ELECTRONIC ATTACHMENTS

for

BUSINESS PAPER

6:30PM TUESDAY, 22 OCTOBER, 2024

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Quong Tart Plaza

Engagement Outcomes Report

20 March – 17 April 2024

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Project background

In May 2023, Council resolved to consult with local Chinese residents and businesses to identify ways to recognise and celebrate Chinese Culture.

In October 2023, Council resolved to commence consultation with local residents, AshBiz Chamber of Commerce, Ashfield and District Historical Society, and local Chinese community organisations on co-naming of Hercules Street Ashfield as Quong Tart Plaza.

Summary

From 20 March to 17 April 2024, the community was invited to provide feedback on the proposed co-naming of Hercules Street Ashfield to Quong Tart Plaza and additional ways Council can celebrate and recognise the Chinese community,

During the engagement period 1,218 people visited the Your Say project page on Council's website.

A total of 47 participants completed the online survey with the majority of respondents (79%) supporting co-naming Quong Tart Plaza with Hercules Street, Ashfield.

A total of 74 responses were received via other feedback methods, including emails, letters, phone calls and face-to-face engagement. Of these, 66% of respondents were supportive of Quong Tart Plaza as an additional name for Hercules Street, Ashfield.

Additional suggestions included:

- Creating a pedestrian -only plaza
- Re-locating Moy Quong Tart bust to the Ashfield Town Hall
- Activating and revitalising local streets of Ashfield of diverse cultural heritage
- More festivals, events and creative activations in Ashfield

Promotion and engagement methods

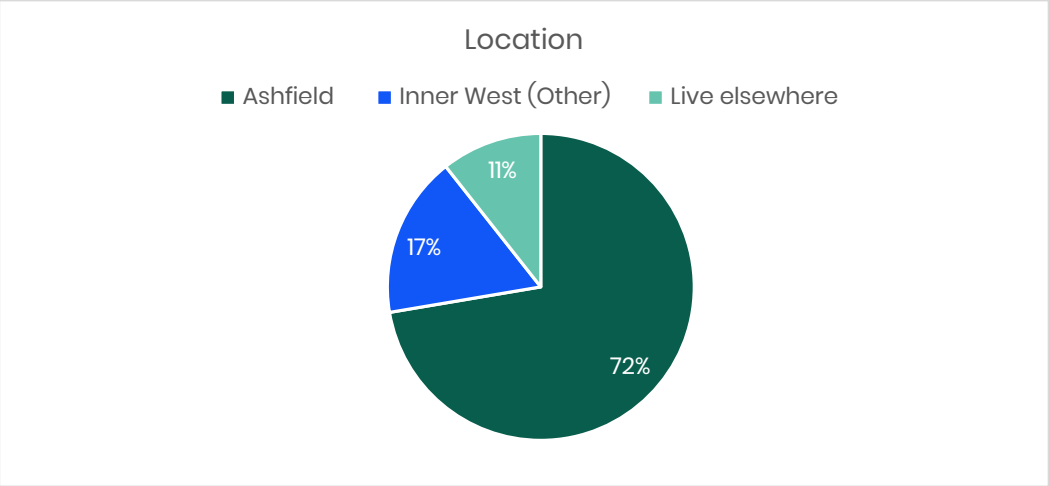
Promotion method	Stakeholders engaged
Project page on Your Say Inner West website	1218 people viewed the project page
Letter to residents	14,390 letters were distributed to residents and businesses in the suburb of Ashfield. The letter was written in English and Simplified Chinese
Emails to key stakeholders	• 750 registered members on the Your Say Inner West platform • 7 Local Chinese community organisations • 22 venue hirers of Ashfield Town Hall and Activity Rooms • Ashfield and District Historical Society • AshBiz Chamber of Commerce
In-person	Council staff presented the project to 15 community members at a Seniors Week Activity – Chinese Paper Cutting workshop on 20 March 2024.
Council's social media	Social media was promoted in English, Simplified Chinese and Traditional Chinese on Facebook and Instagram. A total of 22,267 accounts were reached with 1,038 click throughs • English reached 21,979 accounts (52,375 impressions) • Simplified Chinese and Traditional Chinese reached 537 accounts (1,170 impressions)
Posters	Posters were in English and Simplified Chinese: • 3 Council venues: Ashfield Library. Marrickville Library and Ashfield Service Centre • 10 local businesses in Hercules Street and Liverpool Road Ashfield

Engagement method	Stakeholders engaged
Online survey	47 surveys completed
Online meeting	CASS Care, local Chinese Community organisation
Direct contact from residents	20 emails from individuals and 3 from local community organisations 5 phone calls from individuals and 1 from local community organisation 1 letter from an individual

Who did we hear from?

Council gathers basic demographic information as part of the participant registration process online at Your Say Inner West. Of all those who responded, 55% of respondents identified as culturally and linguistically diverse with 31% of respondents completing the survey in Chinese Simplified.

The majority of respondents (89%) live in the Inner West with 72% living in Ashfield, illustrating a strong correlation of local interest and cultural identity.

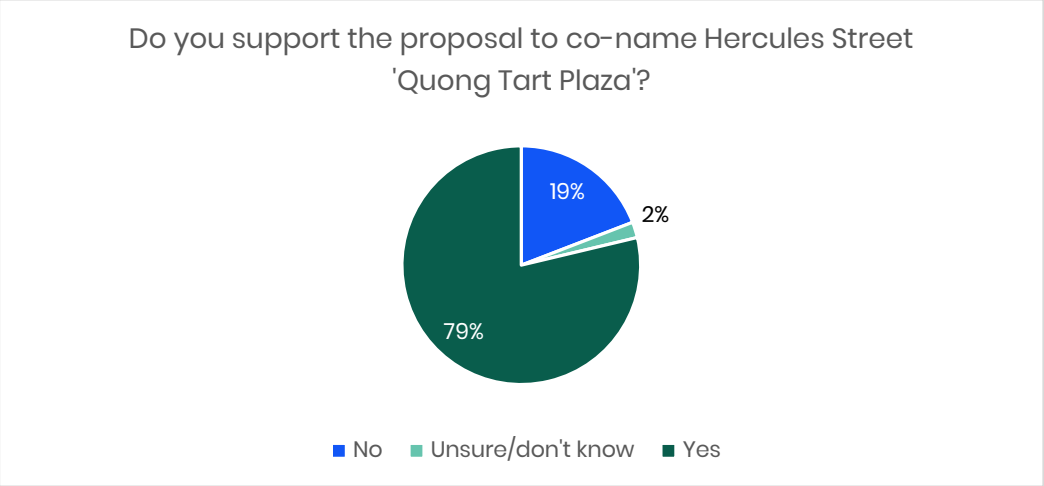


Summary of feedback

Engagement method e.g., Online survey

A total of 47 surveys were completed (32 in English and 15 in Simplified Chinese) and majority of responses (79%) supported the proposal.

Stakeholder feedback included from AshBiz Chamber of Commerce.



We asked	You said	Council response
What are your ideas for how Council can celebrate and recognise Chinese Culture?	Hosting more cultural events and festivals recognising Chinese Culture (36%)	Feedback has been provided to our Creative Communities team to investigate options for further events celebrating the Chinese community.
	Creating visual artworks, murals and creative activation or programming in the community of Chinese Culture (24%)	Feedback has been provided to our Creative Communities team to investigate options for further creative programs celebrating the Chinese community.
	Hosting night markets and street food to showcase diverse foods and culture (20%)	Feedback has been provided to our Economic Development team who support local businesses. Council supports local events

		showcasing Ashfield's multi-cultural community.
	Pedestrianising and re-naming of public spaces/streets including Hercules Street (20%)	Noted.

Engagement method e.g., Online Meeting

An online meeting with local Chinese community organisation CASS Care was held on 17 April 2024. Overall, CASS Care is very supportive of Council's recognition for Chinese contribution to Ashfield and Inner West and support co-naming of Hercules Street, Ashfield as 'Quong Tart Plaza'. Other feedback included:

- Hosting more cultural festivals and events celebrations, such as Lunar New Year and Moon festivals, to bring Chinese and diverse communities together.
- Providing opportunities for diverse communities to learn about Council and its role, functions, purpose to strengthen community cohesion and engagement.

CASS Care obtained feedback from residents who participate in programs delivered in Ashfield Town Hall and Activity Rooms. This feedback was shared via email and included over 60 residents supporting co-naming.

Engagement method e.g., Emails, Letters, Phone calls and other submissions

An overview of comments submitted in the open-ended response section of the online survey is set out below. The verbatim comments can be found in the Appendix.

You said	Council response
Supportive of highlighting Chinese culture through co-naming Quong Tart Plaza and Hercules Street, Ashfield (35%)	Noted.
Hercules Street, Ashfield is a road and unsure if it can be called a 'plaza' - consideration of pedestrianising it or re-locating bust to Ashfield Town Hall Square and revamping the streetscape (20%)	Noted.

Ashfield is diverse, too many cultures, not just one (15%)	Council acknowledges that Ashfield and the Inner West includes many cultures.
A blue plaque is already in place at Gallop House, Ashfield for Moy Quong Tart (10%)	Noted.
Not supportive and disagrees with the co-naming of Quong Tart Plaza and Hercules Street, Ashfield (10%)	Noted.

Next steps

This report will be considered by Council for support to proceed with an application to the Geographical Names Board of NSW for the co-naming of Quong Tart Plaza and Hercules Street, Ashfield. If an application is lodged with the Geographical Names Board of NSW, it will be reviewed against the NSW Place Name Policy, considered, and advertised for public comment.

Everyone who provided feedback will be notified when a Council decision is made.

Final FRMS&P Report

Whites Creek and Johnstons Creek Flood Risk Management Study and Plan

304600164



Prepared for
Inner West Council

19 July 2024

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R004	6/02/2024	Draft Final FRMS&P	AP, AC, HR & MG	TWG (NSW DCCEW and IWC)
R005	16/07/2024	Final FRMSP	AP, AC, HR & MG	TWG (NSW DCCEW and IWC)

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Foreword

The primary objective of the NSW Flood Prone Land Policy 2021 is to reduce the impact of flooding and flood liability on communities and individual owners and occupiers of flood prone property, and to reduce private and public losses resulting from floods, utilising ecologically positive methods wherever possible.

The previous policy formed part of the New South Wales (NSW) Floodplain Development Manual (FDM) in 2005. Recently, two changes have occurred in flood risk management in NSW:

- The 2021 Flood Prone Land Package Update was released in July 2021. The Flood Prone Land package included a new planning direction, planning circular, guideline, standard flood-related Local Environment Plan (LEP) instruments, and several planning legislation changes.
- The finalised and gazetted Flood Risk Management (FRM) Manual was adopted on 30 June 2023. The Manual replaces the FDM 2005 and a number of previous technical guides. The manual provides advice to local councils on the management of flood risk in their local government areas through the flood risk management framework and flood risk management process. This update builds on the 2005 manual and guides. It considers lessons learnt from floods and the application of the flood risk management process and manual since 2005. It considers a range of work on managing natural hazards across government, including relevant national and international frameworks, strategies and best practice guidance. Accompanying the manual is eight FRM Guidelines that comprise a new toolkit to provide guidance for local councils and their consultants.

Under the 2021 policy, councils are primarily responsible for managing flood risk to reduce the risk to life, property damage and other impacts in their local government areas. The State Government subsidises flood management measures to alleviate existing flooding problems and provides specialist technical advice to assist councils in the discharge of their flood risk management responsibilities. The Commonwealth Government also assists with the subsidy of floodplain modification measures. The new policy identifies the following flood risk management 'process' for the identification and management of flood risks:

1. Data Collection - Aims to gather the information needed to support the study being undertaken.
2. Flood Study - Aims to define flood behaviour in sufficient detail to support the understanding and management of flood risk.
3. *Flood Risk Management Study (FRMS) - Provides the basis for examining and recommending FRM measures to manage risks to the existing and growing community, people and built environment. The measures aim to limit the residual flood risk to the community and how this may change over time.*
4. *Flood Risk Management Plan (FRMP) - Builds on the recommendations of the FRM study by clearly outlining council's decision on how it intends to effectively manage flood risk in the study area.*

This Whites Creek and Johnstons Creek Flood Risk Management Study and Plan falls within steps 3 and 4 in the FRM process and has been developed from the previous Flood Study, completed in 2017. An illustration of the FRM process from the FRM Manual is shown below. Beyond the FRM process, councils must also implement, review and update the studies.



Executive Summary

Stantec Australia Pty Ltd (formerly Cardno) was commissioned by Inner West Council ('Council', or IWC) to undertake a Flood Risk Management Study and Plan (FRMS&P) for the Whites Creek and Johnstons Creek Study Areas. The Study Areas are focused around the portions of the two creek catchments that are contained within the former Marrickville Council LGA, south of Parramatta Road.

Community Consultation

Consultation with the community and stakeholders is an important component in the development of a Flood Risk Management Study and Plan. Consultation provides an opportunity to collect feedback and observations from the community on problem areas and potential flood risk management measures. It also provides a mechanism to inform the community about the current study and flood risk within the Study Area and seeks to improve their awareness and readiness for dealing with flooding.

The consultation strategy has been divided into three key sections:

- Consultation in FRMS&P development: This occurs during the initial stages of the project (**Section 1.4)** and involves both informing the community and stakeholders of the project and gathering information on existing flooding issues and suggestions for flood risk management options.
- Review of possible flood management options with key stakeholder groups including Council Engineers, Council Planners, NSW SES, NSW DCCEW and community representatives within Council's Flood Risk Management Advisory Committee.
- Public exhibition of Draft FRMS&P: This occurs in the final stage of the project, with comments sought from the community and stakeholders on the Draft FRMS&P report with this input reviewed and incorporated into the final FRMS&P.

Across the initial consultation period, information regarding the project was advertised on Councils website on the Your Say portal. Outcomes from the initial consultation included, there were 650 views of the project page, initiated by 501 unique visitors. The total viewing time of project information was approximately 7 hours. Two persons contributed to the interactive map. There were three attendees relevant to the Whites Creek and Johnstons Creek study area at the three in-person sessions.

For the public exhibition period in June and July 2024, there were approximately 23 recorded responses across this Study and Whites Creek and Johnstons Creek FRMSP through Your Say uploads (3 submissions and 1 questionnaire response), phone calls (4), and emails (4), along with two in-person sessions (11 attendees). Across all response methods, 1 comment (Your Say upload) related to Alexandra Canal FRMSP. All other responses were related to Whites Creek and Johnstons Creek catchment areas.

Common concerns in public exhibition related to localised stormwater issues not within the scope of flood risk, i.e. maintenance or drainage issues to be addressed by means of temporary solutions prior to the implementation of mitigation options or otherwise captured under Council's capital works. Specifically relating to identified options, comments were received in relation to flooding:

- In the junction of Gladstone Street and Phillip Street in Enmore; Salisbury Road, Camperdown near Church Street; Salisbury Lane, Stanmore near the inlets to the Johnstons Creek, Stafford Street, Stanmore; and Australia Street, Newtown in the Johnstons Creek Catchment; and
- Corunna Street in the Whites Creek catchment.

These comments from the community have been considered and accounted for in the final reporting for the Study and Plan.

Impact of Flooding

The number of flood affected properties for five design events are summarised in the below table. Two forms of property tagging analysis have been considered – tagging of properties with any flood affectation and tagging of properties where the flood extent covers at least 10% of the property area, as was applied under the Johnstons Creek Flood Study.

A review of the number of properties affected between the "10% affectation" and the "any affectation" scenarios, and the relative flood hazard affecting these properties, it was considered that the 10% affectation scenario sufficiently addressed the flood risk, requiring no updates to the flood affected lot tagging currently adopted by Council.

Property Tagging	Base Case Flood Affected Property

	20% AEP	5% AEP	2% AEP	1% AEP	PMF
Flood Affected	770	1006	1107	1197	1906
>10% Area Affectation	197	300	368	409	913
				Total Properties in Catchment	6976

In the PMF event using the 10% property area approach, there are a total of 913 flood affected properties, or 14.2% of the total 6434 properties in the study area. In the 1% AEP the total number of affected properties is 409, or 6.3% of all properties.

With respect to economic impacts of flooding in the study area, the total Average Annual Damage (AAD) for Whites Creek is over $2 million. More than half (58%) of this AAD is a result of the most frequent 20% AEP event, with the next most frequent event, the 5% AEP contributing a further 26% of the AAD. The less frequent events, the 2% and 1% AEP and PMF provide between 2 – 7% of AAD contribution.

For Johnstons Creek, the total AAD is over $28.8 million. Similar to Whites Creek, over half (57%) of this AAD is a result of the most frequent 20% AEP event, with the next most frequent event, the 5% AEP contributing 27% of the AAD. The less frequent events, the 2% and 1% AEP and PMF provide between 3 – 7% of AAD contribution. Though these events result in far higher flood damage totals, particularly the PMF event, their relatively low likelihood means they contribute less to the AAD.

Therefore, as it relates to damages and AAD, structural flood risk management options that reduce flood damages for the most frequent 20% AEP event are expected to provide the biggest benefits to AAD reductions. The following tables are summarised AAD calculations for Whites Creek and Johnstons Creek respectively.

Whites Creek

AEP	Probability	Total Damages	AAD Contribution	AAD Contribution %
20%	0.20	$3,063,904	**$1,242,852**	58%
5%	0.05	$4,464,671	**$566,565**	26%
2%	0.02	$4,784,009	**$140,084**	7%
1%	0.01	$5,404,352	**$51,276**	2%
PMF	0.0000001	$24,166,397	**$147,706**	7%
Total AAD			**$2,148,483**	

Johnstons Creek

AEP	Probability	Total Damages	AAD Contribution	AAD Contribution %
20%	0.20	$40,992,067	**$16,541,136**	57%
5%	0.05	$62,615,455	**$7,809,006**	27%
2%	0.02	$73,588,421	**$2,060,652**	7%
1%	0.01	$82,892,052	**$783,517**	3%
PMF	0.0000001	$247,421,259	**$1,649,915**	6%
Total AAD			**$28,844,226**	

Flood Emergency Response Review

Due to the short duration of both the critical storm affecting the catchment and the time to peak flood depth, there is limited opportunity to stand up an emergency management centre and begin directed evacuation of residents prior to the onset of flooding. Based on a detailed review of flood emergency response provisions and the flash flooding nature of the study area, it is unlikely, almost impossible, that SES doorknocked evacuation will be able to effectively evacuate residents prior to flooding. From this review, potential measures have been identified that could improve flood emergency response potential for the study area:

- Improved flood awareness – Limited knowledge of an individual's potential risk from flooding and the associated lack of planning can cause significant delays to community evacuation due to both acceptance and lag time. A comprehensive flood awareness program for the Study Area, educating residents of the seriousness of the flood risk and the flash flooding nature of the catchment could improve the flood risk to the community.

- Alternative flood warning systems- There are noted difficulties of flood warning systems in flash flooding environments. As forecasting and modelling technology improves, options may be considered for the development of flood warning systems for the Study Area, particularly in the emergency management hotspot areas.
- Self-managed evacuation - Where SES assisted evacuation is not an option, self-managed evacuation is a potential alternative. This describes where people make their own decision to evacuate earlier and move to alternate accommodation, using their own transport. These plans would typically be prepared using information available from Council and with support of the local SES unit, using SES templates such as FloodSafe. The advantage of this approach would be that people can evacuate more quickly than SES assisted evacuation, and as a result reduces the strain on SES and does not rely on a centralised evacuation order. However, self-managed evacuation can also pose a risk if not conducted in an appropriate way. Residents could place themselves at higher risk for example if they evacuate to a location which is even more flood affected, drive through flood waters, or could increase traffic congestion if the wrong route is selected.

Flood Planning Review

The outcomes of the flood planning review were as follows:

- Compared to the requirements for planning proposals outlined within the 2021 Flood Prone Land Policy Update, the current development controls are generally in agreement.
- Compared to the Flood Planning Constraints Categories (FPCC) approach from the 2023 Flood Risk Management (FRM) Manual Guide FB01, current Flood Risk Precincts of the Development Control Plan (DCP) are generally aligned however potentially adopting FPCC offers some potential benefits. These benefits include splitting the current High risk precinct into FPCC1 and FPCC2 where development can be precluded in FPCC1 and more tailored controls can be applied to FPCC2 areas.
- Compared to the requirements for Flood Impact Risk Assessment (FIRA) from the 2023 FRM Manual Guide LU01. Generally, the current development controls are in agreement with the proposed requirements in the guide with some exceptions:
  - The current controls do not require consideration of climate change in assessments.
  - The current controls do not specify flood impacts be considered not just for flood levels but also duration, velocity, evacuation, flood function or hazard categorisation.
  - The current controls do not specifically require a consideration of residual risk of proposed developments to confirm if flood risk is lower than existing based on proposed risk management measures for developments.

Ultimately the current development controls are considered suitable, and generally in accordance with recent guidance both within the 2021 Flood Prone Land Policy Update and the 2023 FRM Manual Guide LU01. However, there are some minor alterations listed in the bullet points above that may improve an applicant's understanding of the controls and provide a more comprehensive assessment of flood risk in future development submissions.

Flood Risk Management Options Background

Three main types of Flood Risk Management (FRM) options were considered:

- Flood modification measures – Flood modification measures are options aimed at preventing / avoiding or reducing the likelihood of flood risks. These options reduce the risk through modification of the flood behaviour in the catchment.
- Property modification measures – Property modification measures are focused on preventing / avoiding and reducing consequences of flood risks. Rather than necessarily modify the flood behaviour, these options aim to modify properties (both existing and future) so that there is a reduction in flood risk.
- Emergency response modification measures – Emergency response modification measures aim to reduce the consequences of flood risks. These measures generally aim to modify the behaviour of people during a flood event.

The assessment of FRM options should consider inputs from people in the community, the economy, social and cultural aspects, services to the community and the natural environment. Relating to the development of FRM options, the following stages were applied in this project:

- Option identification and preliminary option assessment and optimisation – The identification of an inclusive range of FRM options to address local or broad FRM issues for the existing community and new development. Having identified the FRM issues to address and an inclusive range of FRM options worthy of consideration, the viability of these options were discussed with Council, the Committee and other stakeholders in several workshops to determine if they warranted more detailed assessment.
- Detailed option assessment – Detailed assessment and subsequent optimisation of FRM options and packages of options needs to consider their costs, benefits and disbenefits in managing risk. The detailed assessment included flood modelling of options, damages assessment of option benefits, preliminary costing and a Multi-Criteria Assessment (MCA) that considers a broad range of factors quantitatively or qualitatively.
- Recommendation in FRM studies and decision-making in FRM plans.

Detailed Assessment of Options

Following the preliminary option assessment, twenty options were selected for detailed assessment, with the final options listed in the table below.

Option Type	Option ID/Name
Flood Modification (FM)	JC1 v1 – Fowler Street, Camperdown Drainage Upgrade
	JC1 v2 – Fowler Street, Camperdown Detention Basin
	JC5 – Bridge Road, Stanmore Drainage Upgrade
	JC6 v1 – Bridge Road, Stanmore Channel Regrading
	JC6 v2– Bridge Road, Stanmore Channel Widening
	JC7 – Bridge Road, Stanmore Detention Basin
	JC10 – Trafalgar Street, Petersham Drainage Upgrade
	JC13 – Gladstone Street, Enmore Drainage Upgrade
	JC14 – Railway Avenue, Stanmore Road Regrading
	JC15 – Probert Street, Newtown Drainage Upgrade
	JC18 v1 – Kingston Road, Camperdown Drainage Upgrade
	JC18 v2 – Kingston Road, Camperdown Drainage Upgrade
	JC20 – Lennox Street, Newtown Drainage Upgrade
	JC23 – Clarendon Lane, Stanmore Drainage Upgrade
	WC1 – Margaret Street, Petersham Drainage Upgrade
Property Modification (PM)	PM6 – Targeted Stormwater Maintenance
Emergency Management Modification (EM)	EM2 – Review of Local Flood Planning and Information Transfer to NSW SES
	EM3 – Community Flood Awareness
	EM5 – Flood Markers and Signage
	EM6 – Flood Data and Debrief

The detailed assessment of these 20 FRM options was conducted including:

- Hydraulic modelling of five design events – 20%, 5%, 2%, 1% AEP and PMF (for FM options),
- Flood damages benefits assessment (for FM options) involving adopting water level impact results compared to the existing flood damages to determine the potential benefits of the option in the 5 modelled events. The AAD of damage benefits were calculated and the Net Present Worth (NPW) of benefits for all options were calculated assuming a 5% discount rate and 30 year life cycle for the option.
- Cost estimation was conducted for all options for both capital and ongoing / maintenance costs. The process for capital cost estimation was based on quantities for construction estimated from preliminary design for the 15 FM options as they were modelled in the TUFLOW model. Unit rates were initially estimated by Stantec and reviewed and updated by Council staff in some instances to match current cost rates for the local area. A 50% contingency has been applied to all estimates given uncertainty on eventual

design refinement and quantities. For other measures (EM and PM), costs were estimated only on the basis of cost to implement and were done for the purpose of comparison in the multi-criteria assessment. The total cost of the options was calculated for Net Present Worth using a 5% discount rate and an implementation period of 30 years.

> Benefit Cost Ratio - The economic evaluation of each option was performed by considering the reduction in the amount of flood damages incurred for the design events and then comparing this value with the cost of implementing the option. The benefit-cost ratio provides an insight into how the damage savings from a measure relate to its cost of construction and maintenance. Where the benefit-cost ratio is greater than one (BCR >1) the economic benefits are greater than the cost of implementing the measure. For all FM options it is possible to quantify, at least at a high-level both damage benefits and costs of implementation for each option, therefore a BCR is able to be calculated. For PM and EM options, the damage benefits are not easily quantifiable, though there would be some economic benefits of these options in the form of reduced risk to life and resultant reduction in flood damage for loss of life. Therefore in lieu of any damage benefit information, the economic analysis of these options has assumed that BCR is 1.0. The Benefit Cost Ration outcomes for all detailed options have been summarised in the table below.

Option	NPW of AAD Reduction Benefits	NPW of Cost of Implementation of Option	Benefit Cost Ratio
JC1 v1– Fowler Street, Camperdown Drainage Upgrade	$1,578,818	$397,097	3.98
JC1 v2– Fowler Street, Camperdown Detention Basin	$2,952,404	$2,625,485	1.12
JC5 – Bridge Road, Stanmore Drainage Upgrade	$2,176,794	$7,938,503	0.27
JC6 v1 – Bridge Road, Stanmore Channel Regrading	$7,181,786	$1,911,058	3.76
JC6 v2– Bridge Road, Stanmore Channel Widening	$7,403,263	$5,456,303	1.36
JC7 – Bridge Road, Stanmore Detention Basin	$7,632,909	$1,386,777	5.50
JC10– Trafalgar Street, Petersham Drainage Upgrade	$60,783	$704,768	0.09
JC13 – Gladstone Street, Enmore Drainage Upgrade	$6,582,822	$1,646,592	4.00
JC14 – Railway Avenue, Stanmore Road Regrading	$5,299,041	$2,247,616	2.36
JC15 – Probert Street, Newtown Drainage Upgrade	$1,774,388	$452,519	3.92
JC18 v1 – Kingston Road, Camperdown Drainage Upgrade 1	$3,216,878	$368,877	8.72
JC18 v2 – Kingston Road, Camperdown Drainage Upgrade 2	$4,690,901	$1,198,241	3.91
JC20– Lennox Street, Newtown Drainage Upgrade	$8,366,172	$2,300,761	3.64
JC23 – Clarendon Lane, Stanmore Drainage Upgrade	$324,555	$401,322	0.81
WC1 – Margaret Street, Petersham Drainage Upgrade	$4,990,924	$2,356,821	2.12
PM6 – Targeted Stormwater Maintenance	*	$5,719,990	1.0*
EM2 – Review of Local Flood Planning and Info Transfer to NSW SES		$137,794	1.0*
EM3 – Community Flood Awareness		$751,761	1.0*
EM5 – Flood Markers and Signage		$265,294	1.0*
EM6 – Flood Data and Debrief		$275,587	1.0*

*In lieu of benefit values for EM & PM options, due to flood risk reduction BCR value assumed to be 1.0

The BCR results show that of flood risk management options:

- Eight (8) options have BCR values over 3.0, therefore the costs are significantly lower than the calculated benefits.
- Two (2) options have BCR values over 1.5 to 3.0, therefore the costs are lower than the calculated benefits.
- Eight (8) options have BCR values over 0.5 to 1.5, therefore the costs are comparable to the calculated benefits, five (5) such options are EM and PM options with assumed BCR of 1.0.
- Two (2) options have BCR values less than 0.5, therefore the costs are significantly higher than the calculated benefits.

Option PM6 is for the targeted increased maintenance of the stormwater network. Inner West Council, in accordance with its responsibility as owner of the majority of the drainage assets within the study area, has a significant maintenance schedule already in place for all of its stormwater assets. This includes timely responses to community requests or notes relating to any drainage blockage or damage. Option PM6 involves potential additional targeted maintenance of greater frequency than is currently applied at key locations. The potential benefits of the PM6 option for targeted stormwater maintenance was assessed using modelling assuming no blockage of pipes. This is a best-case scenario, that in reality is unlikely to be achievable. Nevertheless, it does provide an indication of areas of potential benefits, even if the scale of benefits may exceed expected outcomes. Therefore, due to this uncertainty, the modelling outcomes in the form of damage benefits were not applied to the BCR outcome for this option PM6.

Multi-Criteria Assessment

To assist Council in identifying the FRM options that provide the most benefits for the society, environment and economy, all options need to be compared against each other based on factors relevant to the study area. Evaluating what constitutes an appropriate strategy for floodplain management is a significant analytical and policy challenge. Such challenges have led to the exploration of alternative policy analysis tools, one being Multi Criteria Assessments (MCA). The goal of MCA is to attempt to directly incorporate multiple values held by community and stakeholders into the analysis of management alternatives while avoiding the reduction of those values into a standard monetary unit. In doing so, one can consider different FRM options in the context of economic criteria as well as other criteria such as social, or environmental aspects. Community and stakeholders can also assign explicit weights to those values to reflect their preferences and priorities. Therefore, MCA provides opportunities for the direct participation of community and stakeholders in the analysis.

An MCA approach has been used for the comparative assessment of all options identified. Each option is given a score according to how well the option meets specific considerations. To keep the scoring system simple a framework has been developed for each criterion.

The selection of criteria and weighting has been completed by involving the technical working group (TWG). A scoring system with 11 criteria (five economic, four social and two environmental) was established for each criterion with scores ranging from +2 for options that represented a significant improvement on existing conditions for any given criteria, to -2 for options that represented a significant worsening of existing conditions. It is noted that for two criteria (Benefit-Cost Ratio and Reduction in Risk to Property or damage) scoring systems was based on quantifiable assessment outcomes, for all other criteria scoring was more qualitative, although supported by sound judgement.

The highest scoring options typically fall into one of two categories:

- Relatively cost-effective FM) options consisting of drainage upgrades that provide significant flood risk reduction benefits (with the exception of the Bridge Road detention basin option).
- EM options which offer significant flood risk reduction with relatively minor cost. Three of the top seven MCA scoring options are EM options.

The lowest scoring options are typically FM options that do not provide significant flood risk reduction benefits relative to their cost, complexity or other issues. The lowest 5 scoring options are all FM options.

Implementation Plan

The list of recommended management options has been transformed into an implementation plan provided in the table below. It lists the following information relevant to the implementation of each adopted FRM option:

- Type and sub-catchment location of option and MCA score;

- The priority for implementation (high, medium, or low) and rank as an outcome of the FRMS&P;
- An estimate of implementation costs including capital and ongoing costs per annum;
- Potential funding mechanism or organisation; and
- Required economic assessment level during Investigation and Design (I&D) stage.

The flood risk management options identified in the below table represent a capital cost of approximately $17.6M, with the flood modification options making up $17.0M of this cost. High priority options have combined capital costs of $5.9M.

It is noted that the implementation plan does not outline a specific timeframe for the implementation of each project. Plan has not been explicitly identified. Rather, the implementation plan provides a body of projects to inform future advocacy, budgeting, and planning in order that Council may be able to undertake works in a prioritised manner as funding becomes available or other opportunities arise in a specific location associated with a proposed option.

Option ID	Option Type	MCA Weighted Score	Option Rank	Implementation Priority	Capital Costs (incl. GST)	Ongoing Costs (p.a incl. GST)	Economic Assessment Level for I&D
Option JC15 – Probert Street, Newtown Drainage Upgrade	Flood Modification (FM)	1.25	1	High	$ 440,990	$ 750	Level 1 (FRMS&P)
Option JC7 – Bridge Road, Stanmore Detention Basin	FM	1.15	2	High	$ 1,317,600	$ 4,500	Level 2 (Detailed damages)
EM2 – Review of Local Flood Planning and Info Transfer to NSW SES	Emergency Management (EM)	1.10	3	High	$ 22,500	$ 7,500	Level 1
Option JC20 – Lennox Street, Newtown Drainage Upgrade	FM	1.10	3	High	$ 2,266,173	$ 2,250	Level 2
Option JC13 - Gladstone Street, Enmore Drainage Upgrade	FM	1.05	5	High	$ 1,612,003	$ 2,250	Level 2
EM3 – Community Flood Awareness	EM	0.95	6	High	$ 60,000	$ 45,000	Level 1
EM5 – Flood Markers and Signage	EM	0.95	6	High	$ 150,000	$ 7,500	Level 1
Option JC14 - Railway Avenue, Stanmore Road Regrading	FM	0.85	8	Medium	$ 2,247,615	$ -	Level 2
Option JC18 v1 - Minor Kingston Road, Camperdown Drainage Upgrade 1	FM	0.75	9	Medium	$ 368,876	$ -	Level 1
Option JC6 v1 - Bridge Road, Stanmore Channel Upgrade (Re-grading North)	FM	0.70	10	Medium	$ 1,899,528	$ 750	Level 2
PM6 – Targeted Stormwater Maintenance	Property Modification (PM)	0.65	11	Medium	$ 349,367	$ 349,367	Level 1
Option JC23 - Clarendon Lane, Stanmore Drainage Upgrade	FM	0.55	12	Medium	$ 378,263	$ 1,500	Level 1
Option JC18 v2 - Major Kingston Road, Camperdown Drainage Upgrade 2	FM	0.55	12	Medium	$ 1,198,240	$ -	Level 2
Option JC1 v2 - Fowler Street, Camperdown Detention Basin	FM	0.50	14	Medium	$ 2,533,250	$ 6,000	Level 2
EM6 – Flood Data and Debrief	EM	0.45	15	Low	$ 45,000	$ 15,000	Level 1
Option WC1 - Margaret Street, Petersham Drainage Upgrade	FM	0.40	16	Low	$ 2,356,821	$ -	Level 2
Option JC1 v1 -Fowler Street, Camperdown Drainage Upgrade	FM	0.35	17	Low	$ 397,097	$ -	Level 1
				Total	**$ 17,643,323**	**$ 442,367**	

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Abbreviations

1D	One-dimensional
2D	Two-dimensional
ABS	Australian Bureau of Statistics
AEP	Annual Exceedance Probability
AHD	Australian Height Datum
AHIP	Aboriginal Heritage Impact Permit
ARI	Average Recurrence Interval
AR&R	Australian Rainfall and Runoff
ASS	Acid Sulfate Soils
BCR	Benefit Cost Ratio
BoM	Australian Bureau of Meteorology
DAWE	Australian Department of Agriculture, Water and Environment.
DCCEW	NSW Department of Climate Change, Energy and Water
DCP	Development Control Plan
DEM	Digital Elevation Model
DPHI	NSW Department of Planning, Housing and Infrastructure
ELVIS	Elevation Information System
EPA	NSW Environmental Protection Authority
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
FDM	Floodplain Development Manual
FRM	Flood Risk Mannagement
FRMS&P	Flood Risk Management Study and Plan
FPL	Flood Planning Level
FPA	Flood Planning Area
GIS	Geographical Information Systems
IFD	Intensity-Frequency-Duration
IWC	Inner West Council
LEP	Local Environment Plan
LGA	Local Government Area
LIDAR	Light Detection and Ranging
NPV	Net Present Value
NSW	New South Wales
PCT	Plant Community Types
PMF	Probable Maximum Flood
PMST	Protected Matters Search Tool
SEPP	State Environmental Planning Policy
SES	NSW State Emergency Service
TEC	Threatened Ecological Community

Glossary

Acid Sulfate Soils (ASS)	Acid sulfate soils (ASS) are naturally occurring sediments and soils containing iron sulfides (mostly pyrite). When these sediments are exposed to the air by excavation or drainage of overlying water, the iron sulfides oxidise and form sulphuric acid. ASSs are widespread among low lying coastal areas of NSW, in estuarine floodplains and coastal lowlands.
Annual Exceedance Probability (AEP)	The probability of an event occurring or being exceeded within a year. For example, a 5% AEP flood would have a 5% chance of occurring in any year. An approximate conversion between ARI and AEP is provided.
Australian Height Datum (AHD)	A standard national surface level datum approximately corresponding to mean sea level.
Average Recurrence Interval (ARI)	The long-term average period between occurrences equalling or exceeding a given value. For example, a 20 year ARI flood would occur on average once every 20 years.
Cadastre, cadastral base	Information in map or digital form showing the extent and usage of land, including streets, lot boundaries, water courses etc.
Catchment	The area draining to a site. It always relates to a particular location and may include the catchments of tributary streams as well as the main stream.
Design flood	A significant event to be considered in the design process; various works within the floodplain may have different design events. E.g. some roads may be designed to be overtopped in the 1% AEP flood event.
Development	The erection of a building or the carrying out of work; or the use of land or of a building or work; or the subdivision of land.
Discharge	The rate of flow of water measured in terms of volume over time. It is to be distinguished from the speed or velocity of flow, which is a measure of how fast the water is moving rather than how much is moving.
Elevation Information System (ELVIS)	ELVIS was launched by Geoscience Australia in 2016 to replace the existing National Elevation Data Framework (NEDF) and to open access to elevation datasets to a wider user base. With the online ELVIS portal, users can now easily download continent-wide elevation data.
Flash flooding	Flooding which is sudden and often unexpected because it is caused by sudden local heavy rainfall or rainfall in another area. Often defined as flooding which occurs within 6 hours of the rain which causes it.
Flood	Relatively high stream flow which overtops the natural or artificial banks in any part of a stream, river, estuary, lake or dam, and/or overland runoff before entering a watercourse and/or coastal inundation resulting from super elevated sea levels and/or waves overtopping coastline defences.
Flood fringe	The remaining area of flood prone land after floodway and flood storage areas have been defined.
Flood hazard	Potential risk to life and limb caused by flooding.
Flood prone land	Land susceptible to inundation by the probable maximum flood (PMF) event, i.e. the maximum extent of flood liable land. Flood Risk Management Plans encompass all flood prone land, rather than being restricted to land subject to designated flood events.
Floodplain	Area of land which is subject to inundation by floods up to the probable maximum flood event, i.e. flood prone land.
Floodplain management measures	The full range of techniques available to floodplain managers.

Floodplain management options	The measures which might be feasible for the management of a particular area.
Flood Planning Area (FPA)	The area of land below the flood planning level and thus subject to flood related development controls.
Flood planning levels (FPLs)	Flood levels selected for planning purposes, as determined in floodplain management studies and incorporated in floodplain management plans. Selection should be based on an understanding of the full range of flood behaviour and the associated flood risk. It should also take into account the social, economic and ecological consequences associated with floods of different severities. Different FPLs may be appropriate for different categories of land use and for different flood plains. The concept of FPLs supersedes the "Standard flood event" of the first edition of the Manual. As FPLs do not necessarily extend to the limits of flood prone land (as defined by the probable maximum flood), floodplain management plans may apply to flood prone land beyond the defined FPLs.
Flood storages	Those parts of the floodplain that are important for the temporary storage of floodwaters during the passage of a flood.
Floodway areas	Those areas of the floodplain where a significant discharge of water occurs during floods. They are often, but not always, aligned with naturally defined channels. Floodways are areas which, even if only partially blocked, would cause a significant redistribution of flood flow, or significant increase in flood levels. Floodways are often, but not necessarily, areas of deeper flow or areas where higher velocities occur. As for flood storage areas, the extent and behaviour of floodways may change with flood severity. Areas that are benign for small floods may cater for much greater and more hazardous flows during larger floods. Hence, it is necessary to investigate a range of flood sizes before adopting a design flood event to define floodway areas.
Geographical Information Systems (GIS)	A system of software and procedures designed to support the management, manipulation, analysis and display of spatially referenced data.
High hazard	Flood conditions that pose a possible danger to personal safety; evacuation by trucks difficult; able-bodied adults would have difficulty wading to safety; potential for significant structural damage to buildings.
Hydraulics	The term given to the study of water flow in a river, channel or pipe, in particular, the evaluation of flow parameters such as stage and velocity.
Hydrograph	A graph that shows how the discharge changes with time at any particular location.
Hydrology	The term given to the study of the rainfall and runoff process as it relates to the derivation of hydrographs for given floods.
Low hazard	Flood conditions such that should it be necessary, people and their possessions could be evacuated by trucks; able-bodied adults would have little difficulty wading to safety.
Mainstream flooding	Inundation of normally dry land occurring when water overflows the natural or artificial banks of the principal watercourses in a catchment. Mainstream flooding generally excludes watercourses constructed with pipes or artificial channels considered as stormwater channels.
Management plan	A document including, as appropriate, both written and diagrammatic information describing how a particular area of land is to be used and managed to achieve defined objectives. It may also include description and discussion of various issues, special features and values of the area, the specific management measures which are to apply and the means and timing by which the plan will be implemented.
Mathematical/computer models	The mathematical representation of the physical processes involved in runoff and stream flow. These models are often run on computers due to the complexity of the mathematical relationships. In this report, the models referred to are mainly involved with rainfall, runoff, pipe and overland stream flow.
Overland Flow	The local runoff, travelling through properties and /or roads, before it discharges into a stream, river, estuary, lake or dam.
Peak discharge	The maximum discharge occurring during a flood event.

Probable maximum flood (PMF)	The flood calculated to be the maximum that is likely to occur.
Probability	A statistical measure of the expected frequency or occurrence of flooding. For a more detailed explanation see AEP and Average Recurrence Interval.
Risk	Chance of something happening that will have an impact. It is measured in terms of consequences and likelihood. For this study, it is the likelihood of consequences arising from the interaction of floods, communities and the environment.
Runoff	The amount of rainfall that actually ends up as stream or pipe flow, also known as rainfall excess.
Stage	Equivalent to 'water level'. Both are measured with reference to a specified datum.
Stage hydrograph	A graph that shows how the water level changes with time. It must be referenced to a particular location and datum.
Stormwater flooding	Inundation by local runoff. Stormwater flooding can be caused by local runoff exceeding the capacity of an urban stormwater drainage system or by the backwater effects of mainstream flooding causing the urban stormwater drainage system to overflow.
Topography	A surface which defines the ground level of a chosen area.

1 Introduction

Stantec Australia Pty Ltd (formerly Cardno (NSW/ACT) Pty Ltd) ('Stantec') was commissioned by Inner West Council ('Council') to undertake a Flood Risk Management Study and Plan (FRMS&P) for the Whites Creek and Johnstons Creek Study Area (**Figure 2-1**). The Study Area is within the Inner West Local Government Area (LGA), located approximately 4km southwest of the Sydney Central Business District (CBD). The Study Area is focused on the portions of Whites Creek and Johnstons Creek located south of Parramatta Road. The remaining areas of these catchments north of Parramatta Road were previously reviewed as part of the Leichhardt Flood Risk Management Study and Plan (Cardno, 2017). **Figure 2-2** outlines the division of the creek catchments between this study and the areas previously completed by Inner West Council and City of Sydney Council, which have been excluded from this study. The Study Area is roughly between Crystal Street in the west and Missenden Road and King Street in the East, extending as far up as Parramatta Road, and south to some areas of Enmore Road and Cambridge Street.

This report is the Final FRMS&P report for Whites Creek and Johnstons Creek, incorporating comments from stakeholder agencies and the comments received from the community during public exhibition.

1.1 Study Context

As outlined within the Floodplain Risk Management (FRM) Manual 2023, like all councils in NSW, Inner West Council is responsible for local land use planning including management of both mainstream and overland flooding within the LGA. In response to the objectives of the New South Wales (NSW) Government's Flood Prone Land Policy, Council has an ongoing commitment to reduce the impact of flooding and flood liability on individual owners and occupiers of flood prone property, and to reduce public losses resulting from floods, utilising ecologically positive methods wherever possible.

Through the Department of Climate Change, Energy and Water (DCCEW, formerly Department of Planning and Environment, DPE) and the State Emergency Service (SES), the NSW Government provides specialist technical assistance to local government on all flooding and land use planning matters. The FRM Manual 2023 guides councils in the strategic management of flood risk across their LGAs through the FRM framework. This supports councils in meeting their responsibilities for a range of FRM activities and their strategic consideration of flooding.

The FRM process is a key element of the FRM framework. Studies and plans under the process support the understanding of flooding, the examination of measures to manage flood risk and informed decisions on how to manage flood risk into the future. They also support the consideration of flooding in broader activities under the FRM framework. The FRM process progresses through four (4) steps in an iterative process:

1. Data Collection
2. Flood Study
3. ***Flood Risk Management Study***
4. ***Flood Risk Management Plan***

The study currently being undertaken addresses steps three and four of the process. The Whites Creek and Johnstons Creek Flood Study was prepared in 2017 by WMAwater for Inner West Council and provides the second step listed above to define the flood behaviour in the Study Area. The Flood Study form the basis of the flood data used for this FRMS&P.

1.2 Study Objectives

The primary objective of this study is to develop a Flood Risk Management Study & Plan that addresses the existing, future and continuing flood problems, considering the potential impacts of climate change, in accordance with the NSW Government's Flood Prone Land Policy and the FRM Manual 2023.

The specific project objectives are to:

- Review the Whites Creek and Johnstons Creek Flood Study (WMAwater 2017) in accordance with the updated requirements of AR&R 2019 and any recent changes in topography in the Study Area;
- Review Council's adopted flood planning area mapping;
- Review the existing emergency response situation and limitations;
- Review effectiveness of current flood management measures;
- Identify floodplain management measures aimed at reducing the social, environmental and economic impacts of flooding and the losses caused by flooding on development and the community, both existing and future;
- Examination of the existing flood warning systems, community flood awareness and emergency response measures in the context of the NSW State Emergency Service's (SES's) developments and disaster planning requirements;
- Reduce the flood hazard and risk to people and property in the existing community and to ensure future development is controlled in a manner consistent with the flood hazard and risk (taking into account the potential impacts of climate change);
- Reduce private and public losses due to flooding; and
- Establish a program for implementation and suggest a mechanism for the funding of the plan which should include funding sources, priorities, staging, funding, responsibilities, constraints, and monitoring.

1.3 Flood Risk Management Principles

Beyond the specific objectives of this study listed above, the FRM Manual 2023 outlines ten (10) principles for flood risk management in NSW:

1. Establish sustainable governance arrangements,
2. Think and plan strategically,
3. Be consultative,
4. Make flood information available,
5. Understand flood behaviour and constraints,
6. Understand flood risk and how it may change,
7. Consider variability and uncertainty,
8. Maintain natural flood functions,
9. Manage flood risk effectively, and,
10. Continually improve the management of flood risk.

The objectives of this study align with these principles, and through the proposed study methodology attempts to account for all of these principles, either directly or indirectly.

1.4 Project Summary

The Whites Creek and Johnstons Creek Flood Risk Management Study and Plan project include the following stages:

- Stage 1 – Data Collection and Review;
- Stage 2 – Additional Data Collection;
- Stage 3 – Community Engagement;
- Stage 4 – Options Identification and Assessment;
- Stage 5 – Draft Flood Risk Management Study and Plan;
- Stage 6 – Public Exhibition of Study and Plan; and
- Stage 7 – Completion of Flood Risk Management Study and Plan.

The Whites Creek and Johnstons Creek Flood Risk Management Study and Plan has been undertaken across seven stages, outlined in the sections below:

- Study Area description including topography, flora and fauna, heritage, demographics (**Section 2**);
- Initial data collection and review process including review of the Flood Study model in accordance with the updated analysis of ARR2019 (**Section 3**);
- Summary of the community consultation process including public exhibition in June and July 2024 (**Section 4**);
- Existing flood risk review including flood planning review (**Section 5**), economic impacts of flooding (**Section 6**), and a flood emergency response review (**Section 7**).
- Summary of flood modification options development and selection of detailed options (**Section 8**).
- Description of detailed assessment of options including modelling, cost estimation, damages benefits and Multi-Criteria Assessment (MCA) (**Section 9**), and implementation program for these detailed options to provide Council guidance on the future implementation of these options (**Section 10**).

2 Study Area Description

2.1 Catchment Background

Johnstons Creek has a total catchment area of approximately 460 ha which drains into Rozelle Bay. The catchment includes suburbs of Newtown, Camperdown, Stanmore, Annandale, Forrest Lodge and Glebe. The catchment area comprises of LGAs under the control of:

- Inner West Council (352 ha); and
- The City of Sydney (108 ha).

Whites Creek has a total catchment area of approximately 262 ha which drains into Rozelle Bay. The catchment includes suburbs of Petersham, Stanmore, Leichardt, Annandale and Lilyfield. It is all contained within the Inner West LGA (formerly Marrickville LGA). The Study Area is wholly urbanised, mostly consisting of residential areas characterised by detached or terraced houses. There are also large open space areas such as Camperdown Park, O'Dea Reserve, Camperdown Memorial Park, Maundrell Park and Weekly Park.

The catchment is highly modified by human activity, with a high proportion of impermeable, hardstand areas. Water drains from the Study Area via council stormwater drainage systems which include covered channels, in-ground pipes, culverts and kerb inlet pits, and via Sydney Water's two major trunk drainage systems, one for each catchment. The trunk drainage systems discharge into Rozelle Bay from a combination of open and covered channels. The Study Area for this FRMS&P, shown in **Figure 2-1**.

2.1.1 History of the Catchment and Flooding

Located in one of the older areas of Sydney, the Study Areas were first settled in the early 19th Century. The original natural drainage system comprised rock gullies draining to small pockets of mangroves along the shoreline at the head of various bays. As development proceeded, the natural drainage lines were subsumed into the constructed drainage system of open channels. Eventually, by the late 19th Century, much of the channel system was progressively covered over and piped, with much of the original system forming the backbone of the present-day stormwater drainage system.

Given the age of the existing stormwater drainage network, there is a prevalence of antiquated drainage systems. In many streets, underground pipe systems do not exist, and in their place are high kerbs and/or dish gutters to convey the stormwater, with minor converter networks only located beneath intersections to carry stormwater below the road at the intersection.

Where there are existing drainage pipelines within the street, many of these pipelines are running at capacity by the 50% AEP and 20% AEP flood events, resulting in high volumes of surface flows. It is further noted that, most of the urban development within the Study Area took place prior to the major and minor drainage system design concept of Australian Rainfall and Runoff (AR&R). The resulting subdivision patterns and housing types has led to a lack of formal overland flowpaths with limited or, in some cases, no opportunity for overland drainage of adjacent low points within the street network. Consequently, many un-drained sag points result in localised flooding.

Historical records indicate flooding within the Johnstons Creek and Whites Creek catchments at many locations for events in excess of the 50% AEP. Some of the major storm events in the catchment include June 1949, November 1961, March 1975, November 1984, January 1991, February 2001, October 2014 and April 2015. Flooding within these catchments is typically dominated by flash flooding, with limited warning times available between the start of rainfall and peak flood depths, with some roads and properties within the lower areas of the catchment becoming cut off or isolated due to rising flood waters.

2.1.2 Topography

The topography of the Johnstons Creek and Whites Creek Study Area is shown in **Figure 2-1**. The Johnstons Creek catchment has a ridgeline that runs along the southern, eastern and western boundaries of around 45 m Australian Height Datum (m AHD) in elevation, which slopes down to low-lying areas in the northern portion that are adjacent to Johnstons Creek with an elevation of approximately 0-5 mAHD.

Whites Creek catchment, to the north-west of the Johnstons Creek catchment, is similar with a ridgeline along the southern, eastern and western boundaries, with the low-lying areas located in the north. The ridgeline along the southern boundary separates the Johnstons Creek catchment from Marrickville Valley catchment.

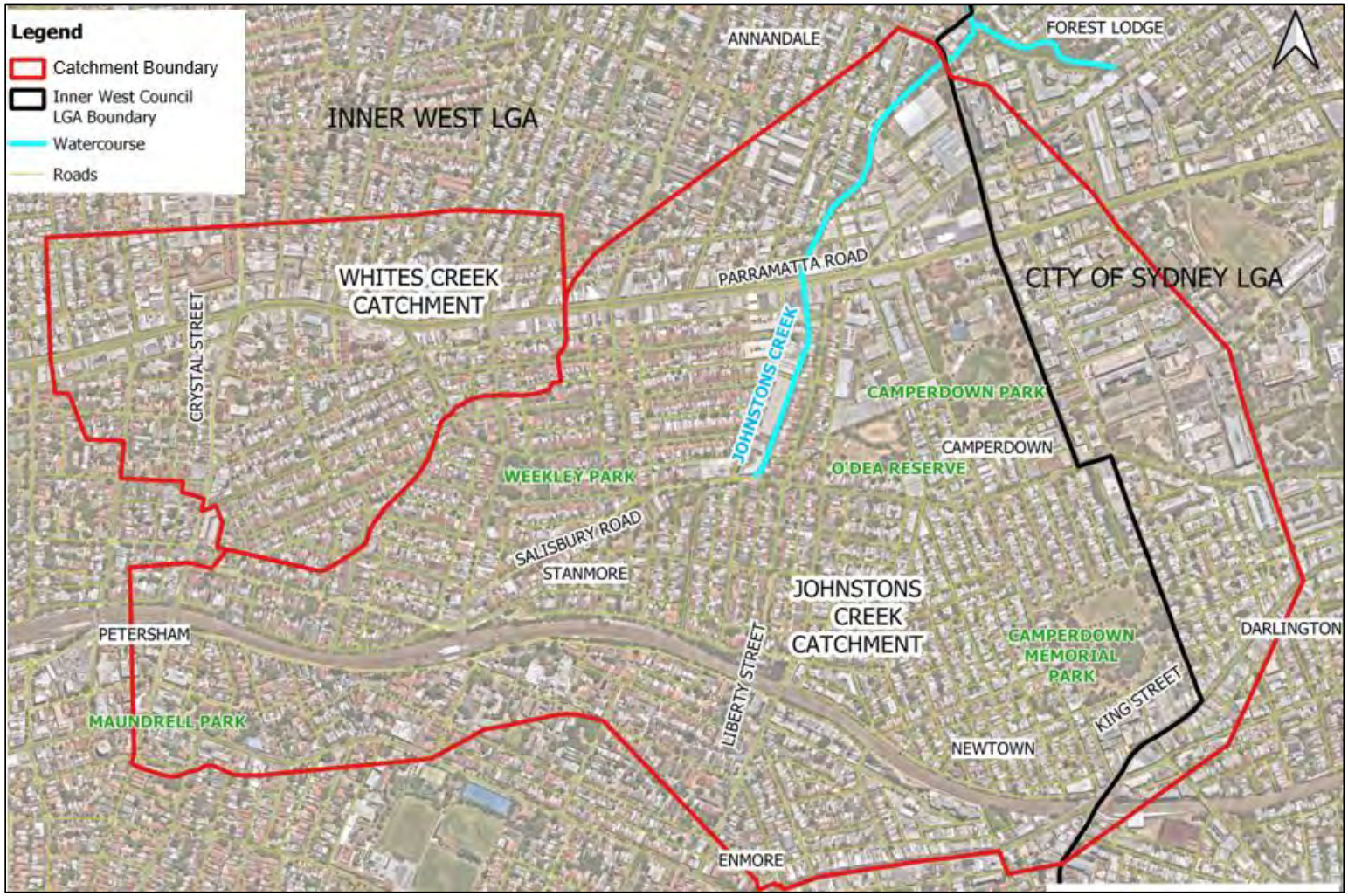

Figure 2-1 Whites Creek and Johnstons Creek Catchment and Study Area

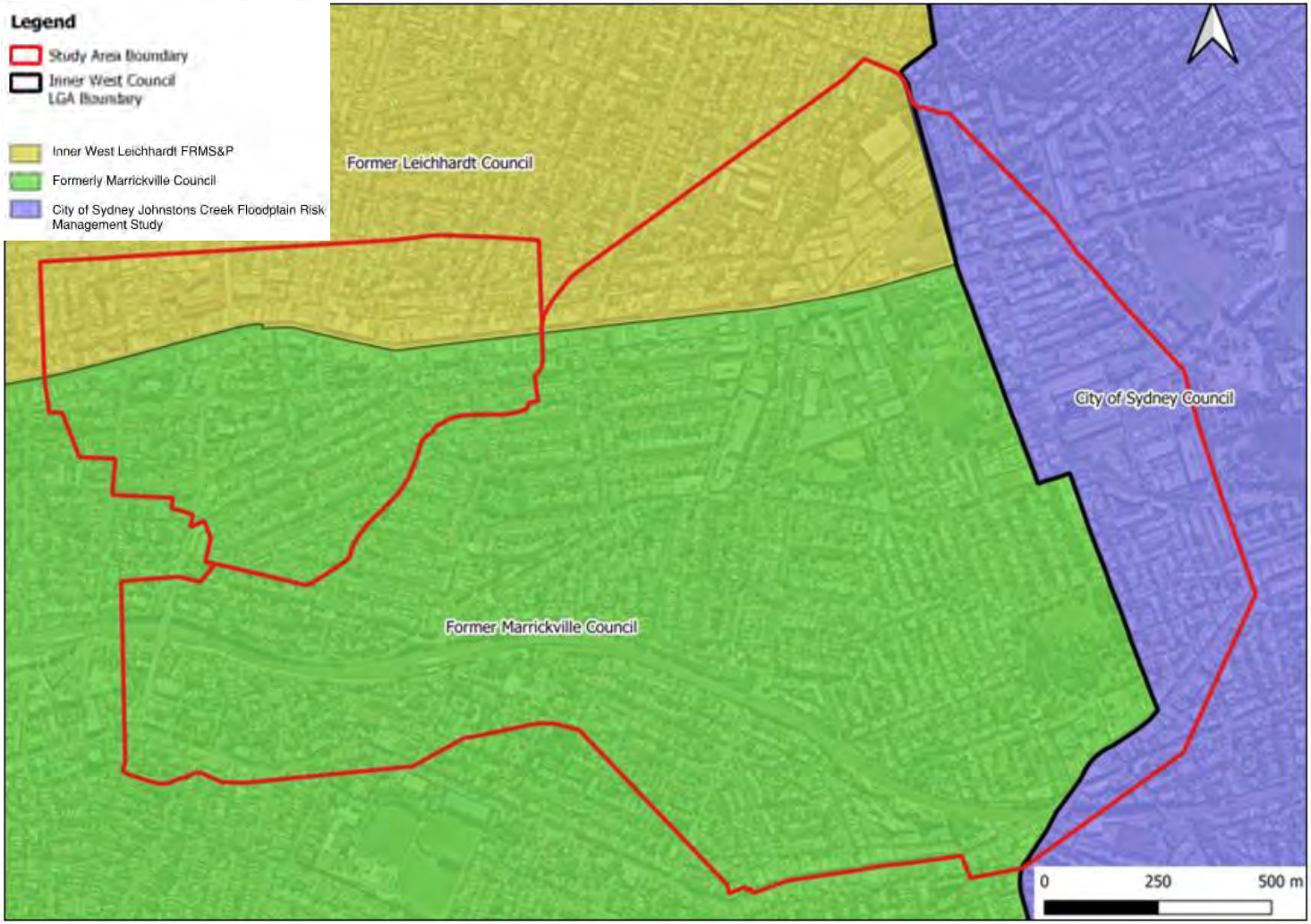
Legend
Study Area Boundary
Inner West Council LGA Boundary
Inner West Leichhardt FRMS&P
Formerly Marrickville Council
City of Sydney Johnstons Creek Floodplain Risk Management Study
Former Leichhardt Council
City of Sydney Council
Former Marrickville Council
0
250
500 m

Figure 2-2 Whites Creek and Johnstons Creek Study Areas Located within the Former Marrickville LGA South of Parramatta Road and West of Mallett Street and Church Street

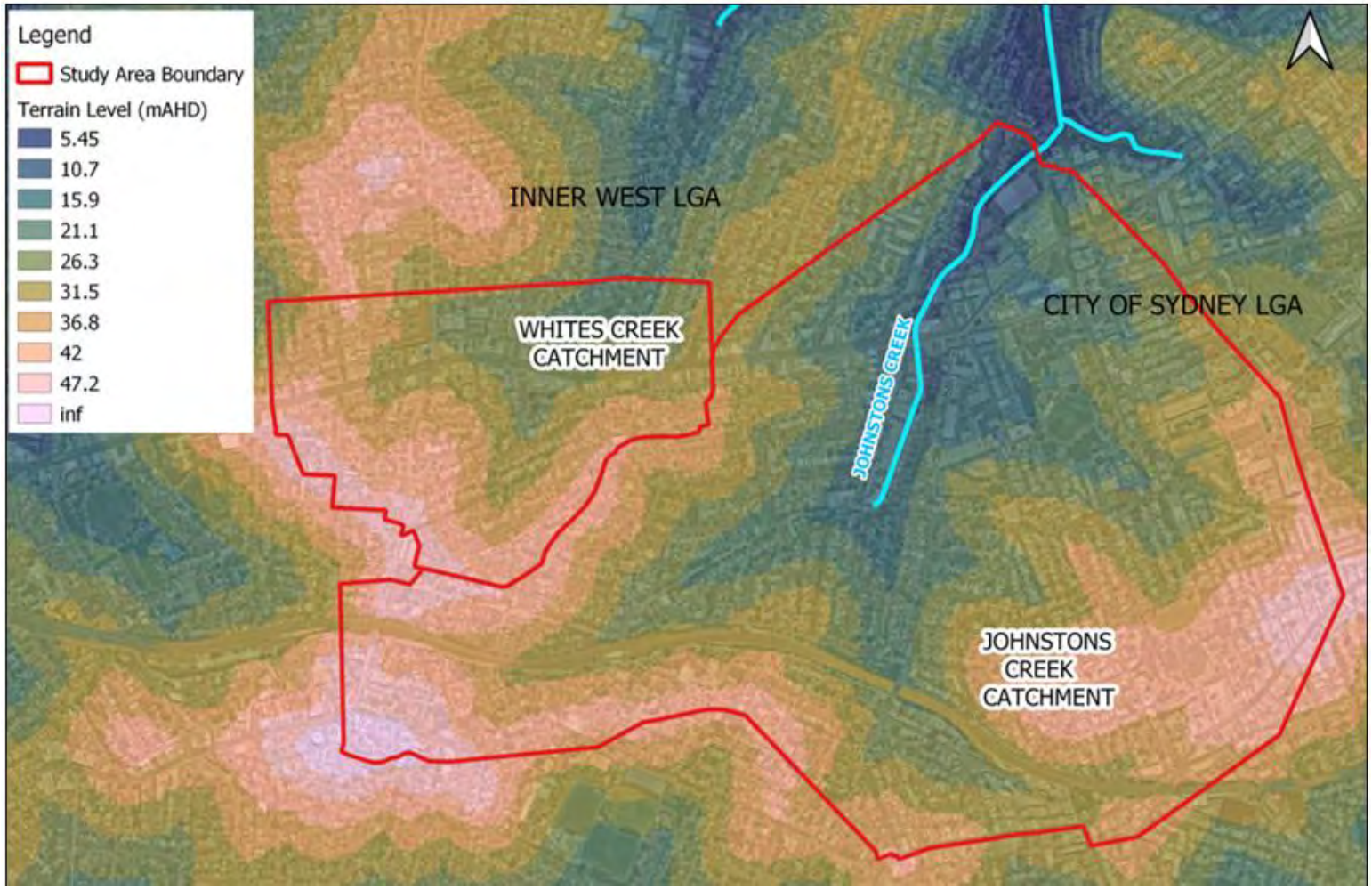

Figure 2-3 Topography of Whites Creek and Johnstons Creek Study Area

2.1.3 Soil Erosion Potential

A review of soil landscapes from eSpade (DPIE, 2021) indicated that the catchment contains two soil landscape groups; Blacktown and Gymea soils. The majority of the Study Area is likely to be underlain by Blacktown soils, which are characterised by shallow to moderately deep red and brown soils on crests, upper slopes and well-drained areas and yellow soils on lower slopes and in areas of poor drainage. Some areas in the northern portion of the Study Area could be underlain by Gymea soils which are characterised by shallow to deep yellow sands on shale lenses.

Blacktown soils are considered to minimal erosion potential as most of the surface is covered by tiles, concrete, bitumen or turf. Soil erosion potential for Gymea soils is high for unsealed surfaces with no stabilising vegetative cover.

2.1.4 Acid Sulfate Soils

Acid Sulfate Soils (ASS) is the common name for soils that contain metal sulfides. The presence of these soils is more likely in low-lying areas of the floodplain. In an undisturbed and waterlogged state, ASS generally pose no or low risk to the environment. However, when disturbed, an oxidation reaction occurs to produce sulfuric acid which can negatively impact the surrounding environment in a number of ways such as a decline in water quality, fish kills and plant death. Sulfuric acid produced by the soils can also corrode and weaken certain structures and building foundations. Part 6.1 of the *Marrickville LEP 2011* outlines general provisions for development near ASS.

Potential ASS within the former Marrickville LGA are classified into five land classes with each land class indicating the depth where potential ASS may occur. Development consent is required for work in those five classes as described in **Table 2-1**.

Table 2-1 Acid Sulfate Soil Land Classes (Source: Marrickville LEP 2011)

Class	Works
1	Any works.
2	Works below the natural ground surface. Works by which the watertable is likely to be lowered.
3	Works more than 1 metre below the natural ground surface. Works by which the watertable is likely to be lowered more than 1 metre below the natural ground surface.
4	Works more than 2 metres below the natural ground surface. Works by which the watertable is likely to be lowered more than 2 metres below the natural ground surface.
5	Works within 500 metres of adjacent Class 1, 2, 3 or 4 land that is below 5 metres Australian Height Datum and by which the watertable is likely to be lowered below 1 metre Australian Height Datum on adjacent Class 1, 2, 3 or 4 land.

2.1.5 Contaminated Land

Contaminated land refers to any land which contains a substance at such concentrations as to present a risk of harm to human or environmental health, as defined in *Contaminated Land Management Act 1997*. Contamination needs to be considered at flood management options development and design stage.

The NSW Department of Planning, Industry and Environment (DPIE) regulates contaminated land sites and maintains a record of written notices issued by the NSW Environmental Protection Authority (NSW EPA) in relation to the investigation or remediation of site contamination. Searches were undertaken of the online Contaminated Land Record and the List of NSW Contaminated Sites notified to the EPA on 18 March 2021. A total of four premises were listed within the Study Area:

- O'Dea Reserve, Salisbury Lane, Camperdown;
- Adjacent to Former Service Station, 79 Wilson Street, Newtown;
- Former Service Station, 81 Wilson Street, Newtown; and
- Aluminium Enterprises, 46 Brocks Lane, Newtown.

The first three of these sites have been formerly regulated under the *Contamination Land Management Act 1997* and the last site has had contamination addressed via the planning process. It is important to note that there are limitations to the registers and there may be contaminated sites that are not listed.

2.2 Threatened Flora and Fauna

A review of DPIE's vegetation mapping for the Sydney Metropolitan Area (NSW OEH, 2016) characterised the vegetation within the Study Area as Urban Exotic / Native (refer **Figure 2-4**). A search of the Australian Department of Agriculture, Water and Environment Protected Matters Search Tool (DAWE, 2021a) for matters listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) was undertaken on 17 March 2021 adopting a 5 km buffer. The PMST indicated that ten threatened ecological communities (TECs) are likely to, or may, occur in the area, namely:

- Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and SouthEast Queensland ecological community (Endangered under the BC Act and EPBC Act);
- Coastal Upland Swamps in the Sydney Basin Bioregion (Endangered under the BC Act and EPBC Act);
- Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion (Endangered under the BC Act and Critically Endangered under the EPBC Act);
- Eastern Suburbs Banksia Scrub of the Sydney Basin Bioregion (Critically Endangered under the BC Act and Endangered under the EPBC Act);
- River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria (Endangered under the BC Act and Critically Endangered under the EPBC Act); and
- Turpentine-Ironbark Forest of the Sydney Basin Bioregion (Critically Endangered under the BC Act and EPBC Act);
- Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion (Critically Endangered under the BC Act and Endangered under the EPBC Act);
- Shale Sandstone Transition Forest of the Sydney Basin Bioregion (Critically Endangered under the BC Act and EPBC Act);
- Upland Basalt Eucalypt Forests of the Sydney Basin Bioregion (Endangered under the EPBC Act); and
- Western Sydney Dry Rainforest and Moist Woodland on Shale (Endangered under the BC Act and Critically Endangered under the EPBC Act).

A search of the DPIE BioNet database was undertaken to assess the potential for threatened species to occur within the Study Area listed under the NSW *Biodiversity Conservation Act 2016* (BC Act) and/or EPBC Act. A total of 97 threatened flora species have been recorded in the LGA, and 108 threatened and migratory fauna sightings have been recorded in the LGA, consisting of:

- Six amphibian species;
- Five reptiles species;
- 70 bird species;
- 23 mammal species;
- Three gastropod species; and
- One insect species.
- Of these, the following species have records in the Study Area:
- *Pteropus poliocephalus* (Grey-headed Flying Fox) listed as vulnerable under BC Act and EPBC Act;
- *Perameles nasuta* (Long-nosed Bandicoot) listed as endangered under the BC Act; and
- *Ptilinopus superbus* (Superb Fruit Dove) listed as vulnerable under the BC Act.

The search identified 21 TECs listed under the BC Act that are known to occur within the LGA, although based on the DPIE vegetation mapping (refer **Figure 2-4**), it is unlikely any of these occur in the Study Area. The potential impacts on vegetation and threatened species that occur or have the potential to occur within the Study Area should be considered in the development and implementation of any proposed flood modifications options or flood protection works.

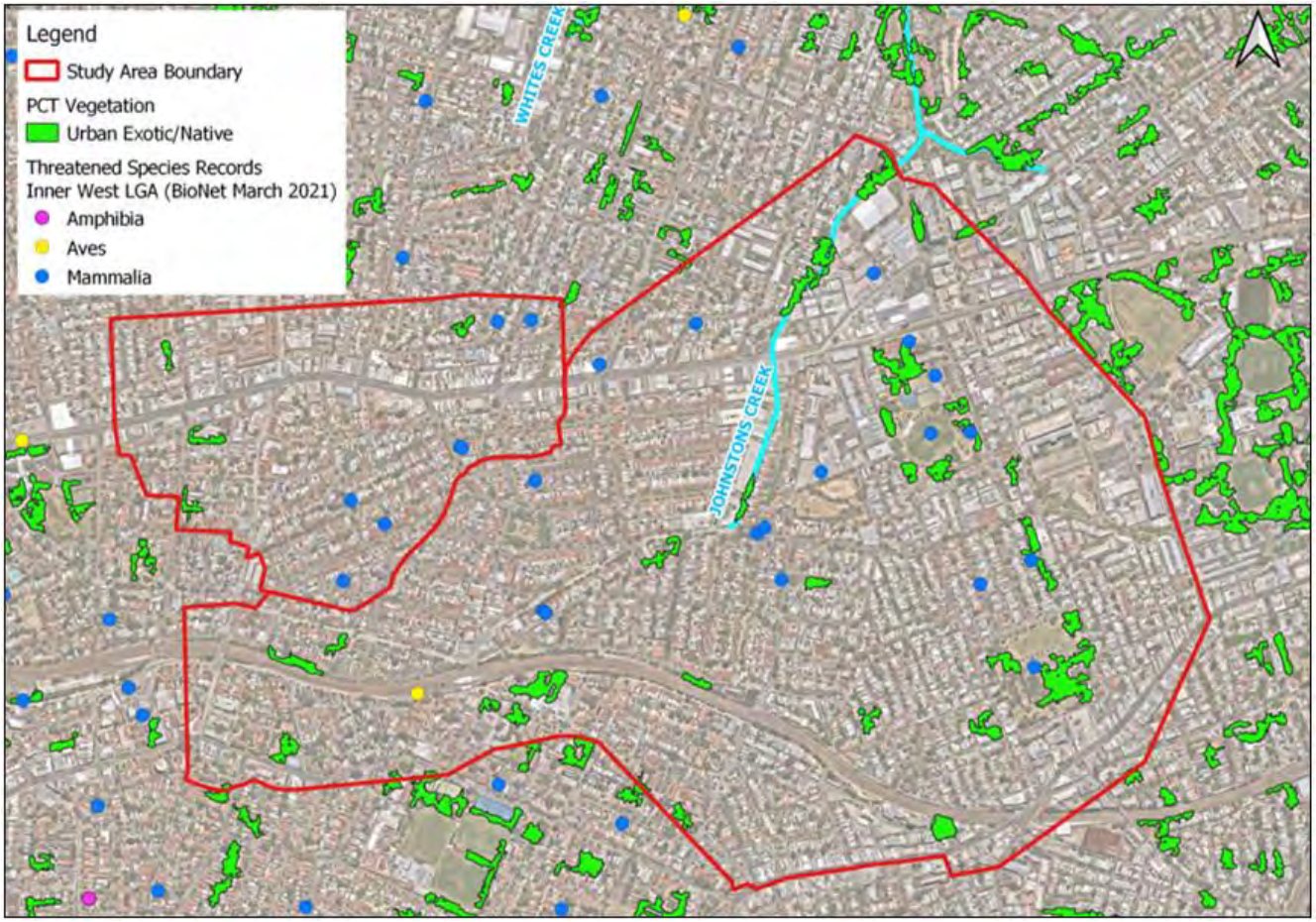

Figure 2-4 Mapping of Whites Creek and Johnstons Creek Biodiversity Constraints

2.3 Heritage

2.3.1 Aboriginal Heritage

Australia contains many different and distinct Aboriginal and Torres Strait Islander groups, each with their own culture, language, beliefs and practices (AIATSIS, 2021). The Inner West LGA is situated on the traditional land of the Gadigal and Wangal peoples of the Eora nation. The Study Area is located on Gadigal land.

A number of sites of Aboriginal archaeological and heritage significance are known (at least one site) are known from the general Study Area based on a search of the Aboriginal Heritage Information Management System. According to the Marrickville Development Control Plan 2011, an Aboriginal Site Survey has identified places of Aboriginal heritage significance with the former Marrickville LGA. Therefore, there is potential for Aboriginal objects to exist across the Study Area even though they have not been formally recorded.

All Aboriginal sites are protected under the *National Parks and Wildlife Act 1974* (NPW Act) and therefore any floodplain management options that have potential to impact on protected sites should be assessed via the Aboriginal cultural heritage due diligence assessment process detailed in the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (DECCW, 2010). Impacts to sites should be avoided in the first instance. In the event a management option would impact an item or site listed under the NPW Act, an Aboriginal Heritage Impact Permit (AHIP) must be sought from DPIE.

In addition, the Marrickville Development Control Plan 2011 outlines provisions and provides guidance on conservation of Aboriginal heritage.

2.3.2 Non-Aboriginal Heritage

Non-Indigenous heritage can be classified into three statutory listing classifications based on significance, namely Commonwealth, State and local. The significance of an item is a status determined by assessing its historical, scientific, cultural, social, archaeological, architectural, natural or aesthetic value.

A desktop review of non-Aboriginal heritage was undertaken for the Inner West LGA. Searches were undertaken of the following databases:

- Australian Heritage Database which incorporates World Heritage List; National Heritage List; Commonwealth Heritage List (DAWE, 2021b);
- State Heritage Register (DCCEW, 2021b); and
- Local Council Heritage as listed on the *Marrickville Local Environmental Plan 2011* (Marrickville Council, 2011a).
- Based on a search of the State Heritage Register (DPIE, 2021) a total of 55 items were found in the IWC LGA were identified as being listed under the NSW *Heritage Act 1977*, with an additional 29 identified as being listed by Sydney Water under Section 170 of the Act. One state heritage items have been identified to be within the Study Area:
- Stanmore Railway Station Group (SHR no. 01251 and Marrickville LEP I248).

There are more than 300 items of local significance and 36 Heritage Conservation Areas listed on the *Marrickville Local Environmental Plan 2011*, with numerous items within the Study Area.

Where it is proposed to undertake works that either directly or indirectly impact on a locally listed heritage item or site, the proponent must refer to the *Marrickville Local Environmental Plan 2011* and Part 8 of the *Marrickville Development Control Plan 2011* for heritage provisions and development guidelines relating to locally listed heritage items.

Figure 2-5 shows Whites Creek and Johnstons Creek Heritage Constraints.

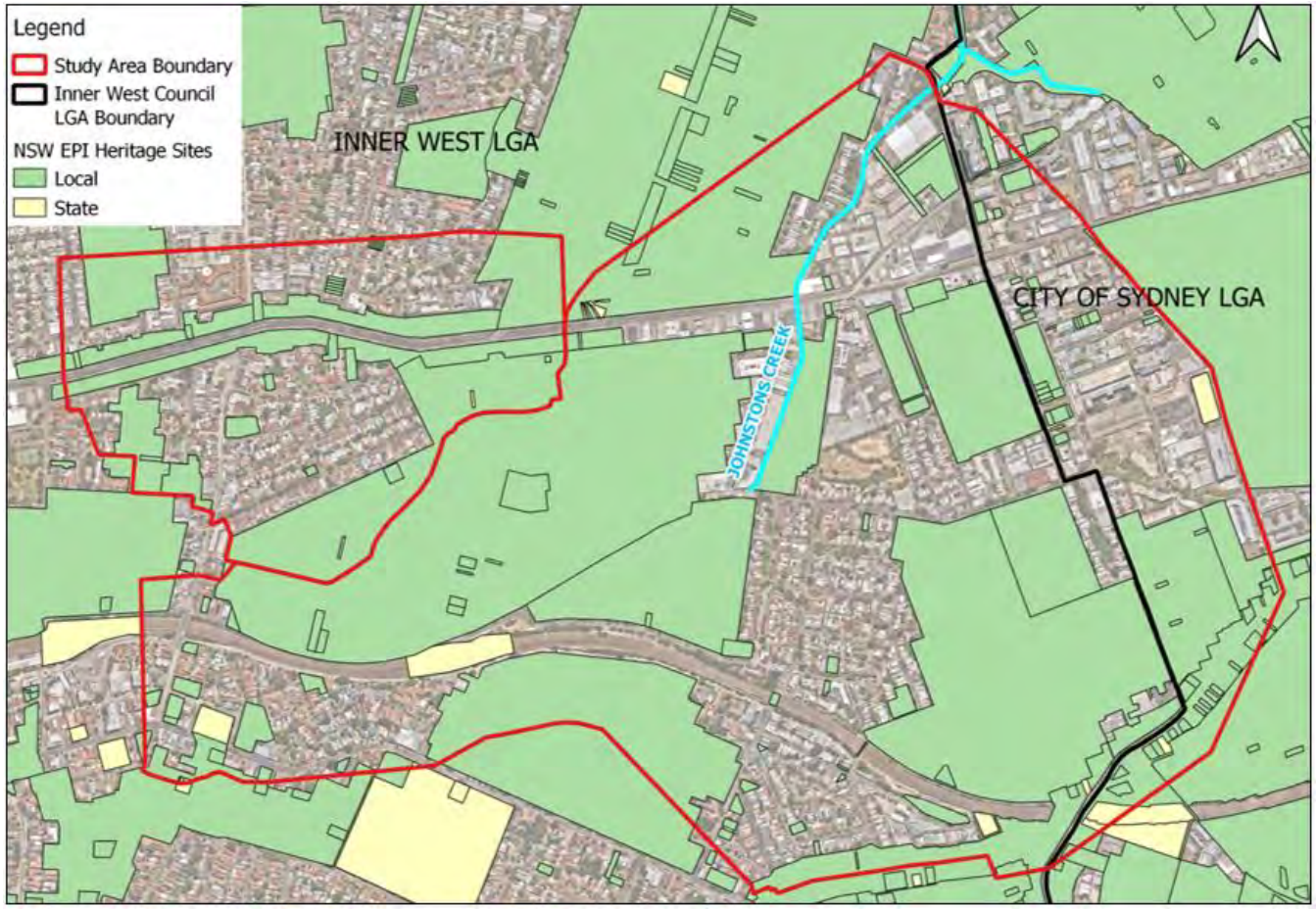

Figure 2-5 Mapping of Whites Creek and Johnstons Creek Heritage Constraints

2.4 Demographic Profile

Knowledge of the demographic character of an area assists in the preparation and evaluation of floodplain management options that are appropriate for the local community. For example, in the consideration of emergency response or evacuation procedures, information may need to be presented in a range of languages and/or additional arrangements may need to be made for less mobile members of the community who may not be able to evacuate efficiently.

Demographic data for the Marrickville and Camperdown area, sourced primarily from the Australian Bureau of Statistics (ABS), was reviewed to gain an appreciation of the social characteristics of the area. The most recent Australian Census was undertaken by ABS in 2016, so this data has been used in the assessment.

The Study Area comprises the Marrickville, Sydenham and Petersham Statistical Area 3 (SA3) and Newtown, Camperdown, Darlington Statistical Area 2 (SA2). All, or part, of the following suburbs are located within the Study Area:

- Enmore;
- Newtown;
- Stanmore;
- Camperdown;
- Petersham;
- Lewisham; and
- Annandale.

Census data showed that the population of the Marrickville, Sydenham and Petersham SA3 in 2016 was approximately 54,609, with a median age of 35 years, which is lower than the median for NSW (38 years). Approximately two thirds of the people living in the Marrickville area are aged between 15-54 years, which suggests that the community is likely to be generally able-bodied and able to evacuate effectively. However, very young children (0-4 years) and the elderly (>75) make up approximately 11% of the population (approximately 5,900 people) so it is important to consider these members of the community in flood risk management planning.

Census data showed that the population of the Newtown, Camperdown and Darlington SA2 in 2016 was approximately 24,839, with a median age of 30 years, which is lower than the median for NSW (38 years). Approximately 80% of the people living in the Camperdown SA3 area are aged between 15-54 years, which suggests that the community is likely to be generally able-bodied and able to evacuate effectively. However, very young children (0-4 years) and the elderly (>75) make up approximately 6% of the population (approximately 1,445 people) so it is important to consider these members of the community in flood risk management planning.

English was the only language spoken in nearly two-thirds (62%) of homes in the Marrickville SA3. Other languages spoken at home included Greek (5.2%), Vietnamese (4.6%), Arabic (1.9%), Portuguese (1.9%) and Cantonese (1.7%). English was the only language spoken in nearly two-thirds (68%) of homes in the Camperdown SA3. Other languages spoken at home included Mandarin (6.6%), Cantonese (1.6%), Spanish (1.2%), Greek (1.2%) and French (0.9%). This suggests that language barriers (e.g. during evacuation, or for flood education) have the potential to be an issue for some households. The inclusion of multi-lingual brochures and personnel may be required in this instance.

Consideration of house prices in Newtown, Camperdown, Stanmore, Annandale and Petersham may assist in the calculation of economic damages incurred during a flood event. According to data from realestate.com.au (realestate.com.au, 2021) the average median property prices across the Study Area are approximately $1,615,000 for houses and $785,000 for units.

3 Review of Available Data

3.1 Whites Creek and Johnstons Creek Flood Study

The Johnstons Creek and Whites Creek Flood Study was completed in 2017 on behalf of Inner West Council formerly Marrickville Council by WMAwater. The Flood Study defined flood behaviour in the catchment for the 50%, 20%, 10%, 2% and 1% Annual Exceedance Probability (AEP) design storms, and the Probable Maximum Flood (PMF). The 2017 Flood Study modelling forms the basis for this Flood Risk Management Study. Further details on the hydrological and hydraulic modelling approaches are discussed below.

3.1.1 Flood Study Approach

Hydrological models were built in DRAINS for each catchment to create flow boundary conditions for input into the hydraulic (TUFLOW) model by using design rainfall patterns specified in AR&R 1987 to produce runoff hydrographs.

The Johnstons Creek model included 240 sub-catchments with an average size of 1.1 ha for a total area of 2.5 km^2, while the Whites Creek model included 48 catchments with an average size of 1.5 ha for a total area of 0.7 km^2. Impervious surface area was determined based on the proportion of sub-catchment area allocated to a number of land use categories, with each category having an estimated impervious percentage based on aerial observation of a representative area. Rainfall losses were modelled using the Horton loss method – with an initial loss of 1.0 mm and a continuing loss of 5.0 mm were adopted.

Comparison with a DRAINS model of the nearby Rose Bay Catchment from a previous study was undertaken to verify the hydrological models. Specific yield (peak discharge divided by upstream catchment area) comparison was undertaken and the Johnstons Creek and Whites Creek catchment models were found to have comparable yields.

The availability of high-quality LIDAR data meant that the Study Area was suitable for 2D hydraulic modelling to assess flood behaviour, with the TUFLOW package being adopted in this case due to wide acceptance in Australia and to ensure consistency with other flood studies previously completed within the (former) Marrickville Council LGA. A separate TUFLOW model was prepared for Johnstons Creek and Whites Creek. The hydraulic models use the runoff hydrographs from the hydrology model as boundary conditions in order to provide estimates of flood depths, velocities and hazard within the Study Area. The models were used to define flood behaviour for the 50%, 20%, 10%, 5%, 2% and 1% AEP flood events and the Probable Maximum Flood (PMF).

The TUFLOW model boundaries are shown in **Figure 2-1**. The TUFLOW model boundary includes the eastern portions of Johnstons Creek catchment, however as these are part of City of Sydney LGA, these areas are not included in the Study Area and will not be considered for flood mitigation options. The Johnstons Creek 2D model had a total area of 2.6 km^2, being approximately bounded at four corners by Missenden Street to the east, Enmore and Stanmore Roads to the south, the Booth St / Mallet St intersection to the north, and Crystal St to the West. The Whites Creek 2D model had a total area of 0.6 km^2 and is approximately bounded by Lorna Lane to the south, and extends to the north an additional 250m past the Study Area boundary of Parramatta Road to include portions of the downstream catchment.

A grid with 2 m by 2 m cell size was adopted for both models in order to provide sufficient detail for roads and overland flow paths. The grid sampled terrain from a 1 m by 1 m DEM generated from LIDAR data (see **Section 3.2** for further discussion). For inflows, local runoff hydrographs were extracted from the DRAINS model and applied to the 2D domain of the TUFLOW model at the downstream end of the sub-catchments. A height versus time boundary was applied to the downstream boundaries (located north of Paramatta Road) of both models to both the 1D and 2D domain.

Roughness coefficients for different flow paths were adopted based on site inspection and correspondence to similar environments, and consistency with ARR 2016 revision guidelines. Buildings and other structures were incorporated into the models based on footprints derived from aerial photography, and modelled as flow path obstructions, while bridges were modelled as 1D features within open channels. All pipes equal to or smaller than 300mm in diameter were assumed to be fully blocked and not included in the Flood Study model. The catchment drainage systems defined in each model included 652 pipes, 659 pits / nodes, and 111 open channel segments for Johnstons Creek, and 114 pipes and 120 pits / nodes for the Whites Creek model.

The joint hydrologic / hydraulic model was calibrated based on the 25th April 2015 event by comparing flood affectation at various locations based on photographs acquired from community consultation and council

database flooding complaints. The model was found to effectively replicate some degree of flood affectation at the locations. Comparison was also carried out with previous studies for verification purposes.

Sensitivity analyses were conducted for the 1% AEP and 5% AEP models based on hydrologic routing lag, Manning's roughness values, pipe blockage, and climate change both rainfall increase (10%, 20%, and 30%).

Design storm result analysis and mapping included peak depths, levels and velocities. The analysis also included a pipe capacity assessment. In addition, the 20% AEP, 5% AEP, 1% AEP and PMF events also had provisional hydraulic hazard, hydraulic categorisation (floodway, flood storage, and flood fringe) and the 1% AEP and PMF events also had flood emergency response classifications.

A provisional Flood Planning Area (FPA) and Flood Control Lot tagging was conducted for the Study Area. The report also briefly summarised the relevant flood development controls for the Study Area.

Eleven flooding hotspots were identified in the Flood Study, 10 within Johnstons Creek and one within Whites Creek which were:

- Hotspot 1 – Parramatta Road, Bridge Road and Cardigan Street, Stanmore;
- Hotspot 2 – Salisbury Road near Stafford Street, Stanmore;
- Hotspot 3 – Salisbury Road, Camperdown;
- Hotspot 4 – Mallett Street, Fowler Street and Gibbens Street, Camperdown;
- Hotspot 5 – Cardigan Street, between Salisbury Road and Railway Avenue, Stanmore;
- Hotspot 6 – Liberty Street, Bedford Street and Railway Avenue, Stanmore;
- Hotspot 7 – Lennox Street and Australia Street, Newtown;
- Hotspot 8 – Trafalgar Street near Crammond Park, Petersham;
- Hotspot 9 – Probert St and Probert Ln (near St Marys St), Newtown;
- Hotspot 10– Australia St and Denison St (near Camperdown Park), Camperdown; and
- Hotspot 11 – Parramatta Road near Phillip Street, Stanmore (Whites Creek catchment).

Refer to **Section 7.5** for maps of the hotspot locations.

3.1.2 Flood Study Data Provided

As part of project inception, Inner West Council provided Stantec with the following data related to the Johnstons Creek and Whites Creek Flood Study (WMAwater, 2017):

- LIDAR data collected in 2013 and obtained from the Land and Property Information (LPI) division of the NSW Government Department of Finance, Services and Innovation. Open water and vegetation also tend to affect the accuracy of LIDAR data. A 1 m x 1 m Digital Elevation Model (DEM) was constructed from the LIDAR to form the basis of the TUFLOW model; and
- Ground and floor level survey at select locations from the previous Whites Creek, Johnstons Creek North, Johnstons Creek South (Dalland and Lucas, 1996, 1998 and 1999) and Johnstons Creek West (Stantec, 2008) studies were used to verify the LIDAR data and was found to have an average elevation difference of 0.01 m in the Johnstons Creek catchment and -0.02 m in the Whites Creek catchment.
- In addition to these Flood Study model terrains, Stantec sourced several other LiDAR and DEM datasets for this study. Detailed review of the following LiDAR sources has been conducted (refer to **Section 3.6.2**):
- LiDAR points provided by Council from an unknown source and date covering part of the Study Area;
- The ELVIS - Elevation and Depth - Foundation Spatial Data website was accessed with two datasets available from the website. The files appear to have been recorded on the following dates:
    - 2013-04-10 – 1m x 1m ASC grid data set in 2km x 2km with an accuracy of 0.3m (95% Confidence Interval) vertical and 0.8m (95% Confidence Interval) horizontal in GDA94 and MGAz56; and
    - 2020-05-10 - 1m x 1m TIFF data set in 2km x 2km with an accuracy of 0.3m (95% Confidence Interval) vertical and 0.8m (95% Confidence Interval) horizontal in GDA2020 and MGAz56.

3.2 Survey Information

The Flood Study model (WMAwater, 2017) was constructed utilising the following available data:

- LIDAR data collected in 2013 and obtained from the Land and Property Information (LPI) division of the NSW Government Department of Finance, Services and Innovation. Open water and vegetation also tend to affect the accuracy of LIDAR data. A 1 m x 1 m Digital Elevation Model (DEM) was constructed from the LIDAR to form the basis of the TUFLOW model; and
- Ground and floor level survey at select locations from the previous Whites Creek, Johnstons Creek North, Johnstons Creek South (Dalland and Lucas, 1996, 1998 and 1999) and Johnstons Creek West (Stantec, 2008) studies were used to verify the LIDAR data and was found to have an average elevation difference of 0.01 m in the Johnstons Creek catchment and -0.02 m in the Whites Creek catchment.
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    - 2013-04-10 – 1m x 1m ASC grid data set in 2km x 2km with an accuracy of 0.3m (95% Confidence Interval) vertical and 0.8m (95% Confidence Interval) horizontal in GDA94 and MGAz56; and
    - 2020-05-10 - 1m x 1m TIFF data set in 2km x 2km with an accuracy of 0.3m (95% Confidence Interval) vertical and 0.8m (95% Confidence Interval) horizontal in GDA2020 and MGAz56.

3.3 GIS Data

As part of project inception, Inner West Council provided Stantec with the following GIS data for the study:

- Local Environment Plan (LEP) land use zone mapping and Acid Sulfate Soil (ASS) layer;
- LGA Boundary layer;
- LiDAR data from an unknown source and date covering part of the Study Area;
- Stormwater pit and pipe network;
- State Environmental Planning Policy (SEPP) 2016 Coastal Management layer; and
- Aerial imagery from an unknown source and date.

Aside from these GIS layers, provided by Council during the early stages of the project, various other publicly available GIS layers were sourced by Stantec for this study including high quality aerial imagery from NearMap (2021) recorded at various periods for the Study Area and its surrounds. This aided in not only providing details about the current site, but also the historical site at the time of the Flood Study. Another example is the various flora and fauna and heritage GIS databases described in **Section 2**.

3.4 Site Inspection

Site inspections of the Study Area were conducted by Stantec representatives on 12 May 2021. In total, 33 different sites within the Study Area were visited, all in areas identified as flood affected based on Flood Study outcomes. The location of the sites visited is shown in **Figure 3-1**. The site visits provided the opportunity to review the following:

- Review flood hotspots identified in the Flood Study (WMAwater, 2017), and the flood study model results compared to the observed topography and layout of the site;
- Review of site layouts and the elevations of floor levels for buildings in the vicinity of flooded areas to help inform the development of a floor level survey scope;
- Noting of the current development of the Study Area with some of the changes in sites discussed further in **Section 3.6.2** and **Section 3.6.3**; and
- Initial review of opportunities and constraints for potential future flood mitigation options.

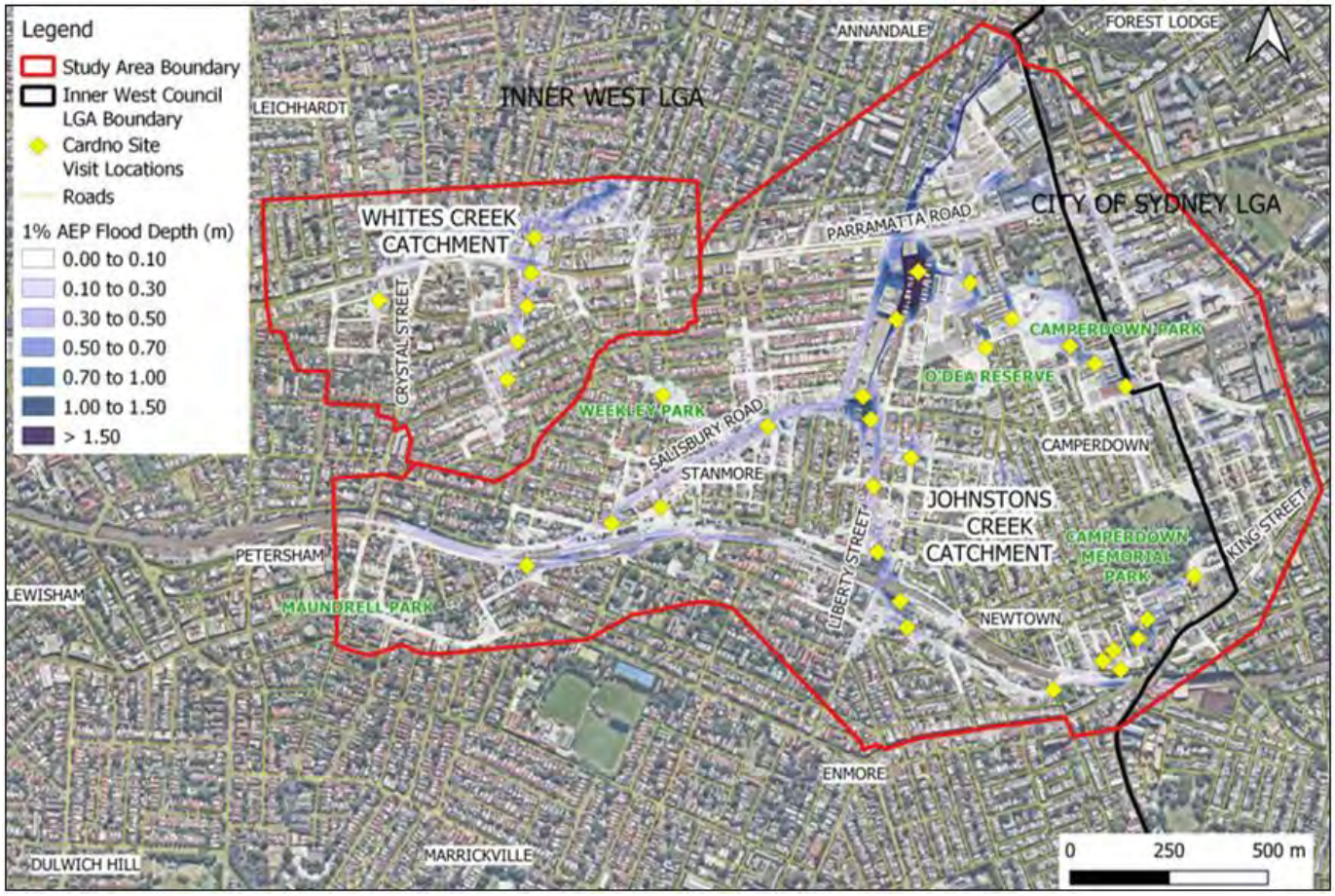

Figure 3-1 Site Locations for Whites Creek & Johnstons Creek Study Area Visited by Stantec on 14/05/2021, with Underlay of Peak 1% AEP Depth Results from the Flood Study (WMAwater, 2017)

3.5 Floor Level Survey

Floor level survey was prepared for the Whites Creek and Johnstons Creek catchment as part of this Study. In total, 403 floor levels were surveyed. For flood affected buildings that did not have surveyed levels from the survey, floor levels were estimated as discussed further in **Section 6.2.3**.

3.6 Flood Study Model Review and Update

Since the completion of the Johnstons Creek and Whites Creek Flood Study in 2017, several developments have occurred in both floodplain management guidance and standards and in the Study Area itself. These changes have the potential to impact the suitability of the Flood Study model in accurately representing the Study Area and its flood behaviour. Therefore, in order to confirm the potential impacts of these changes, a model review process has been conducted accounting for these changes in updated 1% AEP and 5% AEP models. The following model updates were included in this review process:

- Adoption of the AR&R 2019 design rainfall method as opposed to the AR&R 1987 method adopted in the Flood Study model;
- Updates to the model topography to reflect development and changes in the Study Area post-2013; and,
- Updates to the model building polygons to reflect development and changes in the Study Area post-2013.

These updates are detailed further in the following sections with model outcomes from this review discussed in **Section 3.6.4**.

3.6.1 AR&R 2019 Design Rainfall Update

3.6.1.1 Background

An important change has occurred in the development of flood estimation in Australia, with the release of Australian Rainfall and Runoff 2016 (AR&R 2016). On 25 November 2016, Geosciences Australia announced that:

> *The AR&R 2016 Guidelines have now been officially finalised, providing engineers and consultants with the guidance and datasets necessary to produce more accurate and consistent flood studies and mapping across Australia, now and into the future.*

Following this, the AR&R 2019 update was released which included minor updates to AR&R 2016 without changes to the edition. There are specific changes to the methodology for estimation of flood behaviour compared to the AR&R 1987 methodology that was adopted in the Whites Creek and Johnstons Creek Flood Study (WMAwater, 2017). These include:

- Rainfall – the Bureau of Meteorology (BoM) has re-analysed all the Intensity-Frequency-Duration (IFD) parameters across Australia, incorporating 30 further years of data and many more rainfall stations. The method of derivation has also changed, meaning the previously used IFD coefficients have been updated. It is also noted that the standard reporting for storm duration has been reduced;
- Design Storms – AR&R 2019 recommends the utilisation of a suite of design rainfall temporal patterns, with ten patterns for each Annual Exceedance Probability (AEP) and duration of event;
- Storm Loss Rates – AR&R 2019 recommends the use of initial and continuing loss rates for design storms, and is no longer recommending the use of runoff coefficients for hydrological modelling. The loss rates provided are also for the entire storm, as opposed to the burst losses adopted in AR&R 1987; and
- Storm Loss Rates – AR&R 2019 provides for the use of three types of area when assessing loss rates - directly connected impervious areas, indirectly connected impervious areas and pervious areas. The document also provides guidance as to the calculation of these areas.

3.6.1.2 Design Rainfall Update

In AR&R 1987, there was a single temporal pattern defined for each storm burst duration of interest. This limited the number of runs required to identify the critical storm burst duration within a catchment. In AR&R 2019, ten temporal patterns are provided for each storm burst duration.

As part of this model review, all ten temporal patterns were run for each storm burst duration and the median peak flow was determined at each location of interest. It is noted that this requires a ten-fold increase in hydrological assessments to identify the critical storm burst duration, which may vary depending on location

within the catchment. Furthermore, no single temporal pattern will give the median peak flow and that rather the temporal pattern (which gives the peak flow closest to, but higher than, the median flow) has been adopted for assessment purposes.

As part of this model review, the DRAINS model from the Johnstons Creek and Whites Creek Flood Study was updated to AR&R 2019 rainfall for the 1% AEP (1 in 100 year), and 5% AEP (1 in 20 year) events. Two DRAINS models were prepared as part of the Flood Study, one for Johnstons Creek and one for Whites Creek.

For the Johnstons Creek model, for the 1% AEP and 5% AEP, all ten temporal patterns were prepared for the 20, 30, 45, 60, and 90 minute storms. Compared to the AR&R 1987 critical duration of 60 minute, these modelled durations provided sufficient scope to encompass any potential shift in critical duration as part of the AR&R 2019 update.

For the Whites Creek model, the smaller catchment size means that the AR&R 1987 has a relatively shorter critical duration of 20 minutes. For the 1% AEP and 5% AEP all ten temporal patterns were prepared for the 10, 20, 30, and 45 minute storms. Due to the expected shorter critical duration for this catchment these modelled durations provided sufficient scope to encompass any potential shift in critical duration as part of the AR&R 2019 update.

3.6.1.3 Review of Rainfall Loss Approach

AR&R 2019 recommends the use of the initial / continuing loss approach, whereas the Flood Study model used Horton Loss model which is the default loss model for DRAINS with ILSAX hydrology. Stantec conducted a review of the adopted Horton losses from the Flood Study compared to an equivalent initial / continuing loss approach as recommended in AR&R 2019.

The equivalent initial / continuing losses suitable for the Study Area were concluded to be:

- 1% AEP – initial loss 6.4 mm and continuing loss 0.7mm / hour;
- 5% AEP - initial loss 8.5 mm and continuing loss 0.7mm / hour.

The losses were adopted using the Antecedent Moisture Condition (AMC) of 3.0 as adopted in the Flood Study model. In addition, a sensitivity check to an AMC of 3.5 was conducted. The outcomes of the total loss comparison showed for both AMC 3.0 and 3.5 total losses are similar for the shorter durations such as the 10 and 20 minute events. However, as the burst duration increases the Horton Losses becomes higher than that estimated by the Initial-Continuing loss model.

Nevertheless, the comparison shows that the choice of loss model is unlikely to make a significant difference to model results the critical duration was assumed to be relatively short, the catchments are highly impervious so rainfall losses have less affect, and the rainfall excess is much higher than the losses for the 5% & 1% AEP events.

Therefore, the Horton loss curves from the Flood Study model were retained within the review models.

3.6.1.4 Review of Other Model Assumptions

Stantec also conducted a high-level review of other Flood Study model components. It was found that the model set-up was generally appropriate including surface roughness, impervious percentage, and pit and pipe modelling. For time of concentration calculation, the Kinematic Wave equation was adopted which is generally not typically utilised for large, piped catchments, however as calculated travel times are in the appropriate range, this was not considered a concern.

3.6.2 Topography Review and Update

Since the Flood Study model was completed, the catchment has undergone a substantial amount of change and development. As covered in **Section 3.2**, the Flood Study model terrain was based on LiDAR data recorded in 2013, sourced from the ELVIS website from 10 April 2013. A review was undertaken to assess the adequacy of the model terrain by comparing to newer LiDAR data collected May 10, 2020 sourced from the ELVIS website (refer to **Section 3.2** for further details).

Comparing the Flood Study model terrain to the newer DEM showed that the terrain differences between 2013 and 2020 data are largely within +/- 0.2 metres outside of building footprints, with some notable exceptions where significant development has occurred. A comparison of Flood Study model terrain and 2020 LiDAR data is included in **Figure 3-2**.

For Johnstons Creek & Whites Creek Study Area the significant terrain differences outside of building footprints appear to be:

- The 2020 data appears to have the bridge over the railway line at Newtown train station. As the bridge would present a negligible flow restriction, it is suitable for the railway line be modelled in the 2D domain of the model and the bridge structure over the highway was disregarded. This was the approach adopted within the Flood Study model therefore no change to the model terrain was required;
- There are narrow sections of significant differences along the perimeters of the rail corridor. Council had noted that there has not been any major recent works along this corridor to suggest these differences reflect changes in topography from 2013 to 2020. Therefore, these differences are presumably due to slight spatial misalignments in the data sets with the steep sides of the corridor resulting in differences. It is not clear upon review that either the 2013 or 2020 are particularly misaligned along this rail corridor more than the other;
- It also appears that the elevated Stanmore station platform has been recorded in the 2013 LiDAR but not the 2020 LiDAR, as this is a solid, permanent structure the 2013 LiDAR is better in this instance; and
- There are significant differences for a site north of Parramatta Road near the corner of Alexandra Drive and Booth Street due to a new building on this site (discussed further in **Section 3.6.3**).

Therefore, it appears there are only minor terrain differences from 2013 to 2020 LiDAR within the Johnstons Creek and Whites Creek Study Area due to development or alteration of sites over that period. It appears that significant terrain differences between the two data sets can be explained by slight misalignment and recording differences, with no clear indication that the 2013 data is in poorer condition than the 2020 data.

As it is not clear that the 2020 terrain provides better accuracy than the 2013 terrain, the Flood Study model terrain was thus retained in the updated Flood Study Model for Johnstons Creek and Whites Creek Study Area.

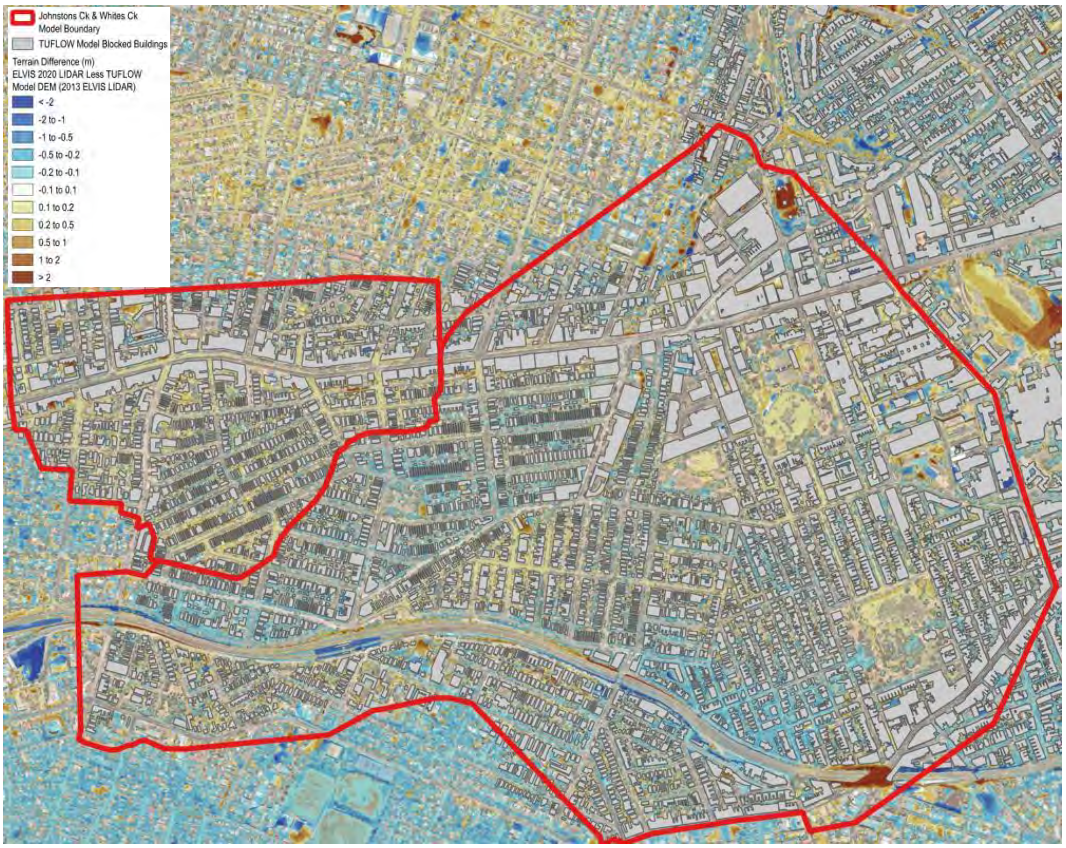

Figure 3-2 Terrain Differences - 2020 LiDAR Less 2013 LiDAR Used in the Whites Creek and Johnstons Creek Flood Study with Labels of Key Sites

3.6.3 Model Building Polygon Review and Update

The Johnstons Creek and Whites Creek Flood Study model assumed full blockage of building footprints by removing building polygons from the 2D terrain of the model. Generally, this approach is considered appropriate. A review was conducted of building footprints from the Flood Study TUFLOW model and more recent 2020 Geoscape building footprints provided by DCCEW, offering a detailed and more up-to-date dataset. Review of the building polygons layer showed that in most instances the polygons align with buildings shown in the aerials, but there were particular instances where this is not the case.

There are presumably two reasons for building polygons not matching building locations in latest available aerials:

- The base data used in the model building polygon layer did not include some areas. The main example of this is where an area of historical buildings along Susan Street in the northern reaches of the Johnstons Creek Study Area have not been included in the polygon layer, presumably because data was not available at this location. Review of the model set-up and results suggest these buildings are only on the fringe of the Johnstons Creek floodplain, however they have been added to the updated model;
- There has been development since the Flood Study with new or removed buildings in the area. Instances of potential new buildings and extended buildings in Johnstons Creek and Whites Creek that have been added to the updated model include:
  - A new building was constructed on a site north of Parramatta Road near the corner of Alexandra Drive and Booth Street. This site is outside the main flood extents but near an overland flow inflow point, though flows do not interact with the site significantly. Nevertheless, the polygon was added to the model;
  - A new building complex has been constructed on the west side of Camperdown Park oval which was added to the updated model;
  - There has been significant redevelopment of sites associated with Royal Alfred Hospital. These sites are within City of Sydney LGA however had potential to alter overland flow downstream within the Inner West LGA, therefore these changes were added to the updated model;
  - In the centre of the Whites Creek catchment just south of Parramatta Road in the middle of the flowpath, an existing car dealership building was expanded. The previous flowpath underneath the building (8m x 0.6m) has been retained in the new building as confirmed on review of design plans for the development approval. This building polygon in the model was expanded;
  - A building fronting Parramatta Road on the north side has been removed in Whites Creek catchment; and
  - Other minor redevelopment sites that are in the floodplain throughout both catchments have been added in such as garages and new and altered building footprints. These site changes were reviewed using latest available aerial imagery compared to historical aerials from the time of the Flood Study.

3.6.4 Model Review Results – Johnstons Creek

The model updates discussed in the above sections were incorporated into a Johnstons Creek review model for the 1% AEP and 5% AEP events, with the outcomes of this modelling summarised in the following sub-sections.

3.6.4.1 Critical Duration

For both the 1% AEP and 5% AEP events, all ten temporal patterns were prepared for the 20, 30, 45, 60, and 90 minute storms. Of the ten temporal patterns for each duration, the median pattern was selected for each duration, and then these duration median results were combined to create the peak flood results. The critical durations for the 1% AEP and 5% AEP from the updated modelling is shown in **Figure 3-3** and **Figure 3-3** respectively.

The critical duration for the majority of the Study Area is the 30 minute storm for the 1% AEP, and the 45 minute for the 5% AEP. For some disconnected ponding areas and for the downstream portion of the Study Area north of Parramatta Road the longer duration storms are critical. Compared to the Flood Study AR&R 1987 critical duration of 60 minute, the shorter critical duration for AR&R 2019 is in keeping with Stantec's past experience on updates to AR&R 2019 where the critical duration has been found to almost always shortens.

3.6.4.2 Peak Water Level Differences

A comparison of peak water level differences for the updated AR&R 2019 model compared to the Flood Study AR&R1987 model for the 1% AEP and 5% AEP from the updated modelling is shown in **Figure 3-5** and **Figure 3-6** respectively.

The results show that throughout the Study Area, the proposed revision to AR&R 2019 has resulted in reductions in peak water level results for both the 1% AEP and 5% AEP throughout the Johnstons Creek catchment. These reductions in peak water level results are in keeping with Stantec's past experience on updates to AR&R 2019, where the severity of peak flooding was almost always reduced as a result of AR&R 2019 updates.

Water level reductions from the Flood Study results are not significantly different for the majority of the Study Area, typically anywhere from -0.01 metres to -0.2 metres for both the 1% AEP and 5% AEP events. The section of Johnstons Creek south of Parramatta Road has more significant reductions of greater than 0.5 metres. It is expected that this is due to this location being the confluence of most runoff from the site resulting in the reductions being more pronounced at this location.

The terrain and building polygon changes do not result in any significant areas of water level increases, the only example is in the immediate vicinity of the new building west of Camperdown Park oval where there are minor localised increases. Therefore updated model results suggest that site changes post-2013 do not have a significant impact on flood behaviour within the Study Area.

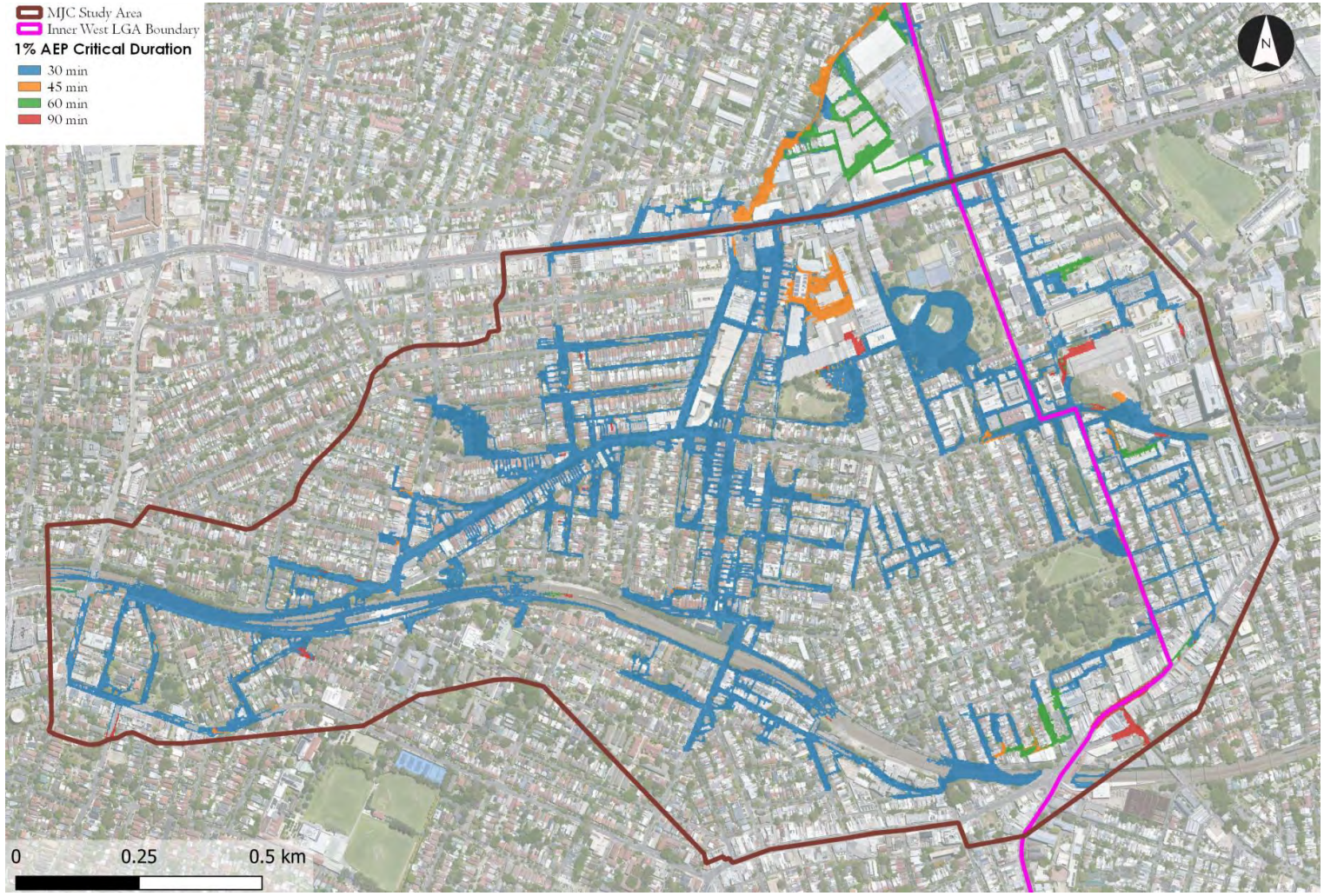

Figure 3-3 1% AEP Critical Duration Storms for Updated Model for Johnstons Creek Study Area Based on AR&R 2019 Design Rainfall Updates

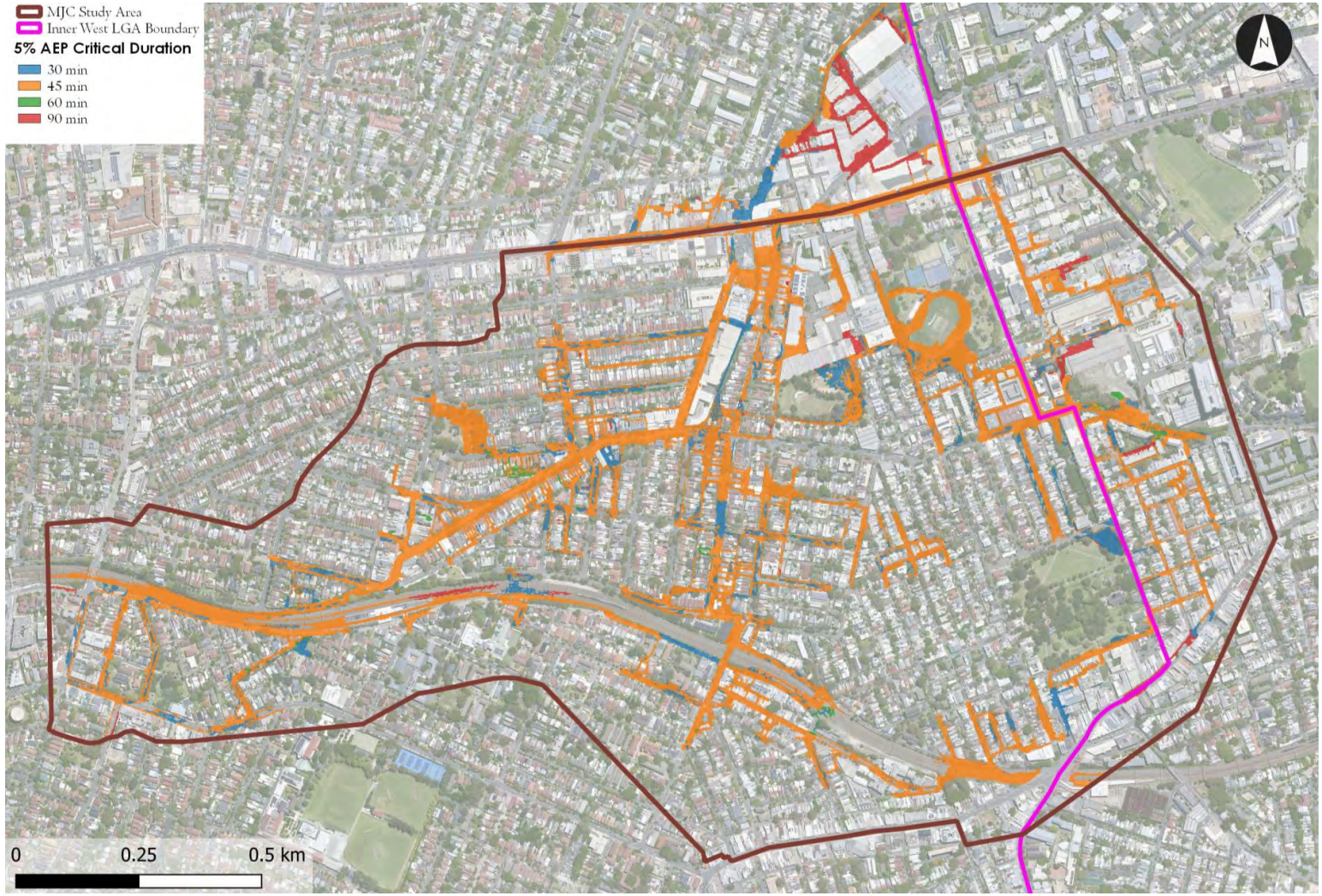

Figure 3-4 5% AEP Critical Duration Storms for Updated Model for Johnstons Creek Study Area Based on AR&R 2019 Design Rainfall Updates

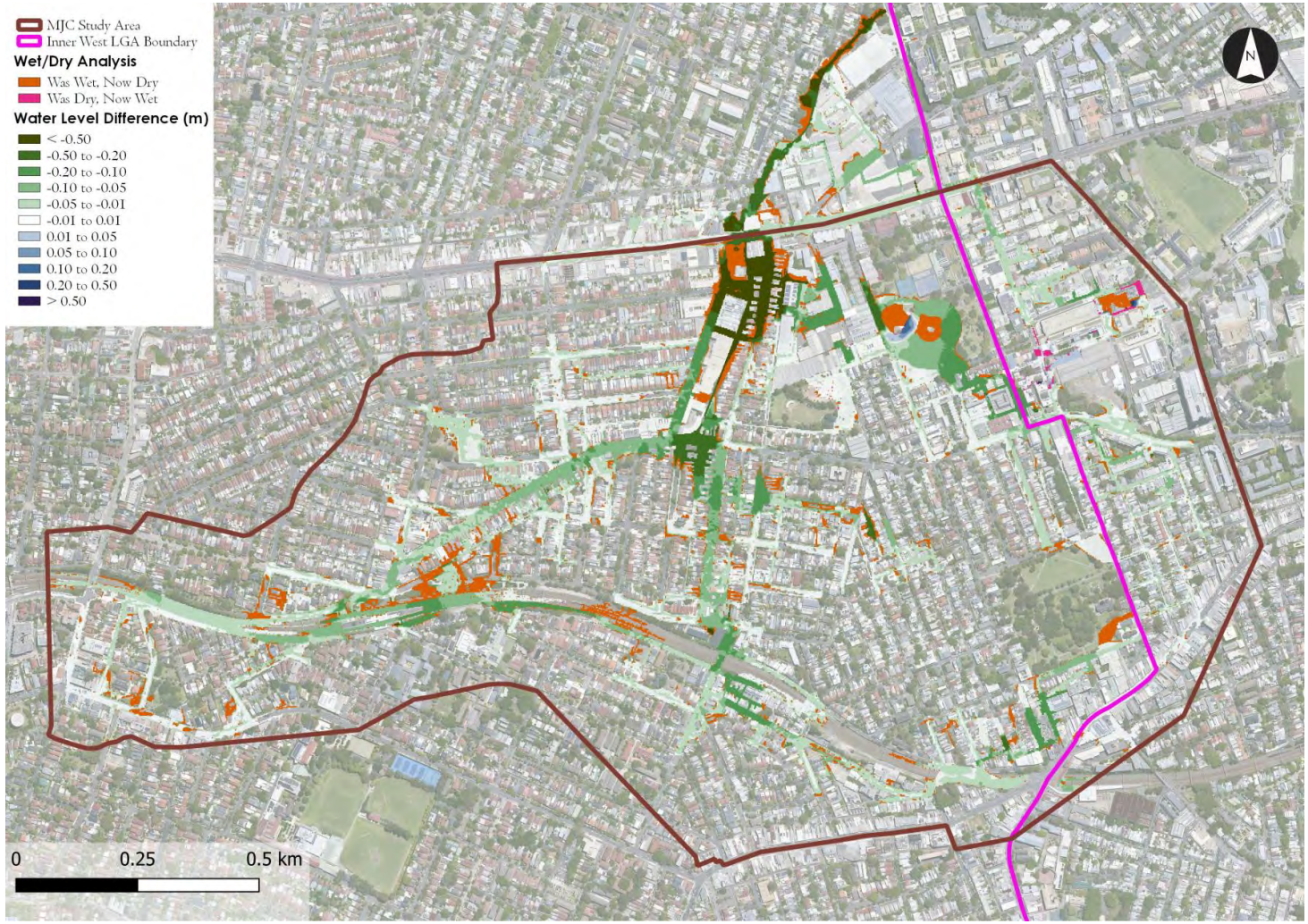

Figure 3-5 1% AEP Peak Water Level Differences – Johnstons Creek - Updated AR&R 2019 Model Less Flood Study AR&R 1987

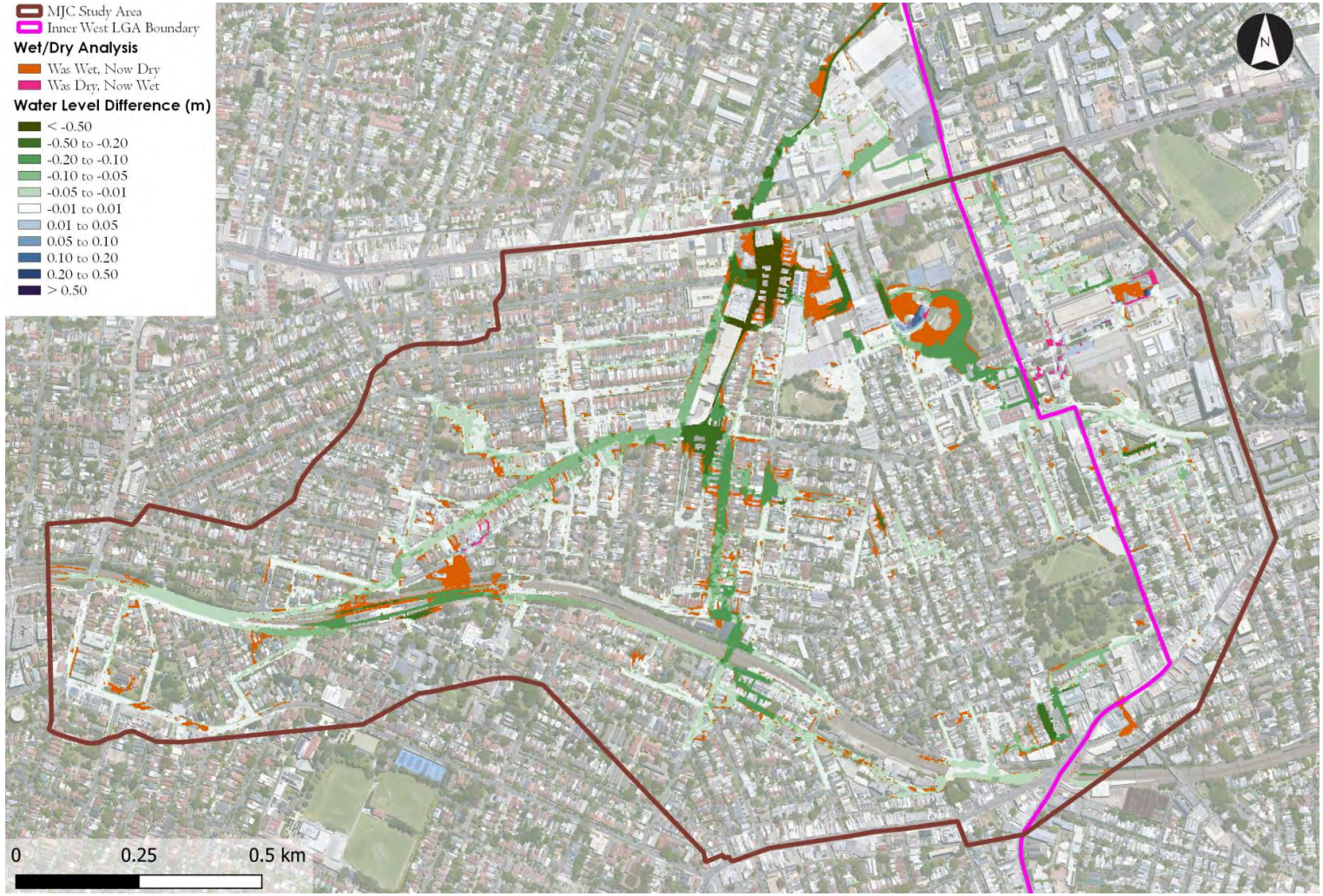

Figure 3-6 5% AEP Peak Water Level Differences – Johnstons Creek - Updated AR&R 2019 Model Less Flood Study AR&R 1987

3.6.5 Model Review Results – Whites Creek

The model updates discussed in the above sections were incorporated into a Whites Creek review model for the 1% AEP and 5% AEP events, with the outcomes of this modelling summarised in the following sub-sections.

3.6.5.1 Critical Duration

For both the 1% AEP and 5% AEP events, all ten temporal patterns were prepared for the 10, 20, 30, 45, and 60 storms. Of the ten temporal patterns for each duration, the median pattern was selected for each duration, and then these duration median results were combined to create the peak flood results. The critical durations for the 1% AEP and 5% AEP from the updated modelling are shown in **Figure 3-7** and **Figure 3-8** respectively.

The critical duration for the majority of the upper catchment the 20 minute storm for the 1% AEP, and the 10 minute for the 5% AEP. For the downstream portion of the Study Area north of Parramatta Road the 30 minute storm is critical for both the 1% AEP and 5% AEP events. Compared to the Flood Study AR&R 1987 critical duration of 20 minute, the critical duration for AR&R 2019 is comparable.

3.6.5.2 Peak Water Level Differences

A comparison of peak water level differences for the updated AR&R 2019 model compared to the Flood Study AR&R1987 model for the 1% AEP and 5% AEP from the updated modelling is shown in **Figure 3-9** and **Figure 3-10** respectively.

The results show that throughout the Study Area, the proposed revision to AR&R 2019 has resulted in reductions in peak water level results for both the 1% AEP and 5% AEP throughout the Whites Creek catchment. These reductions in peak water level results are in keeping with Stantec's past experience on updates to AR&R 2019, where the severity of peak flooding was almost always reduced as a result of AR&R 2019 updates.

Water level reductions from the Flood Study results are not significantly different for the majority of the Study Area, typically anywhere from -0.01 metres to -0.2 metres for both the 1% AEP and 5% AEP events.

The terrain and building polygon changes for the most part do not result in any significant areas of water level increases. The only notable example is a result of the building removal for the north fronting of Parramatta Road, which has opened up a new ponding location for waters to access the rear of these properties. This results in some area of newly flooded area at the rear of the properties. However given this is in the upper portion of the catchment and the flooding is minor it is not seen as a significant change.

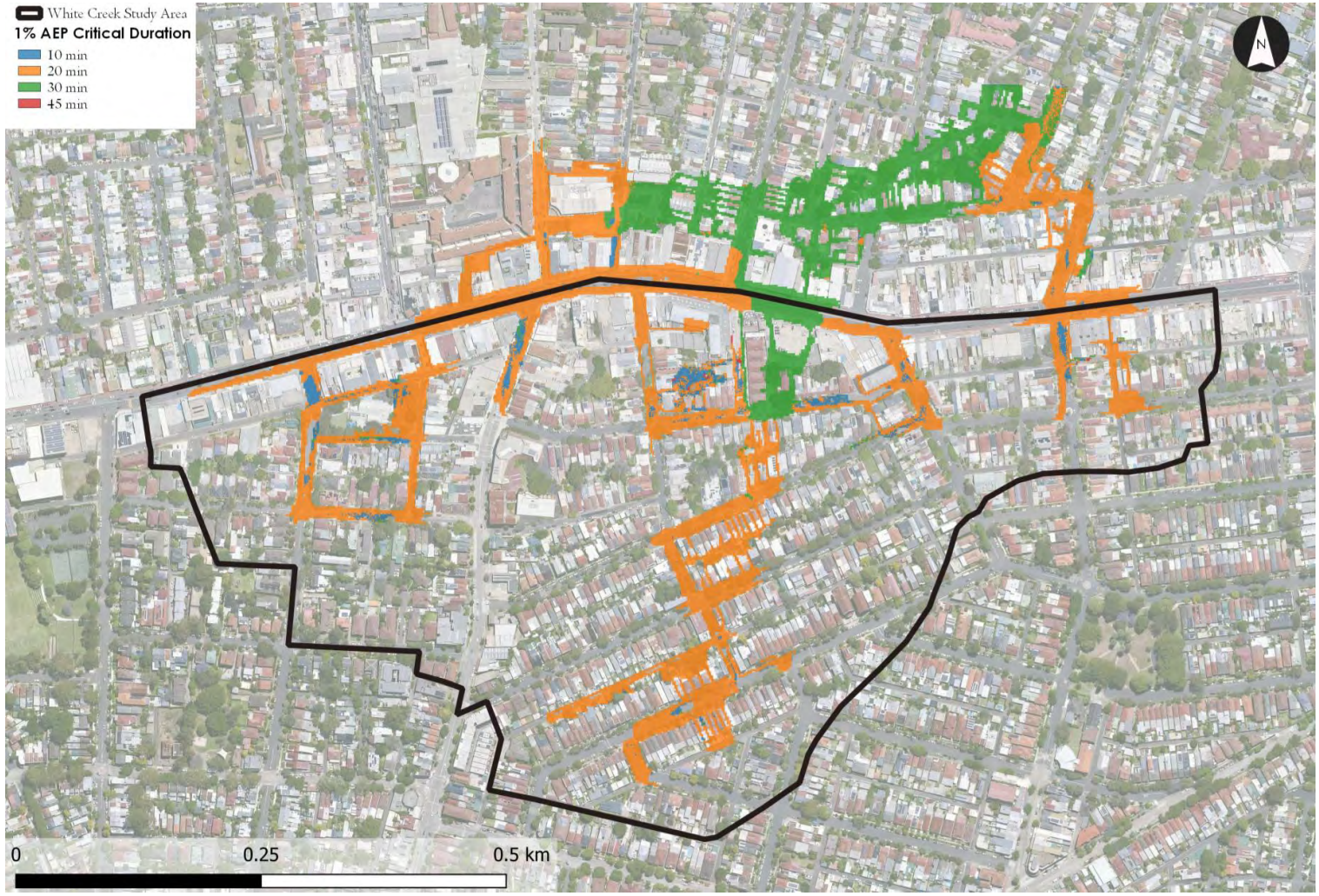

Figure 3-7 1% AEP Critical Duration Storms for Updated Model for Whites Creek Study Area Based on AR&R 2019 Design Rainfall Updates

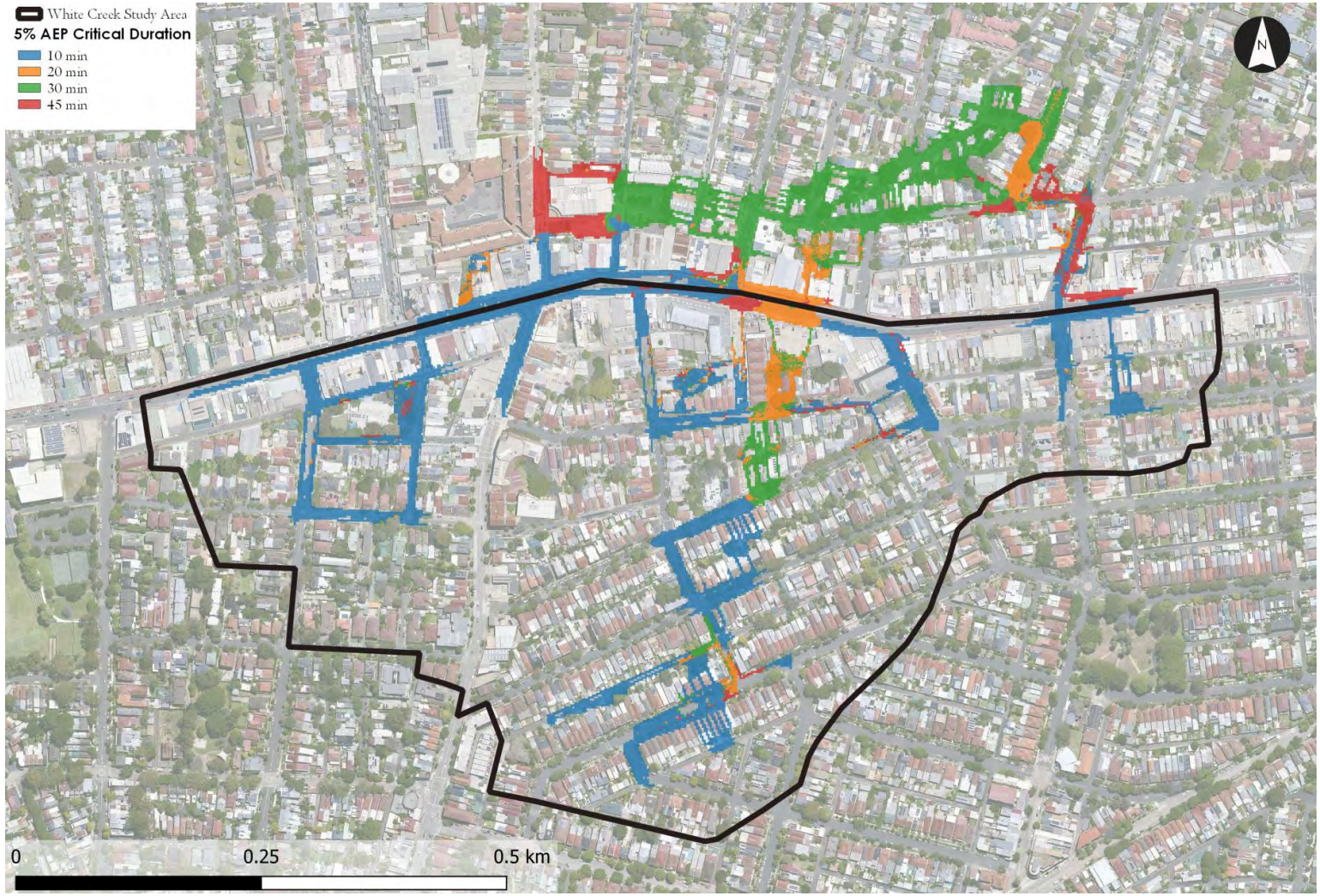

Figure 3-8 5% AEP Critical Duration Storms for Updated Model for Whites Creek Study Area Based on AR&R 2019 Design Rainfall Updates

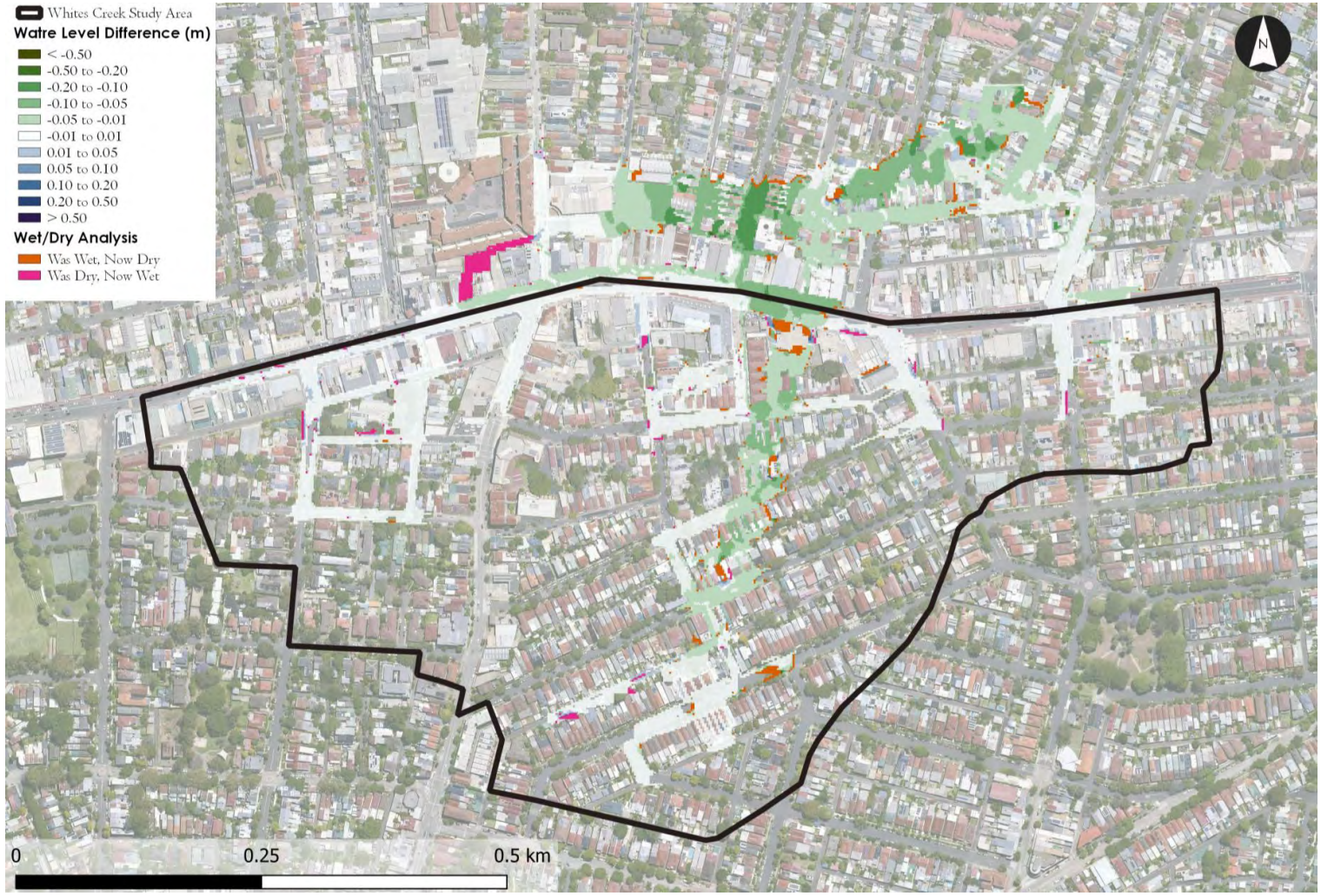

Figure 3-9 1% AEP Peak Water Level Differences – Whites Creek - Updated AR&R 2019 Model Less Flood Study AR&R 1987

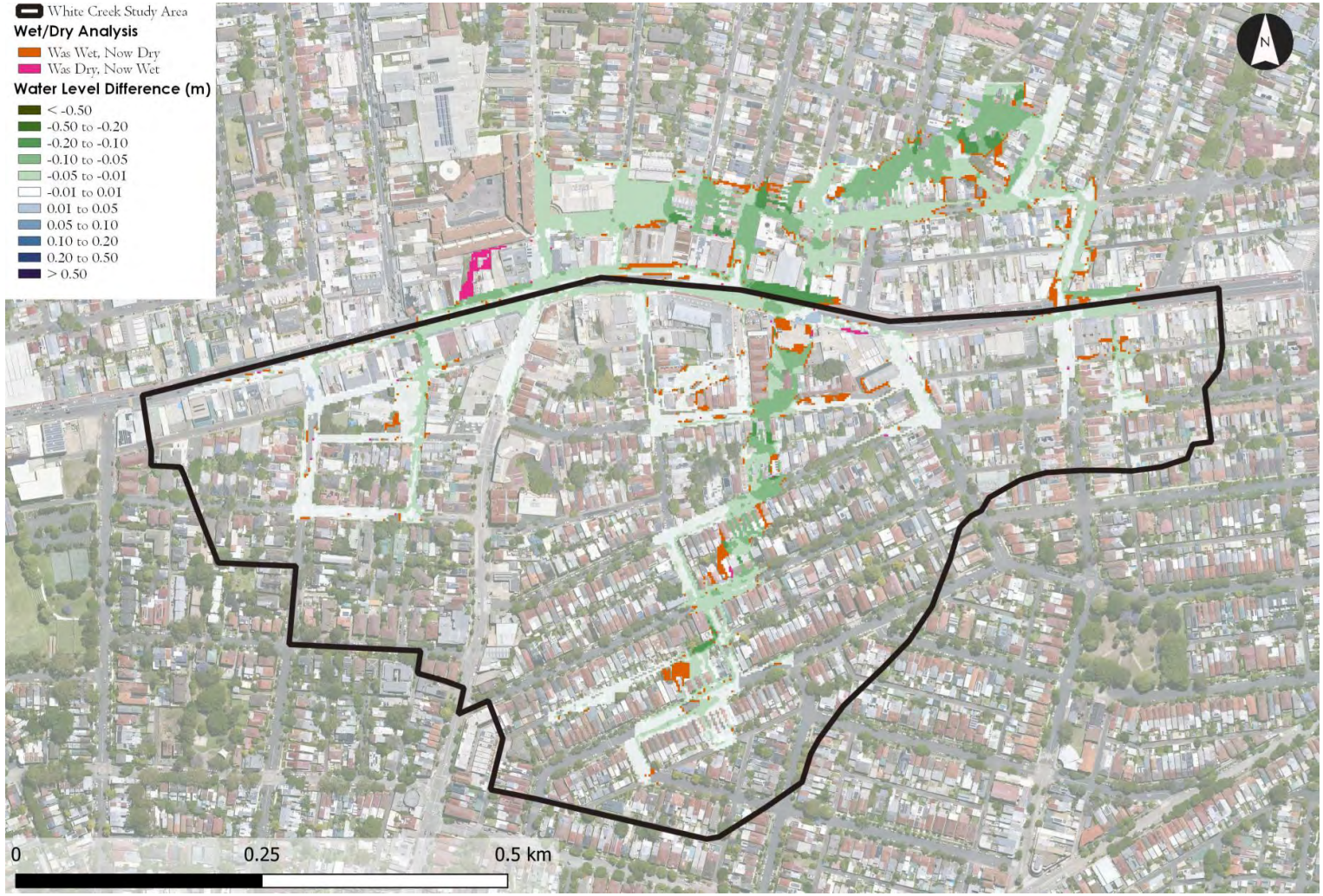

Figure 3-10 5% AEP Peak Water Level Differences – Whites Creek - Updated AR&R 2019 Model Less Flood Study AR&R 1987

4 Consultation

4.1 Consultation Process

Consultation with the community and stakeholders is an important component in the development of a Flood Risk Management Study and Plan. Consultation provides an opportunity to collect feedback and observations from the community on problem areas and potential floodplain management measures. It also provides a mechanism to inform the community about the current study and flood risk within the Study Area and seeks to improve their awareness and readiness for dealing with flooding.

The consultation strategy has been divided into three key sections:

- Consultation in FRMS&P development: This occurred during initials stages of the project (**Section 1.4)**-and involved both informing the community and stakeholders of the project and gathering information on existing flooding issues and suggestions for flood risk management options.
- Review of possible flood management options with key stakeholder groups including Council Engineers, Council Planners, NSW SES, NSW DCCEW and community representatives within Council's Flood Risk Management Advisory Committee.
- Public exhibition of Draft FRMS&P: This occurred in the final stage of the project, with comments sought from the community and stakeholders on the Draft FRMS&P report with this input reviewed and incorporated into the final FRMS&P.

The strategy has been developed in accordance with the IAP2 Quality Assurance Standard and the Inner West Council Community Participation Plan.

4.2 Consultation Plan and Engagement Techniques

A consultation plan was developed in the preliminary stages of this project involving the development of several engagement techniques to achieve the objectives of the two stages of the consultation process. Details of the plan are provided below in **Table 4-1**.

Table 4-1 Consultation Plan

Task	Description	Expected Outcome
Press Release	Stantec will draft a press release for Council's consideration and publication.	> Public awareness of the study. > Assist in engagement with the community through the newsletter/questionnaire, workshops and public exhibition. > Assist in the public acceptance of the study outcomes and implications for development and flood risk management in the future.
Stakeholder Consultation – Council	Relevant Council staff attended the inception meeting to discuss various input to the study and the proposed study approach. Key stakeholders will be consulted in an option development workshop to receive feedback on the preliminary options list.	> All available information is utilised in the preparation of the flood study. > Modelling incorporates the high risk areas. > Council objectives are achieved by the study.
Stakeholder Consultation – Flood Advisory Committee	Stantec will attend and present at four stakeholder meetings (which may include Flood Advisory Committee as deemed suitable) throughout the study.	> Update FRAC on the FRMS&P process. > Provide an opportunity for input from the FRAC on the mitigation options.
Stakeholder Consultation – Agencies	Stantec will contact relevant agency stakeholders (e.g. NSW SES, TfNSW) via letter and follow up email and/or phone.	> Inform the agencies of the study. > Obtain relevant information. > Provide an opportunity for input from the relevant agencies.

Task	Description	Expected Outcome
Community Newsletter and Questionnaire	Stantec will draft a newsletter and questionnaire for Council's consideration. Once finalised Council will print and distribute to target properties within the catchment. Responses will be via a reply-paid envelope. The brochure and survey will also be made available online by Council.	> Inform the community about the study and provide background information. > Identify community concerns and awareness > Gather information from the community on potential flood mitigation options. > Develop and maintain community confidence in the study results.
Website	Council will host a dedicated "Your Say" website for the project. The website will be utilised for media release, online newsletter and questionnaire providing residents with an opportunity to locate the area of flooding on a GIS based system and upload an associated photos/videos they may wish to share.	> Collaborative community engagement process. > Provide community opportunities to provide input/feedback. > Provide key information to the community.
Community Workshops	Stantec will prepare materials for and present at 2 community workshops. One workshops will be undertaken during Stage 2 of the study to get community feedback on the preliminary flood options, the other during Public Exhibition (see below).	> Provide the community with an opportunity to comment on flood mitigation options and an understanding of the outcomes of the Draft Study and Plan.
Public Exhibition Period	Stantec to draft a press release for Council's consideration and publication.	> Inform the community of the draft Study and Plan and invite submissions. > Inform the community of the workshop.
	Council will arrange for the public exhibition of the Draft Flood Risk Management Study and Plan. One community workshop will be undertaken during the public exhibition to present the outcomes of the study and receive feedback from the community.	> Provide an opportunity for the community to review and provide comment on the Draft Study and Plan.

4.3 Council Engagement

Given Inner West Council's role in commissioning this FRMS&P, it is important that Stantec maintain constant engagement with Council's project manager throughout the project. Furthermore, NSW Department of Climate Change, Energy and Water (DCCEW) have maintained an active role in project supervision throughout the project. Council engagement has been maintained through the following:

- An online project inception meeting was held on 12 January 2021 with Council and Stantec representatives in attendance. The inception meeting signified the commencement of the project and provided an opportunity for Council to outline the objectives and expectations for the study, and to provide initial guidance and direction.
- Meetings occurred as required between 2021 and 2022 as the project reached critical milestones and review points, however there were delays associated with COVID and the 2022 Flood Response.
- Fortnightly online project update meetings have been conducted since project recommenced model changes and option analysis on 24 January 2023 with Council, DCCEW and Stantec's project manager in attendance as well as other Stantec staff as needed. The update meetings have provided an opportunity for Stantec to update Council on the ongoing status of the project, and to ask Council for any clarifications or queries that arise during the project.
- Ongoing weekly option development and review workshops with Stantec and Council's technical working groups were held from August through to October. The list of attendees included Council's project managers and NSW DCCEW representatives for the project), as well as relevant stakeholders from technical teams in Council. The goal of the meetings was to seek feedback on the preliminary list of options and refine and identify a set of detailed options for assessment.

- Workshops were held on 13 and 27 July 2023 with Stantec, DCCEW, SES, City of Sydney Council and Council strategic, engineering and planning representatives to present an overview of the FRMS&P and the initial preliminary flood mitigation options.
- Additional weekly workshops were held with Council's project team and NSW DCCEW representatives during option development and modelling to review option outcomes and refinement of options. This allowed the options to be developed in light of Council and DCCEW preferences and advice.

4.4 Flood Risk Management Committee

One of the primary mechanisms by which the study team engaged in consultation with key stakeholders and the community is via the Inner West Flood Management Advisory Committee (FMAC) convened by Council. The Committee includes membership by the following individuals:

- Local community representatives,
- Local business representatives,
- Staff from Inner West Council who have involvement in the study including coordinators, managers, strategic planners, and engineers.
- SES representatives,
- Floodplain Engineer from NSW DCCEW.

The first FRAC meeting for the project was held mid-2022 to discuss the progress of the project and to present the outcomes of the Stage 1 report.

Further meetings were undertaken throughout 2023 to review, seek input, and shortlist proposed flood mitigation and management options for detailed assessment and costings.

The Draft FRMS&P was presented to the Committee for feedback and support for community exhibition in early 2024. The meeting provided an opportunity for the FRM Committee members to ask questions about the FRMS&P. During the meeting the committee endorsed this report to go on public exhibition.

Next FRM Committee meeting will present outcomes of the public exhibition, the comments received from the community and how these were applied to the Final FRMS&P report. This meeting is planned for 24 July 2024 prior to potential Council endorsement and adoption of the final study.

4.5 Initial Consultation

The initial consultation period was held from 7 March 2023 to 6 April 2023. The initial consultation period for this project was run jointly with the Alexandra Canal FRMS&P project. During this period the following materials were made available to the community:

> A dedicated community engagement page for the catchment on Council's Your Say website.was posted for the project,to inform the community about the project and for feedback. The text for the Your Say page has been included in **Appendix A**.

> Press release information for the study was posted to Council's social media and to Council's newsletter.

> Introductory letters were mailed to all owners and occupants of flood affected properties in the study area, which involved mail out to approximately 2,700 properties. The resident letter template provided an introduction to the study, and a link to the Your Say page for further information and a link to complete the online survey. The letter text is included in **Appendix A**.

> A resident online survey / questionnaire was hosted by Council through an online portal, with links to the online survey provided on the project's Your Say page. The survey text is included in **Appendix A.**

Three in-person information sessions were hosted by Council and attended by Stantec flood engineers and Council representatives. Notification of the in-person sessions was posted on the Your Say page and in the introductory letter (for the first session). The details for the three sessions were:

> St Peters Town Hall, 39 Unwins Bridge Road, St Peters on 15 March 2023 from 12.00 – 3.00pm

> St Peters Town Hall, 39 Unwins Bridge Road, St Peters on 15 March 2023 from 5.00 – 8.00pm

> Marrickville Pavilion, 313 Marrickville Road, Marrickville on 20 March 2023 from 12.00 – 3.00pm

4.5.1 Consultation Response Outcomes

Across the initial consultation period, there were 3 community attendees relevant to the Whites Creek and Johnstons Creek study area to the three in-person information sessions.

One of the 3 attendees was a resident from outside of the study area and asked questions about the flood modelling project. The other two attendees raised matters related to the study area, including one from Enmore as their area had been identified as a hot spot and mitigation options considered. A resident from Stanmore showed flood maps of the area and discussed flooding history, clarified that this is a FRMS&P study not to re-assess existing flood behaviour, clarified that DCP requirements were not applicable to existing dwellings, only the portion of new development, hence the reason the existing structure did not need to be raised in recent alterations.

With respect to Your Say outcomes from the initial consultation, there were 650 views of the project page, initiated by 501 unique visitors. The total viewing time of project information was approximately 7 hours. Two persons contributed to the interactive map, including:

- a submission noting that their property was located at the intersection of Salisbury Rd and Mallet St had experienced previous severe water damage of the lift pit and passenger lift infrastructure as a result of flooding at the intersection, incurring repairs and maintenance costs to the residents.
- a submission noting that road and footpaths on Lennox St Newtown are regularly flooded, even during moderate rainfalls and attached a photo from 2 April 2023 showing overflowing drains and gutters.

The adopted Flood Study was downloaded 49 times.

4.5.2 Online Survey Outcomes

Five community members shared their experiences of flooding via the online survey.

- 100% of respondents (5 of 5) were owner occupiers,
- 80% of respondents (4 of 5) declared that other parts of their neighbourhood had flooded since living/working in the catchment area,
- 80% of respondents (4 of 5) believed the flooding disrupted their daily routine,
- While 20% of respondents (1 of 5) suggested they believed lack of capacity in the stormwater network (e.g. pits and pipes) caused drainage systems to surcharge and backflow, 80% of respondents (4 of 5) believed other reasons were are the main cause of flooding in their area,
- 60% of respondents (3 of 5) would prefer management options of
  - culvert / bridge / increasing pipe size and/or capacity, and
  - and planning and flood related development controls to ensure future developments does not add to the existing flood risk.
- 80% of respondents (4 of 5) are concerned about the uncertainty of future climates and the possible impacts on flooding in their area,
- 100% of respondents (5 of 5) believed the climate is changing,
- 60% of respondents (3 of 5) are concerned about the impact of an uncertain climate on future flooding in the study areas,
- 100% of respondents (5 of 5) believe Council should be addressing the impacts of an uncertain future climate on flooding,
- 100% of respondents (5 of 5) gave permission for Stantec or Council to contact them to discuss the information they have provided Council.

4.6 Public Exhibition Period

The public exhibition period is an important stage of any regional Flood Study or FRMS&P as it provides the community and stakeholders the opportunity to provide comment and feedback on the draft outcomes of the study prior to finalisation.

The public exhibition period for this study was conducted from 4 June to 12 July 2024, a period of 5 weeks. The public exhibition period for this project was run jointly with the Whites Creek and Johnstons Creek FRMS&P During this period the following materials were made available to the community:

- An updated Your Say page was posted for the project, with links to the draft final FRMS&P report including appendices, background information for the study, frequently asked questions, an interactive map showing 1% AEP flood extents and sub-catchment boundaries, a study timeline, details of in-person sessions and a feedback submission section for any comments.
- Notification letters were mailed to all owners and occupants of flood affected properties in the study area (including the 1 in 100 Annual Exceedance Probability (AEP) flood extent and the Probable Maximum Flood (PMF) extent), which involved an extensive mail out. The letter notified of the draft report completion, and provided a link to the Your Say page for further information and details of the two in-person sessions.
- Four in-person information sessions were hosted by Council and attended by Stantec flood engineers and Council representatives. The details for the four sessions were (set-ups for both sessions shown in **Figure 4-1**):
  - Thursday 13 June 2024, 5-8pm, Marrickville SES, 17 Railway Road, Sydenham
  - Thursday 20 June 2024, 5-8pm, Marrickville SES, 17 Railway Road, Sydenham
  - Monday 24 June 2024, 1:30-4:30pm, The Pavilion, Marrickville Library
  - Tuesday 2 July 2024, 1:30-4:30pm, The Pavilion, Marrickville Library.

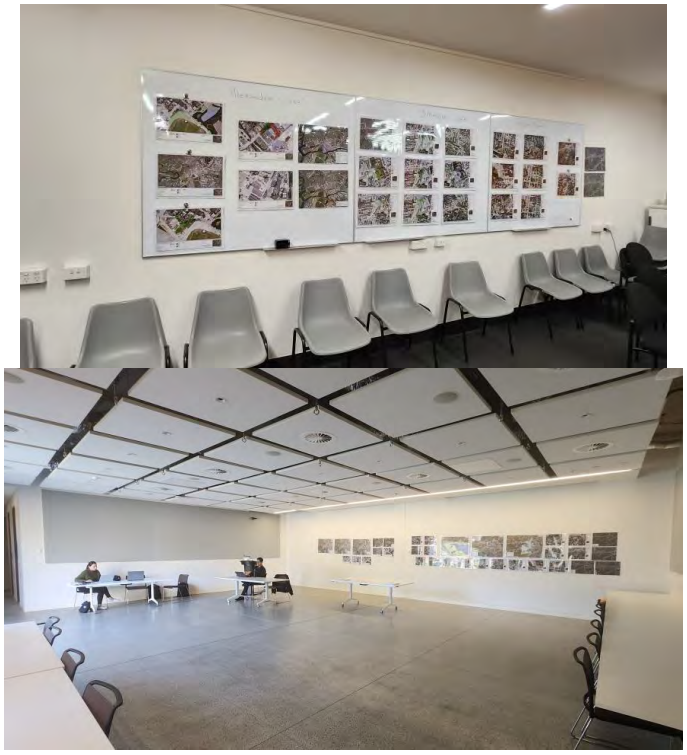

Figure 4-1 Public Exhibition In-Person Setups for Marrickville SES (Above) and The Pavilion, Marrickville Library (Below)

Public exhibition materials remained on display for SES representatives and volunteers in between the two Marrickville SES sessions (from 13 to 20 June 2024) as shown in **Figure 4-2**, including copies of the report, images of the mitigation options and mapping overview.

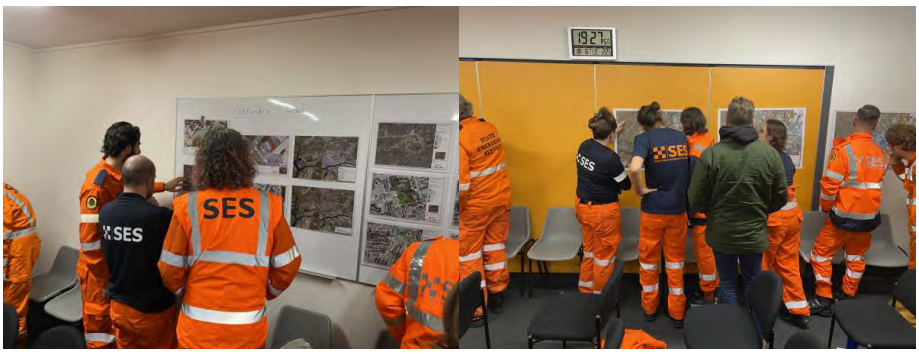

Figure 4-2 Public Exhibition In-Person Setup on display at Marrickville SES from 13 to 20 June 2024

4.6.2 Public Exhibition Response Outcomes

Across the public exhibition period there were 23 recorded responses across both Alexandra Canal FRMSP and Whites Creek and Johnstons Creek FRMSP through one of four response methods:

- Phone calls to Council by 4 different respondents in relation to the public exhibition of the study
- Your Say comment uploads (3 participants) and Your Say questionnaire responses (1 participant) by 4 total participants
- Email responses submitted to Council by 4 respondents
- 11 in-person attendees at the information sessions. These attendees consisted of 1 at the first session, 2 at the second, 7 at the third, and 1 at the fourth session.

Across all response methods, 1 comment (Your Say upload) related to Alexandra Canal FRMSP. All other responses were related to Whites Creek and Johnstons Creek catchment areas.

Although this represents a total of 23 engagements, it should be noted a number of households made several engagements for some households, most commonly residents attending in-person sessions often completed another form of response such as a Your Say written response or email.

With respect to Your Say outcomes from the public exhibition period, there were a total of 708 visits across both Alexandra Canal FRMSP and Whites Creek and Johnstons Creek FRMSP project pages. 459 of these visits were for Whites Creek and Johnstons Creek FRMSP. Additionally, there were 68 downloads of the report.

During the public exhibition period, Council provided stakeholders with the draft final FRMSP report. As part of this engagement,

- One comment was received from Sydney Water regarding the number of overfloor flooded buildings reported. A clarifying response was provided to Council via an email, to be passed onto Sydney Water.
- Council Strategic Planning team commented on the report. Clarifying responses were provided to Council via an email, and updates to the report were made where necessary.

4.6.3 Summary of Public Comments

The most common concerns received across the various forms related to the following:

- Localised stormwater issues not within the scope of flood risk, i.e. maintenance or drainage issues to be addressed by means of temporary solutions prior to the implementation of mitigation options or otherwise captured under Council's capital works
- General enquiries either outside of the catchment subject areas or requesting information about the FRSMP and the proposed mitigation options.

Specifically relating to the flood risk management options, the following comments were received during public exhibition:

- A concern was raised about flooding in the junction of Gladstone Street and Phillip Street in Enmore. The attendee communicated that the flooding was caused by insufficient drainage on King Street. There is a valid flood risk concern to properties further downstream of this intersection, which are subject to low flood island effects. These properties have been assessed to benefit from Option JC13. However, at the intersection where the concern was raised, the observed H5 hazard category within a 1% AEP event is contained within the road corridor. It is also understood that the further upstream King Street is a TfNSW owned asset. Due to these factors affecting feasibility comparative to flood risk benefits, it is unlikely for further proposed solutions in this location to be scored favourably in terms of CBR and MCA.
- A concern was raised about flooding to a property on Salisbury Road, Camperdown near Church Street in the Johnstons Creek catchment. There is a valid flood risk concern to these properties due to the trapped low point with H4-H5 hazard category of flooding within a 1% AEP event. No solution was proposed during option development due to high level feasibility issues resulting from the limited diameter of downstream pipes. It is noted that the subject pits are part of Council's capital works program, and that Council is currently progressing longer term feasibility assessments as part of a separate study. In the meantime, Council may implement an interim approach to mitigate flooding in the short-term including investigating the inlet capacity at that location.
- A concern was raised about Salisbury Lane, Stanmore near the inlets to the Johnstons Creek stormwater channel. The attendee provided images showing flooding of the street, caused by the invert levels of the inlet pipes sitting above the existing street surface level. The subject location is mostly H2 hazard, with minor spots of H3-H4 within a 1% AEP event. The feedback provided by the attendee merits public safety concerns, and it is understood that Council will investigate inlet capacity or drainage upgrades in this area separate from the FRMSP and as part of their capital works.
- Two concerns were raised regarding flood risk classification, insurance premiums and property values in the Johnstons Creek catchment. The community members for these areas did not consider their property to be flood affected. The Flood Study model has been reviewed as part of the FRMSP, and the assumptions used were found to be generally reasonable in line with industry best practice and guidelines. It is noted that these types of concerns relate to the previous Flood Study process where flood affectation of properties was assessed, whereas the focus of the FRMS&P engagement was on the proposed flood risk management options. On Australia Street, there is a proposed JC20 drainage upgrade option directly benefiting the affected properties in this subject area, which are subject to H4 hazard category of flooding within a 1% AEP event.
- A concern was raised regarding Corunna Street in the Whites Creek catchment. The attendee suggested the installation of raingardens additional to the proposed WC1 drainage upgrade option. The option types (i.e. drainage upgrade, road regrading, detention basin, etc) were developed with consideration of feasibility, cost and likelihood of scoring favourably in terms of CBR and MCA. The introduction of a raingarden, though may slow flows and improve water quality treatment in higher frequency events, is not likely to cause reductions to flooding downstream in larger rare events such as the 1% AEP. Council may wish to consider the benefits of installing raingardens as part of a separate feasibility study or included within the capital works program.
-

5 Flood Planning Review

5.1 Flood Affected Properties

A review of flood affected properties has been considered for the study area with a review of changes considered compared to the previous Flood Study property tagging.

The updated property list adopted the original Flood Study model results in creating flood extents. These flood extents apply the flood extent trimming of 0.15 metres depth. This more effectively removes minor sheet flows and shallow overland flows. A comparison of 1% AEP flood extents with and without the 0.15m depths filter is shown in **Figure 5-1**. The comparison shows that the untrimmed flood extents are significantly more widespread than the extents trimmed to 0.15 metre depth, showing there is significant areas of shallow sheet flow modelled in the TUFLOW model.

The number of floods affected properties for five design events are summarised in **Table 5-1** for Whites Creek and Johnstons Creek. Two forms of property tagging analysis have been considered:

> Any flood affectation of the property

> Flood extent covers at least 10% of the property area,

As has been adopted in other study areas by Council, the use of the 10% area tagged approach has been preferred. In the PMF event using the 10% property area approach, there are a total of 913 flood affected properties, or 14.2% of the total 6434 properties in the study area. In the 1% AEP the total number of affected properties is 409, or 6.3% of all properties.

Table 5-1 Flood Affected Property Numbers for Private and Developed Properties (Excluding Parkland Sites) for All Design Flood Events for Base Case Flood Extents

Property Tagging	Base Case Flood Affected Property				
	20% AEP	5% AEP	2% AEP	1% AEP	PMF
Flood Affected	770	1006	1107	1197	1906
>10% Area Affectation	197	300	368	409	913
				Total Properties in Catchment	6976

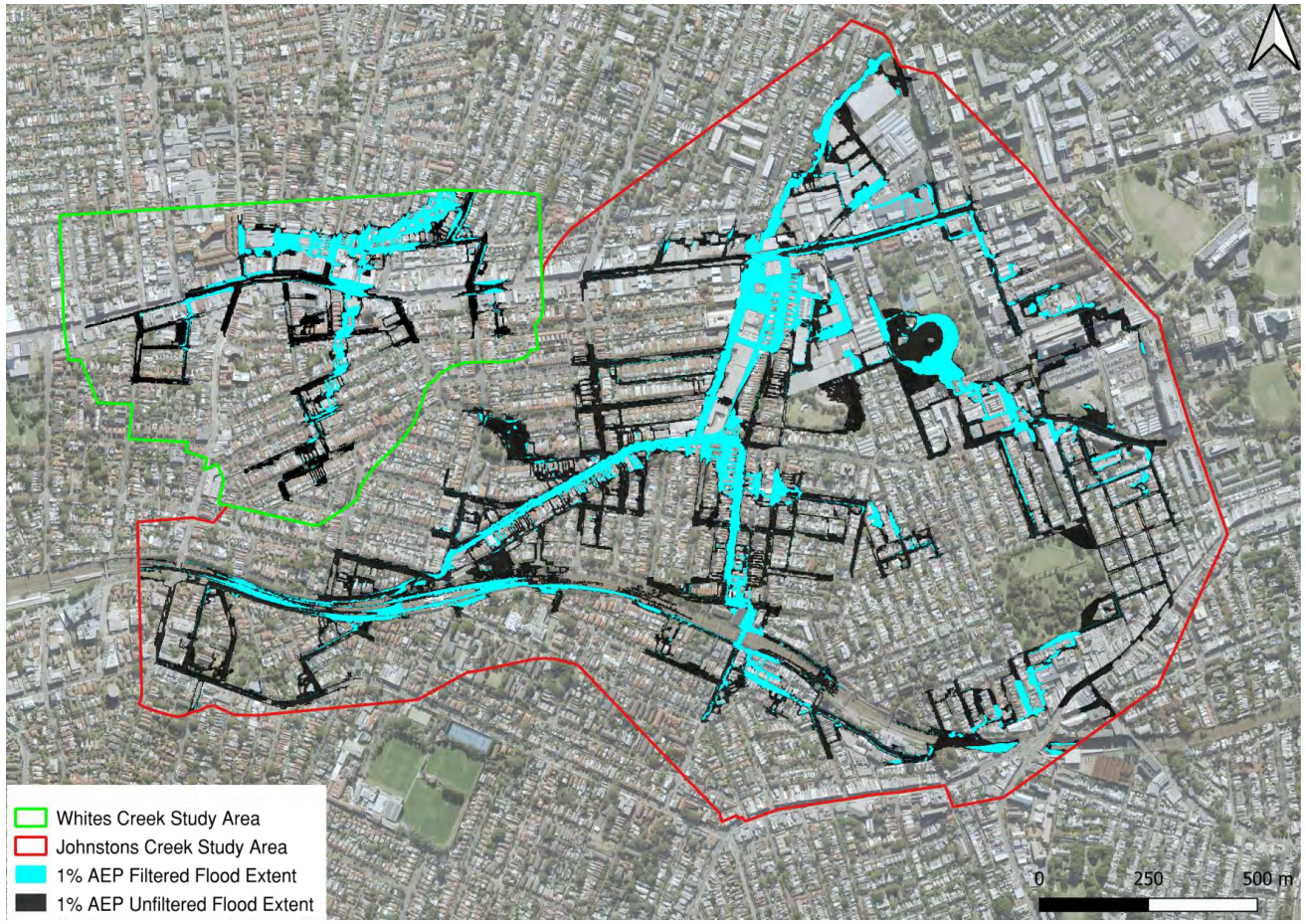

Figure 5-1 Comparison of 1% AEP Flood Extents With and Without 0.15m Depth Filter Applied

5.2 Relative Vulnerability for Development Types

The relative vulnerability of development types and their users to flooding should be considered in decision-making as it can influence risk to the community. Vulnerability to flooding can vary between development types and their typical users.

The 2023 FRM Manual guideline for Flood Impact and Risk Assessment (Flood Risk Management Guide FU01) in Table 6 provides a useful resource in providing a high-level summary of flood risk for different development types of users, buildings and their contents for the same flood exposure. The summaries from this guideline for development types relevant to this Study Area have been included in **Table 5-2**.

It is noted this guidance is a generalisation for development types, and the flood risk of any development will depend on site specifics and details of the development, not just these broad vulnerability assessments. However, this provides a useful resource in understanding the relevant flood risk of different land uses. It should be consulted in the review of current land uses and future development potential in the following sections."

Table 5-2 Relative Flood Risk & Vulnerability of Land Uses for the Same Flood Exposure (Source: NSW DCCEW, FRM Guide FB01)

Type of Use	Relative Risk Compared to Low Density Residential			Comment
	Users	Buildings	Contents	
Low Density Residential	Base	Base	Base	This is used as a baseline for considering relative impacts in other land uses
Medium/high density	Higher	Lower	Lower	Due to the higher density more people are involved but the buildings may be more structurally resistant to flooding. Contents may be less exposed to flooding as they may be over multiple levels
Emergency response management facility	Lower	Lower	Lower	Lower density of development and people
Aged care facility	Higher	Lower	Higher	Users on average more vulnerable in evacuation. Building may be structurally stronger. Potential for high value medical equipment
School	Higher	Lower	Lower	Users on average more vulnerable in evacuation. However, evacuation arrangements likely to be in place. Buildings and contents generally lower value
Correctional facility	Higher	Lower	Lower	May have challenges in the relocation of users therefore continued operation preferable. This relies on accessibility for staff and utility services. Buildings and contents expected to be generally of lower vulnerability
Commercial	Higher	Lower	Varies	Employees may be able to be trained to assist in response to flooding. Higher density of customers, who are likely to be unfamiliar with location or flood issue and therefore more vulnerable. Buildings expected to be generally of lower vulnerability. Contents varies substantially depending on the specific business
Industrial	Lower	Lower	Varies	Employees may be able to be trained to assist in response to flooding, customer density low, but they are likely to be unfamiliar with location or flood issue. Buildings expected to be generally of lower vulnerability. Contents varies substantially depending on the specific business
Hazardous/ offensive industry	Lower	Lower	Higher	Employees may be able to be trained to assist in response to flooding, customer density low, but they are likely to be unfamiliar with location or flood issue. Buildings expected to be generally of lower vulnerability. However, the impacts of hazardous or offensive materials could be significant and need to be considered. This may require management measures such as avoidance of flood-affected areas or effective containment of hazardous or offensive materials to limit impacts on the community or environment
Recreation	Lower	Lower	Lower	Occupied less and may be weather influenced but could be higher density of people when in use. Users often unfamiliar with flooding in the location. Buildings and contents expected to be generally of lower vulnerability or value

5.3 Future Development Potential in Flood Affected Land

5.3.1 Proposed Future Development Sites

In the preliminary stages of the project, Council reviewed submitted planning proposals within the study area and no planning proposal was currently active within the study area.

5.3.2 Future Planning Proposal Requirements

In mid-2021, NSW DCCEW released a new Flood Prone Land Policy Update. Included within this policy is a draft set of standard flood-related clauses for Local Environment Plans (LEPs) to assist local Councils. In addition, the update package included a local planning directive outlining flooding requirements in consideration of planning proposals.

A summary of the key requirements of the local planning direction for planning proposals and their relevance to the future development potential of Whites Creek and Johnstons Creek Catchment is included in **Table 5-3**.

To assist in the discussion of planning proposal requirements related to floodway and high hazard areas, these two maps for the 1% AEP have been overlaid on current land use zoning as shown in **Figure 5-3** and **Figure 5-4** respectively.

The outcomes from **Table 5-3** suggest that development and particularly potential intensification should be prioritised in the flood free portions of the study area where possible. However, the high-level review suggests there is still redevelopment potential within parts of the floodplain.

The guide on flood risk of development types summarised in **Section 5.2**, should be reviewed as a general guide when assessing potential future changes in land use in the floodplain.

Table 5-3 Planning Proposal Requirements and Relevance to Whites Creek and Johnstons Creek Catchment

Planning Proposal Requirement	Relevance to Whites Creek and Johnstons Creek Catchment
A planning proposal must not rezone land within the flood planning area from Recreation, Rural, Special Purpose or Environmental Protection Zones to a Residential, Business, Industrial or Special Purpose Zones.	Based on this requirement there is limited development potential for the flood affected portions of sites that are currently zoned as recreation or special purpose including parts of Stanmore Baptist Church, All Saints Anglican Church, Uniting Church in Australia as well as any zoned Council park sites.
A planning proposal must not contain provisions that apply to the flood planning area which:	
▪ permit development in floodway areas,	Assumed to be the 1% AEP floodway. As shown in **Figure 5-3** the floodway extents in the study area affect various residential areas, business and industrial areas as well as neighbourhood and local centres. Several areas of the Whites Creek and Johnstons Creek catchments may be limited by this requirement.
▪ permit development that will result in significant flood impacts to other properties,	This requirement would need to be assessed through flood impact assessments on a site-by-site basis with detailed assessment of proposed development plans
▪ permit development for the purposes of residential accommodation in high hazard areas,	Assumed to be the 1% AEP high hazard. As shown in **Figure 5-4** there are residential and business areas affected by high flood hazard, which may impact potential redevelopment of these sites in the study area.
▪ permit a significant increase in the development and/or dwelling density of that land,	This requirement will need to be considered in potential intensification of development in the floodplain. It is possible that intensification in flood affected areas may be feasible if flood risk is suitably addressed. However potential intensification should be prioritised in flood free portions of the study area.
▪ permit development for the purpose of centre-based childcare facilities, hostels, boarding houses, group homes, hospitals, residential care facilities, respite day care centres and seniors housing in areas where the occupants of the development cannot effectively evacuate,	These vulnerable development types should not be proposed within the 1% AEP floodplain where possible. As discussed further in **Section 7.3.2**, there are a number of these existing vulnerable developments within the floodplain, the alteration of these sites to improve flood risk should be considered.
▪ are likely to result in a significantly increased requirement for government spending on emergency management services, flood mitigation and emergency response measures, which can include but are not limited to the provision of road infrastructure, flood mitigation infrastructure and utilities, or	Further review of flood emergency management concerns for the study area is included in **Section 7**. Development potential in identified flood emergency hotspots should be avoided based on this requirement. That is unless a potential redevelopment could justifiably be shown to reduce the emergency response burden for an existing site.
▪ permit hazardous industries or hazardous storage establishments where hazardous materials cannot be effectively contained during the occurrence of a flood event.	This may be of concern for the light industrial zoned, flood affected areas in the Johnstons Creek catchment.
A planning proposal must not contain provisions that apply to areas between the flood planning area and probable maximum flood to which Special Flood Considerations apply which include items listed above.	Similar to the above response, vulnerable developments should not be prioritised within PMF affected lands where possible. This also relates to critical infrastructure types for flood emergencies (refer to **Section 7.3**).
For the purposes of preparing a planning proposal, the flood planning area must be consistent with the principles of the FRM Manual 2023 or as otherwise determined by a Flood Risk Management Study or Plan adopted by the relevant council.	The flood planning level should be maintained at the 1% AEP plus 0.5 metre freeboard as in the Inner West LEP and is recommended in the current Flood Prone Land Policy Update. There is no clear evidence that flood behaviour in the study area would justify an alternative FPL.

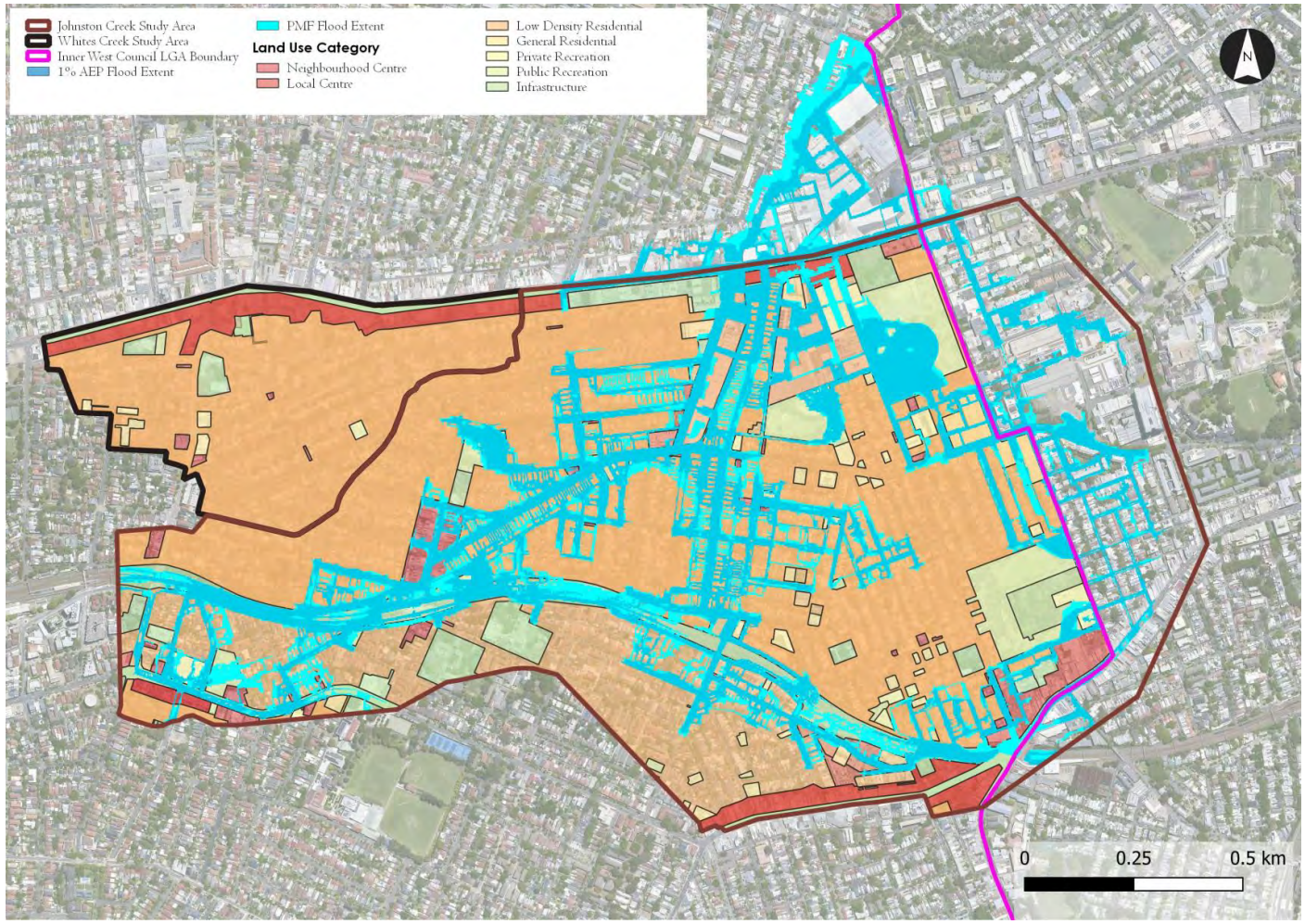

Figure 5-2 Current Land Use Zoning with 1% AEP and PMF Extents

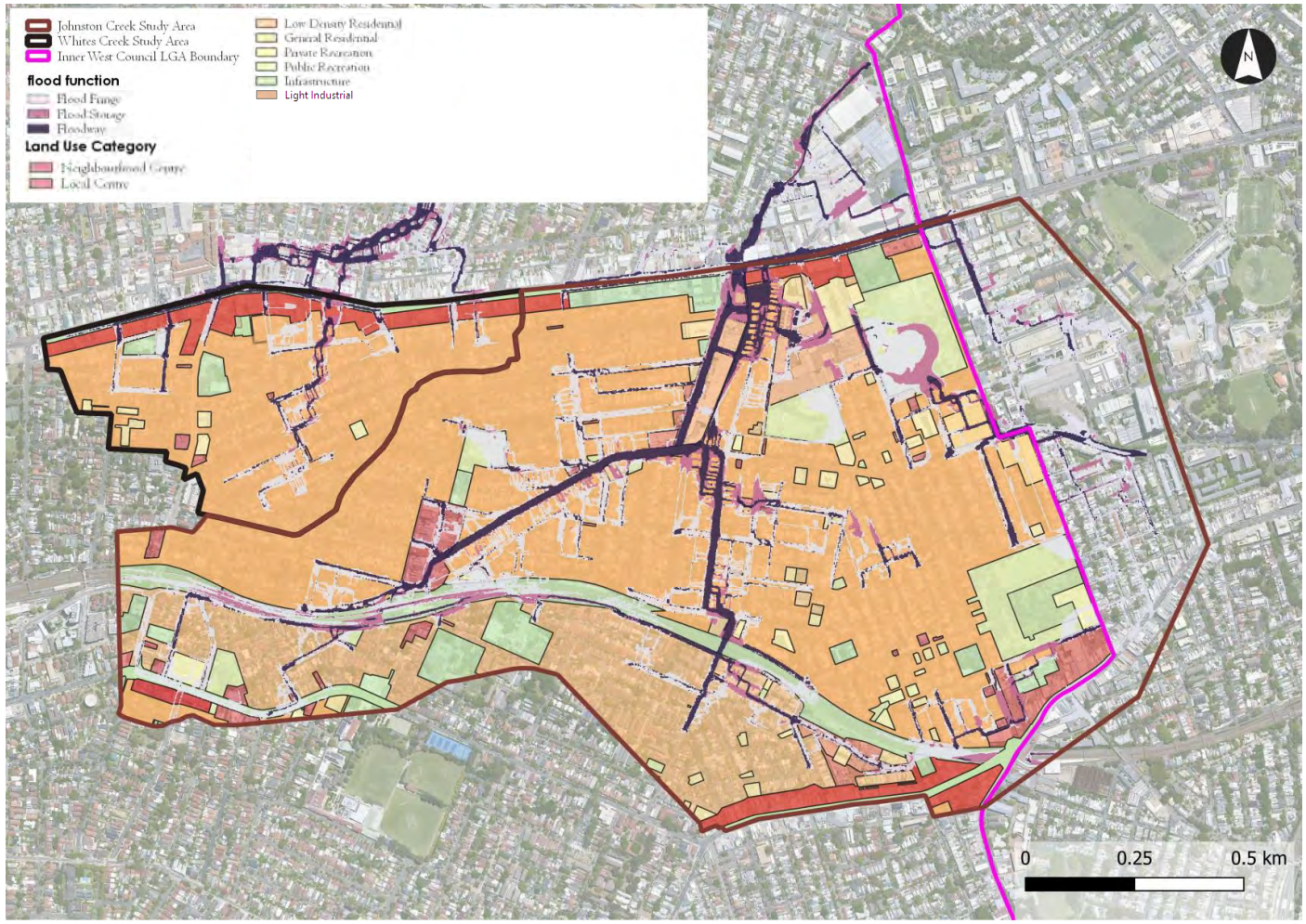

Figure 5-3 1% AEP Flood Function with Floodway on Current Land Use Zoning

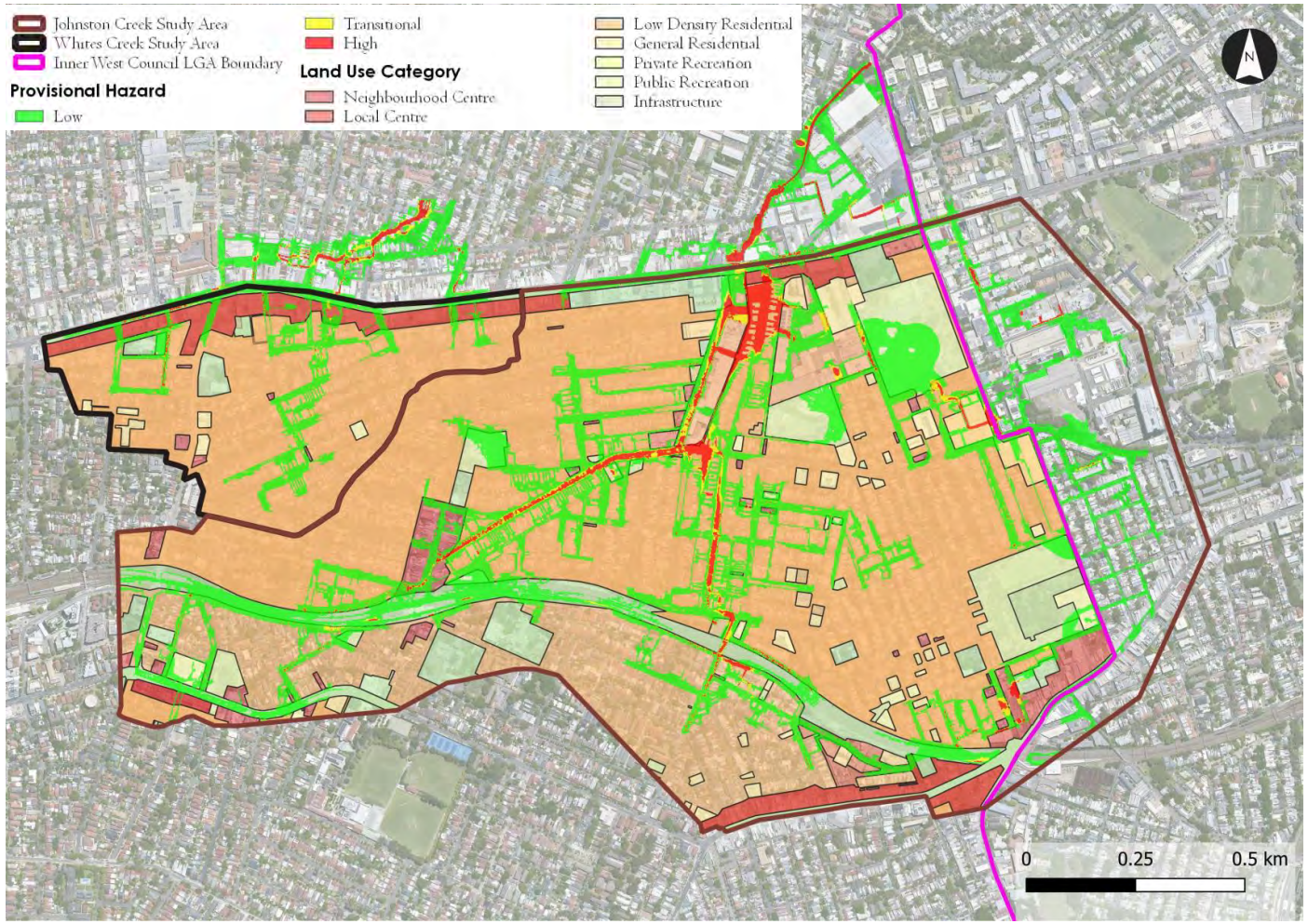

Figure 5-4 1% AEP Provisional Hazard with High Hazard on Current Land Use Zoning

5.4 Flood Related Development Controls

The Whites Creek Catchment and Johnstons Creek Catchment are located in the Inner West LGA where development is controlled through the Local Environment Plans (LEP) and Development Control Plan (DCP). The following sub-sections summarise the flood-related development controls for these documents and provide recommendations.

5.4.1 Local Environment Plan

The Whites Creek Catchment and Johnstons Creek Catchment lie within the Inner West LGA, therefore the relevant document is the Inner West Local Environmental Plan 2022.

As noted in previous sections, in mid-2021, NSW DCCEW released a new Flood Prone Land Policy Update. Included within this policy is a draft set of standard flood-related clauses for Local Environment Plans (LEPs) to assist local Councils. The 2021 package establishes two different categories, and two associated standard Local Environment Plan (LEP) clauses where flood-related development controls may be applied / considered. These are:

- Flood Planning Areas (FPAs): The 'flood planning' LEP clause is mandatory and the LEPs of all Councils in NSW were amended on 14 July 2021,
- Special Flood Considerations (SFCs): The 'special flood consideration' LEP clause is optional, and Councils decide whether to adopt this clause or not. If Councils choose to adopt the optional standard instrument SFC provision, it must be adopted without variation but subject to any relevant direction in the standard instrument (cl 4(2), SI order).

5.4.1.1 Mandatory LEP Clause - Flood Planning Area

Clause 5.21 outlines the requirements for developments in the FPA which is all land under Flood Planning Level (FPL), which in accordance with the FRM Manual 2023 is typically defined by the 1% AEP (1 in 100 AEP) event with a 0.5 metre freeboard. Councils are permitted to propose alternate FPLs, however they are required to demonstrate and document the merits of any decision based on a risk management approach. The land this clause applies to is essentially unchanged from the previous standard LEP clause.

The main updates to the mandatory standard flood related clause include:

- Several new objectives have been added to the updated text including a reference to cumulative impacts, enabling safe and appropriate uses of land, and enabling safe evacuation from the land,
- The requirements for development consent have been updated with reference to:
  - Compatibility to flood function (floodway, flood storage and flood fringe),
  - No offsite flood impacts and the impact of the development on projected changes to flood behaviour (accounting for climate change),
  - There is a reference to safe occupation and efficient evacuation of people and not to exceed the capacity of existing evacuation routes for the surrounding area. Similarly, also stated in the clause is whether the development incorporates measures to minimise the risk to life and ensure the safe evacuation of people in the event of a flood,
  - The intended design and scale of buildings resulting from the development, and the potential to modify, relocate or remove buildings resulting from development if the surrounding area is impacted by flooding.

Review of the draft Inner West LEP shows that the wording of the flood planning section 6.3 reflects this updated wording as is mandatory.

5.4.1.2 Optional LEP Clause – Special Flood Considerations

A new optional flood clause 5.22 has been added to the update called the 'Special Flood Considerations' (SFC) clause. The clause applies to all land between FPA and the PMF, an area that was not covered within the previous standard LEP clause. The types of development this optional clause would apply to includes vulnerable developments and critical infrastructure. In relation to the Special Flood Considerations (SFC) Clause 5.22, as stated within the guideline document:

….this is an optional provision of the Standard Instrument and Councils have the discretion whether to adopt the clause in a LEP in their LGA, provided they have appropriate information and justification to support the flood related development controls. Studies under the FRM process, as well as emergency management planning processes and relevant strategies and plans developed by NSW Government may provide information and support justification for the adoption of the clause.

Inner West Council has adopted the optional LEP clause 5.22 for land between the FPA and the PMF. Therefore, both LEP clauses 5.21 and 5.22 for the FPA and the PMF will be applicable.

5.4.2 Current Development Control Plan

The Whites Creek Catchment and Johnstons Creek Catchment lies within the former Marrickville Council LGA, therefore the relevant document was the Marrickville DCP 2011. This review relates to the Marrickville DCP 2011, Part 2.22 - Flood Management.

Section 2.22.2 – Land Affected complements Clause 6.3 (Flood planning) (currently Clause 5.21) of Inner West Local Environmental Plan 2022 (Inner West LEP 2022). It applies to:

- land identified on the DCP 2011 Flood Planning Area Map (**Figure 5-5**). Flood planning area include:
  - Flood planning area (Cooks River) that land likely to be affected by the 1% AEP flood, factoring in a rise in sea level of 400mm to the year 2050, (plus 500mm freeboard) of the Cooks River; and
  - Flood planning area (Overland Flow) that identifies land (in accordance with Council's Flood Tagging Policy) likely to be affected by the 1% AEP flood associated with various locations affected by local overland flooding.
- land identified as being flood liable land on the DCP 2011 Flood Liable Land Map (**Figure 5-6**). Flood liable land identifies land within a flood planning area, and land likely to be affected by the probable maximum flood (PMF) of the Cooks River. This means that the map identifies some land as being within the Cooks River PMF area, but not within the Cooks River 100-year flood (plus 500mm freeboard) area.

It should be mentioned that he Marrickville DCP 2011 incorporates twelve amendments. Amendment No. 7 relates to amendments to Part 2.22 – Flood Management, to incorporate an updated Flood Planning Area Map and an updated Flood Liable Land Map, came into force on 6 July 2018.

Flood classifications have been applied to parts of the Flood Planning Area (Cooks River). The flood classifications are:

- Low hazard: Should it be necessary, people and their possessions could be evacuated by truck. Able bodied adults would have little difficulty wading out of the area.
- High hazard: Possible danger to life, evacuation by truck difficult, potential for structural damage, and social disruption and financial losses could be high.
- The identified areas, and their flood classifications, are:
  - Riverside Crescent/Tennyson Street area (Marrickville and Dulwich Hill): Low hazard to high hazard.
  - Illawarra Road/Wharf Street area (Marrickville): Low hazard to high hazard.
  - Carrington Road area (Marrickville): Low hazard.
  - Bay Street area (Tempe): Low hazard to high hazard.

Flood management controls apply as follows:

> For land in a flood planning area, the controls apply to all development that requires development consent.

> For land that is flood liable land, but that is not in a flood planning area (land within the Cooks River PMF), the controls also apply to caravan parks, childcare centres, correctional centres, emergency services facilities, hospitals, residential accommodation (except for attached dwellings, dwelling houses, secondary dwellings and semi-detached dwellings), and tourist and visitor accommodation.

The development controls for the former Marrickville LGA (the DCP 2011) are derived from a development nature approach. The procedure to determine what controls apply to proposed development involves:

> Section 2.22.5 of the DCP identifies the category of the development which are grouped into the following:
  - New residential development
  - Residential development – minor additions
  - Non-habitable additions or alterations
  - New non-residential development
  - Non-residential development – additions
  - Change of use of existing buildings
  - Subdivision
  - Filling of land within the Flood Planning Area
  - Land uses on flood liable land identified on the DCP 2011 Flood Liable Land Map
  - Garages, carports, open car parks and basement garages.

There are twenty-nine development controls. **Table 5-1** indicates which flood management control applies to which type of development. Flood management controls are provided in **Appendix B**.

Table 5-4 Development Relevant Flood Management Controls

Development	Flood Management Control
General (applicable to all types of development)	C1, C2, C3, C4
New residential development	C5, C6, C7
Residential development – minor additions	C8, C9, C10
Non-habitable additions or alterations	C11, C12
New non-residential development	C13, C14
Non-residential development – additions	C15, C16
Change of use of existing buildings	C17, C18
Subdivision	C19, C20
Filling of land within the Flood Planning Area	C21
Land uses on flood liable land identified on the DCP 2011 Flood Liable Land Map	C22, C23, C24
Garages, carports, open car parks and basement garages	C25, C26, C27, C28, C29

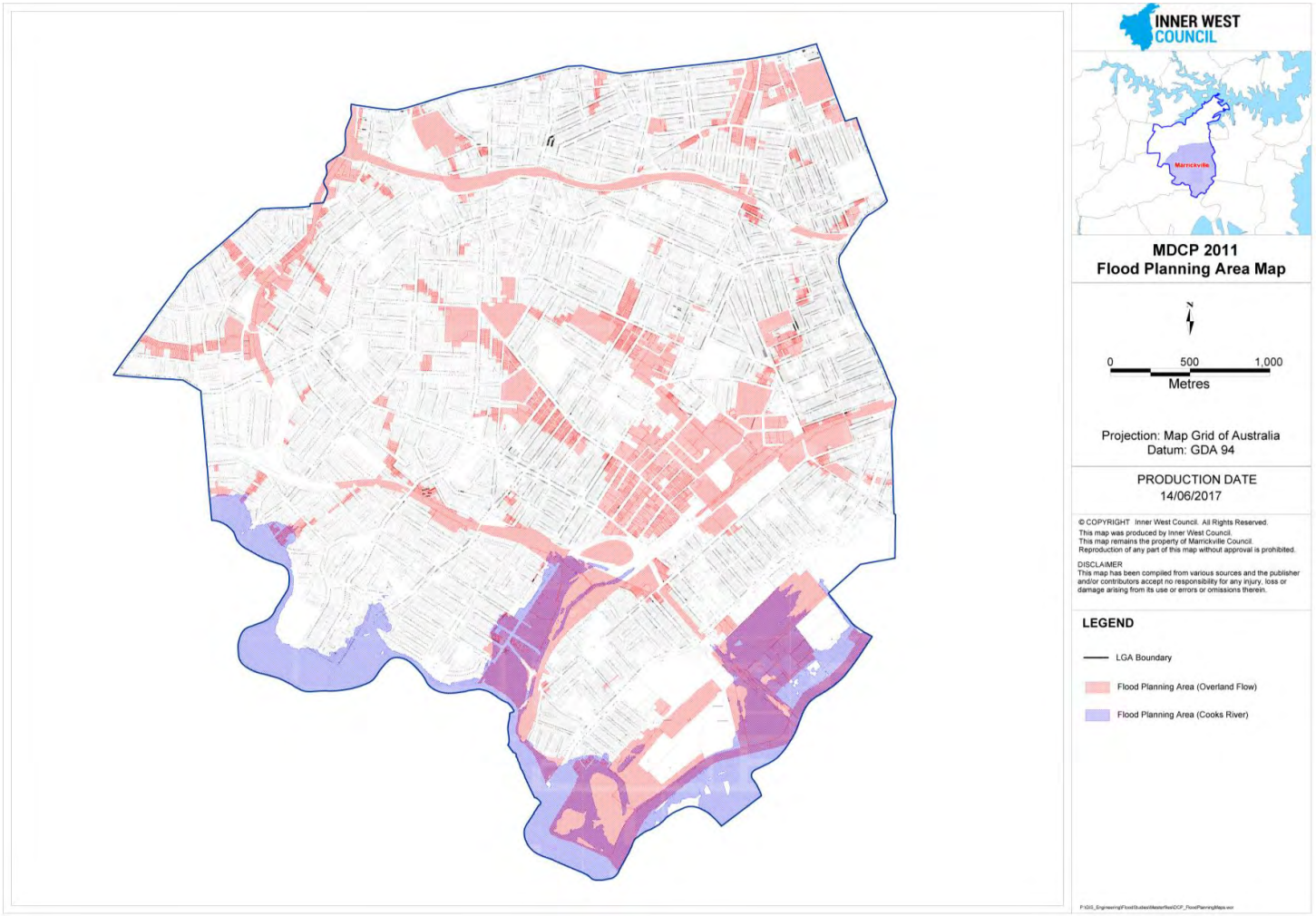

Figure 5-5 Marrickville DCP 2011 Flood Planning Area Map

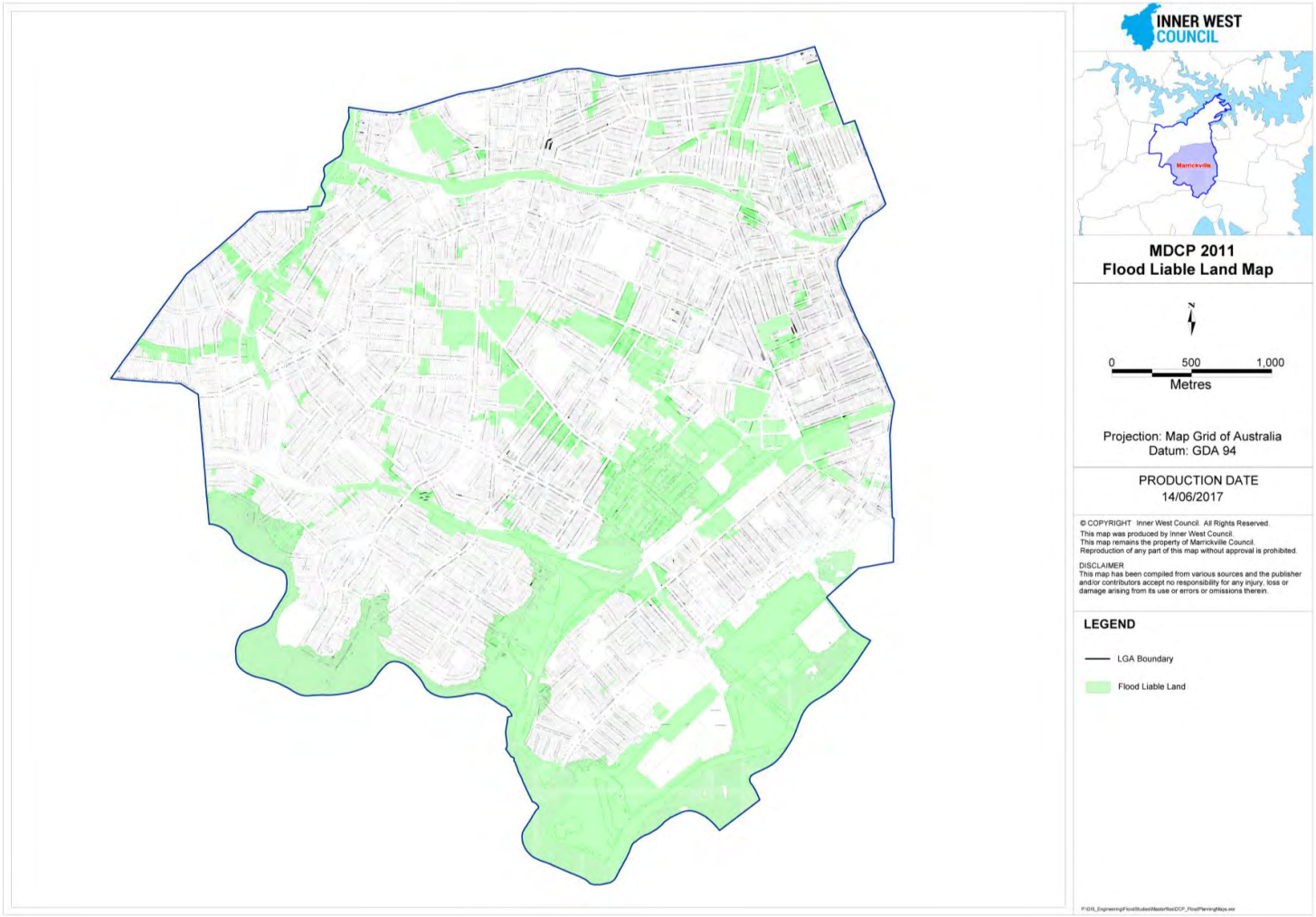

Figure 5-6 Marrickville DCP 2011 Flood Liable Land Map

5.4.3 Flood Impact and Risk Assessment Requirements

More recent guidance for applicant flood impact assessments is included within the 2022 FRM Manual guideline for Flood Impact and Risk Assessment (Flood Risk Management Guide FU01). The guideline provides details on the preparation of both simple and detailed Flood Impact and Risk Assessment (FIRA) for developments. The recommended preparation of a FIRA for developments should consider (as outlined in Section 3 of the FU01 guide):

- Proposed development: The proposed development needs to be shown with the necessary detail.
- Existing and developed model scenarios: The consent authority will need to ensure that flood modelling and/or analysis is sufficient to identify and assess the existing flood conditions and to determine post developed flood impacts and risks. Assessment needs to consider the key details of the final proposal, including development type and density (changing runoff characteristics), infrastructure, proposed modification to waterways or floodplain landform or vegetation.
- Impacts to be addressed: The consideration of development impacts is recommended to extend beyond flood level impacts only, with the table of impacts recommended to consider provided in **Table 5-5** below.

Table 5-5 Typical considerations when assessing impacts due to development (Source: NSW DCCEW, FU01 Guide)

Key considerations	Reasons for considering
Flood level change	• May increase inundation and damage to existing development • May inundate additional existing development • May create new or larger floodways or flowpaths • May isolate new areas
Change in duration of flooding	• May increase damage • May increase duration of isolation
Velocity change	• May increase scour potential and/or damage to buildings
Change in warning and evacuation time	• May decrease available warning time and time available for evacuation
Change in frequency of inundation	• Properties may become flood affected in more frequent events • Access may be cut more frequently • Areas may be isolated more frequently
Flood function categorisation change	• May change categorisation (e.g. flood storage to floodway) and change impacts on flooding on existing development
Hazard categorisation change	• May reduce safety to vehicles, people or buildings

- Managing residual flood risk: In many situations there will be opportunities to limit the increase in risk due to development, however, available options will vary depending on the stage and scale of the development being considered. Typical risk considerations include the risks to people, property and infrastructure, including the ability of the occupants to respond in an emergency. Residual risks will remain after management measures and development controls have been applied. A list of measures available to minimise the increase in flood risk to large and small-scale development are in **Table 5-6**.

Table 5-6 Typical measures to minimise impacts due to development (Source: NSW DCCEW, FU01 Guide)

Multi-lot, large-scale development	Individual, small-scale development
Include strategic management considerations and measures: • avoid floodways and flowpaths • avoid other highly flood constrained areas • provide management measures to manage risks to existing development • consider compatibility of land uses/ development types with the flood constraints on the land • determine and apply controls required to manage risk to the development and its users • consider emergency response issues and options and provide management measures consistent with advice from emergency services	Generally: • avoid floodways and flowpaths • avoid other highly flood constrained areas • apply controls to manage the risk to the development and its users: • management and design measures • structural considerations • floor level controls

The guide notes that documentation should ensure the intent of the approval is clear and maintained for the life of the approved development. This may include the need for conditions that consider:

> Limiting impacts and risks posed to the development and future occupants to ensure these have been appropriately managed. Consent conditions are to incorporate the key requirements to ensure these aspects are addressed. This may include the need to apply flood related controls such as those that nominate minimum fill or floor levels, structural considerations, management measures, address site egress, ensure the safety of occupants during flooding, and restrict unapproved modification to key elements of the development as approved in the consent.

> Management measures required to be considered in a staged manner as necessary to manage risks to the existing community.

> Inclusion of all design reports and drawings in the consent to ensure these are consistent with key parameters used in post development modelling and analysis that formed the basis of the FIRA.

> Modification of key design features of the development that may alter flood behaviour. This may require an additional approval with supporting modelling and/or reporting to ensure impacts of post developed flood risks are either in accordance with the original approval or are within the tolerable levels as defined by the consent authority.

> How risks and impacts of the development change with future climatic conditions.

> Any other specific requirements for consideration by the proponent to manage flood risk.

5.4.4 Conclusion of Review of Development Controls

Upon review of the flood-related development controls within the formerly Marrickville DCP 2011, the following general comments are noted:

- Compared to the requirements for planning proposals outlined within the 2021 Flood Prone Land Policy Update (refer to **Section 5.3.2**), the current development controls are generally in agreement with one exception:
  - The controls do not permit (only) filling of floodways or high flood hazard areas. Regarding the policy requirement for no residential accommodation in high hazard areas, there is a relevant control for new residential development enforcing flood free access must be provided where practicable.
  - The controls require filling of land within the Flood Planning Area (Control C21)
    - not increase flood levels by more than 10mm,
    - not increase downstream velocities by more than 10%,
    - not redistribute flows by more than 15%,
    - the potential for cumulative effects of possible filling proposals in that area is minimal,
    - the development potential of surrounding properties is not adversely affected by the filling proposal,
    - not increase the flood liability of buildings on surrounding properties, and
    - no local drainage flow/runoff problems.
- This is similar to requirements within the policy.
  - Requirements for storage of goods and hazardous materials is consistent.
  - Emergency management requirements are similar, though the controls are more prescriptive outlining refuge and evacuation requirements more specifically which is beneficial to aid applicants.
  - There is not a control that does not permit vulnerable and critical developments below the PMF level, similar to the requirements of the policy relating to these types of developments. Consideration should be given to amending the DCP to specifically address flood risk in vulnerable and critical developments,
- Compared to the requirements for FIRA from the 2022 FRM Manual Guide FU01. Generally, the current development controls are in agreement with the proposed requirements in the guide with some exceptions:
  - The current controls do not require consideration of climate change in assessments.
  - The current controls do not specifically require a consideration of residual risk of proposed developments to confirm if flood risk is lower than existing based on proposed risk management measures for developments.
- The development matrix approach offers a simple platform to be able to apply development controls specific to development types.

Ultimately, the current controls are generally fit for purpose, some alterations to the current development controls should be considered to bring it in accordance with recent guidance both within the 2021 Flood Prone Land Policy Update and the 2022 FRM Manual Guide FU01. This may include the following key changes from the bullet points above:

- setting controls to allow for no new residential accommodation in high hazard areas in accordance with the policy requirement,
- setting controls to reduce flood hazard and associated risk to existing residential accommodation in high hazard areas,
- setting controls that consider the higher flood risk of vulnerable and critical developments below the PMF level, and
- consideration of climate change in assessments.

6 Economic Impact of Flooding

The economic impact of flooding can be defined by what is commonly referred to as flood damages. Flood damages are generally categorised as either tangible (direct and indirect) or intangible damage types, these types are summarised in **Table 6-1**.

Table 6-1 Types of Flood Damages

Type	Description
Direct	Building contents (internal) Structural damage (building repair) External items (vehicles, contents of sheds, etc.)
Indirect	Building contents (internal) Structural damage (building repair) External items (vehicles, contents of sheds, etc.)
Intangible	Social (increased levels of insecurity, depression, stress) Inconvenience (general difficulties in post-flood stage)

The direct damage costs, as indicated in **Table 6-1**, are just one component of the entire cost of a flood event. There are also indirect costs. Together, direct, and indirect costs are referred to as tangible costs. In addition to tangible costs, there are intangible costs such as social distress. The flood damage values discussed in this report are the tangible damages and do not include an assessment of the intangible costs which are difficult to calculate in economic terms.

The purpose of a flood damage assessment is to support decision-making on FRM options. It provides the basis for understanding the scale of benefits or disbenefits FRM measures may have on flood damages to the community. The damage assessment is not intended to be a precise estimate of damage at a given location. Rather, it is intended to provide a reasonable understanding of the relative scale of damage across the study area (focusing on aspects that will be materially changed by FRM measures) and how this may be altered with the implementation of FRM measures.

6.2 Input Data

6.2.1 Building Footprints

The primary flood damage calculation relates to building damages, being structural, contents, relocation, and clean-up costs. Therefore, building damages have been calculated for each individual building footprint, based on the building footprint layer provided by NSW DCCEW.

Commonly in the past flood damages were calculated on a per property basis rather than a per building basis. The adopted damage per building calculation provides a more accurate determinant of flood affectation due to the following reasons:

- Properties may have multiple buildings in the one property therefore damages can be calculated per building and added together,
- Flood model results can be considered only within the building footprints to provide a more accurate localised picture of flood affectation. On a property basis, flooding far removed from building footprints may misrepresent flood affectation near the building where the majority of flood damages are caused.

Therefore, the bulk of flood damages calculation has been conducted based on NSW DCCEW building footprints. The exception is for external (garden) damage which has been considered on a per property basis and then added to the cumulative building damages for each property to create a combined total damage.

6.2.2 Building Types

The adopted damages approach allows for unique classification of flood damages based on the type of building that were able to be determined for each building across the study area. Building types were derived for each building footprint based on building type provided in the NSW DCCEW footprint layer and confirmed through site visit observations, and Google Streetview observations. For example, all 1% AEP flood affected residential

classed properties were inspected from site visit photos or Google Streetview to confirm if they were single or double storey. The building types were classified as follows:

> Residential building types:
  - Single storey:
  - Double storey,
  - Multi-unit,
  - Townhouse.
> Non-residential building types:
  - Low to medium being restaurants, cafes, offices, surgeries, retail outlets, service stations, hardware stores,
  - Default average,
  - Medium to high being chemists, electrical goods, bottle shops, electronics.
> Public buildings:
  - School
  - Hospital
  - Other

Note that all secondary buildings such as garden sheds and garages in residential properties were excluded from damages calculations. In total, when removing secondary buildings there were a total of 909 buildings assessed in the flood damages calculation across the catchment.

The number of dwellings per building footprint were also estimated based on aerial images, site visit observations and Google Streetview. In addition, residential properties were grouped by size with small being less than 135 m^2, medium being between 135 – 200 m^2, default being between 200 – 230 m^2 and large being 230 m^2 or greater.

6.2.3 Floor Levels

Floor levels for all building footprints have been adopted in the damages calculation through one of two methods:

- Based on floor levels survey for the building for surveyed buildings in the study area. The floor level survey data is summarised in **Section 3.5**.
- For non-surveyed buildings, the following floor level estimation process was applied:
  - The average ground level for the building footprint was calculated using the TUFLOW model terrain.
  - Using Google Streetview, an approximate floor height above ground levels was estimated. This floor height was typically 0.15 metres for slab-on-ground type construction, 0.3 metres for normal construction and 0.6 metres for higher suspended floor type buildings.
  - The estimated floor level was calculated from average ground floor of the building footprint plus the approximate floor height above ground.

6.2.4 Hydraulic Model Results

To inform the flood damages calculation, a range of base case model results were assessed for all five design flood events, 20%, 5%, 2% and 1% AEP and PMF events. The results were applied as max values across the building footprints:

- Maximum water levels for footprints were determined for each design event,
- Maximum depth results for footprints were determined for each design event, and,
- Maximum H1-H6 hazard category within the footprint were determined for each design event.

In addition, to inform external (garden) damage calculation, the maximum flood depth for properties were calculated for each design event.

6.3 Flood Damages Methodology

Flood damages can be assessed by several methods including the use of computer programs such as FLDamage or ANUFLOOD, or via more generic methods using spreadsheets. For the purposes of this project, the recently released 2023 Flood Damages Tool (DT01) prepared by NSW DCCEW as part of the FRM Manual 2023 has been adopted for calculation of building damages, with external damages calculated using in-house spreadsheet analysis as summarised in the following sub-sections.

6.3.1 New Flood Damages Tool

This flood damages analysis has been based on the Flood Damages Tool (DT01) prepared by NSW DCCEW as part of the FRM Manual 2023. The damages tool is supported by Section 3 of the Flood Risk Management Measures - Flood Risk Management Guide MM01 which provides background and guidance on the use of the tool.

The methodology outlined within the damages tool is an improved and more detailed calculations than previous damages tools. The damages tool DT01 provides the following advantages over past damages tools provided by the NSW Government:

- It provides not only residential damages for single and double storey houses similar to past tools, but it also provides damages curves for commercial and public infrastructure buildings and specific public buildings,
- The methodology also allows for calculation of risk to life projected costs based on the H1-H6 hazard categorisation of the building,
- It allows for damages estimation based on building footprint areas providing additional detail in analysis.

Therefore the DT01 damages tool was ultimately considered suitable for adoption in this study.

6.3.2 Calculation Parameters

The damages tool DT01 curves are derived for late 2019, and as part of this Study were updated to represent late 2022 dollars (only quarter 1 2023 inflation data available at the time of this report).

General recommendations in the damages tool and guideline are to adjust values in residential damage curves by Consumer Price Index (CPI). The most recent data for CPI from the Australian Bureau of Statistics at the time of the assessment was for March 2023. Therefore, all ordinates in the residential flood damage curves were updated to March 2023 dollars (CPI 132.7) from December 2023 dollars (CPI 130.9).

Consequently, all ordinates on the damage curves were increased by 1.38% compared to the curves presented in the flood damages tool DT01.

6.3.3 Damage Curves for Overfloor Flooding Depths

Residential and non-residential flood damages are generally assessed based on assessments of structural damage, damage to contents, external damage, relocation costs and clean-up costs. In limited cases, the additional damage costs related to structural integrity due to building failure may also warrant consideration. The adopted flood damages curves for residential single and double storey buildings for the various building sizes are shown in **Figure 6-2** and **Figure 6-2** respectively.

Further details about the formulation of the residential damage curves adopted in the flood damages tool DT01 are included in Section 3.1 of Flood Risk Management Guide MM01.

Non-residential flood damage curves including commercial / industrial and public buildings are shown in **Figure 6-3**. Further details about the formulation of the non-residential damage curves adopted in the flood damages tool DT01 are included in Section 3.2 of Flood Risk Management Guide MM01.

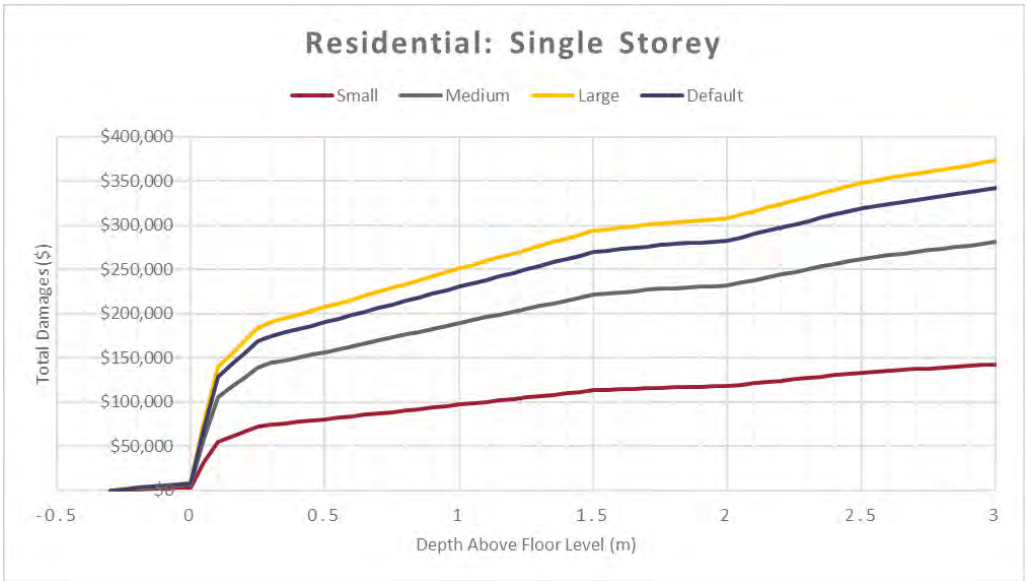

Figure 6-2 Adopted Damage Curves for Residential Single Storey (Source: DT01 Damages Tool)

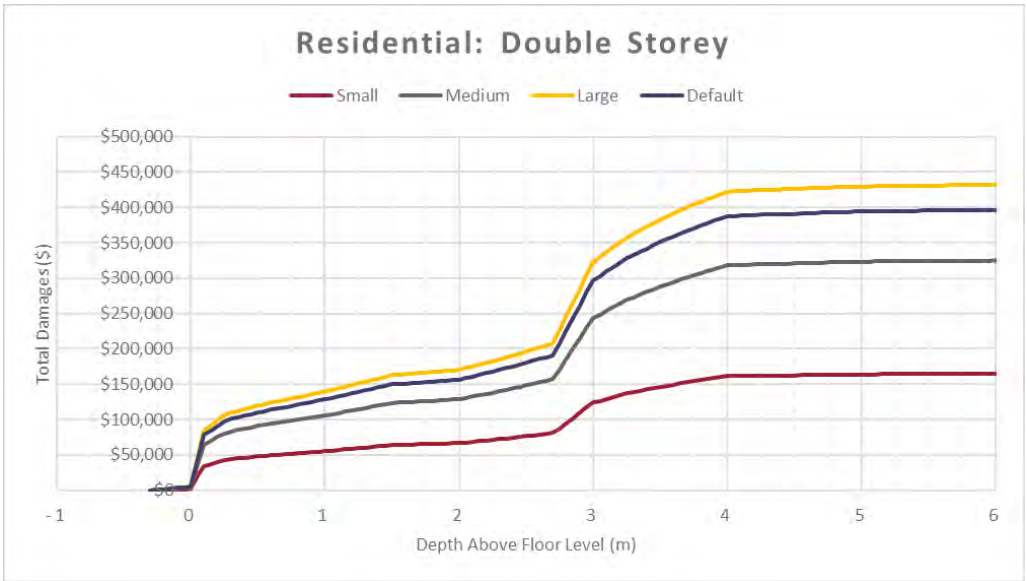

Figure 6-3 Adopted Damage Curves for Residential Double Storey (Source: DT01 Damages Tool)

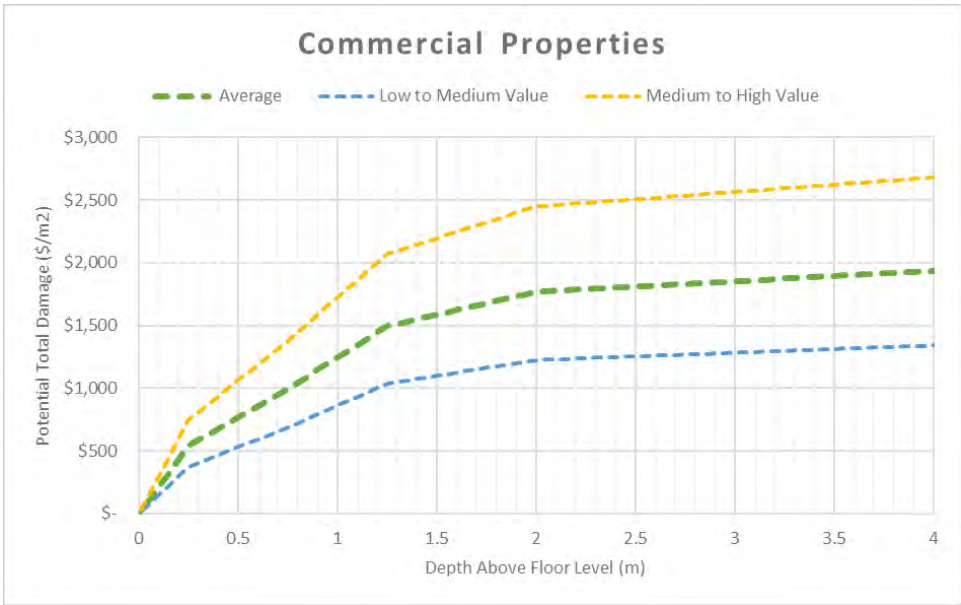

Figure 6-4 Adopted Damage Curves for Commercial and Public Buildings (Source: DT01 Damages Tool)

6.3.4 Property Based Damages Calculation

A fixed external damage of $17,234 in 2023 dollars ($17,000 in 2022 dollars) is to be used for each dwelling site and for each site that contains multi-unit dwellings. This is used when flood depths above the ground level adjacent to the building are at least 0.3 metres or are above the habitable floor level of the house.

The trigger for these external damages has been based on average ground levels around the buildings, if the depth results exceed the threshold of the 0.3 metres, then the fixed damage rate has been applied to each property. The basis for external damage calculation has been based on the building footprint layer, and not based on a property layer. Therefore no external damage has been applied to properties without a building.

6.3.5 Adopted Input Parameters

The flood damages tool DT01 provides numerous input parameters to tailor the flood damages analysis. The tool and associated guide provide advice with respect to default values. The input parameters for this flood damages assessment are as follows:

- Actual to potential ratio = 0.9 (default)
- Regional uplift factor = 1.00 (default for Sydney region)
- Infrastructure damages uplift = 10% of residential damages (default)
- Damages downscale for townhouses and units = 30% (default)
- Internal / contents rate = $550 / m^2 (default)
- Residential clean-up costs = $4,500 / property (default)
- Non-residential indirect costs = 30% of direct actual damages, clean-up costs and loss of trading (default).

With respect to risk to life damages calculations, the equations adopted within the flood damages tool DT01 are summarised in **Figure 6-4**.

$$Injuries = 2 \cdot N_z \times \frac{HR \cdot AV}{100} \cdot PV$$

$$Fatalities = 2 \cdot N(I) \times \frac{HR}{100}$$

$$Hazard\ Rating\ [HR] = d \times (v + 0.5)$$

Where,

N_z	Population living in the floodplain
HR	Hazard Rating (Table 12-6)
AV	Area Vulnerability (Table 12-7)
PV	People Vulnerability = {% residents suffering any long-term illness, % aged 75+}
N(I)	Number of injuries
d	Depth of flooding (m)
v	Velocity of floodwaters (m/s)

Figure 6-5 Flood Risk to Life Damages Calculations (Source: NSW DCCEW, 2023)

The adopted flood risk to life parameters are as follows:

The adopted flood risk to life parameters are as follows:

- Estimated cost per fatality = $5,300,000 (default taken from the Office of Best Practice Regulation (Australian Government)
- Estimated cost per injury = $52,962 (default taken from the Office of Best Practice Regulation (Australian Government)
- N(z) average people per household = 2.1 (default from ABS)
- Speed of onset = 3 (rate of rise is less than 1 hour)
- Primary nature of area = 2 (detached residential dwellings)
- Flood Warning Factor = 3 (calculated from P1, P2 and P3)
- Area Vulnerability (AV) = 8
- People Vulnerability = 36% (default)

6.4 Flood Damages Outcomes

6.4.1 Total Damages

The total damages have been calculated for all design events, 20%, 5%, 2%, and 1% AEP and the PMF event. The results are tabulated in **Table 6-2** and **Table 6-3** show that the damages total for Whites Creek and Johnstons Creek respectively. The tabulated results also show the building and external damages.

As it relates to contributions from building and external damages, the external component makes up only a fraction (8.25% – 13.5%) in Whites Creek and (7.7% – 13.1%) in Johnstons Creek of the total damages, with the vast majority being building related damages including structural, risk to life, contents, relocation etc.

The total damage values and number of affected properties / buildings, and average depth of flooding for the 20%, 5%, 2%, and 1% AEP events are shown **Table 6-2** and **Table 6-3**.

Table 6-2 Existing Total Damages Summary for Design Flood Events for Whites Creek Study Area

Event	Damage Type	Total Damages	Number of Overfloor / Overground Flooded	Avg. Overfloor/ Overground Depth (m)
20% AEP	Building	$2,343,533	39	0.10
	External	$720,371	83	0.34
	Total	$3,063,904		
5% AEP	Building	$3,687,428	48	0.13
	External	$777,243	97	0.34
	Total	$4,464,671		
2% AEP	Building	$3,930,937	52	0.14
	External	$853,071	99	0.36
	Total	$4,784,009		
1% AEP	Building	$4,456,495	59	0.15
	External	$947,857	105	0.37
	Total	$5,404,352		
PMF	Building	$21,749,361	160	0.35
	External	$2,417,036	202	0.61
	Total	$24,166,397		

Table 6-3 Existing Total Damages Summary for Design Flood Events for Johnstons Creek Study Area

Event	Damage Type	Total Damages	Number of Overfloor / Overground Flooded	Avg. Overfloor/ Overground Depth (m)
20% AEP	Building	$36,477,108	272	0.16
	External	$4,514,960	545	0.36
	Total	$40,992,067		
5% AEP	Building	$57,005,721	340	0.22
	External	$5,609,735	633	0.41
	Total	$62,615,455		
2% AEP	Building	$67,308,868	391	0.24
	External	$6,279,554	680	0.43
	Total	$73,588,421		
1% AEP	Building	$76,299,705	419	0.27
	External	$6,592,346	726	0.44
	Total	$82,892,052		
PMF	Building	$234,467,979	835	0.44
	External	$12,953,280	1139	0.63
	Total	$247,421,259		

6.4.2 Average Annual Damage

Average Annual Damage (AAD) is calculated using a probability approach based on the flood damages calculated for each design event. These damage curves attempt to define the damage experienced on a property for varying depths of flooding. The total damage for a design event is determined by adding all the individual property damages for that event. AAD attempts to quantify the flood damage that a floodplain would receive on average during a single year. It does this using a probability approach.

While the PMF event has a theoretical probability of 0% of occurring, to inform the calculation of AAD a representative probability of 0.0000001 (or 0.00001%) has been adopted for the PMF event (equivalent to a 10,000,000 year ARI event). This is based on guidance from AR&R Book 8 – Estimation of Very Rare to Extreme Events which notes this as the equivalent recurrence event for catchment less than 100 km^2. Through this method, the PMF accounts for extremely rare flood events in the AAD calculation.

For the most frequent event, the 20% AEP event, a lower bound flood damages estimate is required for the next most frequent event. In the DT01 tool it has been assumed that the total damages in the 100% AEP event will be $0 creating the lower bound of the AAD curve as per the default set-up of the tool.

The AAD calculation for the Whites Creek and Johnstons Creek catchment is summarised in **Table 6-4** and **Table 6-5.**

Table 6-4 Whites Creek Average Annual Damage Summary for Design Flood Event Contributions

AEP	Probability	Total Damages	AAD Contribution	AAD Contribution %
20%	0.20	$3,063,903.96	**$1,242,852.12**	58%
5%	0.05	$4,464,671.08	**$566,565.20**	26%
2%	0.02	$4,784,008.54	**$140,083.55**	7%
1%	0.01	$5,404,351.73	**$51,276.34**	2%
PMF	0.0000001	$24,166,396.99	**$147,705.89**	7%
Total AAD			**$2,148,483.10**	

Table 6-5 Johnstons Creek Average Annual Damage Summary for Design Flood Event Contributions

AEP	Probability	Total Damages	AAD Contribution	AAD Contribution %
20%	0.20	$40,992,067.07	**$16,541,136.30**	57%
5%	0.05	$62,615,455.20	**$7,809,005.61**	27%
2%	0.02	$73,588,421.34	**$2,060,651.80**	7%
1%	0.01	$82,892,051.58	**$783,517.49**	3%
PMF	0.0000001	$247,421,258.99	**$1,649,914.99**	6%
Total AAD			**$28,844,226.18**	

The total AAD for the Whites Creek is over $2 million. Nearly half (58%) of this AAD is a result of the most frequent 20% AEP event, with the next most frequent event, the 5% AEP contributing 26% of the AAD. The less frequent events, the 2% and 1% AEP and PMF provide between 2 – 7% of AAD contribution. By looking at Johnstons Creek result we can determine that the total AAD is over $28.8 million. Also, nearly half (57%) of this AAD is a result of the most frequent 20% AEP event, with the next most frequent event, the 5% AEP contributing 27% of the AAD. The less frequent events, the 2% and 1% AEP and PMF provide between 3 – 9% of AAD contribution. Though these events result in far higher flood damage totals, particularly the PMF event, their relatively low likelihood means they contribute less to the AAD.

Therefore, as it relates to damages and AAD, structural flood risk management options that reduce flood damages for the most frequent 20% AEP event are expected to provide the biggest benefits to AAD reductions.

7 Flood Emergency Response Review

When determining the flood risk to life, the flood hazard for an area does not directly imply the danger posed to people in the floodplain. This is due to the capacity for people to respond and react to flooding, ensuring they do not enter floodwaters. This concept is referred to as flood emergency response. To help minimise the flood risk to occupants, it is important that there are provisions for flood emergency response.

The primary strategy for the NSW State Emergency Service is horizontal evacuation of people to an area outside of the effects of flooding that has adequate facilities to maintain the safety of the community. However, during flash floods this may not be possible due to the short warning times.

The emergency response provisions for Inner West Council are outlined in the Inner West Local Emergency Management Plan (EMPLAN) and overseen by the Local Emergency Management Committee. Under the provisions of the EMPLAN, NSW SES are appointed as the lead agency for response to Flooding Emergencies. The NSW SES, in conjunction with the Inner West LEMC is responsible for the preparation and management of the Inner West Council Flood Emergency Sub Plan. These documents are intended to provide information to residents and other authorities relating to identified evacuation centres, evacuation procedures, as well as actions and responsibilities in the event of flooding. A review of these available documents is included in **Section 7.1**. There is also a review of available flood emergency response advice in flash flooding situations in **Section 7.2**.

In addition, a review of the flood emergency response potential for the Whites Creek and Johnstons Creek catchments summarised below including key emergency management locations (**Section 7.3**), current and possible flood warning systems (**Section 7.6**), evacuation timeline review (**Section 7.4**), potential for shelter-in-place refuge (**Section 7.6**), and a summary of flood emergency response hotspots (**Section 7.5**).

7.1 Emergency Flood Management Documentation

Emergency Flood Management in NSW is managed by the NSW SES at three levels of scale, at a state-wide level, at a regional level, and a local level. Each subsequent level provides additional local detail in emergency management.

The Inner West catchment is located within the Sydney Metropolitan Emergency Management Region. This region encompasses 8 Local Government Areas of Sydney bounded by Woollahra, Waverley and Randwick to the east and Sutherland Shire to the southwest. The relevant local area with respect to SES emergency planning is the Inner West Local Government Area (LGA).

7.1.1 Local Flood Plan

In December 2021 the SES released Volume I the Inner West Flood Emergency Sub Plan covering operations for flooding within the Inner West Council LGA. Volume I of the plan outlines emergency management arrangements for prevention, preparation, response and initial recovery for flooding in the Inner West LGA.

The local strategies for flood emergency response outlined within Volume I were divided into the four stages of emergency management, prevention / mitigation, preparation, response, and recovery operations. In response to strategies a range of recommended actions are nominated for SES to achieve these strategies. The total number of strategies is 32 and 136 actions, spread across the four stages of emergency management as follows:

- Prevention / mitigation – 2 strategies and 4 actions.
- Preparation – 6 strategies and 22 actions.
- Response – 23 strategies and 105 actions.
- Recovery – 1 strategy and 5 actions.

7.1.2 Local EMPLAN

Inner West Council has established a Local Emergency Management Committee to carry out emergency management as the responsible authority for the Inner West local government area. This committee is responsible for an all-agencies comprehensive approach to emergency planning to prepare the community for disasters. Committee members include Emergency Services and agencies with functional responsibilities.

Inner West Emergency Management Plan has recently been published by NSW SES.

7.1.3 Regional and State Documents

The relevant regional and state emergency management documents are as follows:

- Sydney Metropolitan Region Emergency Management Plan – January 2022
- NSW State Flood Plan – December 2021
- NSW State Emergency Management Plan – December 2018.

The various documents provide more useful information in relation to the roles and responsibilities of various stakeholders in both general emergencies (EMPLANs) and specifically for flood emergencies (Flood Plans).

7.2 Guidance on Emergency Response in Flash Flooding

7.2.1 AFAC Guideline for Emergency Response in Flash Flood Events

In April 2018, the Australasian Fire and Emergency Service Authorities Council (AFAC) released the *Guideline on Emergency Planning and Response to Protect Life in Flash Flood Events*. This guideline for flash flood events provides a useful insight into the position of the national emergency services authorities' council, of which NSW SES is a member. The guideline reflects a consensus on best practice for managing flash flooding, focussing on risk to life. The AFAC define flash flooding as:

> *Flash flooding can be defined as flooding that occurs within six hours or less of the flood-producing rainfall within the affected catchment. This may result in isolation of individuals and communities as time to warn and respond to flash flooding is limited.*
>
> *Flash flood environments are characterised by the rapid onset of flooding from when rainfall begins (often within tens of minutes to a few hours) and by rapid rates of rise and by high flow velocity. The duration of flash flooding is often relatively short by comparison to riverine floods.*

The discussion of flood timing for the Whites Creek and the Johnstons Creek study area (**Section 7.4.2**) shows the entire floodplain is flash flooding based on the above definition, making this guideline relevant to the catchment.

7.2.2 Guidance on Flood Emergency Response Potential in Flash Flood Environments

Effective evacuation typically requires lead times of longer than just a couple of hours and this creates a dilemma for flash flood emergency managers. The following excerpt from the AFAC guideline outlines the dilemma as it relates to the suitability of evacuation and shelter-in-place potential in flash flood environments:

> *Because of the rapid onset of flash flooding and associated high velocity floodwaters, up to 75% of flash flood deaths occur while people are outside buildings attempting to leave or return, and directly exposed to floodwater.*
>
> *This suggests that if evacuation has not occurred prior to the arrival of floodwater, taking refuge inside a building may generally be safer than trying to escape by entering the floodwater. However, some deaths – 25% of the total – occur among people trapped inside buildings. Details are not well documented, and these deaths could be the result of the building filling with flood water to a depth occupants cannot survive or because those trapped inside are swept away when the building fails. Other causes of death could be serious injury or an emergency medical condition while access to emergency assistance is compromised. Fires might also break out in buildings surrounded by floodwater, in which case occupants might not be able to evacuate as they would usually do.*
>
> *For these reasons, remaining in buildings likely to be affected by flash flooding is not low risk and should never be a default strategy for pre-incident planning or incident action planning, even if the buildings are considered likely to withstand the impact of flash flooding. Where the available warning time and resources permit, evacuation should be the primary response strategy.*

This conclusion is similar to advice provided by NSW SES representatives for past studies within Sydney:

> *The NSW SES considers evacuation as the primary response strategy during flooding to protect the at-risk community. This strategy relies on the principles for evacuation that include:*
>
> - *Evacuation completed in sufficient time before the onset of a flood is the safest emergency management strategy.*
> - *The primary method of evacuation should be by vehicle where feasible with pedestrian evacuation as a backup option.*

- *Evacuation must not require people to drive or walk through flood water.*
- *The best vehicular evacuation routes are vehicular escape routes that rise steadily and lead away from the flood.*
- *For existing communities, a strategy of having occupants shelter in place may be acceptable, where the decision to evacuate is left too late, as long as the buildings they inhabit are out of the floodwater or are structurally sound.*
- *Emergency management strategies must consider expected human behaviour and the expected range of severity of hazards*
- *Sheltering in place should only be a strategy where the risk if staying is lower than the risk of evacuating.*

The SES's position, continues to be that isolation is dangerous from the moment it commences and the longer the isolation continues, the more opportunity there is for an emergency to develop.

Additionally, secondary emergencies such as fires and medical emergencies may occur in buildings isolated by floodwater. During flooding it is likely there will be a reduced capacity for relevant emergency service agencies to respond. Even relatively brief periods of isolation, in the order of a few hours, can lead to personal medical emergencies.

While the preferred method of emergency response throughout NSW is for evacuation to be assisted and directed by the SES, there are certain emergency situations where there is limited time available to prepare and facilitate a staged evacuation as preferred. One such example is flash flooding where the rate of rise of floodwaters is extremely fast and the ability for SES to co-ordinate a regional evacuation strategy is not possible.

7.2.3 Guidance for New Developments in Flash Flood Environments

Given the life risk posed by flash flooding and the inherent limitations on how it can be managed, the AFAC guideline recommends new development areas:

- *be designed within the limits of existing flash flood forecast capability,*
- *facilitate rapid and safe evacuation from flash flood prone locations,*
- *account for the likelihood that some people might become trapped inside buildings, and*
- *involve a thorough understanding of how people will behave in a flash flood event and their risks*.

This conclusion is similar to advice provided by NSW SES staff for past studies for new developments:

- *No increase to the existing risk to life and evacuation or reduces the current continuing or residual risk to life.*
- *Where evacuation cannot be accomplished and 'shelter in place' is proposed, then development that will increase the risk to life of future occupants and increase reliance on emergency services should not be permitted. Development strategies relying on deliberate isolation or sheltering in buildings surrounded by flood water are not equivalent, in risk management terms, to evacuation.*

Self-evacuation of the community should be achievable in a manner which is consistent with the NSW SES's principles for evacuation.

It should be made very clear that in relation to the strategy of sheltering in place the SES has done some work with several councils which have flash flood risk over large urban areas. In this existing flash flood context, and only in that context, it has been recognised that causing residents to attempt to evacuate at the time flash flooding is occurring, could be a serious risk to life. Only in areas where urban redevelopment cannot be prevented under existing planning policy, it has therefore been proposed that the DCP (that applies) for any new or redeveloped dwelling will require an internal refuge area above the level of the PMF (Opper and Toniato, 2008).

7.3 Emergency Management Locations

7.3.1 Emergency Services Locations

Emergency services locations are considered critical during flooding if the infrastructure is relied upon for emergency management on a regional scale or pose a significant hazard to surrounding areas. Therefore, these types of emergency services have been mapped at a regional scale around the Whites Creek and Johnstons Creek Catchment as shown in **Figure 7-1**. This map has also been included in **Appendix C**.

The following emergency services have been mapped in the region around this catchment:

- Hospitals,
- Ambulance stations,
- Fire stations,
- Police stations, and
- NSW SES facilities.

Within the study areas there is the Newtown Police Station, NSW Newtown Fire Station, Street John Ambulance and King George V building Hospital all located in the Johnstons Creek Catchment. The Newtown Police Station and the NSW Newtown Fire Station site are partially flood affected in the 1% AEP and PMF events While Street John Ambulance is flood free in all the events, also Australia Street is flood free from the south but flooded from the south.

Also shown in **Figure 7-1** with the emergency service locations is the 1% AEP and PMF flood extents, not only for the study area, but for the vicinity of Whites Creek and Johnstons Creek. The flood extents show the regional isolation of the study area from emergency services.

Most roads are isolated from overland flooding from within the Study Areas, then other catchments cause road flooding that would further block access to emergency services during a regional overland flood event. Though it was not possible to show the flood extents outside the LGA, it is assumed that access to emergency services would be similarly restricted for areas outside the LGA. The nearest hospitals would be King George V building and Royal Prince Alfred Hospital Emergency Room in the northeast of study area. It is assumed that there would be no flood free access to these hospitals in the event of a regional flash flooding event from any part of the study area.

7.3.2 Vulnerable Developments

Vulnerable development relates to the increased risk of loss of life to vulnerable people including children, the elderly and disabled in most of these land use types. These demographics have a significantly greater risk to life when exposed to flood hazard. In addition, there is increased risk to life resulting from periods of isolation from medical emergency services due to pre-existing health conditions. Mobility of the related demographics is also compromised which will impede the effectiveness of both emergency response types. Included in these development types are:

- Schools, Preschools, and Childcare centres,
- Aged care facilities and retirement villages,
- Detention Centres – due to the limited mobility of the detained, these sites make flood evacuation much more difficult, and
- Hotels – the lack of local knowledge of hotel guests, coupled with the number of guests needing to be managed by hotel staff mean these are higher risk sites.

These categories of vulnerable developments match those presented in the 2021 Flood Prone Land Policy Update. Further discussion of the relative vulnerability of development types is in **Section 5.2**.

These sites have been mapped for the Study Area in **Figure 7-2**, which is also included in **Appendix C**.

The mapping shows that most vulnerable developments are suitably located in flood free land, with some of these developments partially affected by flooding, with only some locations significantly flood affected. Due to the permissibility of childcare centres, preschools and retirement communities in various land use zonings, the location of vulnerable developments will change over time. This mapping should be reviewed and updated by Council in the future to have a continued understanding of flood risk vulnerable developments.

7.3.3 Current Emergency Management Procedures for Vulnerable Developments

The NSW SES within the Inner West LGA Local Flood Plan provide the following specific actions within **Section 5.8.3** and **Section 5.9.2** as it relates to evacuation of vulnerable developments:

- Health Services Functional Area will coordinate the evacuation of hospitals, health centres and aged care facilities (including nursing homes) in consultation with the NSW SES and Welfare Services.
- School administration offices (Government and Private) will coordinate the evacuation of schools in consultation with the NSW SES and Welfare Services, if not already closed.
- Welfare Services Functional Area will manage evacuation centres for affected residents and travellers in accordance with the Welfare Services Functional Area Supporting Plan.
- Schools Administration (Government and Private) will manage the safety of students directly affected by flooding and will work with the NSW SES in the temporary closure of schools and will coordinate with NSW SES Transport and Welfare Services in the management of school evacuees.

As discussed further in **Section 7.4.6**, the flash flooding nature of the Study Area will make it difficult for SES to coordinate the evacuation of these vulnerable sites within the time available from the onset of rainfall. It is therefore recommended that individual flood response plans are developed for both existing and future vulnerable developments that are flood affected within the study area.

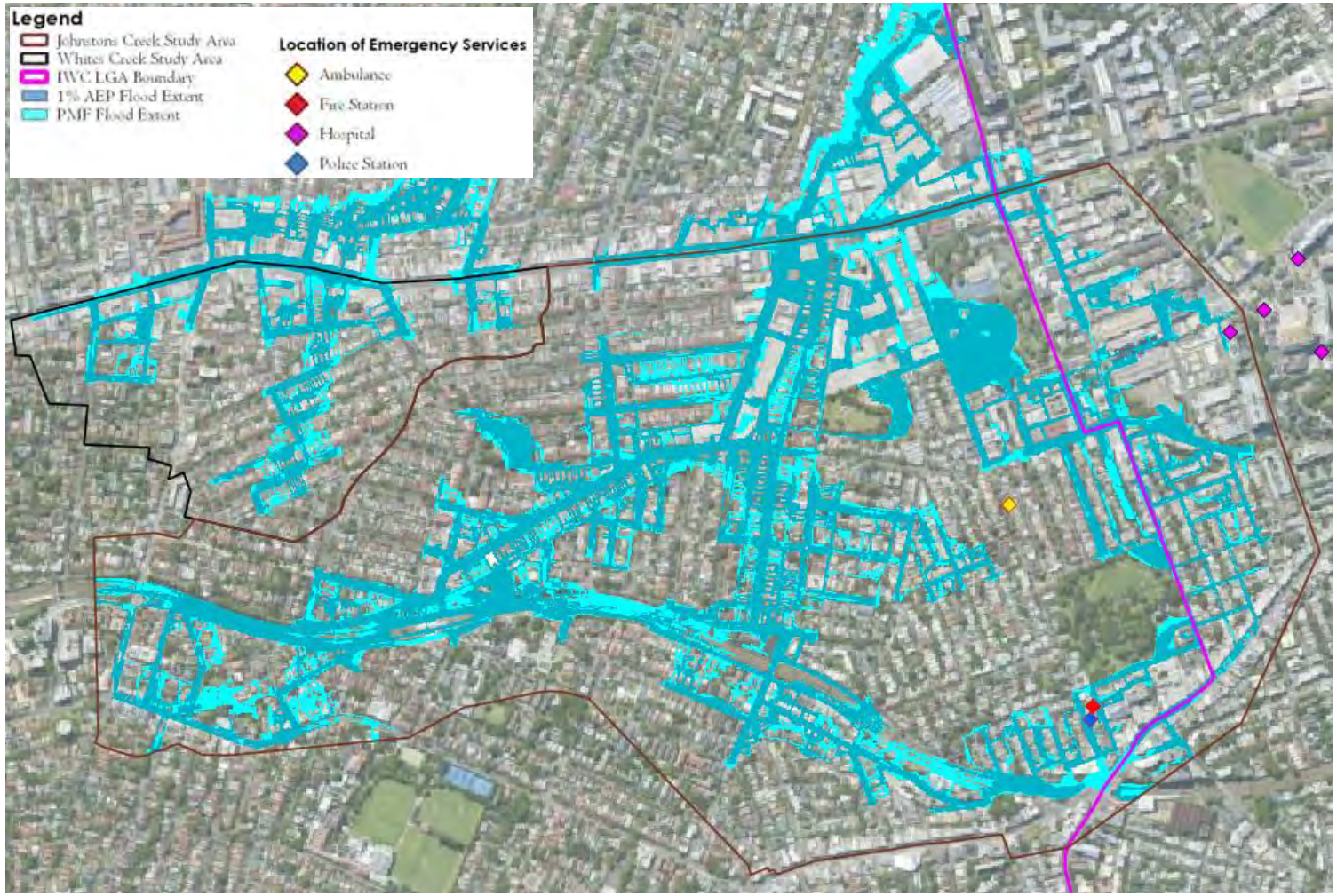

Figure 7-1 Location of Emergency Services in the Region with CBC LGA 1% AEP and PMF Extents

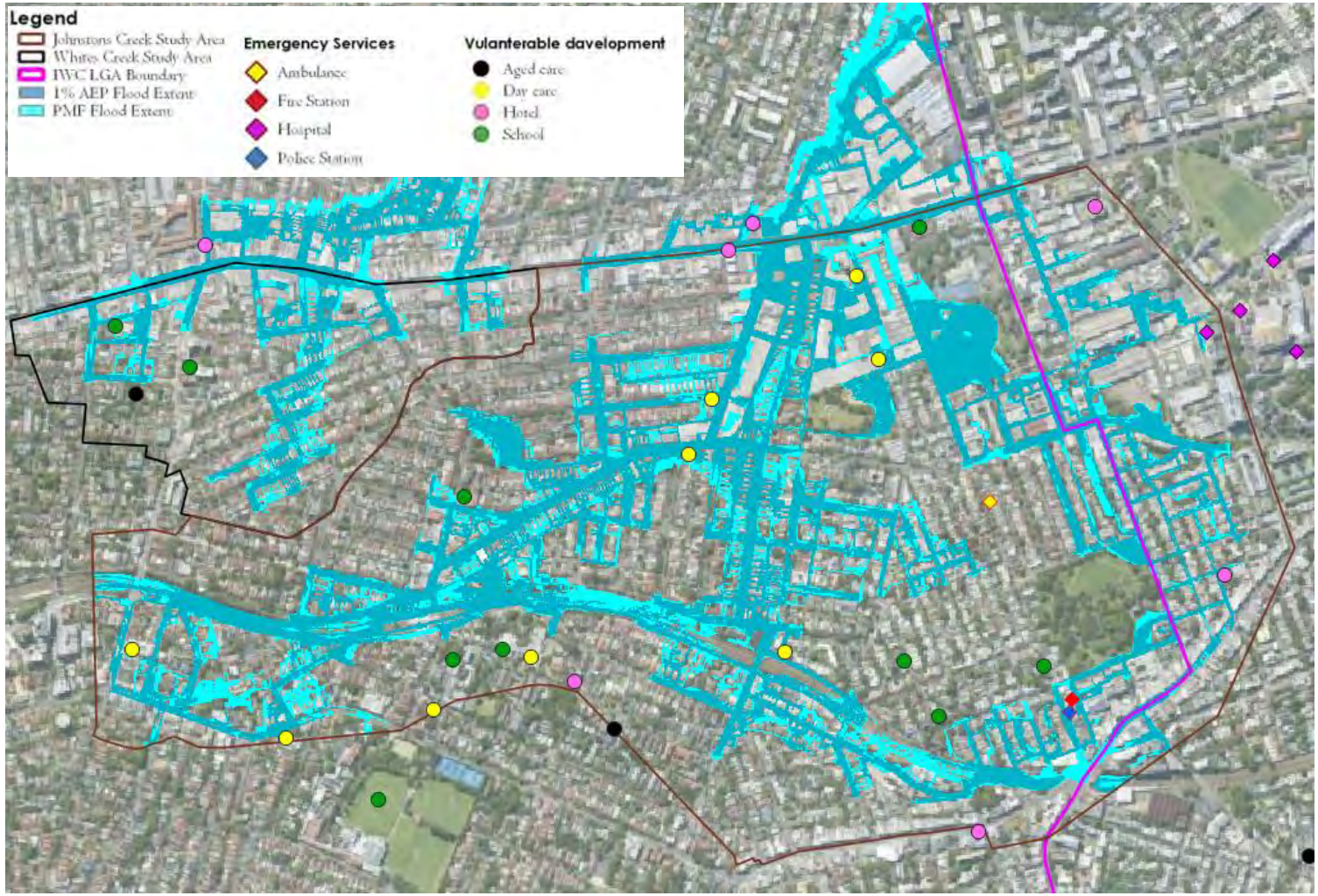

Figure 7-2 Location of Vulnerable Developments and Emergency Services within the Study Area with 1% AEP and PMF Extents

7.4 Evacuation Timeline

7.4.1 Background

The NSW SES Timeline Evacuation Model has been the de facto standard for evacuation calculations in NSW since it was first developed for evacuation planning in the Hawkesbury Nepean Valley. Though the guideline has not yet been released, the paper Technical Guideline for SES Timeline Evacuation Model was prepared by Molino S. et al in 2013 briefing the industry on the application of the guideline.

The timeline assessment of evacuation potential relates to the regional evacuation of floodplains through doorknocking by SES volunteers through to the evacuation of all occupants for the region.

At the centre of the timeline methodology is the following concept:

Surplus Time = Time Available – Time Required

If surplus time is positive then evacuation of all occupants is feasible, while a negative value implies evacuation of all occupants is not likely to be able to be achieved. The determination of the two times, 'Time Available', and 'Time Required' is summarised in the following sections.

7.4.2 Sub-Catchment Flood Water Levels and Timing

A review of flood timing for the Whites Creek and the Johnstons Creek catchments has been conducted based on the model results for the 20%, 5%, 2%, and 1% AEP and PMF events at two locations. All have a rainfall duration of 1 hour. The flood timing inspection points, shown in **Figure 7-3** include one point on Parramatta Road in Whites Creek catchment and other point is on Salisbury Road in Johnstons Creek. This selected location generally matches the identified emergency hotspots discussed in **Section 7.5**.

7.4.3 Rate of Rise

With regards to rate of rise for the PMF event,

- Parramatta Road site in Whites Creek begins flooding in a couple of minutes after the onset of rainfall, with between 1.5 metres of flooding depth within an hour of the onset of rainfall; and
- Salisbury Road Site in Johnstons Creek begin flooding in 10 minutes after the onset of rainfall, with between 2.5 metres of flooding depth within an hour of the onset of rainfall.

For the 1% AEP and smaller design events,

- Parramatta Road site in Whites Creek begin flooding in a few minutes after the onset of rainfall, with up to 0.7 metre of flooding depth within an hour of the onset of rainfall; and
- Salisbury Road Site in Johnstons Creek begin flooding in 20 minutes after the onset of rainfall, with between 1.5 metres of flooding depth within an hour of the onset of rainfall.

7.4.4 Duration of Flooding

With regards to flooding duration for the PMF event, in Whites Creek and Johnston Creek the model simulation period was set at only 0.5 hours for the model. These short simulation times allow for the peak of flooding to occur, and as shown in **Figure 7-4**, also allow the falling limb of the PMF flood.

For the Parramatta Road Site in the Whites Creek catchment much of the local overland flooding has finished within 0.5 hours of the onset of rainfall. For the 1% AEP and smaller events, the duration of flooding is expected to be less than the PMF, a shown in **Figure 7-4** these events have durations of flooding of less than 1 hour.

For the Salisbury Road Site in the Johnstons Creek catchment the majority of the local overland flooding has finished within 2 hours of the onset of rainfall. For the 1% AEP and smaller events, the duration of flooding is expected to be less than the PMF, a shown in **Figure 7-5** these events have durations of flooding of less than 1.5 hour.

The only locations with risk of longer duration flooding are trapped low points that either have no existing stormwater drainage, or drainage that becomes blocked in the event of flooding. With no mechanism for draining these low points its reasonable that ponding may persist until any blockages are removed. Generally throughout the study area the duration of flooding is expected to typically be sub-daily.

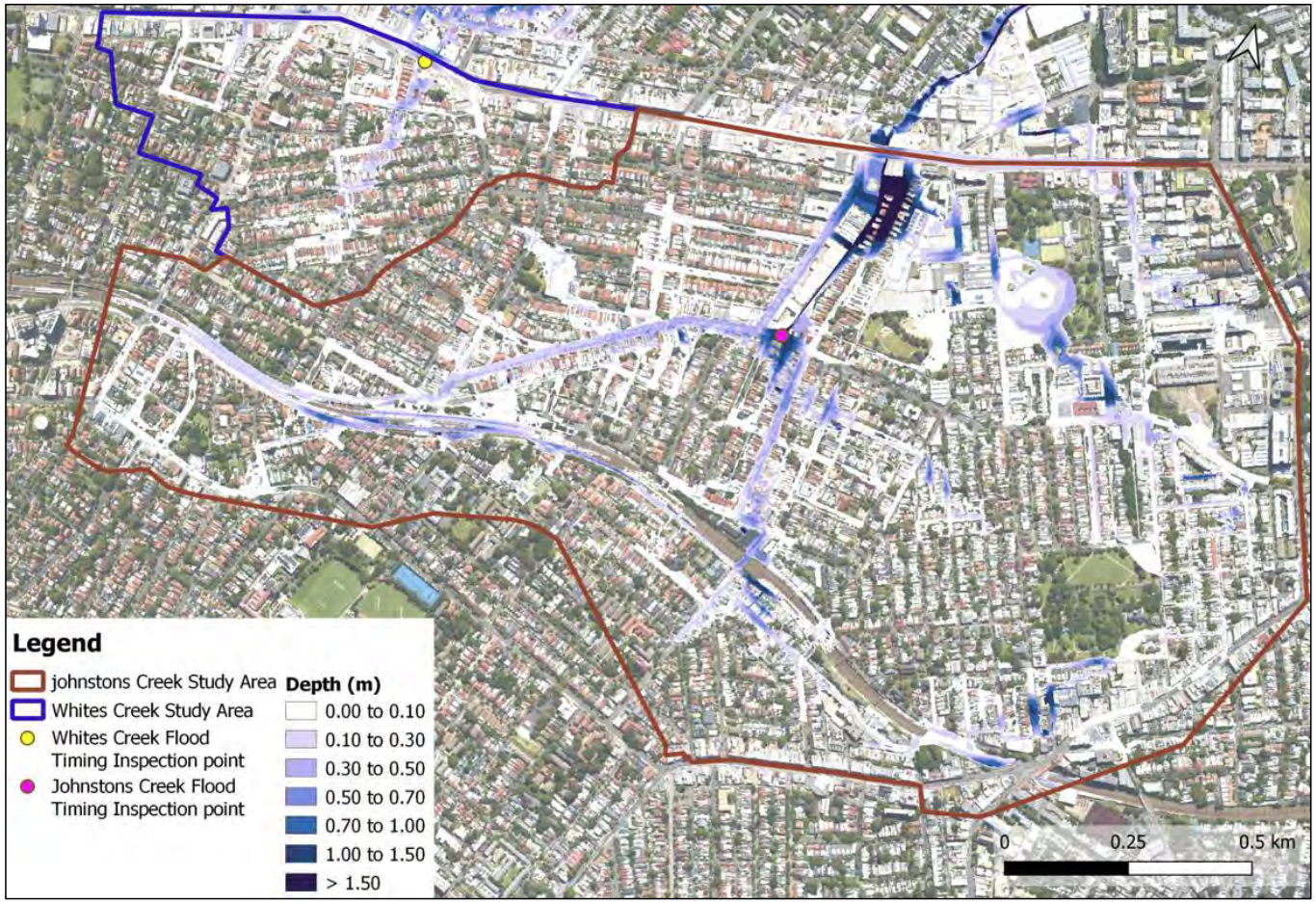

Figure 7-3 Flood Timing Inspection Points with 1% AEP Peak Depth Results

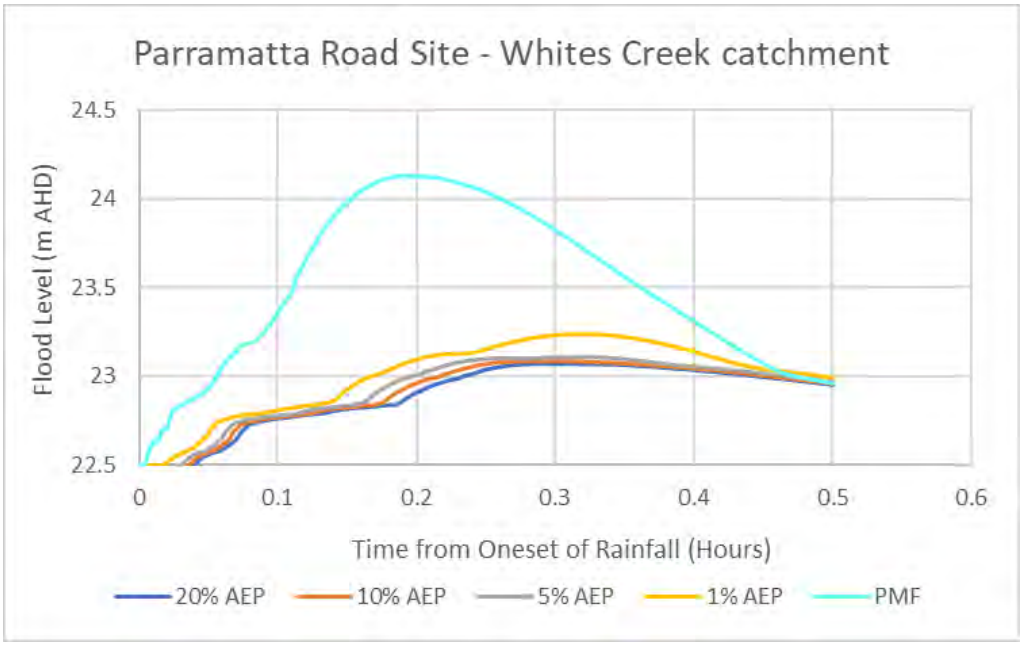

Figure 7-4 Flood Level Time Series Result for Base Case Models for Whites Creek Catchment Location

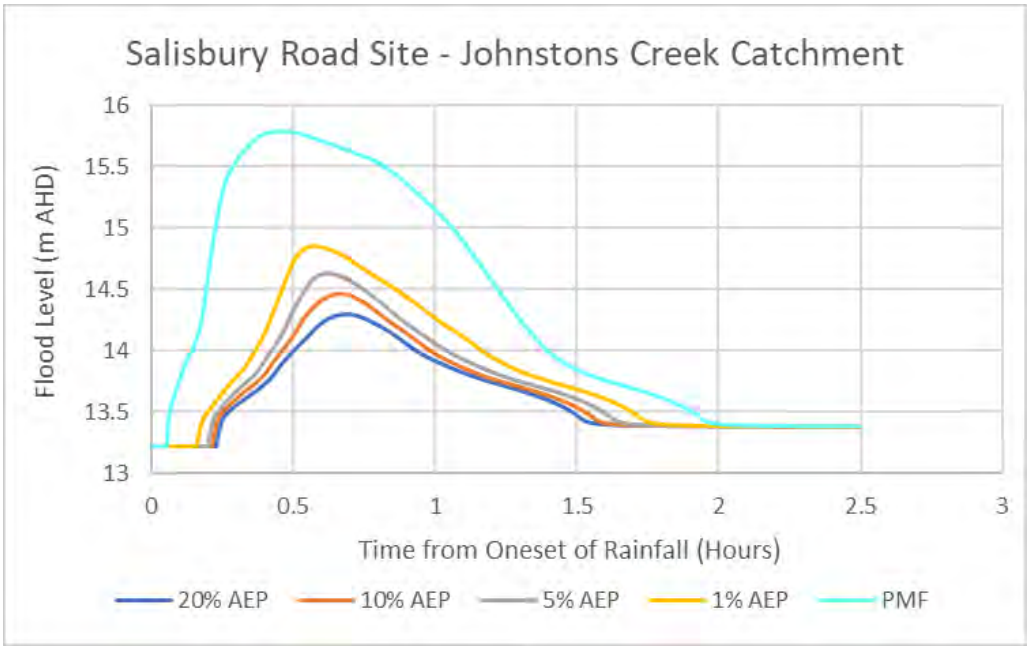

Figure 7-5 Flood Level Time Series Result for Base Case Models for Johnston Creek Catchment Location

7.4.5 Time Available

The 'Time Available' is dependent on rate of rise of waters, meaning it varies for each evacuation scenario. From the flood timing assessment included above, the rate of rise is extreme for the Whites Creek and Johnstons Creek catchments with significant flooding occurring:

> For the Whites Creek catchment
  - A couple of minutes from the onset of rainfall for the PMF event,
  - A few minutes from the onset of rainfall for the 1% AEP and smaller events.

> For the Johnstons Creek catchment
  - Between 5 – 10 minutes (0.1 hours) from the onset of rainfall for the PMF event,
  - Between 10 – 20 minutes (0.1 – 0.2 hours) from the onset of rainfall for the 1% AEP and smaller events.

Therefore there is very little time available from the onset of storm burst rainfall for evacuation to occur. In addition, the volume of rainfall occurring is extreme in both a 1% AEP and PMF storm. It is unlikely that evacuating during the early stages of a design storm burst rainfall event will be safe as both vehicle safety and pedestrian safety is compromised under such heavy rainfall.

As a result, the only form of flood evacuation trigger for the Study Area that will provide sufficient available time to facilitate evacuation is flood forecasting methods as observed rainfall or flooding means that the opportunity to evacuate low-lying areas has already passed.

7.4.6 Time Required for SES Assisted Evacuation

The SES evacuation timeline model uses the following equation to calculate 'Time Required' to evacuate residents by doorknocking by SES volunteers:

Time Required = Warning Acceptance Factor (WAF) + Warning Lag Time (WLT) + Travel Time (TT) + Travel Safety Factor (TSF)

Where the following values are recommended:

- Warning Acceptance Factor = 1 hour – accounts for the delay between occupants receiving the evacuation warning and acting upon it.
- Warning Lag Time = 1 hour – an allowance for the time taken by occupants to prepare for evacuation such as packing their belongings etc.
- Travel Time = Variable – the number of hours taken for the evacuation of all vehicles based on road capacity. NSW SES recommend a road lane capacity of 600 vehicles per hour.
- Travel Safety Factor = Variable – added to travel time to account for any delays along the evacuation route for example resulting from accidents.

Note that time required is calculated from the time that SES are on site and ready to begin doorknocking. Before this time there is an additional phase of mobilisation of SES staff which is the time taken to coordinate and travel to residences to commence doorknocking. There is no data available on mobilisation time for local SES services. For the purposes of this analysis, it is assumed that it will take half an hour to coordinate SES staff and mobilise them to the flood affected areas.

Based on the above contributors, the overall time required for evacuation of the Whites Creek and Johnstons Creek catchments is a minimum of 2.5 hours (2 hours for WAF and WLT and 0.5 hours for mobilisation). It should be noted that this is a low bound estimate, as various factors such as Travel Time, and Travel Safety Factor have been disregarded. This means that in relation to SES doorknocked evacuation for the Study Area, evacuation needs to be triggered at least 2.5 hours prior to a storm burst rainfall event occurring.

While the Bureau of Meteorology (BoM) provide various flood forecasting tools, it is assumed there are no forecasting tools currently available that can provide the requisite confidence to trigger an evacuation based on flood forecasting 2.5 hours in the future.

Therefore, it is concluded that SES doorknocked evacuation is not a reliable emergency response in the Whites Creek and Johnstons Creek catchments. While SES assisted evacuation may be suitable for more long duration rainfall events, for the critical storm burst rainfall events which result in flash flooding this approach is not appropriate.

7.5 Emergency Management Hotspots

As part of initial consultation for this project, NSW SES representatives requested emergency management mapping for hotspot areas in the Study Area. These emergency management maps have been provided in **Appendix C**.

The maps include flood information for the 20% and 1% AEP and PMF events to provide the requested information for the full range of design events. The maps provide the following information to assist SES:

- H1-H6 hazard mapping for the three selected design flood events to show areas of vehicular, pedestrian and building instability,
- Estimated overfloor flooding depth in metres for the three selected design flood events to provide an indication of flood risk sites,
- Indicative evacuation routes to flood free land. A distinction has been made between evacuation routes suitable for vehicles which are preferred and pedestrian only evacuation routes, and,

In total, eight emergency management hotspot areas have been identified as shown in **Figure 7-6**, six in the Johnstons Creek catchment and two in the Whites Creek catchment. This figure is also replicated in **Appendix C**.

Potential flood risk management options, particularly emergency management focused options, should prioritise these eight hotspot areas:

- Hotspot 1 – Johnstons Creek area of Stanmore between Parramatta Road, Mallett Street, Salisbury Road, and Northumberland Avenue.
- Hotspot 2 – Johnstons Creek near Stanmore Railway Station, including Salisbury Road between Douglas Street and Lincoln Street.
- Hotspot 3 – Johnstons Creek between Stanmore and Petersham, from Stanmore Road to Douglas St.
- Hotspot 4 – Johnstons Creek areas of Stanmore and Enmore, from Salisbury Road down to Charles St.
- Hotspot 5 – Johnstons Creek area of Enmore between Camperdown Memorial Rest Park/Cemetery and the railway line.
- Hotspot 6 – Johnstons Creek and Church Street, between King Street and Lucas Street.
- Hotspot 7 – Whites Creek area of Petersham between Temple Street and Parramatta Road.
- Hotspot 8 – Whites Creek area of Petersham between Parramatta Road and Fort Street.

Within these hotspot areas, pockets of low flood island properties have been identified to support SES operations. These are the higher risk areas with limited evacuation potential due to flooding of access roads in accordance with the principles of the Flood Emergency Classification of Communities (FERCC) (outlined in Part C of Flood Risk Management Guide EM01), A distinction has been made for low flood islands in industrial land uses where the risk to life may be different than residential land uses.

As noted within AIDR guideline 7.2 that outlines requirements for FERCC there is the following note:

> *The guideline supports decision making at a precinct or community scale, and for rivers and creeks where flow paths can readily be defined. It is not intended for application in local overland flooding at a smaller scale, or to individual structures.*

While the type of flooding in this study area would be defined as overland flooding, the FERCC mapping of specific hotspot areas does help to identify the properties that will have complications with flood emergency response.

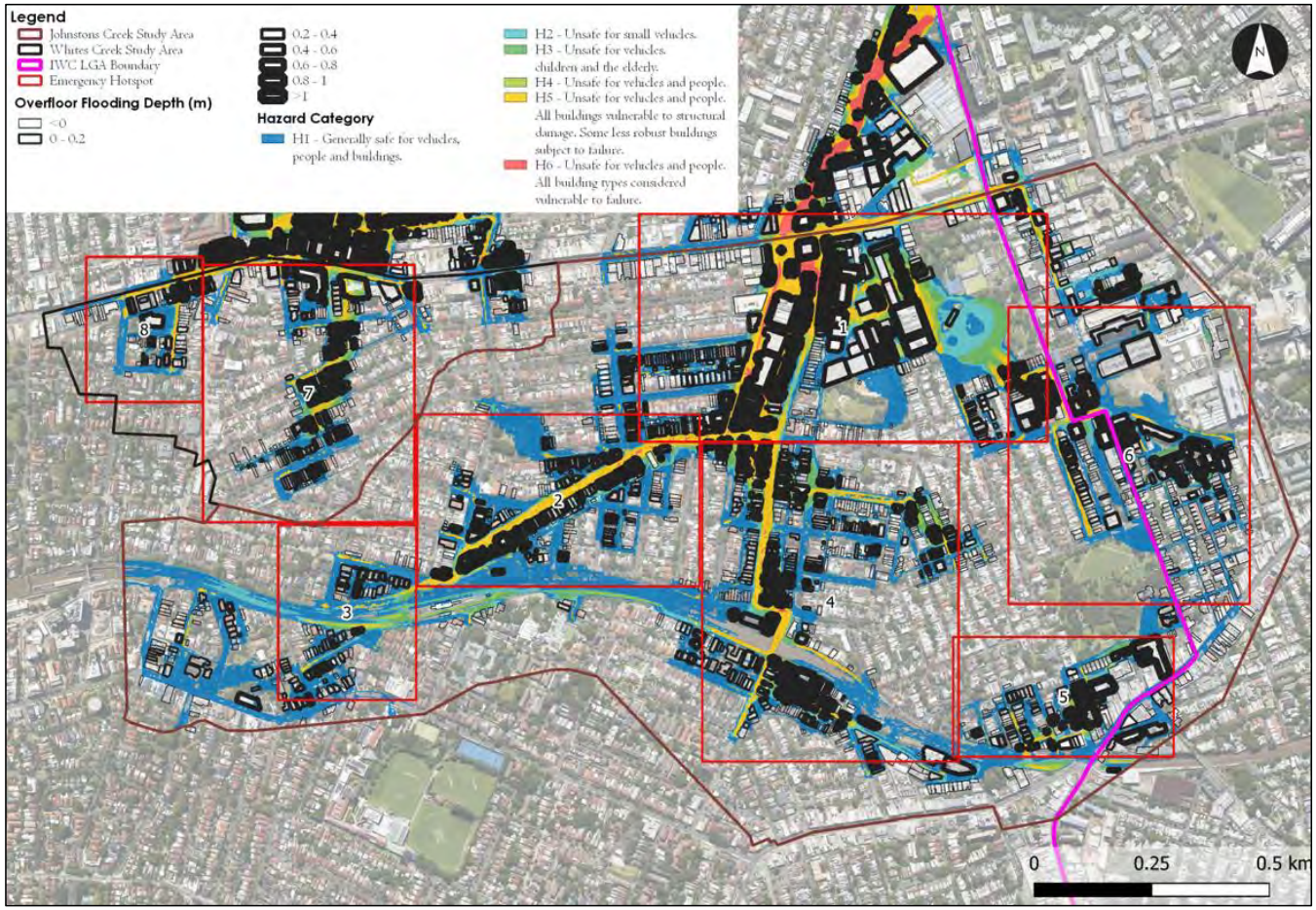

Figure 7-6 Emergency Management Hotspots with PMF H1-H6 Hazard

7.6 Flood Warning Systems

There are two components to a flood warning system:

- Monitoring of weather and flood conditions to decide when emergency response is required,
- Disseminating this information to residents so that evacuation may commence.

These two components of both current and potential flood warning systems are discussed in the following sub-sections.

7.6.1 Current Flood Warning System

The Inner West LGA Flood Emergency Sub Plan (SES, 2021) under Section 5.4 discusses the range of monitoring and alerts currently adopted by the NSW SES in the local area:

- The BoM issues public weather and flood warning products before and during a flood. These may include:
  - Severe Thunderstorm Warnings with reference to heavy rainfall
  - Regional Severe Thunderstorm Warnings with reference to heavy rainfall
  - Detailed Severe Thunderstorm Warnings (for Sydney/Newcastle/ Wollongong) with reference to heavy rainfall,
  - Severe Weather Warnings with reference to heavy rainfall and/or storm surge,
  - Flood Watches, and
  - Flood Warnings.
- In a flash flooding environment, these services can provide pre-emptive warnings of potential flood-causing rainfall, however they are considered less viable for ongoing updates and warnings during a flood event and monitoring of these resources during an event is not considered appropriate. Further discussion of the reasons for this are included in **Section 7.2**.

In addition to these resources that are monitored by the NSW SES, the Flood Plan also notes how these warnings are then disseminated to the community, with the SES providing alerts and flood information through:

- Mobile and fixed public address systems and sirens.
- Two-way radio.
- Emergency Alert (SMS and voice message alerting system).
- Telecommunications (including Auto dial systems).
- Facsimile.
- Standard Emergency Warning Signal.
- Doorknocking.
- Variable message signs.
- Community notices in identified hubs.
- Distribution through established community liaison networks, partnerships, and relationships, and
- NSW SES social media and website.
- NSW SES may seek support from agencies and local Council to share the SES social media messages.
- Road closure information will be provided to the community through Transport for NSW ‘Live Traffic’ website: www.livetraffic.com or ‘Transport InfoLine’: 131 500. Also, VMS messaging on roadways may also be used to advise motorists.

Several of these options will provide a useful means of almost instantaneously distributing flood warnings to the community. However, some of these means such as doorknocking and social media posts and community notices are unlikely to have the near instantaneous response needed from the community in flash flooding situations.

7.6.2 Discussion of Flood Warning Systems in Flash Flooding Environments

A summary of the considerations for flood warning systems in flash flooding is contained in the below excerpt from the AFAC guideline for flash flooding:

> *Successful evacuation strategies require a warning system that delivers enough lead time to accommodate the operational decisions, the mobilisation of the necessary resources, the warning and the movement of people at risk.*
>
> *Where pre-incident planning identifies existing warning lead times as being non-existent, too short or based on too much uncertainty, improvements to warning systems within existing hydro-meteorological capability should be a priority.*
>
> *Weather forecasting and flash flood prediction is undergoing continual improvement. This is the result of many factors, including better science and the influence of technology. The advent of faster and more 'accurate' weather and hydrological modelling and enhanced real-time observation systems such as Doppler radar are examples of such advances.*
>
> *However, although forecast 'accuracy' is improving for 24 to 72-hour periods, the near-to-real-time period of one to six hours, the period most relevant to flash flood environments, remains a significant forecasting challenge.*
>
> *Effective evacuation typically requires lead times of longer than just a couple of hours and this creates a dilemma for flash flood emergency managers. Due to the nature of flash flood catchments, flash flood warning systems based on detection of rainfall or water level generally yield short lead times (often as short as 30 minutes) and as a result provide limited prospects for using such systems to trigger planned and effective evacuation.*
>
> *Warning systems based on weather forecast can yield longer lead times but provide only a qualitative assessment of the potential for flash flooding over a broad geographical area. A forecast-based warning also inherently provides less certainty in either the location or rainfall volume from which to derive the expected depth and timing of flash flooding. This makes it difficult to provide timely and accurate advice to at-risk communities about flash flooding, regarding advice about who needs to evacuate and when to evacuate.*
>
> *Initiating evacuation of large numbers of people from areas prone to flash flooding based on these uncertain triggers may be theoretically defensible in a purely risk avoidance context but it is likely to be viewed as socially and economically unsustainable. Frequent evacuations in which no flooding occurs, which statistically will be the outcome of forecast-based warning and evacuation, could also lead to a situation where warnings are eventually ignored by the community.*
>
> *These considerations call for flash flood emergency managers to engage with flash flood prone communities, both to discuss and agree on appropriate triggers for agency-led evacuation, and to educate the community on appropriate behaviour in the event of flash flooding occurring with no or very little warning (including messages about the dangers of late evacuation, and strategies such as moving from unsuitable to suitable buildings).*

Within the Inner West, the constraint in deploying an effective flooding warning system is the time available to obtain and process actual rainfall and runoff data to provide an accurate prediction of flood behaviour in a timely manner to residents. Current technologies do not currently provide sufficient time to record and model potential rainfalls and the resulting impact to in time for sufficient community warning. However, this is an area of advancing technology, and improvements may be possible within a medium timeline.

Consequently, a flood warning system is not recommended as an immediate action for this catchment; however, advancements in technology should continue to be monitored for potential medium to long term implementation in the emergency management hotspots discussed in **Section 7.5**.

7.7 Shelter-in-Place Potential

NSW DPE following consultation with NSW SES have released the Draft Shelter-in-Place Guidelines in December 2022. The principles outlined in the guideline for shelter-in-place reflect those included in **Section 7.2**. Essentially that evacuation is the primary response strategy, however in flash flooding areas where evacuation is not possible, shelter-in-place is an alternative, and a last resort for brownfield and greenfield developments.

The guideline provides a list of requirements for potential shelter-in-place. Some requirements relate to development specific considerations such as access to utilities and power during shelter, a minimum flood space area for shelter, and the storage of food, first aid and other resources. However, there are some requirements that relate to the flood affectation of the area, specifically relating to:

- Stability of shelter-in-place structure,
- The duration of flooding of the refuge area and,
- The feasibility of flood free refuge area.

The potential for shelter-in-place to be implemented for the study area based on these three factors is investigated in the following sections.

The advantage of shelter-in-place is that residents do not require as long to respond for this type of emergency response to be appropriate. As opposed to evacuation where people possibly need to travel a significant distance to reach flood free land, for shelter-in-place people are likely only going to need to access a mezzanine level or first floor within the same building. Thus, the response is more readily available for flash flooding environments and can offer residents a refuge even at night when people are likely to be asleep and not able to respond to evacuation warnings.

As noted within Emergency Management Principle 4 of the 2023 FRM Guide EM01, shelter-in-place should consider the following additional risks for this emergency response type:

- *Isolation – There is no known safe period of isolation in a flood, the longer the period of isolation the greater the risk to occupants who are isolated.*
- *Secondary risks – This includes fire and medical emergencies that can impact on the safety of people isolated by floodwater. The potential risk to occupants needs to be considered and managed.*
- *Consideration of human behaviour – The behaviour of individuals such as choosing not to remain isolated from their family or social network in a building on a floor above the PMF for an extended flood duration, or attempting to return to a building during a flood, needs to be considered when adopting EM strategy.*

7.7.1 Structural Stability

The collapse of a shelter-in-place refuge would result in almost certain loss of life and is not acceptable under any flood event. To determine the likelihood of this occurring the structural stability of shelter-in-place refuges in the event of flooding needs to be assessed.

Hazard categories H5 and H6 both involve structural instability with lower hazard groups H1-H4 being generally considered in a stable range for structures. Mapping of H1-H6 hazard for the 20% and 1% AEP and PMF events for the emergency hotspots is included in **Appendix C**.

The results show that H6 areas where as guided by the hazard definitions building stability is compromised are generally confined to road reserve, backyards and dedicated waterways and channels.

The extent of H5 areas are where standard buildings may be unstable but buildings designed for flood affectation may be stable based on hazard definitions. The H5 extents are more widespread than H6 but in most locations are not within existing building footprints. At these locations any prospective shelter-in-place refuges would need to be specially engineered to withstand flood forces in the PMF event.

7.7.2 Duration of Flooding

The duration of inundation (the time for which the location is submerged) is guided by the water level time series for the Study Area discussed in **Section 7.4.2**. The analysis shows that the duration of flooding for the Study Area is short with most locations flood free less than 1 hour in Whites Creek and 2 hours in Johnstons Creek after the onset of rainfall for the PMF event. For frequent flood events the duration of flooding is same.

As the maximum duration of flooding is expected to be sub-daily for the majority of the floodplain the flood risk to life associated with any prospective shelter-in-place isolation is expected to be manageable through provision of supplies / services to the refuges. However it should be noted from the AFAC guidelines:

> *However, safety of isolation is subjective, and there is no evidence-based method for determining the tolerable duration of isolation that might result from floods. This is to state that the question of what is a safe period of isolation is not resolved.*

Further discussion of duration of isolation is provided within Principle 4 of the 2023 FRM Guide EM01, which notes secondary risks including fire and medical emergencies can impact on the safety of people isolated by floodwater, and consideration of human behaviour in flooding isolation conditions.

7.7.3 Flood Free Refuge

Flood hazard exposure is the main risk to life related to flooding. Therefore if shelter-in-place is implemented where occupants will remain on site for the duration of the flooding event, it is essential that refuge not expose them to any direct flood hazard, i.e. that the refuge is flood free. As a result, flood refuge should have floor levels located above the PMF water levels.

PMF peak depths throughout the Whites Creek and Johnstons Creek study area are relatively shallow compared to riverine or mainstream floodplains. In the upper catchment where overland flow typically occurs and fringe areas of the floodplain PMF depths can be less than 0.5 metres, and even lower than the Flood Planning Level (1% AEP plus 500mm freeboard). In these locations it is not onerous at all to require for shelter-in-place refuge above the PMF level.

In some sections of the floodplain, such as the commercial area along Bridge Road in the northern side of the Johnstons Creek catchment, PMF peak depths may be more significant. For these locations, shelter-in-place refuges become more onerous to construct as they will likely require a mezzanine level or a first floor to be constructed. However, such elevated levels are possibly advantageous to future industrial developments in the area assuming that they can be allowed for within height restrictions for the area.

Sections 7.7.1 to 7.7.3 indicate that the SIP (shelter-in-place) and planned vertical refuge in the flood impacted areas of the Whites Creek and Johnstons Creek study area may not possible due to intensity and duration of flooding, though it may be feasible for large portions of the study area. There will be a need for the development of local level resilience at highly impacted properties to address and manage flooding risks. This would include an elevated platform (say 2m) at a flood impacted property based on available space, which could be used by residents to take refuge during flooding events. This will negate the requirements from the SES to mobilise resources and investments. The flood impacted property owners should be incentivised to build such elevated platforms.

7.8 Potential Improvements to Flood Emergency Response

Based on the detailed review of flood emergency response provisions for the Whites Creek and Johnstons Creek catchments, it is unlikely, almost impossible, that SES doorknocked evacuation will be able to effectively evacuate residents prior to flooding. From this review, a number of potential measures have been identified that could improve flood emergency response potential for the study area:

- Self-managed evacuation,
- Improved flood awareness.

These points are discussed further in the following sections.

The potential for early warning systems to reduce the Warning Lag Time is discussed in **Section 7.4**. As noted in this section, current technology does not provide a suitable resource at this time, however newer technologies may provide for rapid modelling and predictions in the mid-term.

Another consideration to improve the emergency timeline is to reduce the Travel Time by utilising a shelter-in-place strategy where evacuation cannot be readily achieved. The suitability of this approach discussed further in in **Section 7.6**. As noted in this section, where structural stability, duration of flooding and flood free refuge are feasible, this may be a potential alternative. It is important to note that all of these potential alternatives are less preferential to SES assisted evacuation, which as per NSW SES and NSW DCCEW guidance is the primary and preferred form of flood emergency response.

These review outcomes have been considered and form the basis of the assessment of Emergency Management (EM) options as discussed in **Section 8.5**.

7.8.1 Self-Managed Evacuation

Where SES assisted evacuation is not an option, self-managed evacuation is a potential alternative. This describes where people make their own decision to evacuate earlier and move to alternate accommodation, using their own transport. These plans would typically be prepared using information available from Council and with support of the local SES unit, using SES templates such as FloodSafe. Self-managed evacuation has a number of advantages:

- People can be evacuated far quicker than SES assisted evacuation as various factors in the evacuation timeline are reduced or removed completely such as accounting for time for SES to mobilise, and doorknocking time.
- Self-managed evacuation reduces the strain on SES resources as part of the floodplain will be evacuated without needing to be doorknocked or otherwise prompted. Also less coordination is required on the part of SES as the scale of the evacuation exercise is lessened by some people being self-reliant.

However, self-managed evacuation can also pose a risk if not conducted in an appropriate way. Residents could place themselves at higher risk for example if they evacuate to a location which is even more flood affected, drive through flood waters, or could increase traffic congestion if the wrong route is selected.

A way for Council to encourage and confirm the adequacy of any self-managed evacuation is through flood emergency response development controls. This could be through implementing requirements for new developments to develop flood emergency response plans particularly large-scale development such as medium and high density residential. Another alternative to improve self-managed evacuation could be requiring site-specific flood warning systems, however these systems typically rely on observed flooding. NSW SES in their advice for this project noted “self-evacuation of the community should be achievable”.

7.8.2 Improved Flood Awareness

For the SES evacuation timeline model, two factors are typically expected to take one hour each in order for residents to evacuate, Warning Acceptance Factor and Warning Lag Time. These two factors both contribute to the poor outcome for the Whites Creek and Johnstons Creek catchments evacuation timeline, however both can feasibly be significantly reduced through improved flood awareness:

- Warning Acceptance Factor, accounts for the delay between occupants receiving the evacuation warning and acting upon it. If people are aware of the flood risk of the area that they live in, then it is reasonable to expect that they will acknowledge the seriousness of any flood warning, and perhaps begin evacuating immediately instead of one hour after receiving the warning.
- Warning Lag Time, an allowance for the time taken by occupants to prepare for evacuation such as packing their belongings etc. If residents are aware of the flash flooding nature of the catchment they are in, then they will know that they have very limited time to respond before flooding commences, leaving the majority of their belongings behind to ensure they evacuate as soon as possible for their own safety.

Based on the above considerations a comprehensive flood awareness program for the Study Area, educating residents of the seriousness of the flood risk and the flash flooding nature of the catchment could improve the evacuation timeline. Currently the processes of residents in evacuation are expected to take on average 2 hours, however this could potentially be reduced to 15 minutes if residents were suitably aware of flood risk in the area.

The crucial safety message to **not enter floodwaters** is relevant to all community members as flash flooding due to overland flow in heavy rainfall events (also referred to as stormwater flooding) is recognised as a high risk to all road users driving on flooded roads across the LGA.

8 Flood Risk Management Options

8.1 Background

8.1.1 Managing Flood Risk

Risk is a combination of the consequences of flooding and the likelihood of these consequences occurring. Flood risk to the community is not static. It can be influenced by Flood Risk Management (FRM) measures, climate change, and future development. It is important to understand these risks and how they may change over time so that this can be considered in management.

Considering flood behaviour with existing measures in place provides a basis for understanding the residual risk to the community with existing conditions, how risks may change into the future, and making informed management decisions. Flood risk can be categorised as existing, future or residual risk as follows:

- Existing Flood Risk – existing buildings and development on flood prone land. Such buildings and developments by virtue of their presence and location are exposed to an 'existing' risk of flooding,
- Future Flood Risk – buildings and developments that may be built on flood prone land in the future. Such buildings and developments would be exposed to a flood risk when they are built, and
- Residual Flood Risk – buildings and development that would be at risk following the implementation of FRM measures. Unless a FRM measure is designed to the PMF, it may be exceeded by a sufficiently large event at some time in the future, meaning in most instances there is still a residual flood risk.

The alternate approaches to managing risk are outlined in **Table 8-1**. The hierarchy of preferred risk approaches is from top to bottom in the approaches listed in the table. This hierarchy is also referenced within Section 3 of the Flood Risk Management Guide FB01.

Table 8-1 Flood Risk Management Alternatives (Source: SCARM, 2000)

Alternative	Examples
Preventing / Avoiding Risk	Appropriate development within the flood extent, setting suitable planning levels.
Reducing likelihood of risk	Measures to reduce flood risk such as drainage augmentation, levees, and detention.
Reducing consequences of risk	Development controls to ensure structures are built to withstand flooding.
Transferring risk	Via insurance – may be applicable in some areas depending on insurer.
Financing risk	Natural disaster funding.
Accepting Risk	Accepting the risk of flooding as a consequence of having the structure where it is.

The relevant emergency response provisions for Inner West Council are established in the Local EMPLAN by the Local Emergency Management Committee (LEMC). The EMPLAN details the combat agency for each hazard and is an all hazards all agencies approach. It refers to sub plans for hazard specific emergency management arrangements and planning. The flood emergency management arrangements that are outlined in the local flood plan (sub plan) expand on the roles and responsibilities of all local stakeholders including LEMC, and the NSW SES local volunteer unit as the combat agency for flooding, this is relevant once the SES stands up an Incident Management Team (activated) by a weather alert by the Bureau of Meteorology.

On all relevant public websites, members of the community within the PMF floodplain are encouraged to know their risk in relation to their local river level gauge. The AWS flood warnings that are issued provide clear statements for actions through Hazard Watch including for residents to stay informed of messaging based on Bureau warnings and reported flood water levels.

The crucial safety message to **not enter floodwaters** is relevant to all community members as flash flooding due to overland flow in heavy rainfall events (also referred to as stormwater flooding) is recognised as a high risk to all road users driving on flooded roads across the LGA. A valuable output of the FRM process to NSW SES flood intelligence is the mapping and tabulation of inundated roads by elevation and depth of flooding at various design storm events.

8.1.2 Options Development Process

As stated within the FRM Guide MM01 the assessment of FRM options should consider:

- Their practicality and feasibility, including the timeframe within which they may be implemented.
- The social, economic, and environmental costs, benefits and disbenefits of FRM measures.
- The upfront, ongoing and complementary work and lifecycle costs involved in implementation.
- Input from the community and the acceptability of measures to the community.
- Consistency with industry guidance and government direction, policy and guidance.

The assessment of FRM options should consider people in the community, the economy, social and cultural aspects, services to the community and the natural environment. Relating to the development of FRM options, the FRM Guide MM01 recommends the following stages within a FRMS&P:

- Option identification and preliminary option assessment and optimisation – The identification of an inclusive range of FRM options to address local or broad FRM issues for the existing community and new development. Having identified the FRM issues to address and an inclusive range of FRM options worthy of consideration, the viability of these options needs to be tested to determine if they warrant more detailed assessment. This process is summarised within the following sections.
- Detailed option assessment – Detailed assessment and subsequent optimisation of FRM options and packages of options needs to consider their costs, benefits and disbenefits in managing risk. The detailed assessment includes flood modelling of options, damages assessment of option benefits, preliminary costing and a Multi-Criteria Assessment (MCA) that considers a broad range of factors quantitatively or qualitatively.
- Recommendation in FRM studies and decision-making in FRM plans.

8.2 Flood Risk Management Measures

FRM measures (interchangeably referred to as FRM options in this report) which are available for the management of flood risk can be categorised according to the way in which the risk is managed. There are five broad categories outlined within Table 29 of the FRM Guide MM01:

- Flood information - Flood information is essential to understanding flooding. Therefore the continued sourcing of flood information for the study area is considered a stand-alone FRM measure that indirectly influences future flood risk through informing decision-making.
- Flood modification measures – Flood modification measures are options aimed at preventing / avoiding or reducing the likelihood of flood risks. These options reduce the risk through modification of the flood behaviour in the catchment.
- Property modification measures – Property modification measures are focused on preventing / avoiding and reducing consequences of flood risks. Rather than necessarily modify the flood behaviour, these options aim to modify properties (both existing and future) so that there is a reduction in flood risk.
- Emergency response modification measures – Emergency response modification measures aim to reduce the consequences of flood risks. These measures generally aim to modify the behaviour of people during a flood event.
- Environment enhancement – Measures that look to prevent / avoid and reduce consequences of flood risk while also enhance environmental outcomes. Examples include catchment management measures, waterway modification measures, and Water Sensitive Urban Design (WSUD).

8.3 List of Flood Modification Options

Opportunities for potential flood modification options were identified by incorporating the following:

- Observations made during the site visit,
- Comments received by the general public during initial consultation, and by project stakeholders including DCCEW, SES, City of Sydney Council and Council strategic, engineering and planning representatives during several workshops, and the Flood Risk Management Committee. Comment was sought from all of these stakeholders during option identification and development.
- Assessment of the existing terrain, drainage information and 1% AEP and PMF flood hazards provided by Council.

A preliminary and exhaustive list of potential modification options for flood mitigation was developed, with a total of 25 flood modification (structural) options identified within the Whites Creek and Johnstons Creek study area. Mapping of the comprehensive list of options are included within **Appendix D**. The flood modification options have been grouped into the following categories:

- Drainage Upgrade,
- Channel Upgrade,
- Bridge Upgrade,
- Detention Basin,
- Road Regrading,
- Drainage Maintenance.

The number of possible flood modification options and option types that were considered for each catchment are summarised in **Table 8-2**.

Table 8-2 Number of Flood Modification Options by Type and Sub-Catchment

Catchment	Drainage Upgrade	Drainage Maintenance	Channel Upgrade	Detention Basin	Road Regrading	Total
Whites Creek	3	0	0	0	0	**3**
Johnstons Creek	9	1	1	4	7	**22**

These options have been outlined in the following **Figure 8-1** to **Figure 8-7**.

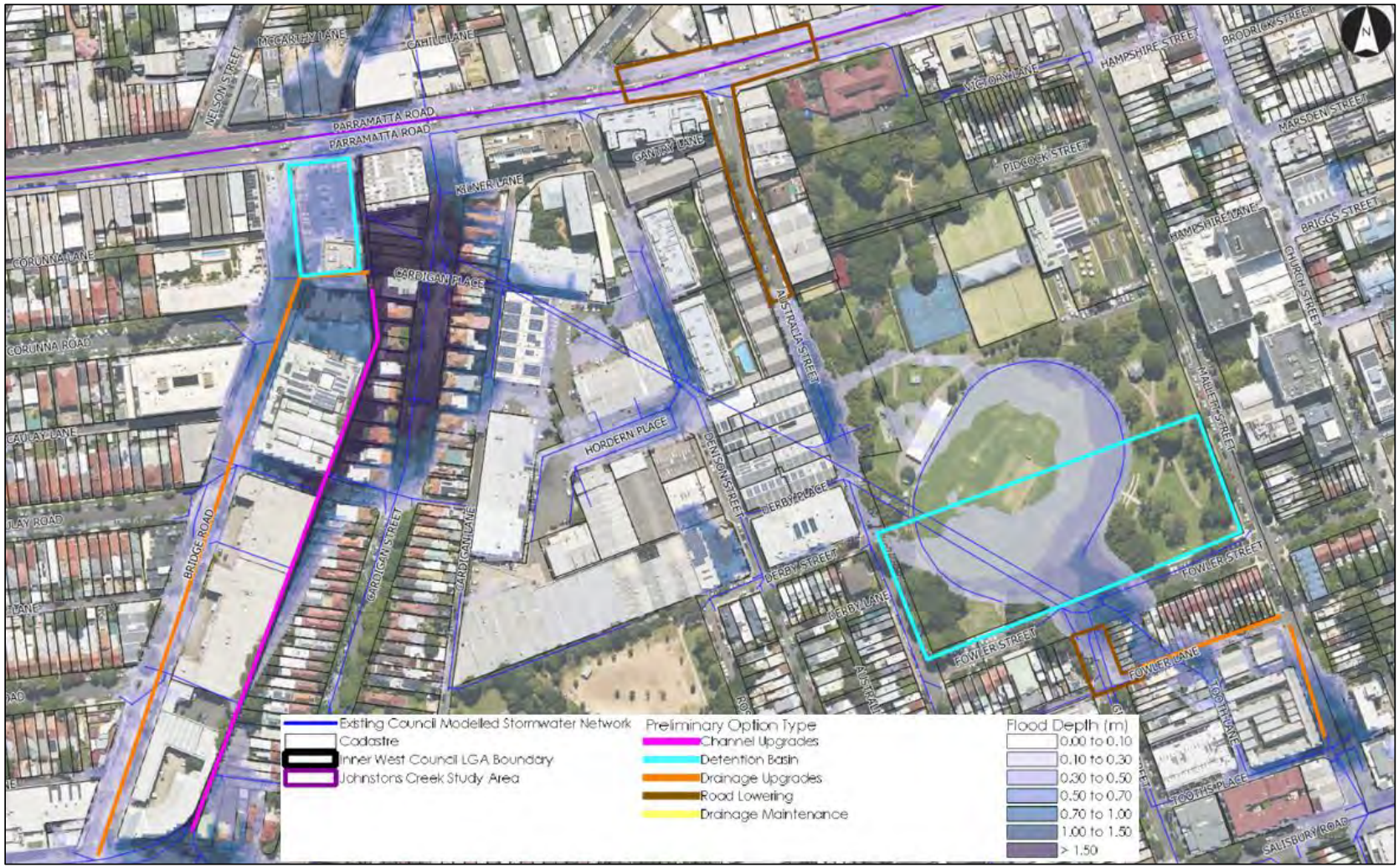

Figure 8-1 Johnstons Creek Hotspots 1 and 6 Mitigation Options



Figure 8-2 Johnstons Creek Hotspot 2 Mitigation Options

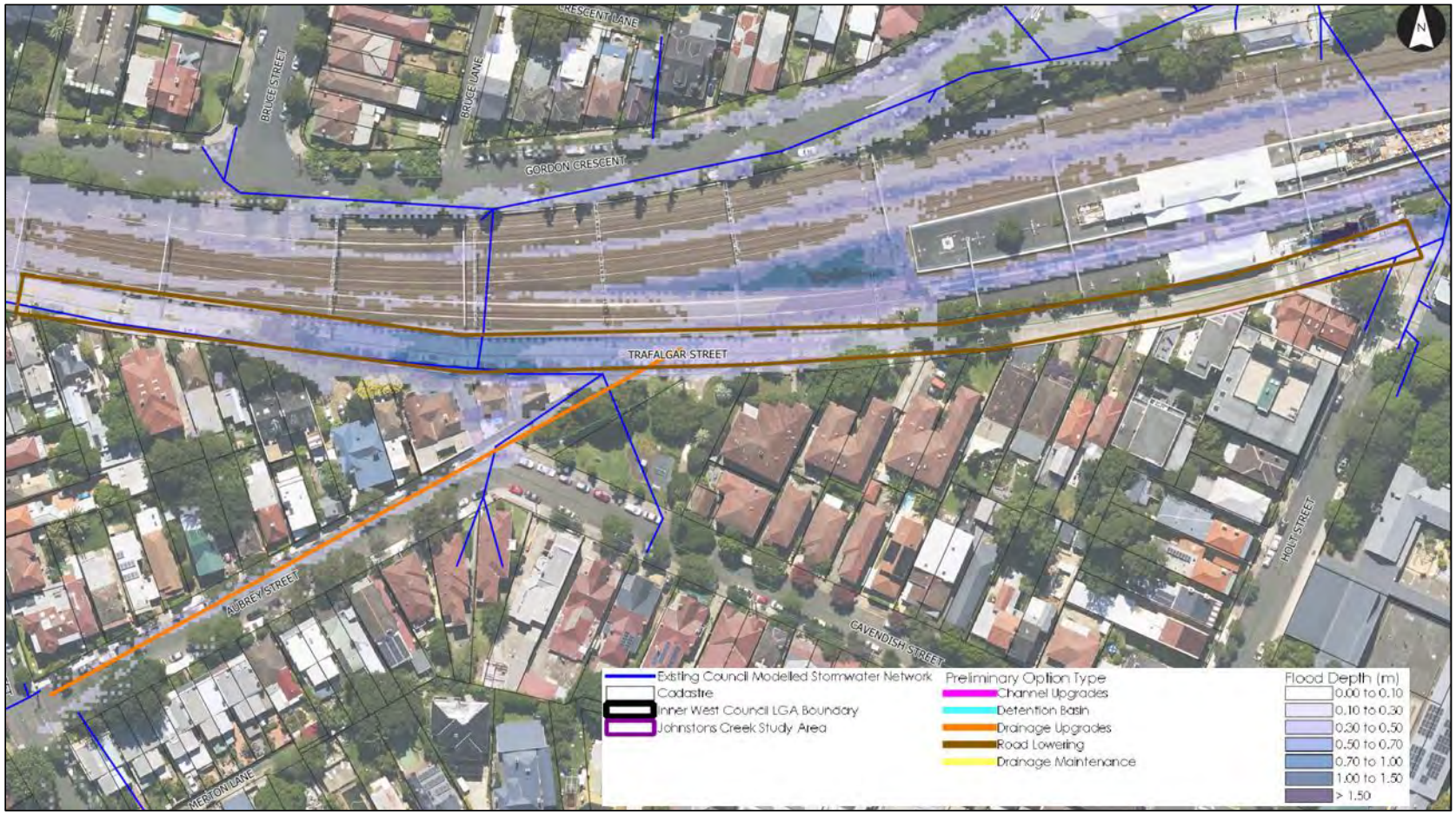

Figure 8-3 Johnstons Creek Hotspot 3 Mitigation Options



Figure 8-4 Johnstons Creek Hotspot 4 Mitigation Options



Figure 8-5 Johnstons Creek Hotspot 5 Mitigation Options



Figure 8-6 Whites Creek Hotspot 7 Mitigation Options



Figure 8-7 Whites Creek Hotspot 8 Mitigation Options

8.4 Preliminary Flood Modification Options

8.4.1 Initial Preliminary Flood Modification Options

The comprehensive list of possible flood modification options and option types that were considered are summarised in **Table 8-3.**

Table 8-3 Comprehensive List of Flood Modification Options

Location	Catchment	Type	Hotspot*	Description
Bridge Road, Stanmore	Johnstons Creek	Drainage Upgrade	1	Improve drainage capacity to better convey water towards the existing channel between Bridge Road and Cardigan Street.
Fowler Lane, Camperdown	Johnstons Creek	Drainage Upgrade	1/6	Improve drainage capacity along Mallett Street and Fowler Lane to reduce flooding impacts to Tooths Place and Fowler Street properties.
Gibbens Street, Camperdown	Johnstons Creek	Road Regrading	1/6	Regrade the existing road to better convey water through to Gibbens Street instead of Fowler Street properties.
Australia Street / Parramatta Road, Stanmore	Johnstons Creek	Road Regrading	1	Regrade the existing Australia Street and Parramatta Road intersection to convey water towards Parramatta Road instead of through properties.
Between Bridge Road and Cardigan Street, Stanmore	Johnstons Creek	Channel Upgrade	1	Improve channel capacity to reduce impacts to surrounding properties.
Camperdown Park, Australia Street, Camperdown	Johnstons Creek	Detention Basin	1/6	Construction of a detention basin to reduce flooding of downstream properties.
Salisbury Road / Douglas Street, Camperdown	Johnstons Creek	Drainage Upgrade	2	Improve drainage capacity to better convey water away from Salisbury Road properties.
Salisbury Road, Camperdown	Johnstons Creek	Drainage Maintenance	2	Carry out routine ongoing maintenance of existing drainage to sustain adequate drainage capacity.
Aubrey Street Trafalgar Street, Petersham	Johnstons Creek	Drainage Upgrade	3	Improve drainage capacity to reduce flooding impacts to the corner of Aubrey Street and Trafalgar Street.
Trafalgar Street, Petersham	Johnstons Creek	Road Regrading	3	Regrade the existing road to prevent ponding near Aubrey Street.
Stafford Street, Stanmore	Johnstons Creek	Drainage Upgrade	4	Improve drainage capacity to reduce water flow through properties.
Stafford Lane, Stanmore	Johnstons Creek	Drainage Upgrade	4	Improve drainage capacity to reduce water flow through properties.
Probert Street / Lane, Newtown	Johnstons Creek	Drainage Upgrade	4	Improve drainage capacity to reduce water flow through properties.
Bishopgate Lane, Camperdown	Johnstons Creek	Road Regrading	4	Regrade the existing road to redirect flow away from properties.
Kingston Road / Salisbury Road, Camperdown	Johnstons Creek	Road Regrading	4	Regrade the existing road to redirect flow away from properties.
Railway Avenue, Stanmore	Johnstons Creek	Road Regrading	4	Regrade the existing road to redirect flow away from properties.
Gladstone Street opp. Philip Lane, Enmore	Johnstons Creek	Detention Basin	4	Construction of a detention basin to reduce flooding of downstream properties.

Location	Catchment	Type	Hotspot*	Description
Gladstone Street adj. Augustus Street, Enmore	Johnstons Creek	Detention Basin	4	Construction of a detention basin to reduce flooding of downstream properties.
Probert Street / Melville Lane, Newtown	Johnstons Creek	Drainage Upgrade	5	Improve drainage capacity to reduce water flow through properties.
Eliza Street / Australia Street, Camperdown	Johnstons Creek	Drainage Upgrade	5	Improve drainage capacity to reduce water flow through properties.
Lennox Street, Newtown	Johnstons Creek	Road Regrading	5	Regrade the existing road to redirect flow away from properties.
Albany Road to Parramatta Road, Stanmore	Whites Creek	Drainage Upgrade	7	Improve drainage capacity to reduce water flow through properties.
Petersham Street, Petersham	Whites Creek	Drainage Upgrade	8	Improve drainage capacity to reduce water flow through properties.
Railway Avenue, Stanmore	Whites Creek	Drainage Upgrade	8	Improve drainage capacity to reduce water flow through properties.

Refer to **Section 7.5 for further details of the hotspot locations.*

Upon Council review, discussions were held to determine which of these preliminary options are to be adopted for further assessment. Details of the selected options are in the below report sections.

8.4.2 Selection of Initial Preliminary Flood Risk Management Options

An initial high-level assessment was carried out for each option based on the following criteria: potential benefits, technical feasibility and costs.

Benefits were assessed based on the expected or potential effects on flood affected areas. The zoning type, number of properties as well as road type/usage were considered. Benefits were categorised as negligible, very low, low, medium and high.

Technical feasibility and cost were assessed based on the specific requirements of each option such as earthworks, roadworks, potential property impacts, length of pipe upgrades, etc. Feasibility and costs were categorised as very low, low, medium and high.

Upon Council review, workshops were held with project stakeholders including DCCEW, SES, City of Sydney Council and Council strategic, engineering and planning representatives during several workshops, and the FRM Committee. The outcome of these discussions was to determine which of these preliminary options are to be adopted for further assessment. Options that scored relatively lower in terms of the above criteria (potential benefits, technical feasibility and costs) were not selected to be progressed.

Out of 23 total FM options (20 for Johnstons Creek and 3 for Whites Creek), 13 were recommended to be progressed to modelling (12 for Johnstons Creek and 1 for Whites Creek). A single Property Modification (PM) option (PM6) for increased drainage maintenance was considered for both study areas. With both PM and FM options the total number of modelled options is 15 (13 for Johnstons Creek and 2 for Whites Creek). The selected preliminary options are in **Table 8-4**. The flood modification options not selected for detailed assessment, including a brief reason, have been summarised in **Table 8-5**.

Table 8-4 List of Modelled Flood Risk Management Options

Option ID/ Location	Type	Number of Modelling Iterations	Continued to Detailed Assessment (Y/N)
JC1 – Fowler Street, Camperdown	Drainage Upgrade/ Detention Basin	5	Yes
JC5 – Bridge Road, Stanmore	Drainage Upgrade	6	Yes
JC6 – Bridge Road, Stanmore	Channel Upgrade	5	Yes
JC7 – Bridge Road, Stanmore	Detention Basin	1	Yes
JC9 – Salisbury Road, Camperdown	Drainage Upgrade	3	No
JC10 – Trafalgar Street, Petersham	Drainage Upgrade	3	Yes
JC13 – Gladstone Street, Enmore	Drainage Upgrade	4	Yes
JC14 – Railway Avenue, Stanmore	Road Regrading	1	Yes
JC15 – Probert Street, Newtown	Drainage Upgrade	2	Yes
JC18 – Kingston Road, Camperdown	Drainage Upgrade	4	Yes
JC20 – Lennox Street, Newtown	Drainage Upgrade	2	Yes
JC23 – Clarendon Lane, Stanmore	Drainage Upgrade	1	Yes
WC1 – Margaret Street, Petersham	Drainage Upgrade	5	Yes
PM6 – Targeted Stormwater Maintenance	Drainage Maintenance	1	Yes

Table 8-5 Options Not Progressed to Detailed Assessment

Location	Catchment	Type	Hotspot*	Reason For Not Progressing
Gibbens Street, Camperdown	Johnstons Creek	Road Regrading	1/6	Relatively low technical feasibility/high cost. Depth of road lowering required to divert flows away from residential properties on Fowler Lane was not feasible.
Australia Street / Parramatta Road, Stanmore	Johnstons Creek	Road Regrading	1	Relatively low technical feasibility/high cost. Length of road lowering and scale of works was significant with an interface with TfNSW road. Potential impacts on properties.
Salisbury Road / Douglas Street, Camperdown	Johnstons Creek	Drainage Upgrade	2	Partially included in JC5 Bridge Road Drainage Upgrade, relatively low technical feasibility Length of pipe upgrades, and limited capacity of downstream Sydney Water channels meant not feasible. Twin existing pipes under road meant limited space for additional capacity.
Salisbury Road, Camperdown	Johnstons Creek	Drainage Maintenance	2	Included in PM6 for assessment on a catchment-wide scale, therefore specific assessment at this high debris location not necessary.
Trafalgar Street, Petersham	Johnstons Creek	Road Regrading	3	Relatively low technical feasibility/high cost. Scale of works required to divert runoff from Aubrey Street around residential properties to Trafalgar Street not considered feasible.
Stafford Street, Stanmore	Johnstons Creek	Drainage Upgrade	4	Partially included in JC18 Kingston Road Drainage Upgrade. Network capacity found to be constrained with no capacity for additional inlet pits, length of pipe upgrades considered not feasible with limited capacity in downstream Sydney Water channels.
Stafford Lane, Stanmore	Johnstons Creek	Drainage Upgrade	4	Partially included in JC18 Kingston Road Drainage Upgrade. Network capacity found to be constrained with no capacity for additional inlet pits, length of pipe upgrades considered not feasible with limited capacity in downstream Sydney Water channels.
Bishopgate Lane, Camperdown	Johnstons Creek	Road Regrading	4	Relatively low technical feasibility/high cost. Depth of cut required to lower road to divert flows away from Probert St not considered feasible. Found that drainage upgrade for additional inlet pit capacity preferred option.
Kingston Road / Salisbury Road, Camperdown	Johnstons Creek	Road Regrading	4	Relatively low technical feasibility/high cost. Length and depth of road lowering to Salisbury Road to divert flows around residential properties was not considered feasible.
Gladstone Street opp. Philip Lane, Enmore	Johnstons Creek	Detention Basin	4	Relatively low technical feasibility/high cost. Rail corridor open space opportunity not deemed feasible for detention basin given potential utilities, contamination and ownership considerations.
Gladstone Street adj. Augustus Street, Enmore	Johnstons Creek	Detention Basin	4	Relatively low technical feasibility/high cost. Bugler playground opportunities not deemed feasible for detention basin given limited volumes and potential utilities, and loss of public space.
Eliza Street / Australia Street, Camperdown	Johnstons Creek	Drainage Upgrade	5	Included in Lennox Street option, rather than upgrading existing line, a diversion of runoff from upstream was deemed the preferred option.
Lennox Street, Newtown	Johnstons Creek	Road Regrading	5	Relatively low technical feasibility/high cost. Length and depth of road lowering to divert flows around properties was not considered feasible.
Petersham Street, Petersham	Whites Creek	Drainage Upgrade	8	Relatively low technical feasibility. Scale of works to increase capacity was not feasible based on existing flood affectation.
Railway Avenue, Stanmore	Whites Creek	Drainage Upgrade	8	Relatively low technical feasibility. Scale of works to increase capacity was not feasible based on existing flood affectation.

8.4.3 Modelling of Preliminary Flood Risk Management Options

The 15 flood risk management options that were selected for preliminary assessment were developed and modelled in the two sub-catchment TUFLOW models for Johnstons Creek and Whites Creek with the following methodology:

- 5 design events were considered: 20% AEP, 5% AEP (DSHHWS), 2% AEP, 1% AEP and PMF.
- The PM6 model scenario involved the unblocking off all pipes from the model. The assumption in this model approach is that improved maintenance would potentially remove blockage of pits and pipes, as a theoretical best-case scenario.
- PM6 was used as a base case for the FM options. Details on the PM6 scenario are in **Section 8.5**. The justification for adopting the PM6 option as the base case for the FM options is the removal of blockage. The FM options rely on the effectiveness of the drainage network, therefore assuming an unblocked condition is considered a suitable basis for assessing potential benefits of any drainage upgrades.
- Each option had a unique model scenario established to account for the proposed option details. Each option model was based off the base case.
- Each option was then initially modelled for the 20% AEP design event, then selected for detailed assessment based on the 20% AEP flood level difference impacts and other opportunities for improvement identified from the model set up.
- Options that were selected for detailed assessment were then progressed to modelling of all 5 design events.
- The methodology for each option accounted for the proposed works in the TUFLOW model as follows:
  - Drainage upgrades were modelled with updates to the 1D network with duplication of pits and pipes, and creation of new pits and pipes. The details of the proposed network were based on review of existing conditions to develop feasible pipe / culvert dimensions, locations, inverts and pit sizes.
  - Channel upgrades were modelled as 1D irregular channel elements with cross sections as per the base case model. Changes to the channel shapes, inverts, and 1D roughness values were applied to represent proposed changes in channel shape and lining.
  - Two types of detention basins were modelled. The inverts of the basins were determined based on review of existing conditions, terrain levels and minimum connection levels to existing stormwater networks.
    - Within the 2D domain of the TUFLOW model with 2D_zshapes applied to create basin shapes
    - Within the 1D pit and pipes network to simulate an underground detention basin, using pit dimensions to set the basin size and a short section of smaller diameter pipe to represent the effects of an overflow weir.
  - Road or surface regrading was modelled in the 2D domain of the TUFLOW model with 2D_zshapes, raising or lowering the existing surface to divert flows away from private property and retention in the road reserve.

8.4.4 Development and Optimisation of Preliminary Flood Modification Options

As per Section 2.2.4 of the FRM Guide MM01, optimisation of options may be used to refine options to improve benefits and reduce costs or disbenefits. This process was conducted for the 4 preliminary flood modification measures developed for this study.

The option as proposed in discussions with Council and NSW DCCEW was initially modelled, and then depending on the outcomes of the initial modelling was often refined and altered to enhance option benefits. In some instances, this led to significant changes in option design through this optimisation process.

Optimisation not only occurred based on maximising flood benefits, but also in response to other factors that were accounted for in the preliminary option development including:

> Maximising the feasibility of the option. This included consideration of the following:
  - Subsurface utility locations, with proposed earthworks avoiding the vicinity of these utilities where possible.
  - Suitable scale of works justifiable based on the anticipated flood benefits, such as downstream pipe sizes and lengths.
  - Land ownership and avoiding works on private lands where possible.
> Considering the relative cost of the option based on the scale of works, this provides an indication of the economic feasibility of the option.
> Reducing flood affectation and flood risk on private properties, particularly residential properties wherever possible. In some instances this resulted in additional flood risk within publicly owned lands such as road reserves and public open spaces.
> Minimising disturbance of ecological communities and minimising tree removal. The types of vegetation on subject sites were guided by site visit observations and Google Streetview.
> Minimising adverse impacts on private properties or non-publicly owned lands. While some options would result in significant benefits for some properties, it was important they not adversely affect other properties.

For the 4 preliminary flood modification options, a summary of the option outcomes considering the above factors was provided to Council and NSW DCCEW for their review. As discussed in the sections below, these factors were assessed in determining the options to carry into detailed assessment.

8.5 Other Preliminary Options

Beyond the 14 flood modification options that were modelled and assessed, a further twelve non-structural preliminary options were considered:

- Six preliminary Property Modification (PM) measures including Voluntary House Raising (VHR), flood proofing, Voluntary Purchase (VP) and two derivatives (land swap and Council redevelopment) and targeted stormwater maintenance. The options are discussed further in **Table 8-6**.
- Six preliminary Emergency Management Modification (EM) measures including flood prediction and warning, review of Local Flood Planning and information transfer to NSW SES, community flood awareness and school education programs, flood markers and signage and flood data and debrief. The options are discussed further in **Table 8-7**. It is noted that comment on these preliminary options was sought from NSW SES representatives to determine their opinion on the proposed Emergency Management options given the relevance to their operations.

These options were developed based on guidance provided within the FRM Guide MM01, the 2023 FRM Manual and based on past experience with option development in other study areas.

In total, 4 EM options and 1 PM options were recommended/selected for detailed assessment.

Table 8-6 Preliminary Property Modification Options

Option ID	Option Name	Description	Recommendation for Detailed Option
PM1	Voluntary House Raising (VHR)	House raising is a measure designed to reduce the incidence of over-floor flooding of existing buildings through works where Council and NSW DCCEW make contributions to the funding the cost of the work. There are a range of factors that contribute to the feasibility of Voluntary House Raising. The scheme should involve raising residential properties above a minimum design level, assumed to be Council's flood planning level (FPL) meaning 1% AEP plus 0.5 metre freeboard. While house raising can reduce the occurrence of overfloor flooding, there are issues related to the practice, including: > The potential for damage to items on a property other than the raised dwelling are not reduced – such as gardens, sheds, garages, granny flats, decks etc.; > Unless a dwelling is raised above the level of the PMF, and proven to be stable in such a flood event, the potential for above floor flooding still exists – i.e. there will still be a residual risk; > Evacuation may be required during a flood event for a medical emergency or similar, even if no overfloor flooding occurs, and this evacuation is likely to be hampered by floodwaters surrounding a property; > Ensure new footings or piers can withstand flood-related forces; and > Potential conflict with height restrictions imposed for a specific zone or locality within the LGA. The Guidelines for voluntary house raising schemes: Floodplain Management Program (NSW DCCEW, 2020) sets out ineligibility criteria for house raising under the Voluntary House Raising (VHR) scheme. In addition, follow up discussions with NSW DCCEW representatives have provided further information as the potential eligibility of properties for a VHR scheme. The adopted eligibility criteria for this FRMS&P based on these resources is as follows: > Must be residential dwellings to be eligible for funding. Commercial and industrial, public buildings or secondary dwellings are not considered eligible. > Properties that would not achieve a positive benefit through damage reduction relative to cost (i.e. benefit-cost ratio less than 1). > The post-raised building must be stable and therefore not be in a high hazard area. As outlined in the guideline this is defined as areas with PMF hazard of H4 or less being eligible. > Building located in 1% AEP floodway areas are not considered eligible as they represent a significant flow obstruction. > Based on NSW DCCEW guidance, house construction of brick or masonry type are not feasible for raising due to the difficulty of raising floors for such structures. Therefore, only fibro or timber type constructed houses are considered eligible. > Funding is only available for properties where the buildings were approved and constructed prior to 1986, when the original Floodplain Development Manual was gazetted by the State Government. Properties built after this date should have been constructed in accordance with the principles in the manual. > Properties which are already benefiting substantially from other floodplain mitigation measures, such as houses already protected by a levee. There are negligible existing flood mitigation measures in the study area. It is assumed that this requirement does not relate to properties that may benefit from one of the FM options proposed within the FRMS&P as these are not currently implemented mitigations.	No Considering the overland flooding nature of the study area, and the limited impact this would provide, and the suitability of the existing housing construction, this option was not considered viable.

Option ID	Option Name	Description	Recommendation for Detailed Option
PM2	Voluntary Purchase (VP)	Voluntary purchase is the optional purchase of pre-selected properties funded jointly by Council and the State Government. It would free both residents and emergency services personnel from the hazard of future floods by removing the risk, and is achieved by the purchase of properties and the removal and demolition of buildings. Properties could be purchased by Council at an equitable price and only when voluntarily offered. Such areas would then need to be re-zoned under the LEP to a flood compatible use, such as recreation or parkland, or possibly redeveloped in a manner that is consistent with the flood hazard (see PM5 below). Voluntary House Purchase is funded by Council with assistance from the State Government. However, due to the relatively expensive nature of such a program, limited availability of Government and/or Council funding can be a major constraint to undertaking Voluntary House Purchases. Typically, only a small number of properties within a floodplain can be considered for Voluntary Purchase, however, more can be assisted if funding is available. The Guidelines for voluntary purchase schemes: Floodplain Management Program (NSW DCCEW, 2020) to assist in determining when and where voluntary purchase schemes may be suitable. The guideline recommends that voluntary purchase be considered where: > There are highly hazardous flood conditions from riverine or overland flooding and the principal objective is to remove people living in these properties and reduce the risk to life of residents and potential rescuers; > A property is located within a floodway and the removal of a building may be part of a floodway clearance program that aims to reduce significant impacts on flood behaviour elsewhere in the floodplain by enabling the floodway to more effectively perform its flow conveyance function; and/or > Purchase of a property enables other flood mitigation works (such as channel improvements or levee construction) to be implemented because the property will impede construction or may be adversely affected by the works with impacts not able to be offset. > Must be residential dwellings to be eligible for funding. Commercial and industrial, public buildings or secondary dwellings are not considered eligible; > Properties that would achieve a positive benefit through damage reduction relative to cost (i.e. benefit cost ratio less than 1).	No Considering the overland flooding nature of the study area, heritage of existing buildings, and likely community expectation, this option was not considered viable.
PM3	Flood Proofing	Flood proofing involves undertaking structural changes and other procedures in order to reduce or eliminate the risk to life and property, and thus the damage caused by flooding. Flood proofing of buildings can be undertaken through a combination of measures incorporated in the design, construction and alteration of individual buildings or structures subject to flooding. It is primarily suited to industrial or commercial properties. Examples of proofing measures include: > All structural elements below the FPL shall be constructed from flood compatible materials. > All structures must be designed and constructed to ensure structural integrity for immersion and impact of debris up to the 100 years ARI flood event. If the structure is to be relied upon for shelter-in-place evacuation, then structural integrity must be ensured up to the level of the PMF. > All electrical equipment, wiring, fuel lines or any other service pipes and connections must be waterproofed to the FPL. The NSW SES Flash Flood Tool Kit (SES, 2012) provides businesses with a template to create a flood-safe plan and to be prepared to implement flood proofing measures.	No Current DCP provisions should address future development. The number of overfloor flooded properties across the LGA would make this type of scheme not feasible.

Option ID	Option Name	Description	Recommendation for Detailed Option
PM4	Land Swap	An alternative to voluntary purchase is the consideration of a land swap program whereby Council swaps a parcel of land outside of the flood prone area, such as an existing park, for a parcel of flood prone land with the appropriate transfer of any existing facilities to the acquired site. After the land swap, Council would then arrange for demolition of the building and have the land re-zoned under the LEP to open space. Since a detailed floor level survey has not been undertaken and over floor flooding has been estimated based on a desktop assessment, it is recommended that Council undertake a detailed floor level survey to validate if properties identified for voluntary purchase are suitable for land swap.	No – Due to lack of available Council owned land, particularly land that is flood free, therefore land swap not feasible.
PM5	Council Re-development	This option also provides an alternative to the Voluntary Purchase scheme. While Council would still purchase the worst affected properties, it would redevelop these properties in a flood compatible manner and re-sell them with a break-even objective.	No - From high level review conducted no properties are immediately apparent for being suitable for a scheme of this type.
PM6	Targeted Stormwater Maintenance	Vegetated roadsides result in significant leaf and branch drop which build up over time and often results in drainage inlet pits blocking rapidly when runoff events occur. This can lead to concentrated and uncontrolled overland flows occurring downslope of these inlets thereby increasing surface flows through streets and private properties. It is recommended that regular street sweeping is undertaken to reduce the potential for the inlets to become blocked and subsequently reduce the frequency of uncontrolled overland flows on streets and through private properties. In addition to regular street sweeping which reduces the potential for inlet pits to become blocked, it is also recommended that stormwater pits in areas subject to flooding are cleaned on a more frequent basis. Suction machines can be used to remove silt and rubbish from the pits. A stormwater maintenance program is currently implemented by Council, with the above tasks routinely conducted. However additional maintenance works could possibly be implemented in the future. It is difficult to quantify the potential benefits that an increased maintenance schedule may have, as the effectiveness of maintenance is reliant on the relative timing of maintenance and flooding. If a flood occurs immediately after a maintenance and cleaning then the benefits in flood reduction may be strongly evident. If flooding occurs after a long period without cleaning then any potential benefits of maintenance would be diminished. Therefore any increase maintenance program should consider the frequency of cleaning and other works. Option PM6 is for the targeted increased maintenance of the stormwater network. Inner West Council, in accordance with its responsibility as owner of the majority of the drainage assets within the study area, has a significant maintenance schedule already in place for all of its stormwater assets. This includes timely responses to community requests or notes relating to any drainage blockage or damage. Option PM6 involves potential additional targeted maintenance of greater frequency than is currently applied at key locations. The potential benefits of the PM6 option for targeted stormwater maintenance would be assessed using modelling assuming no blockage of pipes. This is a best-case scenario, that in reality is unlikely to be achievable. Nevertheless, it does provide an indication of areas of potential benefits, even if the scale of benefits may exceed expected outcomes.	Yes Council currently undertakes maintenance of the stormwater network. The base case model assumes a 100% blockage factor that has been applied to all small diameter pipes. A targeted cleaning program would help reduce the risk of blockage impacting flooding in small diameter pipelines.

Table 8-7 Preliminary Emergency Management Modification Options

Option ID	Option Name	Description	NSW SES Comment	Recommendation for Detailed Option
EM1	Flood Prediction and Warning	The critical duration and response times for the study area floodplain limit the implementation of a flood warning system. The short duration flooding experienced in local systems is not well suited to flood warning systems. Severe weather warnings are likely to be the only assistance for these areas. While flood response times of less than an hour that have been modelled in this study area make any form of warning system seem impossible, there are several factors that may make a scheme worth further investigation: > Flood free land throughout the study area is typically not a long distance. Unlike riverine catchments where the evacuation routes can be kilometres long, as shown in the evacuation route mapping the distance to flood free land does not typically exceed several hundred metres. This means that land above the PMF level could be reached by pedestrians or vehicles in a matter of minutes based on travel time. > Due to the local nature of the flooding, there should be less traffic for evacuation routes as there is not a regional evacuation route that needs to service an entire community. The 2023 FRM Guide EM01 provides advice around the development of a Total Warning System for Flooding (TWSF). The components of a TWSF must be integrated for a system to operate effectively.	Agree that a flood warning system is not feasible. BoM warnings are useful indicators of potential flooding. The NSW SES has adopted the Australian Warning System (AWS) for Riverine Flooding and Tsunami and is planning on extending this to Storms - including Flash flooding	No - A local flood warning system may not be feasible due to the flash flooding nature of the study areas. However, the short distance to flood free land means that any advanced warning may provide improved flood risk for the residents. Not progressed as a detailed option as currently not feasible to implement.
EM2	Review of Local Flood Planning and Information Transfer to NSW SES	Having a robust EM plan that can provide the basis for responding to various scales of flood threat and be altered to fit the particular circumstances of an event can assist with flood preparation, response and recovery. The review of local flood plans should also include: > A review of the current flood warning classifications (minor, moderate and major) for the location relative to the impacts on the community and any associated recommendations. > Clarification of the scale of impacts and the scale of the emergency response required in relation to key events and the associated flood timings so this can inform decisions and logistics. For example, for a levee protected community, having a plan in place on how to respond to floods that do not threaten the levee, threaten to result in minor overtopping of the levee, and for extreme floods that overwhelm the levee and town, can provide flexibility. > A review of other key information in the plan in light of the information in this study. The findings of this FRMS&P are an important source of catchment specific information for the NSW SES and Council. Details of flood risks at specific locations are important for planning of operational tasks and for the future review of the Flood Emergency Sub-Plan. The NSW SES have developed a Flood Risk Management Checklist to clearly establish the current expectations for data developed in the FRM process for the purposes of generating reliable flood intelligence to support flood emergency planning. This is a standard across the board and the checklist	NSW SES is currently revising the way flood planning is addressed in the IW LGA. The current draft VOL 2 of the flood plan is currently on hold and focus is on Pre-Incident Plans (PIPs) for flood rescue hotspots. The planning teams in Marrickville and Ashfield Leichardt units are refining overview documents for hotspot Zones to supplement the PIPs	Yes - Providing outcomes from the FRMS&P to NSW SES is essential.

Option ID	Option Name	Description	NSW SES Comment	Recommendation for Detailed Option
		is normally adopted upon receiving a formal request via the agency referral process. The checklist relates to three categories; Flood Studies, FRMS&P, and Key Flood Risk Management Issues		
EM3	Community Flood Awareness	Flood awareness is an essential component of flood risk management for people residing in the floodplain, it is important to maintain an adequate level of flood awareness during the extended periods when flooding does not occur. A continuous awareness program is required to ensure new residents are informed, the level of awareness of long-term residents is maintained, and to cater for changing circumstances of flood behaviour and new developments. This option would focus on education of the entire LGA with the objective to educate residents that may be in the floodplain at the time of flooding or may attempt to enter floodwaters. There are a broad range of approaches that can be adopted, which all should be done in close consultation with NSW SES: > Develop FloodSafe Brochure and FloodSafe Toolkit > Develop a post-flood data collection strategy > Hold a FloodSafe launch event > Develop a flood information package for new residents. This option however would not necessitate SES involvement in a Council flood awareness program. It is understood that some flood awareness programs are currently adopted in the local area. Collaboration with SES would be advantageous, as the expectation would be that Council could develop a flood awareness program that provides support and supplements SES flood awareness schemes. The implementation of a flood awareness program may be important in supporting other EM options. For example, the development of a flood warning system (option EM1) would require strong flood awareness, and flood signage and markers (option EM5) would provide best benefits if accompanied with a flood awareness program.	NSW SES supports the development of a council flood awareness program, accompanied by measures outlined in EM5	Yes - Recommended outcome of the FRMS&P. Support shown for this option during stakeholder workshop call.
EM4	School Education Program	The SES has developed a tailored program for school children in primary schools. The program, includes teacher's resources, newsletters, activities and games, is designed to deliver knowledge and awareness of floods to young children. SES personnel are also available to visit schools to talk about flooding and flood response. Further details of these programs are available on the SES StormSafe website. Education of parents / carers relating to the flood affectation of the school and the emergency response procedures in place to ensure the safety of their children could be provided directly or through children in the form of brochures etc. Particularly for the study area floodplain it should be reinforced to parents that as all schools have programs in place so they should never enter floodwaters in an attempt to reach their children at school.	NSW SES supports schools who have such programs in place. NSW SES obtains contact details from relevant school authorities.	Supported in Principle Not Recommended for Detailed Analysis – Council can engage and advocate on this matter, however only Considered an SES and Department of Education can take action.

Option ID	Option Name	Description	NSW SES Comment	Recommendation for Detailed Option
EM5	Flood Markers and Signage	While the above public programs can be effective in improving the long-term awareness of flood risk, in the event of flooding these education programs can easily be forgotten. Therefore, flood warning signage can be an effective tool to remind or inform residents of the risks associated with entering floodwaters, and to also provide practical information in the event of flooding such as recommended evacuation routes. Appropriate flood warning signs should be posted at all locations of significant flooding. These signs may contain information on flooding issues or be depth gauges to inform residents of the flooding depth over roads and paths. Also, evacuation route mapping could be provided on these signs to assist residents. In addition, consultation could be conducted with Transport for NSW (TfNSW) to discuss potential flood signage for flood affected regional roads through the study area. Potential flood affected roads for signage and markers may include: > Parramatta Road at the crossing of Johnstons Creek and Whites Creek. This is a potential regional access route for NSW SES operations. > Salisbury Road and Bridge Road in Stanmore at flood affected ponding areas. > Liberty Street railway bridge crossing in Enmore > Lennox Street in Newtown > Fowler Street and Australia Street near Camperdown Oval > Probert Street and Kingston Road ponding areas in Newtown/Camperdown.	NSW SES supports and encourages the adoption of this measure. Many of the roads affected are high traffic through roads and used by non-residents, so local awareness campaigns are not relevant to these road users. Our flood rescue operators also support these measures as they also indicate to responders the depth of water in the area.	Yes - Recommended outcome of the FRMS&P. Support shown for this option during stakeholder workshop call.
EM6	Flood Data and Debrief	A flood event provides an ideal opportunity to capture information on the flood and learn from it. It helps understand the event, the consequences for the community, successes and limitations in current management practices and how the community recovered. Information can be captured in coordinated community surveys. This information should be collated, and a report produced to catalogue what has been captured and its availability and format. The data should be securely stored and made publicly available. The information can be used in both explaining this event to the community and in considering future flood risk, EM and land-use planning decisions within and potentially beyond this community. These tasks are currently part of Council's requirements for flooding response. It is also noted that post-flood funding is also available from NSW DCCEW.	NSW SES supports this measure and considers this information vital to refining flood planning and response alternatives.	Yes - Recommended outcome of the FRMS&P. While Council already implements a program of post-flood data collection, continued emphasis of the need for such schemes is recommended. Post flood funding available from NSW DCCEW

9 Detailed Assessment of Options

9.1 Options for Detailed Assessment

A total of 20 options were selected for detailed assessment including hydraulic modelling of 5 design events (for 14 Johnstons Creek and 1 Whites Creek FM options and 1 PM option for each study area), damages assessment, cost estimation and Multi-Criteria Assessment (MCA). A summary of the 20 options is included in **Table 9-1**. It is noted that detailed options retained their preliminary option ID, therefore the ID numbering of the detailed option list is non-sequential.

Table 9-1 Description of Options for Detailed Assessment

Option Type	Option ID/Name	Modelled Option
Flood Modification (FM)	JC1 v1 – Fowler Street, Camperdown Drainage Upgrade	Yes
	JC1 v2 – Fowler Street, Camperdown Detention Basin	Yes
	JC5 – Bridge Road, Stanmore Drainage Upgrade	Yes
	JC6 v1 – Bridge Road, Stanmore Channel Regrading	Yes
	JC6 v2 – Bridge Road, Stanmore Channel Widening	Yes
	JC7 – Bridge Road, Stanmore Detention Basin	Yes
	JC10 – Trafalgar Street, Petersham Drainage Upgrade	Yes
	JC13 – Gladstone Street, Enmore Drainage Upgrade	Yes
	JC14 – Railway Avenue, Stanmore Road Regrading	Yes
	JC15 – Probert Street, Newtown Drainage Upgrade	Yes
	JC18 v1 – Kingston Road, Camperdown Drainage Upgrade	Yes
	JC18 v2 – Kingston Road, Camperdown Drainage Upgrade	Yes
	JC20 – Lennox Street, Newtown Drainage Upgrade	Yes
	JC23 – Clarendon Lane, Stanmore Drainage Upgrade	Yes
	WC1 – Margaret Street, Petersham Drainage Upgrade	Yes
Property Modification (PM)	PM6 – Targeted Stormwater Maintenance	Yes
Emergency Management Modification (EM)	EM2 – Review of Local Flood Planning and Information Transfer to NSW SES	No
	EM3 – Community Flood Awareness	No
	EM5 – Flood Markers and Signage	No
	EM6 – Flood Data and Debrief	No

A brief description of the proposed works for the 15 FM options proposed for adoption are summarised in Table 9-2. The layout of these FM options is also included in **Appendix E**.

Of the 15 flood modification options selected for detailed assessment, 14 are within the Johnstons Creek sub-catchment and 1 is within the Whites Creek sub-catchment. The location of the 15 flood modification options is shown in **Table 9-2**.

There are 2 detention basins proposed (one underground storage and one being a retrofit of an existing private carpark), 10 pit and pipe drainage network updates, 2 stormwater channel upgrades, and 1 road regrading projects. Options may have multiple components of the above option types, for example a detention basin option may also incorporate a pit and pipe drainage alteration.

Table 9-2 Description of FM Options for Detailed Assessment

Option ID	Sub-Catchment	Description
JC1 v1 – Fowler Street, Camperdown Drainage Upgrade	Johnstons Creek	Various pits on Australia St, Mallett St, Tooth Pl/Ln, Fowler Ln/St and Deniston St changed to unlimited capacity. Pipe to low point on Australia St upgraded from 0.45m to 0.75m. Drainage line from Fowler Ln/St diverted to the other culvert under Camperdown Oval. Two pipes on Deniston St upgraded from 0.3m to 0.75m.
JC1 v2 – Fowler Street, Camperdown Detention Basin	Johnstons Creek	Proposed underground storage pit under Camperdown Oval (2.5m depth, approximate area of 1700m2), incorporating above drainage upgrades.
JC5 – Bridge Road, Stanmore Drainage Upgrade	Johnstons Creek	Proposed and upgraded drainage throughout Bridge Rd with culvert size of 3.6m x 1.2m connected from the existing Salisbury Road intersection drainage network, pits with unlimited capacity throughout. This option does not include the detention basin in JC7.
JC6 v1 – Bridge Road, Stanmore Channel Regrading	Johnstons Creek	Cross sections and invert levels of the 1D irregular channel lowered to achieve 1% grade both north and south of Parramatta Road.
JC6 v2 – Bridge Road, Stanmore Channel Widening	Johnstons Creek	Channel inverts lowered to 0.5% to 0.7% grade south of Parramatta Road only, with widening to the west of the channel by 3m.
JC7 – Bridge Road, Stanmore Detention Basin	Johnstons Creek	Use of the existing basement at 29-31 Bridge Road as a detention basin (3m depth).
JC10 – Trafalgar Street, Petersham Drainage Upgrade	Johnstons Creek	Pipes on Trafalgar Street (eastbound side) upgraded to 0.9m with 5 pits changed to unlimited capacity and one directional intake only (for model stability).
JC13 – Gladstone Street, Enmore Drainage Upgrade	Johnstons Creek	Various pits along Gladstone St, Trafalgar St, Bedford St and Liberty St changed to unlimited capacity. One 0.3m pipe upgraded to 0.6m and one 1.2m pipe with pit added to a low point on Bedford St. Pipe sizes on Liberty St increased from 0.3m to 0.6m.
JC14 – Railway Avenue, Stanmore Road Regrading	Johnstons Creek	Lowering of the Railway Avenue to redirect flow from properties to the road corridor.
JC15 – Probert Street, Newtown Drainage Upgrade	Johnstons Creek	4 pits on Probert Street changed to unlimited capacity and one pipe with 0.9m diameter added to Probert St.
JC18 v1 – Kingston Road, Camperdown Drainage Upgrade 1	Johnstons Creek	Pits at intersection of Cardigan St and Marmion St changed to unlimited capacity. Two 0.3m pipes upstream of the drainage under private properties upgraded to 0.825m.
JC18 v2 – Kingston Road, Camperdown Drainage Upgrade 2	Johnstons Creek	Including above drainage upgrades, plus drainage under the private properties upgraded to 0.9m x 1.5m culvert and 4 additional pits on Cardigan Street changed to unlimited capacity.
JC20 – Lennox Street, Newtown Drainage Upgrade	Johnstons Creek	Proposed drainage on Australia Street, new 1d network with 0.6m diameter pipes added.
JC23 – Clarendon Lane, Stanmore Drainage Upgrade	Johnstons Creek	5 pits changed to unlimited intake and one 0.3m diameter pipe added on Clarendon Lane.
WC1 – Margaret Street, Petersham Drainage Upgrade	Whites Creek	Various pits on Margaret St, Corunna Rd, Westbourne St and Charles St changed to unlimited capacity. Pipes between Margaret St and Corunna Rd upgraded to 0.9m. Pipes between Parramatta Rd and Margaret St upgraded to 1.8m x 1.2m.

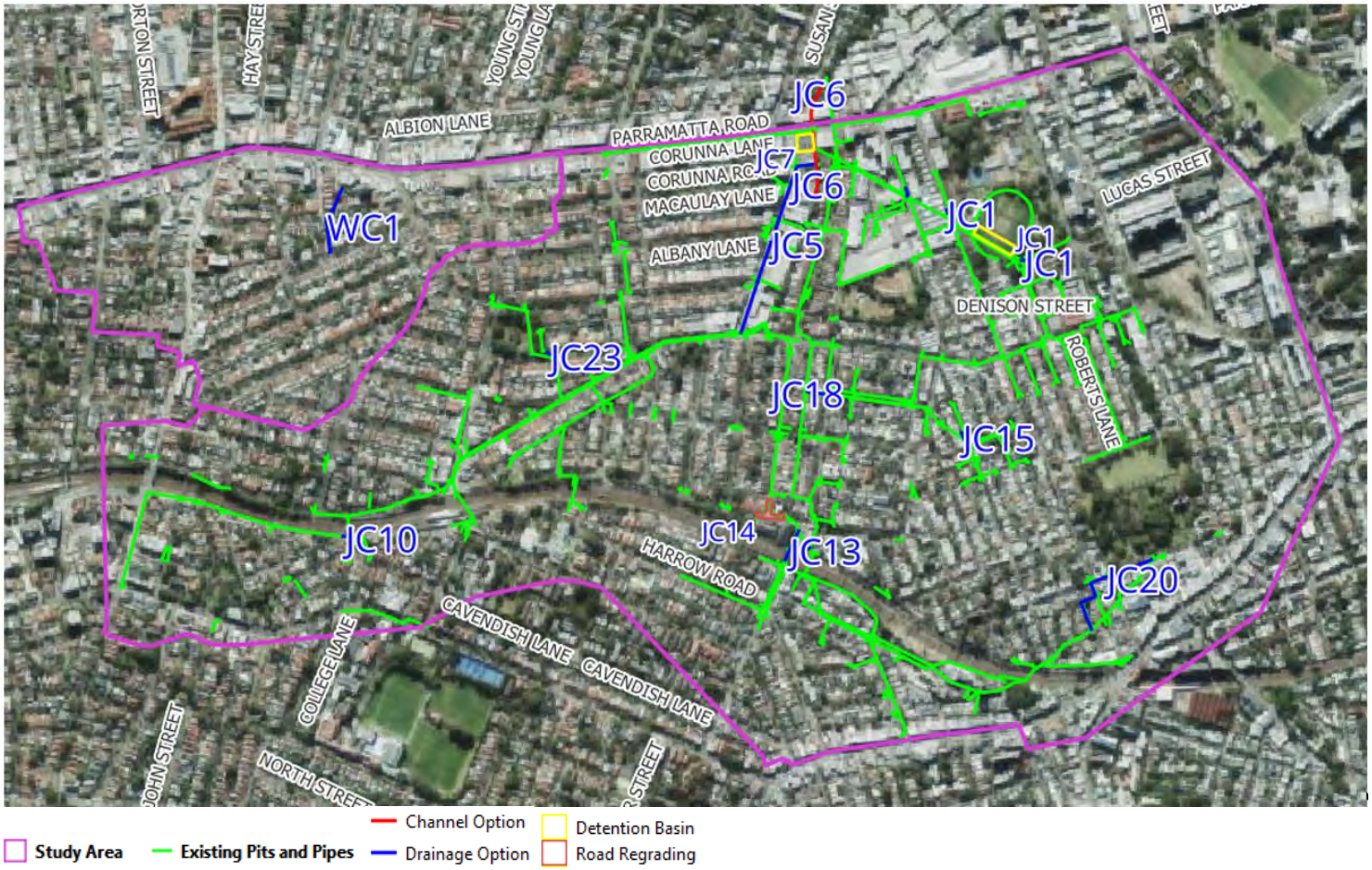

Figure 9-1 Location of 14 Detailed Flood Modification Options for Whites Creek and Johnstons Creek

9.2 Hydraulic Modelling of Options

The hydraulic modelling of detailed flood modification options reflected the model approach adopted for the preliminary options summarised in **Section 8.4.3**. The 13 detailed flood modification options and one property modification option were modelled for five design flood events - the 20%, 5%, 2% and 1% AEP and PMF events.

The review of hydraulic model results for detailed options included water level difference plots for each option compared to the PM6 base case for all 5 design events. The extent and scale of water level reductions and complete removal of flooding informed flood risk improvement conclusions for each option. Flood impact maps for all five modelled options for all five design flood events are included in **Appendix E**.

9.3 Preliminary Costing

Preliminary cost estimates have been prepared for all FM options, which allow for an economic assessment via consideration of the cost of implementation and the associated reduction in flood damages. The process for capital cost estimation was as follows:

- Quantities for construction have been estimated from preliminary design for the 13 FM options as they were modelled in the TUFLOW model. This included cut and fill volumes, disturbance footprint areas, and pipe lengths and diameters.
- Unit rates were initially estimated by Stantec based on past project experience. These unit cost rates were reviewed by Council staff and revised in some instances to match current cost rates for the local area.
- Due to the high-level nature of the estimates, a 50% contingency has been applied to all estimates given uncertainty on eventual design refinement and quantities.

Ongoing maintenance costs of FM Options have been estimated based on expected site conditions post-construction. Typically maintenance works assumed include pit and pipe cleaning, CCTV and mowing and maintenance of open space areas, with only minor expected costs associated. Due to uncertainty on future maintenance requirements and annual costs for Council, a 50% contingency has been applied to ongoing cost estimates as well.

Cost estimates for the Property Modification Option, PM6, the annual drainage maintenance budget for Inner West Council was scaled to the study area as an estimate of potential costs for increased maintenance based on the number of existing stormwater pipes. This amount was applied as both a capital cost and an ongoing maintenance cost for PM6.

For Emergency Management (EM) options, costs were estimated only on the basis of cost to implement, and were done for the purpose of comparison in the multi-criteria assessment. Ongoing costs for EM options were estimated based on expected work needed for each scheme.

Due to uncertainty of potential capital and ongoing costs for all PM and EM options, a 50% contingency has been applied to all, remaining consistent with the assessment of the FM options as well.

A summary of cost estimation outcomes for the 13 FM, 1 PM and 4 EM detailed options are included in **Table 9-3**. All capital and ongoing costs are excluding GST, and account for the 50% contingency.

Table 9-3 Cost Estimates for High-Level Quantitatively Assessed Options

Option	Capital Cost (excl. GST)	Ongoing Annual Cost (excl. GST)*
JC1 v1 – Fowler Street, Camperdown Drainage Upgrade	$397,097	$-
JC1 v2 – Fowler Street, Camperdown Detention Basin	$2,533,250	$6,000
JC5 – Bridge Road, Stanmore Drainage Upgrade	$7,915,444	$1,500
JC6 v1 – Bridge Road, Stanmore Channel Regrading	$1,899,528	$750
JC6 v2 – Bridge Road, Stanmore Channel Widening	$5,444,773	$750
JC7 – Bridge Road, Stanmore Detention Basin	$1,317,600	$4,500
JC10– Trafalgar Street, Petersham Drainage Upgrade	$704,767	$-
JC13 – Gladstone Street, Enmore Drainage Upgrade	$1,612,003	$2,250
JC14 – Railway Avenue, Stanmore Road Regrading	$2,247,615	$-
JC15 – Probert Street, Newtown Drainage Upgrade	$440,990	$750
JC18 v1 – Kingston Road, Camperdown Drainage Upgrade 1	$368,876	$-
JC18 v2 – Kingston Road, Camperdown Drainage Upgrade 2 (with upgrades under private properties)	$1,198,240	$-
JC20– Lennox Street, Newtown Drainage Upgrade	$2,266,173	$2,250
JC23 – Clarendon Lane, Stanmore Drainage Upgrade	$378,263	$1,500
WC1 – Margaret Street, Petersham Drainage Upgrade	$2,356,821	$-
PM6 – Targeted stormwater maintenance	$349,367	$349,367
EM2 – Review of Local Flood Planning and Info Transfer to NSW SES	$22,500	$7,500
EM3 – Community Flood Awareness	$60,000	$45,000
EM5 – Flood Markers and Signage	$150,000	$7,500
EM6 – Flood Data and Debrief	$45,000	$15,000

9.4 Damages Assessment of Options

An assessment of flood damages of the study area for the existing condition was presented in **Section 6**. The 2023 DT01 damage tool provides both a base case tab and an option tab such that damage benefits can be assessed within the tool. The base case is used to compare the performance of modelled options, and through calculation of post-option damages based on hydraulic model results the potential flood damage benefits of each option. The details of all methodology and input data for the option condition damages assessment are unchanged from those summarised in **Section 6**.

The damage assessment for options focussed only on the extent of impacts of the options, not the entire study area, with the total damage benefits calculated from the difference between option and PM6 condition damage totals in these areas of impact.

The new 2023 damages tool optimised external damage calculations by directly assessing them, eliminating the necessity for a separate property layer in the process. The tool features a tab for the base case and an option tab for inputting options data, enhancing the ease of comparing modelled options' performance.

Notably, the total length of assessment utilised a 30-year timeframe, as opposed to the previously employed 50 years, with a discount rate of 5% being considered throughout the analysis in agreement with DT01 defaults.

For PM6, applying existing condition, all pits and pipes were unblocked, achieving the desired PM6 condition to assess the best possible outcomes of increased drainage maintenance. For the PM6 option, the existing case was adopted as the base case. For the FM options, the PM6 condition assessment was used as the base case.

A summary of damage benefit outcomes for the five modelled design flood events (20%, 5%, 2%, and 1% AEP and PMF) for each of the 14 JC options and WC option is included in **Table 9-3** and **Table 9-4**.

The Average Annual Damage (AAD) reduction for each of the options has also been calculated in **Table 9-3** and **Table 9-4**. The total combined AAD benefit of 14 JC options is estimated to be nearly $3.9M per year and for WC option is nearly $320,000 per year.

Reduction in Flood Damages and AAD Associated with each Johnstons Creek Option

Option ID	Total Damages Reduction					Average Annual Damage Reduction
	PMF	1% AEP	2% AEP	5% AEP	20% AEP	
JC1 v1	$312,176	$216,803	$119,176	$20,646	$172,248	$102,704
JC1 v2	$78,827	$392,436	$797,530	$212,980	$277,497	$192,058
JC5	$128,968	$164,075	$352,491	$434,254	$169,430	$141,604
JC6 v1	$1,376,171	$1,203,646	$1,590,679	$1,506,617	$510,676	$467,185
JC6 v2	$1,625,581	$1,605,751	$1,353,928	$1,489,613	$538,691	$481,593
JC7	$149,280	$411,217	$1,357,498	$700,338	$729,992	$496,532
JC10	$0	$6,944	$53,643	$25,872	$879	$3,954
JC13	$2,127,043	$1,184,098	$712,851	$956,963	$555,234	$428,222
JC14	$3,431,063	$397,750	$466,465	$502,598	$489,152	$344,710
JC15	$20,170	$26,655	$142,280	$248,752	$163,320	$115,426
JC18 v1	$144,802	$9,424	$14,515	$35,953	$372,580	$209,263
JC18 v2	$1,010,857	$802,299	$589,819	$693,695	$396,096	$305,150
JC20	$173,057	$403,022	$554,971	$1,124,269	$776,464	$544,231
JC23	$0	$0	$35,676	$0	$37,089	$21,113
Total	$10,577,994	$6,824,120	$8,141,522	$7,952,549	$5,189,347	$3,853,745

Table 9-4 Reduction in Flood Damages and AAD Associated with each WC Option

Option ID	Total Damages Reduction					Average Annual Damage Reduction
	PMF	1% AEP	2% AEP	5% AEP	20% AEP	
WC1	$163,419	$419,958	$369,589	$345,327	$511,240	$324,667

In this process, the overflow depth was calculated utilizing the water level difference between the modelled option and PM6. This involved the addition of the water level difference to the PM6 overflow depth. Finally, to obtain the overflow level, the floor level was added to the calculated overflow depth.

The new 2023 damages tool optimised external damage calculations by directly assessing them, eliminating the necessity for a separate property layer in the process. The tool features a tab for the base case and an option tab for inputting options data, enhancing the ease of comparing modelled options' performance.

Notably, the total length of assessment utilised a 30-year timeframe, as opposed to the previously employed 50 years, with a discount rate of 5% being considered throughout the analysis.

9.5 Benefit-Cost Ratio

The economic evaluation of each option was performed by considering the reduction in the amount of flood damages incurred for the design events and then comparing this value with the cost of implementing the option.

Table 9-5 summarises the results of the economic assessment of each of the options. The indicator adopted to assess these measures on economic merit is the benefit-cost ratio (BCR), which is based on the net present worth (NPW) of the benefits (reduction in AAD, refer to **Section 9.4**) and the costs (of implementation, refer to **Section 9.3**). In the calculation of NPW, a 5% discount rate and an implementation period of 30 years have been adopted (default values in the 2023 DT01 Damage Tool).

The benefit-cost ratio provides an insight into how the damage savings from a measure relate to its cost of construction and maintenance.

- Where the benefit-cost ratio is greater than one (BCR >1) the economic benefits are greater than the cost of implementing the measure.
- Where the benefit-cost is less than one but greater than zero (0 < BCR < 1) there is still an economic benefit from implementing the measure, but the cost of implementing the measure is greater than the economic benefit.
- Where the benefit-cost is equal to zero (BCR = 0), there is no economic benefit from implementing the measure.

For all FM options it is possible to quantify, at least at a high-level both damage benefits and costs of implementation for each option, therefore a BCR is able to be calculated. For EM and PM options, the damage benefits are not easily quantifiable, though there would be some economic benefits of these options in the form of reduced risk to life and resultant reduction in flood damage for loss of life. Therefore in lieu of any damage benefit information, the economic analysis of these options has assumed that BCR is 1.0.

Table 9-5 Summary of Net Present Worth of Benefits and Costs and Resultant Benefit Cost Ratio

Option	NPW of AAD Reduction Benefits	NPW of Cost of Implementation of Option	Benefit Cost Ratio
JC1 v1– Fowler Street, Camperdown Drainage Upgrade	$1,578,818	$397,097	3.98
JC1 v2– Fowler Street, Camperdown Detention Basin	$2,952,404	$2,625,485	1.12
JC5 – Bridge Road, Stanmore Drainage Upgrade	$2,176,794	$7,938,503	0.27
JC6 v1 – Bridge Road, Stanmore Channel Regrading	$7,181,786	$1,911,058	3.76
JC6 v2– Bridge Road, Stanmore Channel Widening	$7,403,263	$5,456,303	1.36
JC7 – Bridge Road, Stanmore Detention Basin	$7,632,909	$1,386,777	5.50
JC10– Trafalgar Street, Petersham Drainage Upgrade	$60,783	$704,768	0.09
JC13 – Gladstone Street, Enmore Drainage Upgrade	$6,582,822	$1,646,592	4.00
JC14 – Railway Avenue, Stanmore Road Regrading	$5,299,041	$2,247,616	2.36
JC15 – Probert Street, Newtown Drainage Upgrade	$1,774,388	$452,519	3.92
JC18 v1 – Kingston Road, Camperdown Drainage Upgrade 1	$3,216,878	$368,877	8.72
JC18 v2 – Kingston Road, Camperdown Drainage Upgrade 2	$4,690,901	$1,198,241	3.91
JC20– Lennox Street, Newtown Drainage Upgrade	$8,366,172	$2,300,761	3.64
JC23 – Clarendon Lane, Stanmore Drainage Upgrade	$324,555	$401,322	0.81
WC1 – Margaret Street, Petersham Drainage Upgrade	$4,990,924	$2,356,821	2.12
PM6 – Drainage Maintenance		$5,719,990	1.0*
EM2 – Review of Local Flood Planning and Info Transfer to NSW SES		$137,794	1.0*
EM3 – Community Flood Awareness		$751,761	1.0*
EM5 – Flood Markers and Signage		$265,294	1.0*
EM6 – Flood Data and Debrief		$275,587	1.0*

*In lieu of benefit values for EM options, due to flood risk reduction BCR value assumed to be 1.0

The BCR results show that of flood risk management options:

- Eight (8) options have BCR values over 3.0, therefore the costs are significantly lower than the calculated benefits.
- Two (2) options have BCR values over 1.5 to 3.0, therefore the costs are lower than the calculated benefits.
- Eight (8) options have BCR values over 0.5 to 1.5, therefore the costs are comparable to the calculated benefits, five (5) such options are EM and PM options with assumed BCR of 1.0.
- Two (2) options have BCR values less than 0.5, therefore the costs are significantly higher than the calculated benefits.

The PM6 option cannot be easily assessed as the potential benefits of targeted maintenance are difficult to quantify. A sensitivity modelling scenario has been adopted assuming no blockage of pipes as a result of maintenance. This is a best case scenario, that in reality is unlikely to be achievable. Nevertheless, it does provide an indication of areas of potential benefits, even if the scale of benefits may exceed expected outcomes. Therefore, due to this uncertainty, the modelling outcomes in the form of damage benefits were not applied to the BCR outcome for this option PM6.

9.6 Multi-Criteria Assessment

To assist Council in identifying the FRM options that provide the most benefits for the community, all options need to be compared against each other based on factors relevant to the study area.

Evaluating what constitutes an appropriate strategy for floodplain management is a significant analytical and policy challenge. Such challenges have led to the exploration of alternative policy analysis tools, one being Multi Criteria Assessments (MCA). The goal of MCA is to attempt to directly incorporate multiple values held by community and stakeholders into the analysis of management alternatives while avoiding the reduction of those values into a standard monetary unit. In doing so, one can consider different FRM options in the context of economic criteria as well as other criteria such as social, or environmental aspects. Community and stakeholders can also assign explicit weights to those values to reflect their preferences and priorities. Therefore, MCA provides opportunities for the direct participation of community and stakeholders in the analysis.

An MCA approach has been used for the comparative assessment of all options identified using a similar approach to that recommended in 2023 FRM Guide MM01. This approach uses a subjective scoring system to assess the merits of each option. The principal value of such a system is that it allows comparisons to be made between alternatives using a common index. In addition, the MCA makes the assessment of alternatives “transparent” (i.e. all important factors are included in the analysis).

However, this approach does not provide an absolute “right” answer as to what should be included in the plan and what should be omitted. Rather, it provides a method by which Council, community and stakeholders can re-examine options and, if necessary, debate the relative scoring assigned.

Each option is given a score according to how well the option meets specific considerations. In order to keep the scoring system simple a framework has been developed for each criterion.

9.6.1 Development of Criteria

A balanced FRMS&P addresses existing, future and continuing risk to reduce residual risk to a level more acceptable to the community and in doing so generally involves assessing, deciding on and prioritising a range of FRM measures.

One way of considering the outcomes of an MCA of different options or packages of options is the establishment of an options assessment matrix that considers a range of criteria that can influence decision-making. The criteria used can vary with the flood situation and community. Some may not be relevant to the circumstances or the options being considered. In addition, different communities, decision-makers and groups may consider different criteria and specific elements to be more or less important. One way of addressing this variation is to weight the relative importance of these criteria so this can be factored into the assessment.

As per the recommendations of Section 2.2.5 of the FRM Guide MM01, the selection of criteria and weighting should be completed independent of scoring and actively involve the FRM committee and its technical working group (TWG).

There are a total of 11 MCA criteria adopted for this FRMS&P:

- 5 economic criteria – Benefit-cost ratio, risk to property, technical feasibility, implementation complexity, and adaptability/long-term performance
- 4 social criteria – Risk to life, emergency access and evacuation, social disruption and public open spaces, and community and stakeholder support
- 2 environment criteria – Flora and fauna impact and heritage impact.

The criteria weightings provided by Council are summarised in **Table 9-6**.

9.6.2 Criteria Scoring System

A scoring system was established for each criterion with scores ranging from +2 for options that represented a significant improvement on existing conditions for any given criteria, to -2 for options that represented a significant worsening of existing conditions. The scoring system for all 10 criteria are summarised in **Table 9-6**. It is noted that for two criteria (Benefit-Cost Ratio and Reduction in Risk to Property) scoring systems was based on quantifiable assessment outcomes, for all other criteria scoring was more subjective.

Table 9-6 Multi-Criteria Assessment - Scoring System Summary

Category	Criterion	Weighting	Description of Criterion Assessment	Score				
				-2	-1	0	1	2
Economic	Benefit-Cost Ratio	20%	The cost effectiveness of the scheme, i.e. the tangible return on investment	0 to 0.25	0.25 to 0.5	0.5 to 1.5	1.5 to 3.0	>3.0
	Reduction in Risk to Property	5%	Based on reduction in AAD, it establishes the tangible benefit of an option	Major increase in AAD (>$200,000)	Slight increase in AAD ($200k to $100k)	Negligible Improvement (less than $100k AAD impact)	Slight decrease in AAD ($200k to $100k)	Major decrease in AAD ($>200,000)
	Technical Feasibility	10%	Establishes the feasibility of options based on likely service constraints, environmental hazards, and programming contingencies such as land acquisition or agreements with external agencies	There are a number of significant factors that pose an impact on the feasibility of the project	There is a single significant factor or multiple smaller factors that pose a potential impact on the feasibility of the project	May or may not be feasible	Likely to be feasible with management of constraints	Very likely to be feasible with no significant restraint
	Implementation Complexity	5%	Ease of constructability within Council's standard Capital Works Planning	Construction timeframe greater than 1 year Project cannot be broken down into sequential components	Construction timeframe greater than	Key components can be completed in isolation within 12 months	Overall construction timeframe less than 12 months Minor components can be staged	Construction timeframe less than 6 months Major components can be staged
	Adaptability and long-term performance	10%	The impact the option will have both in terms of feasibility, benefits and cost over the life of the option, and adaptability to climate change conditions	Significantly diminished performance long-term or under climate change	Slightly diminished performance long-term or under climate change	Unchanged performance long-term or under climate change	Unchanged or improved performance long-term or under climate change with minor ongoing costs	Unchanged or improved performance long-term or under climate change with negligible ongoing costs
Social	Reduction in Risk to Life	15%	The impact on risk to life from the 20% AEP up to the PMF event	Widespread or significant localised increase in risk to life	Localised or slight increase in risk to life	Negligible change in risk to life	Localised or slight reduction of risk to life	Widespread or significant localised reduction of risk to life
	Emergency Access and Evacuation	10%	The impact on the ability to evacuate or for NSW SES or emergency services under extreme flood conditions	Widespread or significant localised impact on evacuation and emergency services	Localised or slight localised impact on evacuation and emergency services	Negligible impact on evacuation and emergency services	Localised or slight improvement for evacuation and emergency services	Widespread or significant localised improvement for evacuation and emergency services
	Social Disruption and Public Open Spaces	5%	The impact of the risk management option on social disruption and the use of public spaces	Significant increase in the frequency of flooding or limitation of the use of a public space or causes significant social disruption	Increase in the frequency of flooding or limitation of the use of a public space or causes social disruption	Negligible impact on public space or social disruption	Reduces the frequency of flooding or provides enhanced use of a public space or causes social benefit	Significantly reduces the frequency of flooding or enhanced use of a public space or causes significant social benefit
	Community and Stakeholder Support	10%	Support for the option based on FRM Committee meeting, stakeholder engagement and community consultation outcomes	Strong opposition to the option in multiple submissions	Slight opposition to the option	No response	Slight support to the option	Significant support to the option
Environment	Impact on Fauna/Flora	5%	Likely impacts on Threatened Ecological Communities and Threatened Species	High negative impact	Slight negative impact	Negligible impact	Some benefit	Considerable benefit
	Impact on Heritage	5%	Impact to Heritage items	Likely impact on State, National, or Aboriginal Heritage item	Likely impact or increased impact on a local heritage item	No impact	Reduces the impact of flooding to heritage item or heritage conservation area	Heritage item no longer flooded

9.6.3 Multi-Criteria Scoring Outcomes

The assignment of a score and brief discussion reasoning for the score for each criterion for all flood modification (FM), property modification (PM), and emergency management (EM) modification options is shown in its entirety in the matrices presented in **Appendix F**.

The unweighted scores of the MCA has a range from 20 to -20 based on 10 criteria each with a score of +2 to -2. The weighted final MCA scores using the criteria weighting (see **Table 9-6**) have a possible range of +2.0 to -2.0. The total weighted and unweighted MCA scores for each detailed option are summarised in **Table 9-7**. The options have been tabulated in order from highest to lowest weighted score.

Due to the relative weighting of the 10 criteria the weighted and unweighted scores for options are not ordered the same. This provides an insight into the significance of appropriate criteria weighting.

Table 9-7 MCA Outcomes for Weighted and Unweighted Scores for Detailed Options

Option ID	Option Type	Total Unweighted Score (from -20 to 20)	MCA Weighted Score	Final Rank
Option JC15 - Probert Street, Newtown Drainage Upgrade	Flood Management (FM)	12	1.25	1
Option JC7 - Bridge Road, Stanmore Detention Basin	Flood Management (FM)	11	1.15	2
EM2 – Review of Local Flood Planning and Info Transfer to NSW SES	Emergency Management (EM)	11	1.10	3
Option JC20 - Lennox Street, Newtown Drainage Upgrade	Flood Management (FM)	10	1.10	3
Option JC13 - Gladstone Street, Enmore Drainage Upgrade	Flood Management (FM)	9	1.05	5
EM3 – Community Flood Awareness	Emergency Management (EM)	10	0.95	6
EM5 – Flood Markers and Signage	Emergency Management (EM)	10	0.95	6
Option JC14 v2 - Railway Avenue, Stanmore Road Regrading	Flood Management (FM)	7	0.85	8
Option JC18 v1 - Minor Kingston Road, Camperdown Drainage Upgrade	Flood Management (FM)	7	0.75	9
Option JC6 v1 - Bridge Road, Stanmore Channel Upgrade (Re-grading North)	Flood Management (FM)	5	0.70	10
PM6 –Targeted stormwater maintenance	Property Modification (PM)	7	0.65	11
Option JC23 - Clarendon Lane, Stanmore Drainage Upgrade	Flood Management (FM)	7	0.55	12
Option JC18 v2 - Major Kingston Road, Camperdown Drainage Upgrade	Flood Management (FM)	3	0.55	12
Option JC1 v5 - Fowler Street, Camperdown Detention Basin	Flood Management (FM)	5	0.50	14
EM6 – Flood Data and Debrief	Emergency Management (EM)	5	0.45	15
Option WC1 - Margaret Street, Petersham Drainage Upgrade	Flood Management (FM)	1	0.40	16
Option JC1 v1 -Fowler Street, Camperdown Drainage Upgrade	Flood Management (FM)	4	0.35	17
JC6– Bridge Road, Stanmore Channel Widening	Flood Modification (FM)	3	0.30	18
JC10– Trafalgar Street, Petersham Drainage Upgrade	Flood Modification (FM)	5	0.15	19
JC5 – Bridge Road, Stanmore Drainage Upgrade	Flood Modification (FM)	0	0.00	20

The highest scoring options typically fall into one of two categories:

- Relatively cost-effective FM) options consisting of drainage upgrades that provide significant flood risk reduction benefits (with the exception of the Bridge Road detention basin option).
- EM options which offer significant flood risk reduction with relatively minor cost. Three of the top seven MCA scoring options are EM options.

The lowest scoring options are typically FM options that do not provide significant flood risk reduction benefits relative to their cost, complexity or other issues. The lowest 5 scoring options are all FM options.

10 Implementation Program

The Flood Risk Management options outlined in **Section 9** are recommended for implementation as an outcome of the Floodplain Risk Management Study. In order to achieve the implementation of relevant management actions, a plan of implementation has been developed as outlined in the following sections.

10.1 Steps to Implementation

The steps in progressing the flood risk management process from this point onwards are:

- Formal adoption of FRMS&P: Following public exhibition and FRM Committee approval, Council will formally adopt the final Flood Risk Management Study and Plan;
- Investigation and Design (I&D) stage – Most options will next require an Investigation and Design (I&D) phase to further refine the design and further confirm the feasibility of the option. An equivalent assessment is a 'Feasibility Study' or 'Scoping Study' for programs such as the Voluntary House Raising Scheme. These investigation and design assessments for individual projects should build on the assessment undertaken in the FRM plan. The potential steps of the I&D stage may include:
  - Prior to the I&D stage, grant funding applications for the I&D assessment may need to be submitted by Council when required.
  - Additional investigations may be required to inform feasibility assessment. For example, for Flood Modification options these may include geotechnical investigations, subsurface utility survey, or environmental impact reviews.
  - Concept design of the option.
  - Detailed design of the option.
  - Environmental approvals submissions such as a Review of Environmental Factors (REF) or Environmental Impact Statement (EIS).
  - Economic assessment of options (Level 1, Level 2 or Level 3 guided by the framework discussed in the next sub-section) potentially including further detailed damages benefit assessment, or cost estimation compared to the analyses conducted in this FRMS&P.
- Following I&D stage, if required, a grant funding application will need to be submitted to support the implementation / construction of the option.
- Implementation / construction of the flood risk management option.

10.2 Economic Assessment Framework for Options

Where external funding is required, the FRM economic assessment framework, as shown in **Figure 10-1**, provides the basis for further assessment of the FRM measures as part of the investigation and design phases of implementation.

The framework for the economic assessment of FRM measures from the FRM Guide MM01 is shown in **Figure 10-1**. It provides a summary of the economic assessment of FRM options following on from a FRMS&P into Investigation and Design (I&D) stage and into Implementation stage. This provides useful context into the different levels of detailed assessment required for FRM options once they proceed beyond the FRMS&P stage. There are four levels of economic assessment based on this framework:

- Level 1 assessments are the least detailed form of economic assessment. Level 1 assessments include preliminary costing, damages benefit estimation and an MCA including preliminary cost-benefit summary. These Level 1 assessments are applied at the FRMS&P phase for all FRM options, regardless of expected option cost. For FRM options with expected cost less than $1 million, a level 1 assessment is also appropriate at I&D and implementation stage as no grant approval is required. The Level 1 assessment in this FRMS&P for detailed options is summarised in **Section 9.5**.
- Level 2 assessments update the Level 1 economic analysis to include cost estimates from I&D stage. Consider whether additional damage assessment factors (not included but likely to influence the outcome) should be included to improve the Level 1 damage assessment, also consider sensitivity assessment to discount rate, and increases, and decreases in benefits and costs. Level 2 assessments relate to FRM

options with expected value between $1-$5 million. Level 2 assessments require additional reporting incorporated in I&D reporting to support grant application for implementation.

- Level 3 assessments are similar to Level 2 with updating of Level 1 economic analysis to include cost estimates from I&D stage, but with potential to include more detailed techniques for monetary valuation. Use of more detailed assessment techniques for benefits assessment, for example, evacuation modelling may be appropriate to identify risk to life more readily. More detailed sensitivity analyses than Level 2 with a more detailed stand-alone report or appendix to the I&D report to support grant application. Level 3 assessments relate to FRM options with expected value between $5-$10 million.
- For FRM Options with expected value in excess of $10 million, the option must go through a NSW Treasury gateway review process with more detailed economic assessment and reporting required.

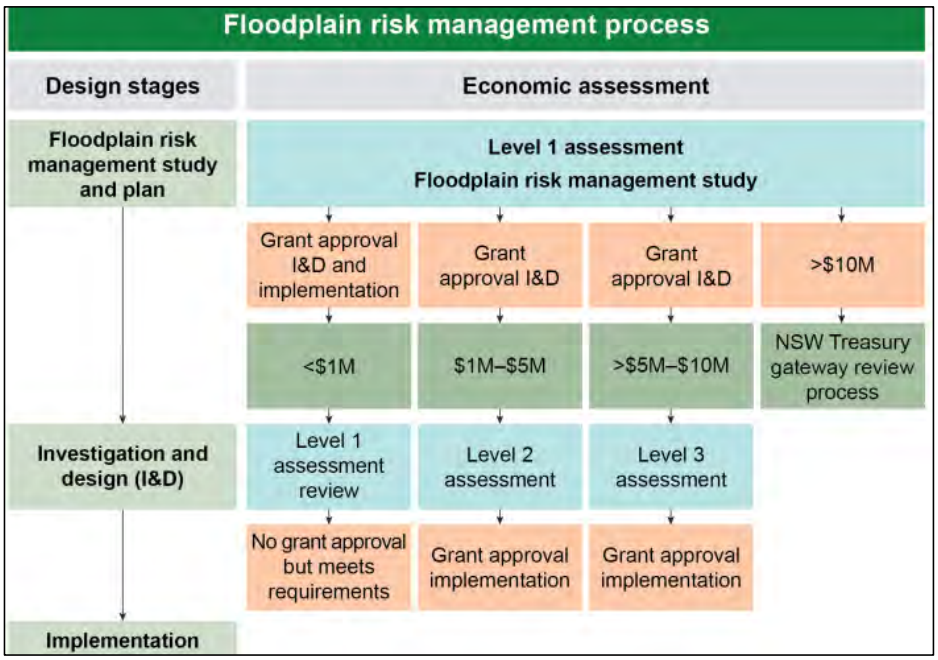

Figure 10-1 Detailed FRM Measure Economic Assessment Framework (Source: FRM Guide MM01)

The expected necessary economic assessment level of each option in this FRMS&P is summarised in the implementation program in **Table 10-1**. The economic assessments will need to be completed during Investigation and Design (I&D) stage for each option.

10.3 Funding Mechanisms for FRM Options

As stated in FRM Guide MM01, FRM plans may recommend a range of implementation measures that are funded through one of the following means:

a. Council funded: Can be implemented within council's own resources, such as updating land-use planning arrangements. Council should progress these measures within their own resources considering the priorities in the plan

b. Funded by Other Agencies: Are the agreed responsibility of, or require agreed input from external parties to implement. Examples include updating EM planning arrangements, or options located within the lands of other stakeholder agencies. Council should work with external parties to support implementation, considering the priorities in the plan.

c. Grant Funded: Will generally require external funding support, such as new or upgraded FRM works, including levees, basins, and flood warning systems. Council will need to apply for these grant funds.

The anticipated funding mechanism for each option adopted within this FRMS&P is summarised in the implementation program in **Table 10-1**. This is an assumed funding source, it is possible that funding sources other than those listed in **Table 10-1** may be considered for any given option at Council's discretion and with the agreement and support from any relevant funding agencies.

10.3.1 Grant Funding

The NSW Government's floodplain management grants support local Councils to manage flood risk. The funding for FRM option implementation from these grants has traditionally comes from two programs:

> NSW Floodplain Management Program, and

> Floodplain Risk Management Grants Scheme (jointly funded by the NSW DCCEW and the Commonwealth Government).

Applications for funding can be made by Council for the implementation of actions identified in a FRMS&P. The information provided in the applications for each management action is used to rank the priority for funding of all actions across NSW. The information presented in this FRMS&P can be used as a starting point to complete the relevant applications for funding.

Sufficient information should be provided in reports to facilitate funding applications for eligible projects under relevant funding programs. Information currently needed to support these applications relates to Council's commitment to FRM, how FRM measures were identified and assessed, community involvement in FRM plan development, and the FRM benefits of the project for the community.

10.4 Ranking and Prioritisation of Options

Based on review of the Multi-Criteria Assessment outcomes summarised in **Section 9.6**, the options have been ranked in order of preference. The MCA scores were combined to produce an options implementation preferences list as shown in **Table 10-1**. As shown in the rank column, this table was ordered based on ranking, from highest ranking to lowest ranking option.

In addition, a priority has been assigned to each of the options to inform the implementation strategy. The priority reflects the recommended urgency of the option from a reduction in flood risk perspective, it is possible that the order of implementation that Council adopts may differ from these priority assignments.

The grouping of options into the three priority categories has been based on the distribution of MCA scoring, with categories set at points of clear delineation of scoring outcomes. There is a MCA score difference of 0.90 from the worst scoring high priority option and the best medium priority option, with a 0.15 score difference from medium to low. The three priority categories are:

> High – Seven options were identified as high priority. Of the high priority options, four are Flood Modification (FM), or structural options and three are Emergency Management (EM) modification options. The range of MCA scores for high priority options is 1.25 to 0.95 (ranks 1-7)

> Medium – Eight options were identified as medium priority. Of the medium priority options, two are Property Modification (PM) options and six are Flood Modification (FM), or structural options. The range of MCA scores for medium priority options is 0.90 to 0.50 (ranks 7-14); and

- Low – Three options were identified as low priority. Of the low priority options, two are Flood Modification (FM), or structural options and two are Emergency Management (EM) options. The range of MCA scores for low priority options is 0.45 to 0.35 (ranks 15-18).

Three Flood Management (FM) options were removed from the implementation plan due to relatively low ranking scores:

- JC6 v1 Bridge Road channel widening upgrade
- JC10 Trafalgar Street drainage upgrade
- JC5 Bridge Road Drainage upgrade.

10.5 Implementation Plan

The list of recommended management options has been transformed into an implementation plan provided in **Table 10-1**. It lists the following information relevant to the implementation of each adopted FRM option:

- Type and sub-catchment location of option and Multi-Criteria Assessment score;
- The priority for implementation (high, medium, or low) and rank as an outcome of the FRMS&P;
- An estimate of implementation costs including capital and ongoing costs per annum;
- Potential funding mechanism or organisation; and
- Required economic assessment level during I&D stage from framework in **Section 10.2**.

The flood risk management options identified in **Table 10-1** represent a capital cost of approximately $17.6M, with the flood modification options making up $17.0M of this cost. High priority options have combined capital costs of $5.9M.

It is noted that the implementation plan does not outline a specific timeframe for each project. Rather, the implementation plan provides a body of projects to inform future advocacy, budgeting, and planning in order that Council may be able to undertake works in a prioritised manner as funding becomes available, or other opportunities arise in a specific location associated with a proposed option.

Table 10-1 Implementation Plan for Whites Creek and Johnstons Creek FRMS&P

Option ID	Option Type	MCA Weighted Score	Option Rank	Implementation Priority	Capital Costs (incl. GST)	Ongoing Costs (p.a incl. GST)	Economic Assessment Level for I&D
Option JC15 - Probert Street, Newtown Drainage Upgrade	Flood Modification (FM)	1.25	1	High	$ 440,990	$ 750	Level 1 (FRMS&P)
Option JC7 - Bridge Road, Stanmore Detention Basin	Flood Modification (FM)	1.15	2	High	$ 1,317,600	$ 4,500	Level 2 (Detailed damages)
EM2 – Review of Local Flood Planning and Info Transfer to NSW SES	Emergency Management (EM)	1.10	3	High	$ 22,500	$ 7,500	Level 1 (FRMS&P)
Option JC20 - Lennox Street, Newtown Drainage Upgrade	Flood Modification (FM)	1.10	3	High	$ 2,266,173	$ 2,250	Level 2 (Detailed damages)
Option JC13 - Gladstone Street, Enmore Drainage Upgrade	Flood Modification (FM)	1.05	5	High	$ 1,612,003	$ 2,250	Level 2 (Detailed damages)
EM3 – Community Flood Awareness	Emergency Management (EM)	0.95	6	High	$ 60,000	$ 45,000	Level 1 (FRMS&P)
EM5 – Flood Markers and Signage	Emergency Management (EM)	0.95	6	High	$ 150,000	$ 7,500	Level 1 (FRMS&P)
Option JC14 - Railway Avenue, Stanmore Road Regrading	Flood Modification (FM)	0.85	8	Medium	$ 2,247,615	$ -	Level 2 (Detailed damages)
Option JC18 v1 - Minor Kingston Road, Camperdown Drainage Upgrade 1	Flood Modification (FM)	0.75	9	Medium	$ 368,876	$ -	Level 1 (FRMS&P)
Option JC6 v1 - Bridge Road, Stanmore Channel Upgrade (Re-grading North)	Flood Modification (FM)	0.70	10	Medium	$ 1,899,528	$ 750	Level 2 (Detailed damages)
PM6 – Targeted stormwater maintenance	Property Modification (PM)	0.65	11	Medium	$ 349,367	$ 349,367	Level 1 (FRMS&P)
Option JC23 - Clarendon Lane, Stanmore Drainage Upgrade	Flood Modification (FM)	0.55	12	Medium	$ 378,263	$ 1,500	Level 1 (FRMS&P)
Option JC18 v2 - Major Kingston Road, Camperdown Drainage Upgrade 2	Flood Modification (FM)	0.55	12	Medium	$ 1,198,240	$ -	Level 2 (Detailed damages)
Option JC1 v2 - Fowler Street, Camperdown Detention Basin	Flood Modification (FM)	0.50	14	Medium	$ 2,533,250	$ 6,000	Level 2 (Detailed damages)
EM6 – Flood Data and Debrief	Emergency Management (EM)	0.45	15	Low	$ 45,000	$ 15,000	Level 1 (FRMS&P)
Option WC1 - Margaret Street, Petersham Drainage Upgrade	Flood Modification (FM)	0.40	16	Low	$ 2,356,821	$ -	Level 2 (Detailed damages)
Option JC1 v1 -Fowler Street, Camperdown Drainage Upgrade	Flood Modification (FM)	0.35	17	Low	$ 397,097	$ -	Level 1 (FRMS&P)
				Total	**$ 17,643,323**	**$ 442,367**	

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11 Conclusions

This Draft Final Flood Risk Management Study and Plan (FRMS&P) report summarises the outcomes of the study undertaken for Inner West Council for Whites Creek and Johnstons Creek Catchments. This includes initial data collection and review process, community consultation, review of the flood study models, existing risk assessments including economic impacts of flooding, flood emergency response review, and flood planning review. It includes a summary of the flood risk management option development process and preliminary option assessment to refine options for adoption. The report also documents the detailed option assessment including modelling, cost estimation, damage benefits assessment, and Multi-Criteria Assessment (MCA) and provides a prioritised list of final options. Finally, the report outlines an implementation program to assist Council in the future implementation of these final options.

The flood study model review process involved the updating of the Flood Study TUFLOW model to account for ARR2019 design rainfall (Flood Study adopted ARR87 rainfall), and updating for present-day terrain in the form of LiDAR. The review concluded that the impacts of the model updates were relatively minor therefore the Flood Study model was appropriate for retention as the base case model for this FRMS&P and the assessment of options.

The flood damages assessment, flood emergency response review and flood planning review all contribute to the understanding of existing flooding as it relates to economic impacts, risk to life, and future development respectively.

A preliminary assessment of flood modification options has also been conducted including flood modelling of Flood Modification (FM) options and consideration of Property Modification (PM) options and Emergency Management Modification (EM) options. In total 37 preliminary options were developed including 25 FM, 6 PM and 6 EM options. From these preliminary options, 20 options have been selected for detailed assessment including 15 FM options, 1 PM options, and 4 EM options.

The detailed option assessment to review the selected final 20 options through flood modelling to assess the impacts of the option, flood damages (both for FM and PM options only, not EM options), cost estimation and Multi-Criteria Assessment (MCA). Three Flood Management (FM) options were removed from the implementation plan due to relatively low ranking scores, leaving a total of 17 options in the implementation plan. The outcomes of the MCA have been applied to the implementation plan including a list of priority options with seven high priority options, seven medium priority options, and three low priority options. Of the high priority options, four are Flood Modification (FM), or structural options and three are Emergency Management (EM) modification options.

The Draft Final FRMS&P report was placed on public exhibition, to receive comments and feedback from the community on the draft outcomes of the study prior to finalisation. The public exhibition period was conducted for a five-week period in June and July 2024. Comments from the community were collated and reviewed and incorporated into the Final FRMS&P report.

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APPENDIX

A

CONSULTATION MATERIALS

Stantec

Johnstons Creek and Whites Creek Flood Management Plan

Managing flood risk in your neighbourhood



Project updates

What we heard about your experiences of flooding?

1 June 2023

Between 7 March and 6 April 2023 we sought your feedback on the Johnstons Creek & Whites Creek Flood Risk Management Study and Plan. The purpose of the engagement was to understand resident experiences of stormwater and flooding within the Johnstons Creek and Whites Creek catchments and to identify preferences for flood management options.

Key points on the engagement methods and results:

- The Your Say Inner West project page was viewed 650 times
- Five people shared their experiences of flooding via the online survey and two contributed to the interactive map
- Seven people attended a drop-in session to ask questions and share their experiences
- The adopted Flood Study was downloaded 49 times

Feedback received during this engagement has been passed on to Council's consultant and will assist with developing flood mitigation options for these catchments. A detailed study will be prepared and placed on exhibition towards the end of 2023.

Community feedback dates

Tuesday 7 March - Thursday 6 April 2023

Council is exploring options for managing the impact of floods in the Johnstons Creek and Whites Creek catchment.

In 2017 Council completed the Johnstons Creek and Whites Creek Flood Study. This involved modelling flood behaviour using rainfall data and information from the community about past storm events. The study determined:

- Where flood water will run
- How the existing drainage system will cope.
- Which properties are affected?

The results from this investigation can be found in the completed Flood Study.

What happening now?

Council has engaged specialist flood consultants, Stantec, to prepare a Floodplain Risk Management Study and Plan (the Management Plan) for Johnstons and Whites Creeks. This involves reviewing the Flood Study and identifying options for reducing flood risk in the catchment.

What does the management plan propose?

The primary objective of the flood Management Plan is to identify options to mitigate and manage flood risk. This will involve consideration of options that seek to:

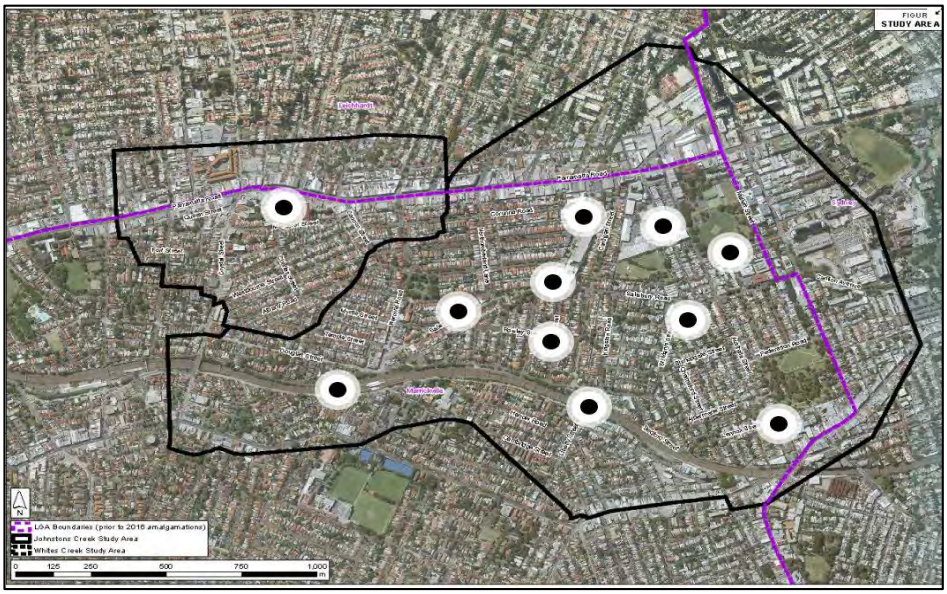
- Modify flood behaviour (e.g. levees, upgrade of stormwater systems)
- Mitigate the impact of flooding on existing properties (e.g. via floor raising)
- Control future development in the floodplain
- Guide emergency management when a flood occurs

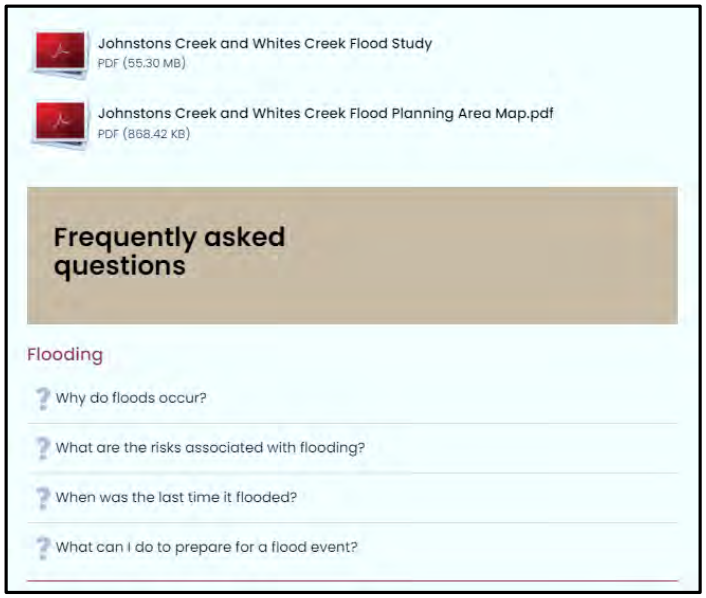
Future development on properties that are flood affected may be subject to development controls.

What can you influence?

We asked the community to share their recent experiences of flooding in the Johnstons/Whites Creeks catchment to ensure the flood management plan reflects current areas of concern.

Community members could also let us know their preferences for flood management options in the catchment area.





What happens next?

The project team is using your feedback and other information to develop the final flood Management Plan. Everyone who provided feedback will be updated via email and on this project page when the Management Plan is available.

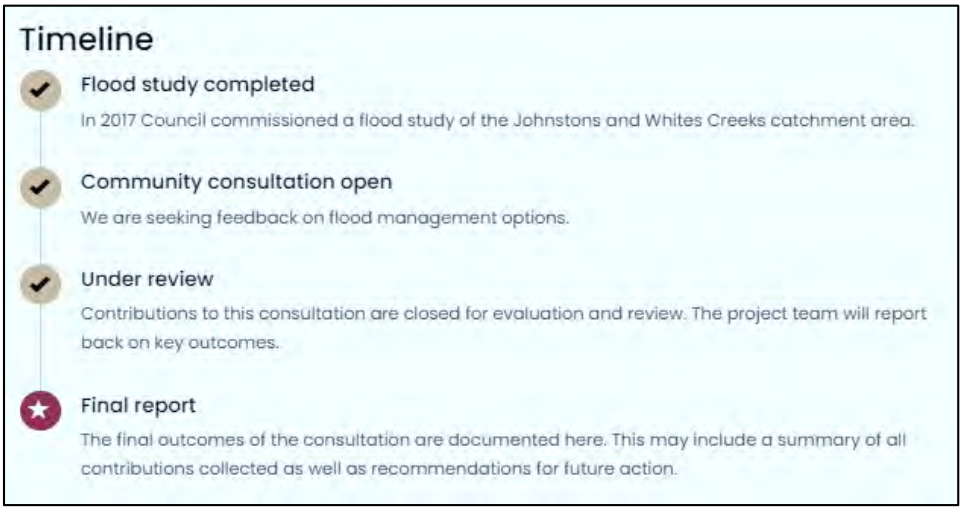
Contact us:

Have questions or want to learn more about the project? Contact us below:

Name Rafaah Georges

Phone 02 9392 5208

Email rafaah.georges@innerwest.nsw.gov.au



7 March 2023

Managing flood risk in your neighbourhood

Whites Creek and Johnstons Creek

Council is preparing a plan to manage the impact of floods in the Whites Creek and Johnstons Creek areas. Management options can include upgrading stormwater systems, controls on future development and guiding emergency response plans.

Find out more and have your say

To learn more, share your experiences or to discuss your preference for flood management options.

- **Online** at yoursay.innerwest.nsw.gov.au
- **In person** at an information session:
  - Wednesday 15 March 2023, 12-3pm and 5-8pm at St Peters Town Hall - Main Hall
  - Monday 20 March 2023, 12-3pm at Marrickville Library - Pavilion Hall
- **Phone** Rafaah Georges on 02 9392 5208
- **Email** floodstudies@innerwest.nsw.gov.au
- **Write to** Rafaah Georges, Inner West Council, PO Box 14 Petersham 2049

The last date to provide feedback is **Thursday 6 April 2023.**

What happens next?

All feedback will be reviewed and inform further investigations of response strategies and possible drainage upgrades. The results will be collated into a Flood Risk Management Plan that will be presented to the community in late 2023.

What else is happening?

Surveyors will be in the neighbourhood during March and April, taking levels in the flood affected areas to help with assessing the merits of the flood management options. Stantec and North Western Surveyors will be undertaking this work on behalf of Council and will be carrying authorisation from Council.

Yours faithfully,

Ryann Midei
Director Infrastructure

Inner West Council
innerwest.nsw.gov.au
02 9392 5000

260 Liverpool Rd, Ashfield NSW 2131
7-15 Wetherill St, Leichhardt NSW 2040
2-14 Fisher St PO Box 14, Petersham NSW 2040

Whites Creek and Johnstons Creek Resident Online Survey/ Questionnaire

Question 1 **Is your property:**

- ☐ Owner occupier
- ☐ Rented - by yourself
- ☐ Rented - by others
- ☐ A business
- ☐ Other

Question 2 **Have you ever experienced flooding since living/working in the catchment area?**

- ☐ Yes, floodwater has entered my house/business
- ☐ Yes, floodwater has entered my yard
- ☐ Yes, the road was flooded and I couldn't drive my car
- ☐ Yes, the stormwater channel reached capacity and was overflowing
- ☐ Yes, other parts of my neighbourhood have flooded
- ☐ Yes, I saw water flowing out of street drains, pits or manholes
- ☐ No, I haven't experienced flooding

Question 3 **How did the flooding affect you/your business?**

- ☐ Parts of my house/business building were damaged
- ☐ The contents of my house/business were damaged
- ☐ My garden, yard, and/or surrounding property were damaged
- ☐ My car(s) were damaged
- ☐ I couldn't leave the house/business
- ☐ Family members/work mates couldn't leave/return to the house/business
- ☐ The flooding disrupted my daily routine
- ☐ The flooding didn't affect me
- ☐ Not applicable - I have not experienced flooding in the catchment area
- ☐ Other

Question 4 **Please upload any materials or photos to evidence the flooding you experienced.**

Question 5 **What do you believe to be the main cause of flooding in your area?**

- ☐ Stormwater channels reaching capacity and overflowing.
- ☐ Lack of capacity in the stormwater network (e.g., pits and pipes) causing drainage systems to surcharge and backflow.
- ☐ Rainfall runoff flowing to a channel or drain.
- ☐ Other

Question 6 **As a local resident who may have witnessed flooding/drainage problems, you may have your own ideas on how to reduce flood risks. Which of the following management options would you prefer? Select your 5 preferred options.**

- ☐ Stormwater harvesting such as rainwater tanks.
- ☐ Retarding or detention basins; these temporarily hold water and reduce peak flows.
- ☐ Culvert / bridge / increasing pipe size and/or capacity.
- ☐ Levee banks
- ☐ Environmental channel improvements
- ☐ Diversion of channels
- ☐ Planning and flood related development controls to ensure future development does not add to the existing flood risk.

- ☐ Voluntary raising of houses to reduce flood damages by raising floor levels above a design flood.
- ☐ Voluntary purchase of highly affected properties by Council and demolition of any buildings on the property
- ☐ Education of community, providing greater awareness of potential hazards
- ☐ Flood forecasting, flood warning, evacuation planning and emergency response such as early warning systems, improved local SES capabilities/ resources or improved radio and phone communications.

Question 7 **Please specify any other options you believe are suitable.**

Question 8 **Are you concerned about the uncertainty of future climates and the possible impacts on flooding in your area?**

- ☐ Yes
- ☐ No

Question 9 **Do you believe the climate is changing?**

- ☐ Yes, it will have significant effects
- ☐ Yes, but the effects won't be significant
- ☐ Not at all

Question 10 **Are you concerned about the impact of an uncertain climate on future flooding in the study areas?**

- ☐ Yes
- ☐ Somewhat
- ☐ No

Question 11 **Should Council be addressing the impacts of an uncertain future climate on flooding?**

- ☐ Yes
- ☐ No

Question 12 **Enter your email address here if you would like to receive a copy of your submission via email.**

Question 13 **Do you give permission for Cardno or Council to contact you to discuss the information you have provided us?**

- ☐ Yes
- ☐ No

APPENDIX

B

MARRICKVILLE DCP 2011 – FLOOD MANAGEMENT CONTROLS

Stantec

2.22

GENERIC PROVISIONS
FLOOD MANAGEMENT



MARRICKVILLE council



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Part 2 Generic Provisions

2.22 Flood Management

A flood is an overflow or accumulation of an expanse of water that submerges land. In the sense of flowing water, the word may also be applied to the inflow of the tide. Floods are a natural and inevitable event that communities must learn to live with while minimising risks to public health and safety, property and infrastructure.

This section recognises that there are some flooding risks that require development controls and guidelines in order to reduce or eliminate their impacts.

2.22.1 Objectives

O1	To maintain the existing flood regime and flow conveyance capacity.
O2	To enable the safe occupation of, and evacuation from, land to which flood management controls apply.
O3	To avoid significant adverse impacts upon flood behaviour.
O4	To avoid significant adverse effects on the environment that would cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of the river bank/watercourse.
O5	To limit uses to those compatible with flow conveyance function and flood hazard.
O6	To minimise risk to human life and damage to property.

2.22.2 Land affected

This section complements Clause 6.3 (Flood planning) of Inner West Local Environmental Plan 2022 (Inner West LEP 2022). It applies to land identified on the DCP 2011 Flood Planning Area Map in Appendix 1 and land identified as being flood liable land on the DCP 2011 Flood Liable Land Map in Appendix 2.

For the purposes of this Section of the DCP:

> Flood planning levels(FPLs) are the combinations of flood levels (derived from significant historical flood events or floods of specific annual exceedance probability (AEP) and freeboards selected for floodplain risk management purposes.
>
> The Standard Flood adopted by Council is the 1% AEP or the 1 in 100 year flood. The Standard Flood has been used to derive the Flood Planning Levels.

The land identified on the DCP 2011 Flood Liable Land Map and on the DCP 2011 Flood Planning Area Map is based on information available to Council when the Plans were prepared. As new information becomes available, the DCP 2011 Flood Planning Area Map and the DCP 2011 Flood Liable Land Map may change.

2.22.2.1 Flood planning area (Cooks River)

The Flood Planning Area (Cooks River) identifies land likely to be affected by the 1% AEP flood, factoring in a rise in sea level of 400mm to the year 2050, (plus 500mm freeboard) of the Cooks River.

PART 2: GENERIC PROVISIONS

2.22.2.2 Flood planning area (Overland Flow)

The Flood Planning Area (Overland Flow) identifies land (in accordance with Council's Flood Tagging Policy) likely to be affected by the 1% AEP flood associated with various locations affected by local overland flooding.

2.22.2.1 Flood planning level

The Flood Planning Level is the 1% AEP flood level plus freeboard. The applicable freeboard is 500mm unless an exception is described within a specific development control.

2.22.2.2 Flood liable land

Land identified on the DCP 2011 Flood Liable Map as flood liable land identifies land within a flood planning area, and land likely to be affected by the probable maximum flood (PMF) of the Cooks River. This means that the map identifies some land as being within the Cooks River PMF area, but not within the Cooks River 100-year flood (plus 500mm freeboard) area.

NB *The 1% AEP flood is a flood that has a one per cent probability of occurring or being exceeded in any year. The probable maximum flood (PMF) is calculated to be the maximum flood likely to occur. Freeboard refers to a factor of safety and is expressed as a height above the flood level. Freeboard tends to compensate for factors such as wave action and localised hydraulic effects.*

2.22.3 Development affected

Flood management controls apply as follows:

- For land in a flood planning area, the controls apply to all development that requires development consent.
- For land that is flood liable land, but that is not in a flood planning area (land within the Cooks River PMF), the controls also apply to caravan parks, child care centres, correctional centres, emergency services facilities, hospitals, residential accommodation (except for attached dwellings, dwelling houses, secondary dwellings and semi-detached dwellings), and tourist and visitor accommodation.

2.22.4 Cooks River flood classification areas

Flood classifications have been applied to parts of the Flood Planning Area (Cooks River). The flood classifications are:

- Low hazard: Should it be necessary, people and their possessions could be evacuated by truck. Able bodied adults would have little difficulty wading out of the area.
- High hazard: Possible danger to life, evacuation by truck difficult, potential for structural damage, and social disruption and financial losses could be high.

The identified areas, and their flood classifications, are:

1. Riverside Crescent/Tennyson Street area (Marrickville and Dulwich Hill): Low hazard to high hazard.
2. Illawarra Road/Wharf Street area (Marrickville): Low hazard to high hazard.
3. Carrington Road area (Marrickville): Low hazard.
4. Bay Street area (Tempe): Low hazard to high hazard.

2.22.5 Controls

General

C1 A *Flood Risk Management Report* must be submitted for applications that are on land identified on the Flood Planning Area Map in Appendix 1 and land identified as flood liable on the Flood Liable Land Map in Appendix 2.

The report must be informed by flood information relevant to the subject property and surrounds, including the 1% AEP flood level, Flood Planning Level, Probable Maximum Flood (PMF) level and the Flood Hazard Category, as obtained from Council.

The report is not required where the assessed value of the works is under $50,000 except where, in the opinion of Council, those works are likely to substantially increase the risk of flood to the subject or adjoining or nearby sites.

The report may be limited to a short report (Flood Risk Management Statement) for single residential dwellings, alterations and additions or change of use developments where the property is confirmed by Council as being subject only to low hazard flooding. The Flood Risk Management Statement must reference the source of flood information; specify the relevant flood information applicable to the site, then describe the proposed development and how it meets the relevant development controls.

If Council is concerned with the apparent loss of flood storage and/or flood or overland flow paths, and/or increase in flow velocities, and/or risk of life, on any type of development, the applicant may be requested to undertake further analysis in support of the proposal and detail it in a new/revised Flood Risk Management Report.

C2 The Flood Risk Management Report must address:

a. Description of the existing stormwater drainage system, including catchment definition.
b. Extent of the 1% AEP flood event in the vicinity of the development.
c. The Flood Hazard Category affecting the subject site and surrounds. Where the site is subject to the high hazard flooding category, the Probable Maximum Flood (PMF) extent must be shown.
d. Long and cross sections showing the Flood Planning Level(s) in relationship to the floor levels of all existing and proposed components of the development.
e. Recommendations on all precautions to minimise risk to personal safety of occupants and the risk of property damage for the total development to address the flood impacts on the site during a 1% AEP flood and PMF event. These precautions must include but not be limited to the following:
    i. Types of materials to be used to ensure the structural integrity of the development for immersion and impact of velocity and debris for the 1% AEP flood event and PMF (for high hazard);
    ii. Waterproofing methods, including electrical equipment, wiring, fuel lines or any other service pipes or connections;
    iii. A flood evacuation strategy (Flood Emergency Response Plan); and

PART 2: GENERIC PROVISIONS

iv. On site response plan to minimise flood damage, and provide adequate storage areas for hazardous materials and valuable goods above the flood level;

f. Details of any flood mitigation works that are proposed to protect the development.

g. Supporting calculations.

h. The architectural/engineering plans on which the assessment is based.

i. The date of inspection.

j. The professional qualifications and experience of the author(s).

C3 All applications for development must be accompanied by a survey plan including relevant levels to AHD (Australian Height Datum). Consideration must be given to whether structures or filling are likely to affect flood behaviour and whether consultation with other authorities is necessary.

C4 Compliance with flood management controls must be balanced by the need to comply with other controls in this DCP.

Controls for new residential development

C5 Floor levels (Flood Planning Levels) of habitable rooms must be a minimum of 500mm above the 1% AEP flood level at that location. For areas of minor overland flow (a depth of 300mm or less or overland flow of 2cum/sec or less) a lower freeboard of 300mm may be considered on its merits.

C6 Any portion of buildings below the Flood Planning Level) must be constructed from flood compatible materials (See Schedule 1).

C7 Flood free access must be provided where practicable.

Controls for residential development – minor additions

C8 Once-only additions with a habitable floor area of up to 30m^2 may be approved with floor levels below the 1% AEP flood level at that location if the applicant can demonstrate that no practical alternatives exist for constructing the extension above the 1% AEP flood level.

C9 Additions greater than 30m^2 will be considered against the requirements for new residential development (refer C5, C6, and C7).

C10 Any portion of buildings below the Flood Planning Level must be constructed from flood compatible materials.

Controls for non-habitable additions or alterations

C11 All flood sensitive equipment must be located above the Flood Planning Level at that location.

C12 Any portion of buildings below the Flood Planning Level must be built from flood compatible materials.

Controls for new non-residential development

C13 Floor levels (except for access-ways) must be at least 500mm above the 1% AEP flood level, or the buildings must be flood-proofed to at least 500mm above the 1% AEP flood level. For areas of minor overland flow (a depth of 300mm or less or overland flow of 2cum/sec or less) a lower freeboard of 300mm may be considered on its merits.

C14 Flood-free access must be provided where practicable.

Controls for non-residential development – additions

C15 Where the proposed development is for an addition to an existing building within the Flood Planning Area, the development may be approved with floor levels below the 1% AEP flood Level if the applicant can demonstrate that all practical measures will be taken to prevent or minimise the impact of flooding. In determining the required floor level, matters which will be considered include:

i. The nature of the proposed landuse;
ii. The frequency and depth of possible flooding;
iii. The potential for life and property loss;
iv. The suitability of the building for its proposed use; and
v. Whether the filling of the site or raising of the floor levels would render the development of the site impractical or uneconomical.

C16 Any portion of the proposed addition below the 1% AEP must be built from flood compatible materials.

Controls for change of use of existing buildings

C17 Development consent for change of use of an existing building with floor levels below the 1% AEP flood level will only be given where there is no foreseeable risk of pollution associated with the proposed use of the building in the event that 1% AEP flood event occurs.

C18 In determining whether to grant development consent for change of use of an existing building with floor levels below the1% AEP flood level, consideration will be given to whether the proposed development would result in increased flood risk for the property on which the building is located, or other land. In this regard, the following matters will be considered:

i. The nature of the proposed use and the manner in which it is proposed to be carried out within the building or on the land; and
ii. The foreseeable risk of pollution associated with the proposed use of the building/land in the event that the 1% AEP flood event occurs.

Controls for subdivision

C19 Development consent for the subdivision of flood liable land may depend on whether the land to which the proposed development relates is unsuitable for any development made likely by the subdivision, by reason of the land likely to be subject to flooding.

C20 Development consent for the subdivision of flood liable land may depend on whether the carrying out of the subdivision and any associated site works would:

i. Adversely impede the flow of flood water on the land or land in its vicinity;
ii. Imperil the safety of persons on that land or land in its vicinity in the event of the land being inundated with flood water; and
iii. Aggravate the consequences of flood water flowing on that land or land in its immediate vicinity with regard to erosion or siltation.

PART 2: GENERIC PROVISIONS

Controls for filling of land within the Flood Planning Area

C21 Development consent will not be granted to filling of flood ways or high flood hazard areas. Consideration will only be given to granting development consent to the filling of other flood liable land where:

i. Flood levels are not increased by more than 10mm by the proposed filling.
ii. Downstream velocities are not increased by more than 10% by the proposed filling.
iii. Proposed filling does not redistribute flows by more than 15%.
iv. The potential for cumulative effects of possible filling proposals in that area is minimal.
v. The development potential of surrounding properties is not adversely affected by the filling proposal.
vi. The flood liability of buildings on surrounding properties is not increased.
vii. The filling creates no local drainage flow/runoff problems.

NB *Where the proposal has the potential to increase flood levels, depths, velocities and/or the risk to life or property, through loss of flood storage and/or blockage/ redirection of overland flowpaths, the Flood Risk Management Report supporting the development application must include detailed flood analysis. Such analysis should address compliance with all relevant development controls and include survey cross-sections to provide representative topographic information. The proponent should approach Council to determine available Council flood studies for the area, with the analysis based on or calibrated against relevant studies. In some cases, flood model data can be obtained from Council, subject to application and payment of fees.*

Controls for land uses on flood liable land identified on the DCP 2011 Flood Liable Land Map

C22 A site emergency response flood plan must be prepared in case of a PMF flood.

C23 Adequate flood warning systems, signage and exits must be available to allow safe and orderly evacuation without increased reliance upon the State Emergency Service (SES) or other authorised emergency services personnel.

C24 Reliable access for pedestrians or vehicles must be provided from the building, commencing at a minimum level equal to the lowest habitable floor level to an area of refuge above the PMF.

Controls for garages, carports, open car parks and basement garages

C25 The floor level of new enclosed garages must be at or above the 1% AEP flood level plus 200mm. In extenuating circumstances, consideration may be given to a floor level at a lower level, being the highest practical level but no lower than 180mm below the 1% AEP flood level, where it can be demonstrated that providing the floor level at the Flood Planning Level is not practical within the constraints of compliance with Australian Standard AS/NZS 2890.1 Parking facilities as amended.

C26 The floor levels of open car park areas and carports must meet the same criteria as above for garages. In extreme circumstances, for single dwelling residential development, a floor level below the 1% AEP flood

level minus 180mm may be accepted for a single car space, subject to bollards being provided along the 'free' perimeter (excluding the vehicle entry on one side only) at 1.2m intervals and the floor level being raised as high as practical within the constraints of compliance with Australian Standard AS/NZS 2890.1 Parking facilities as amended.

C27 On properties with a low flood hazard classification, basement (below natural ground level) car parking must have all access and potential water entry points above the Flood Planning Level, and a clearly signposted flood free pedestrian evacuation route provided from the basement area separate to the vehicular access ramps. For basement car parking in properties affected by High Hazard flooding further considerations will apply.

C28 Basement garages must include:

a. Suitable pumps must be provided within the garage to allow for the drainage of stormwater should the basement garage become inundated during flooding.

b. Adequate flood warning systems, signage and exits must be available to allow safe and orderly evacuation without increased reliance upon the SES or other authorised emergency services personnel.

C29 For parking areas servicing more than two parking spaces, reliable access for pedestrians must be provided from all parking areas, to a safe haven which is above the PMF.

PART 2: GENERIC PROVISIONS

2.22.6 SCHEDULE 1 – Flood compatible materials

Building component	Flood compatible material
Flooring and sub-floor	• concrete slab-on-ground monolith
	• suspended reinforced concrete slab
Floor covering	• clay tiles
	• concrete, precast or in situ
	• concrete tiles
	• epoxy, formed-in-place
	• mastic flooring, formed-in-place
	• rubber sheets or tiles with chemicals-set-adhesive
	• silicone floors formed-in-place
	• vinyl sheets or tiles with chemical-set adhesive
	• ceramic tiles, fixed with mortar or chemical-set adhesive
	• asphalt tiles, fixed with water resistant adhesive
Wall structure	• solid brickwork, blockwork, reinforced, concrete or mass concrete
Roofing structure (for situations where the relevant flood level is above the ceiling)	• reinforced concrete construction • galvanised metal construction
Doors	• solid panel with water proof adhesives
	• flush door with marine ply filled with closed cell foam
	• painted metal construction
	• aluminium or galvanised steel frame
Wall and ceiling linings	• fibro-cement board
	• brick, face or glazed
	• clay tile glazed in waterproof mortar
	• concrete
	• concrete block
	• steel with waterproof applications
	• stone, natural solid or veneer, waterproof grout
	• glass blocks
	• glass
	• plastic sheeting or wall with waterproof adhesive
Insulation windows	• foam (closed cell types)
	• aluminium frame with stainless steel rollers or similar corrosion and water resistant material
Nails, bolts, hinges and fittings	• brass, nylon or stainless steel • removable pin hinges • hot dipped galvanised steel wire nails or similar

SCHEDULE 1: Flood compatible materials (cont.)	
Electrical and mechanical equipment For development constructed on land to which this section of the DCP applies, the electrical and mechanical materials, equipment and installation must conform to the following requirements: **Main power supply** Subject to the approval of the relevant authority the incoming main commercial power service equipment, including all metering equipment, must be located above the relevant flood level. Means must be available to easily disconnect the dwelling from the main power supply. **Wiring** All wiring, power outlets, switches, must be to the maximum extent possible, located above the maximum flood level. All electrical wiring installed below this level must be suitable for continuous underwater immersion and must contain no fibrous components. Each leakage circuit-breaker (core balance relays) must be installed. Only submersible type splices must be used below maximum flood level. All conduits located below the relevant designated flood level must be so installed that they will be self-draining if subjected to flooding. **Equipment** All equipment installed below or partially below the relevant flood level must be capable of disconnection by a single plug and socket assembly. **Reconnection** Should any electrical device and/or part of the wiring be flooded it must be thoroughly cleaned or replaced and checked by an approved electrical contractor before reconnection.	**Heating and air conditioning systems** Where viable, heating and air conditioning systems should be installed in areas and spaces of the development above maximum flood level. When this is not feasible, every precaution must be taken to minimise the damage caused by submersion according to the following guidelines: **Fuel** Heating systems using gas or oil as fuel must have a manually operated valve located in the fuel supply line to enable fuel cut-off. **Installation** Heating equipment and fuel storage tanks must be mounted on and securely anchored to a foundation pad of sufficient mass to overcome buoyancy and prevent movement that could damage the fuel supply line. All storage tanks must be vented to an elevation of 600mm above the relevant flood level. **Ducting** All ductwork located below the relevant flood level must be provided with openings for drainage and cleaning. Self-draining may be achieved by constructing the ductwork on a suitable grade. Where ductwork must pass through a water-tight wall or floor below the relevant flood level, a closure assemble operated from above relevant flood level must protect the ductwork.

PART 2: GENERIC PROVISIONS

Appendix 1 - DCP 2011 Flood Planning Area Map

See the attached map.

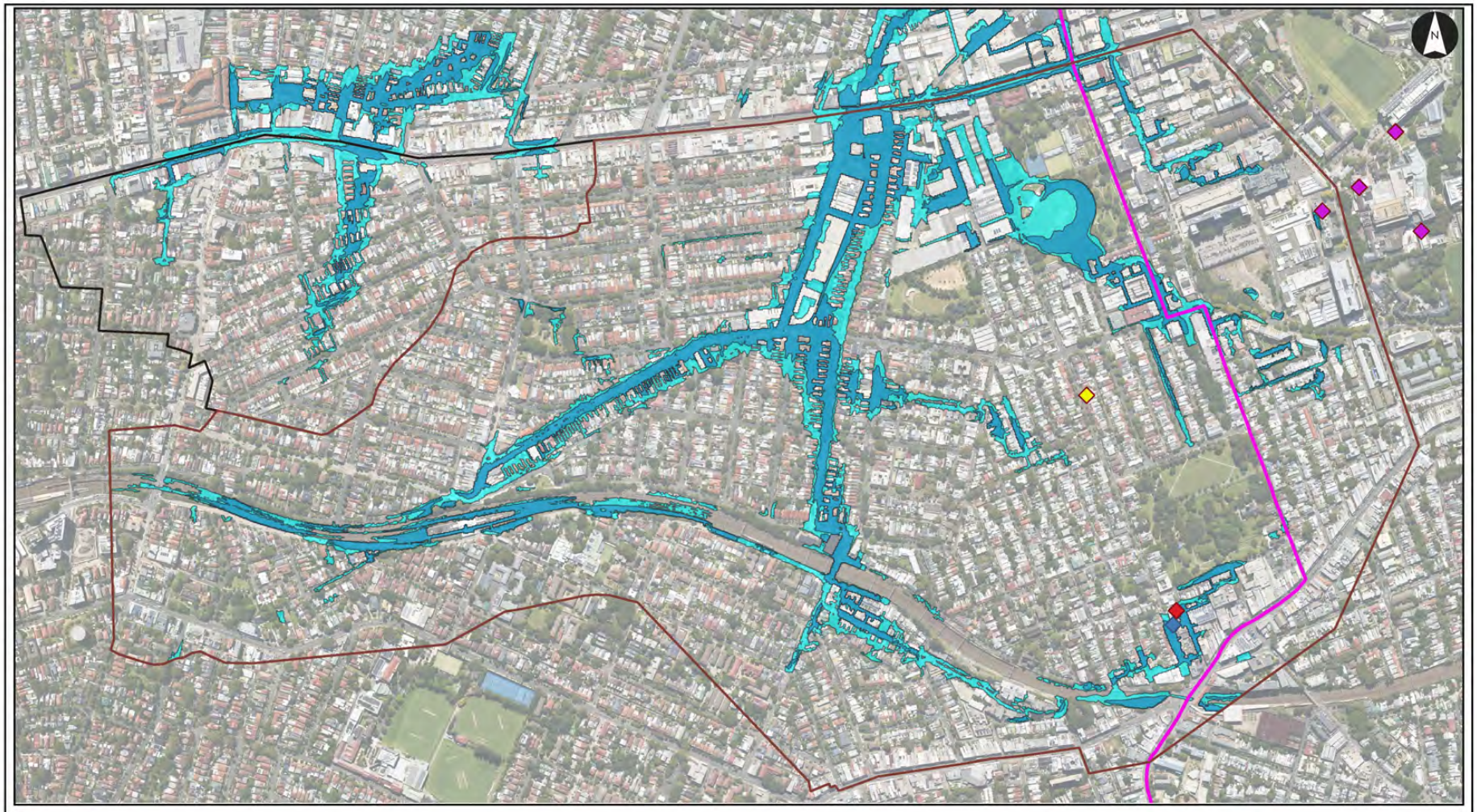
Appendix 2 - DCP 2011 Flood Liable Land Map

See the attached map.

APPENDIX C

EMERGENCY MANAGEMENT MAPS

Stantec



Emergency Services within the Study Area with 1% AEP and PMF Extent

Project: Whites Creek and Johnstons Creek Flood Risk Management Study and Plan

Client: Inner West Council
Project Code: NW30096
Drawn By: Habba Rahimi, Checked By: Alireza Pouya
Date: (2023-06-28)
Figure No: 1

Stantec

Legend

- Johnstons Creek Study Area
- Whites Creek Study Area
- IWC LGA Boundary
- 1% AEP Flood Extent
- PMF Flood Extent

Location of Emergency Services

- Ambulance
- Fire Station
- Hospital
- Police Station

Notes:
1. Map displayed in EPSG:28356

References:
1. Aerial Imagery [Metromap, March 2023]

DRAFT - Not For Construction

0 0.2 0.4 km

Scale at A3: 1:7000



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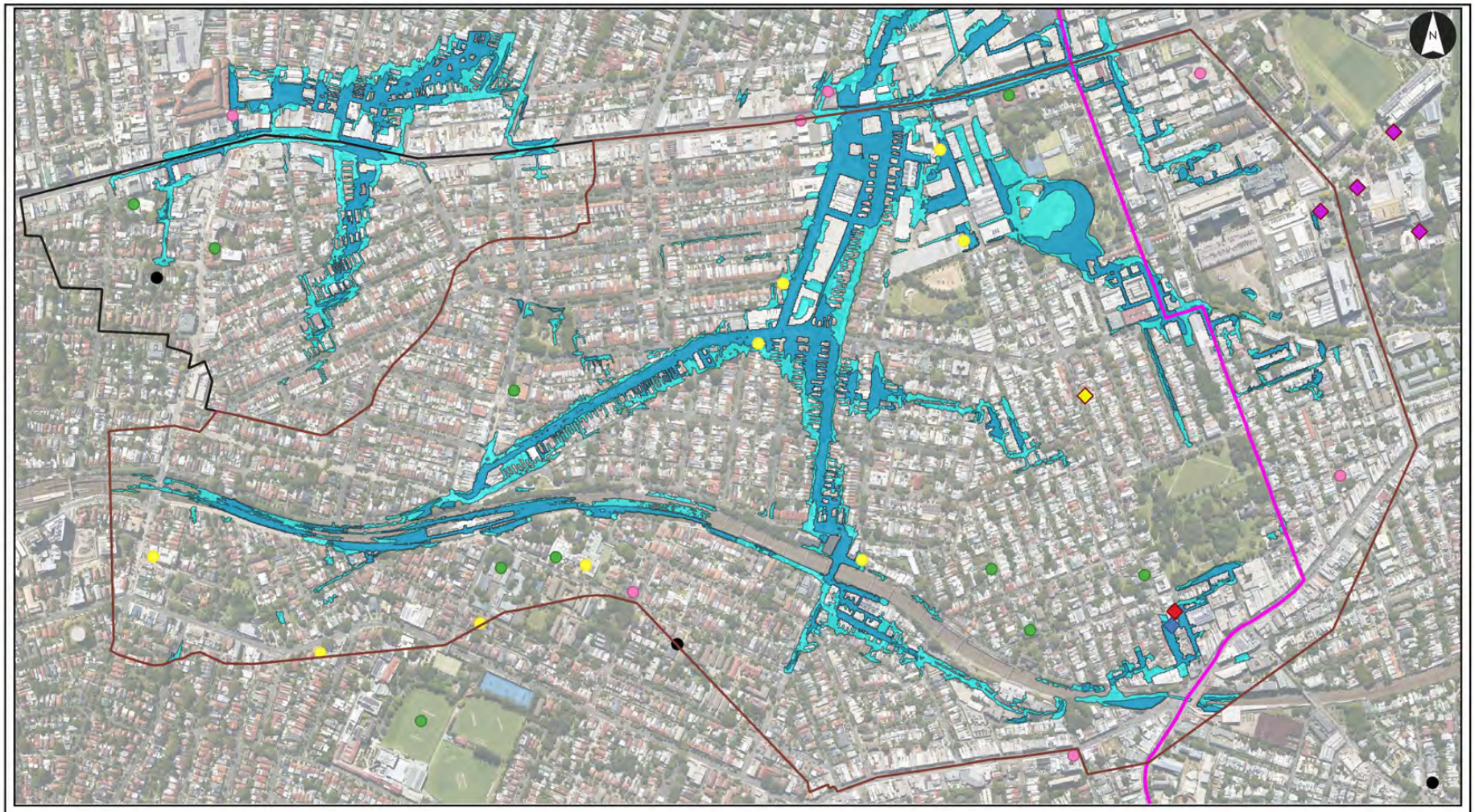

Vulnerable Development and Emergency Services within the Study Area with 1% AEP and PMF Extent

Project: Whites Creek and Johnstons Creek Flood Risk Management Study and Plan

Client: Inner West Council
Project Code: NW30096
Drawn By: Habba Rahimi, Checked By: Alireza Pouya
Date: (2023-06-28)
Figure No: 2

Stantec

Legend

- Johnstons Creek Study Area
- Whites Creek Study Area
- IWC LGA Boundary
- 1% AEP Flood Extent
- PMF Flood Extent

Location of Emergency Services

- Ambulance
- Fire Station
- Hospital
- Police Station

Location of Vulanterable davelopment

- Aged care
- Day care
- Hotel
- School

Notes:
1. Map displayed in EPSG:28356

References:
1. Aerial Imagery [Metromap, March 2023]

DRAFT - Not For Construction

0 0.2 0.4 km

Scale at A3: 1:7000



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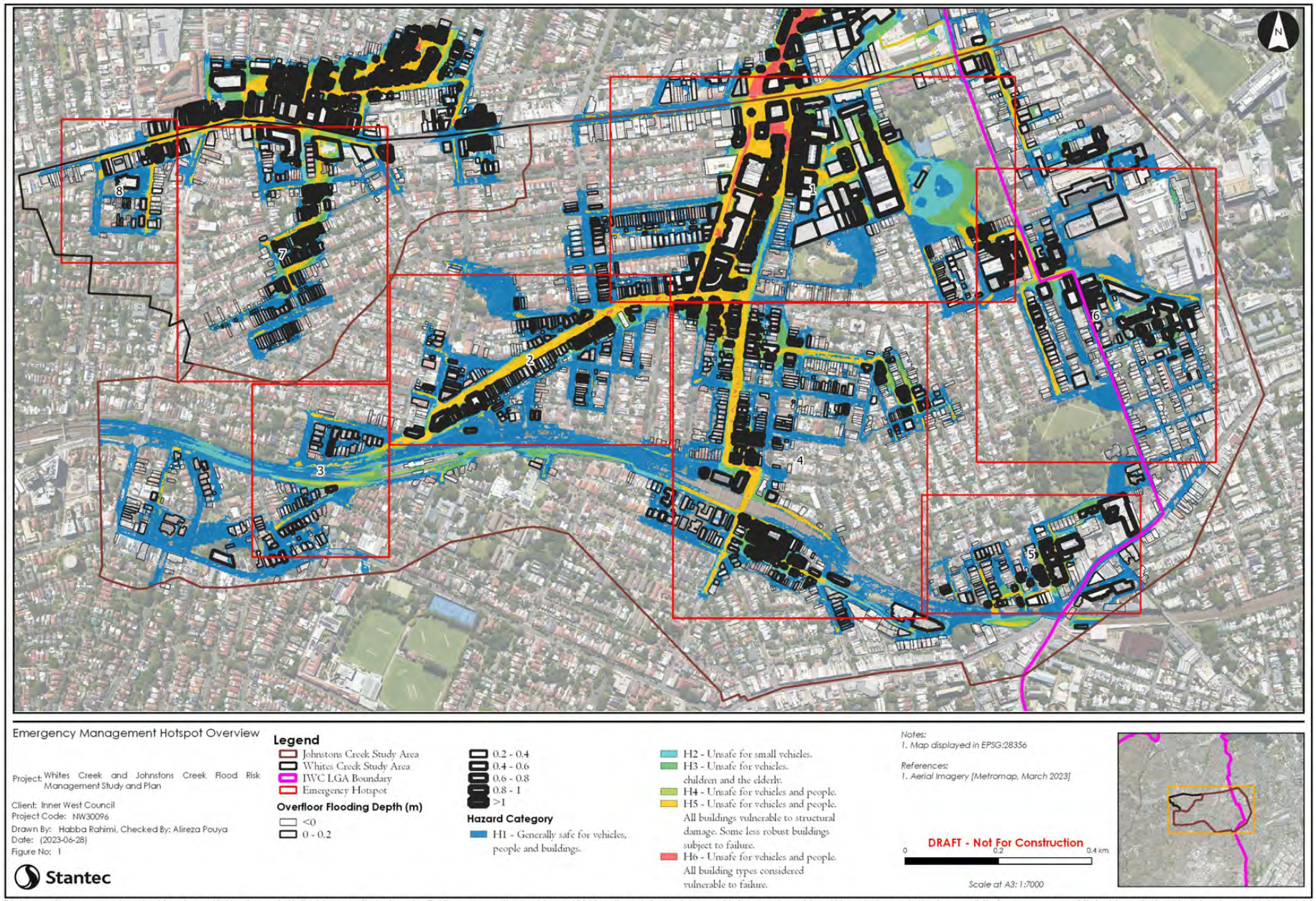

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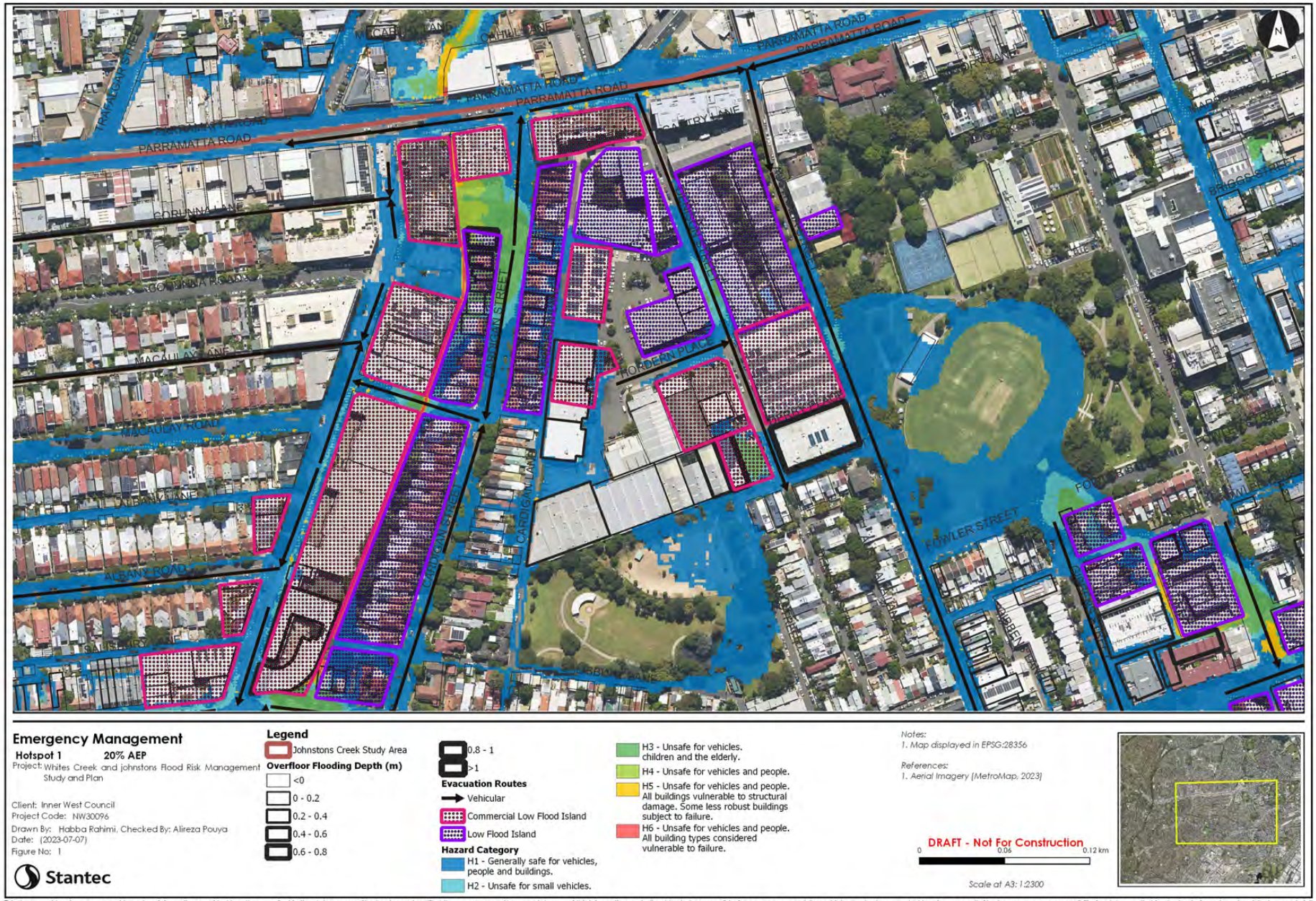

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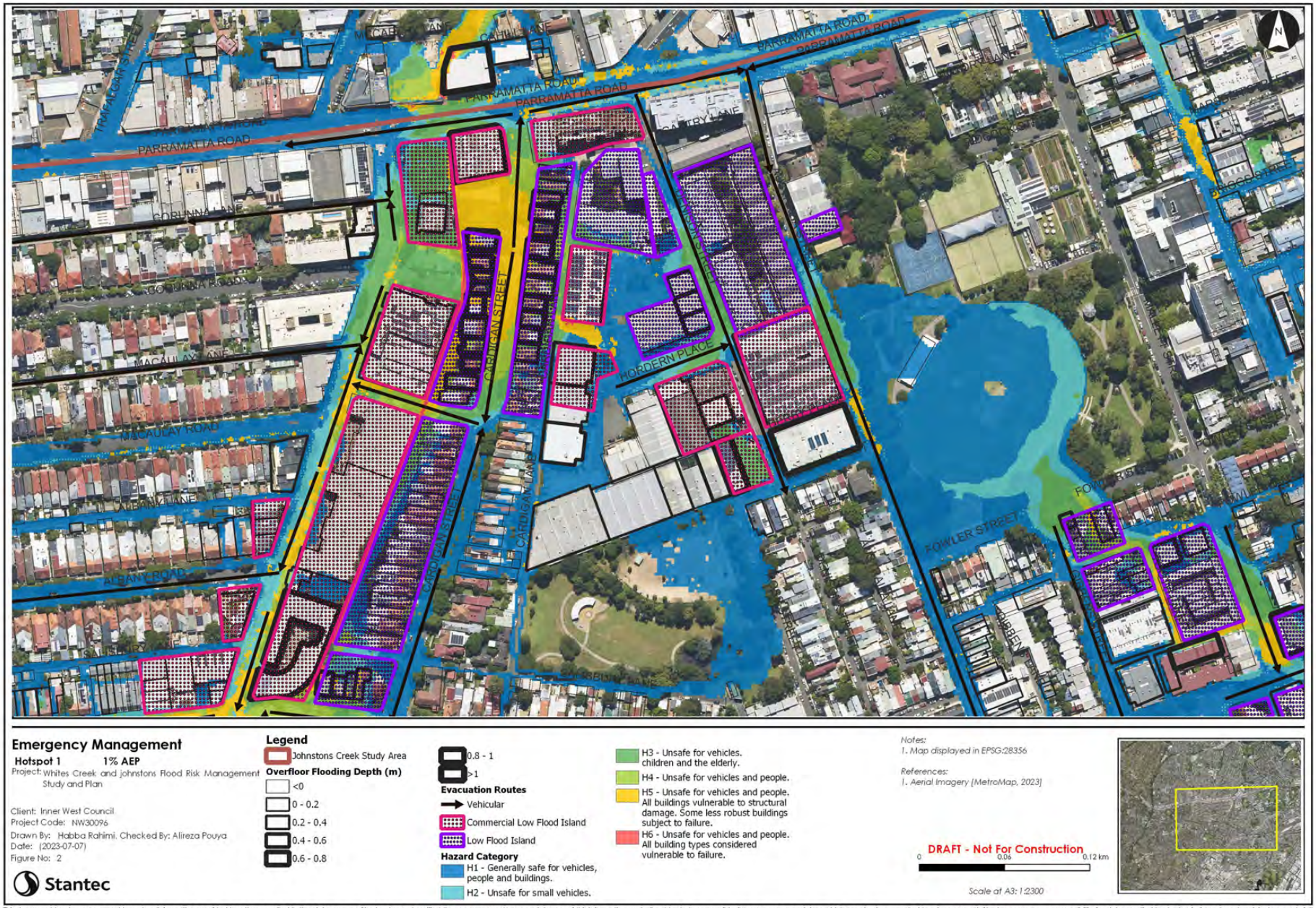

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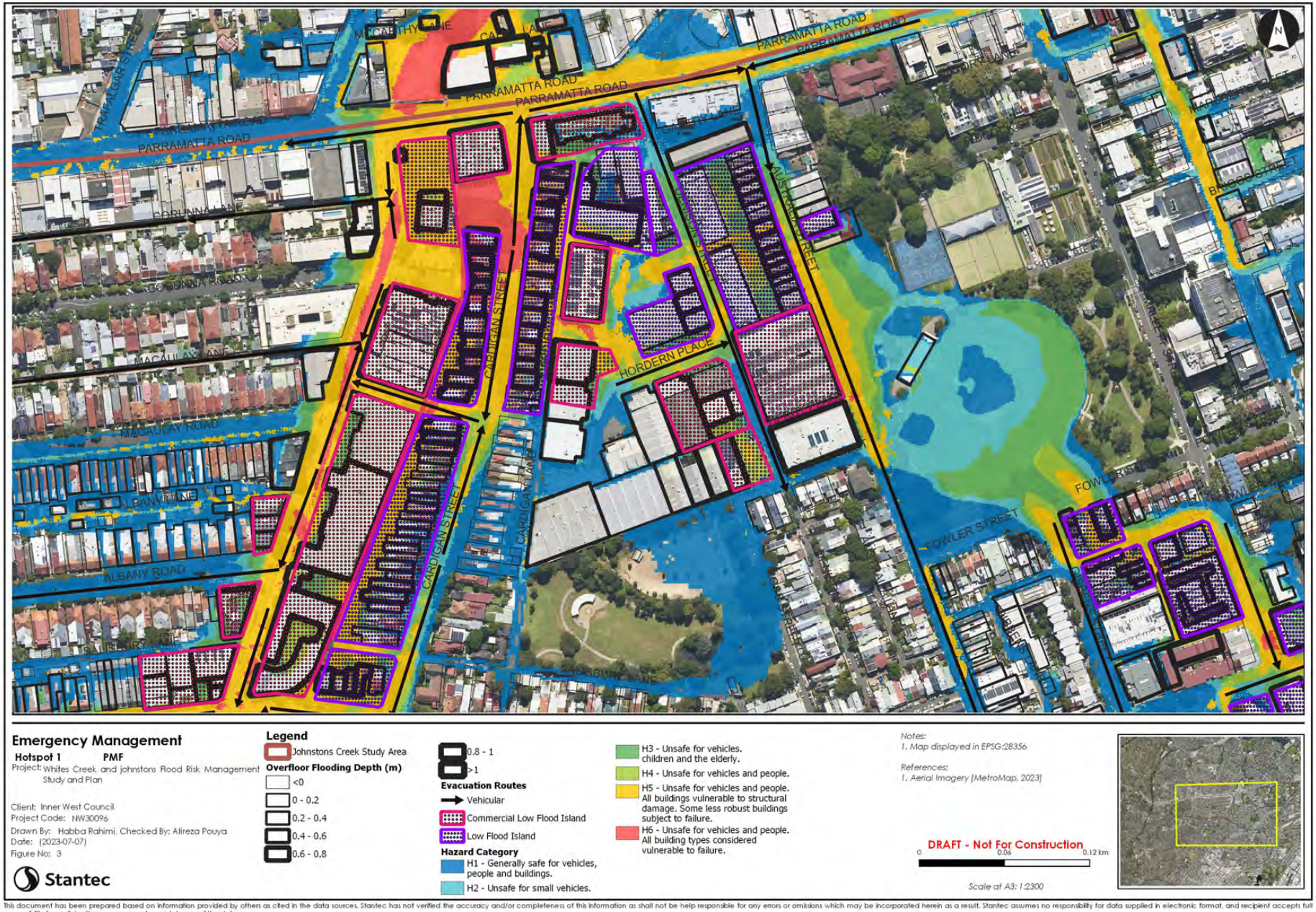

Emergency Management

Hotspot 1 **PMF**

Project: Whites Creek and Johnstons Flood Risk Management Study and Plan

Client: Inner West Council
Project Code: NW30096
Drawn By: Habba Rahimi, Checked By: Alireza Pouya
Date: (2023-07-07)
Figure No: 3

Stantec

Legend

- Johnstons Creek Study Area

Overfloor Flooding Depth (m)

- <0
- 0 - 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- 0.8 - 1
- >1

Evacuation Routes

- Vehicular
- Commercial Low Flood Island
- Low Flood Island

Hazard Category

- H1 - Generally safe for vehicles, people and buildings.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for vehicles, children and the elderly.
- H4 - Unsafe for vehicles and people.
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.

Notes:
1. Map displayed in EPSG:28356

References:
1. Aerial Imagery (MetroMap, 2023)

DRAFT - Not For Construction

0 0.06 0.12 km

Scale at A3: 1:2300

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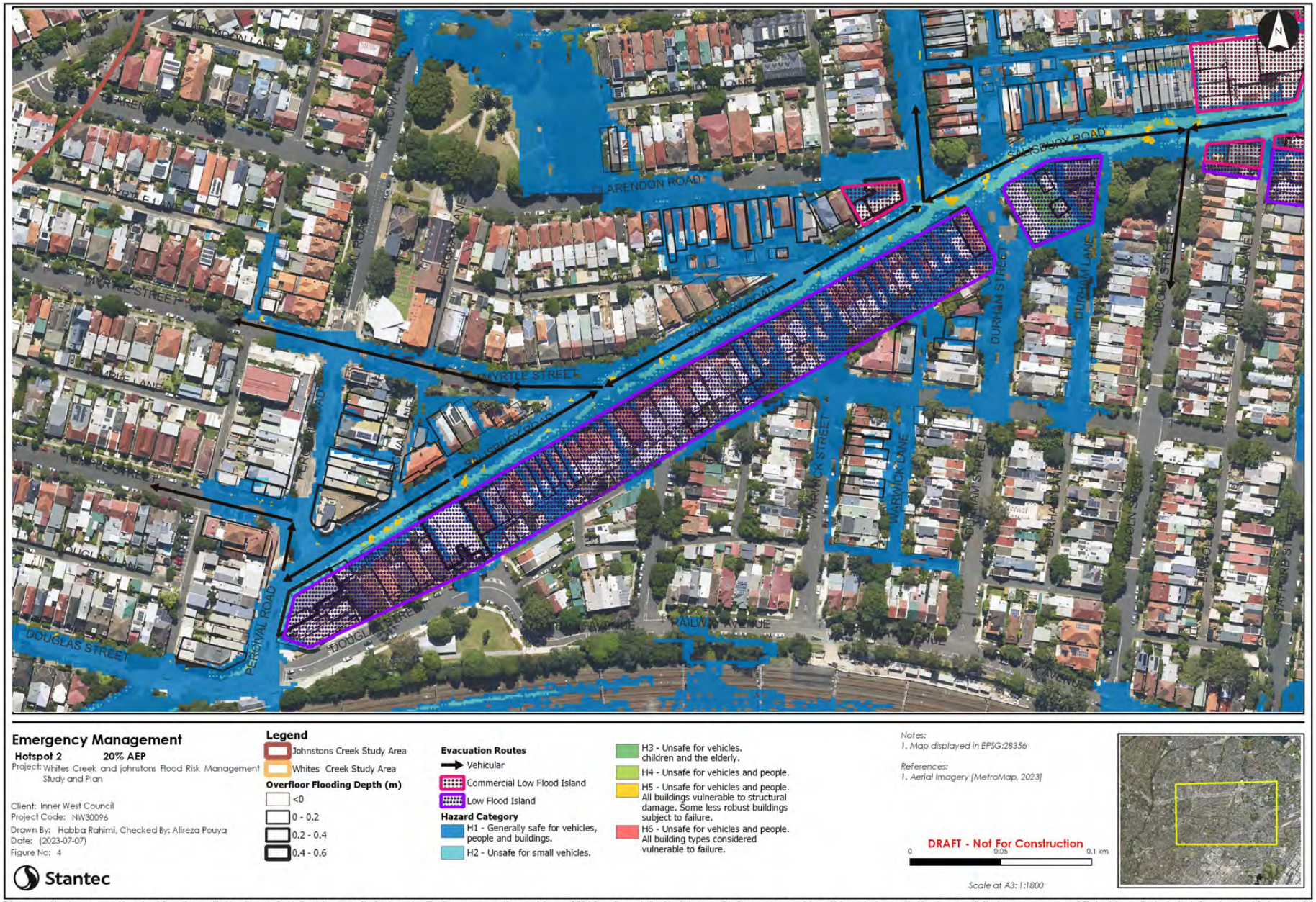

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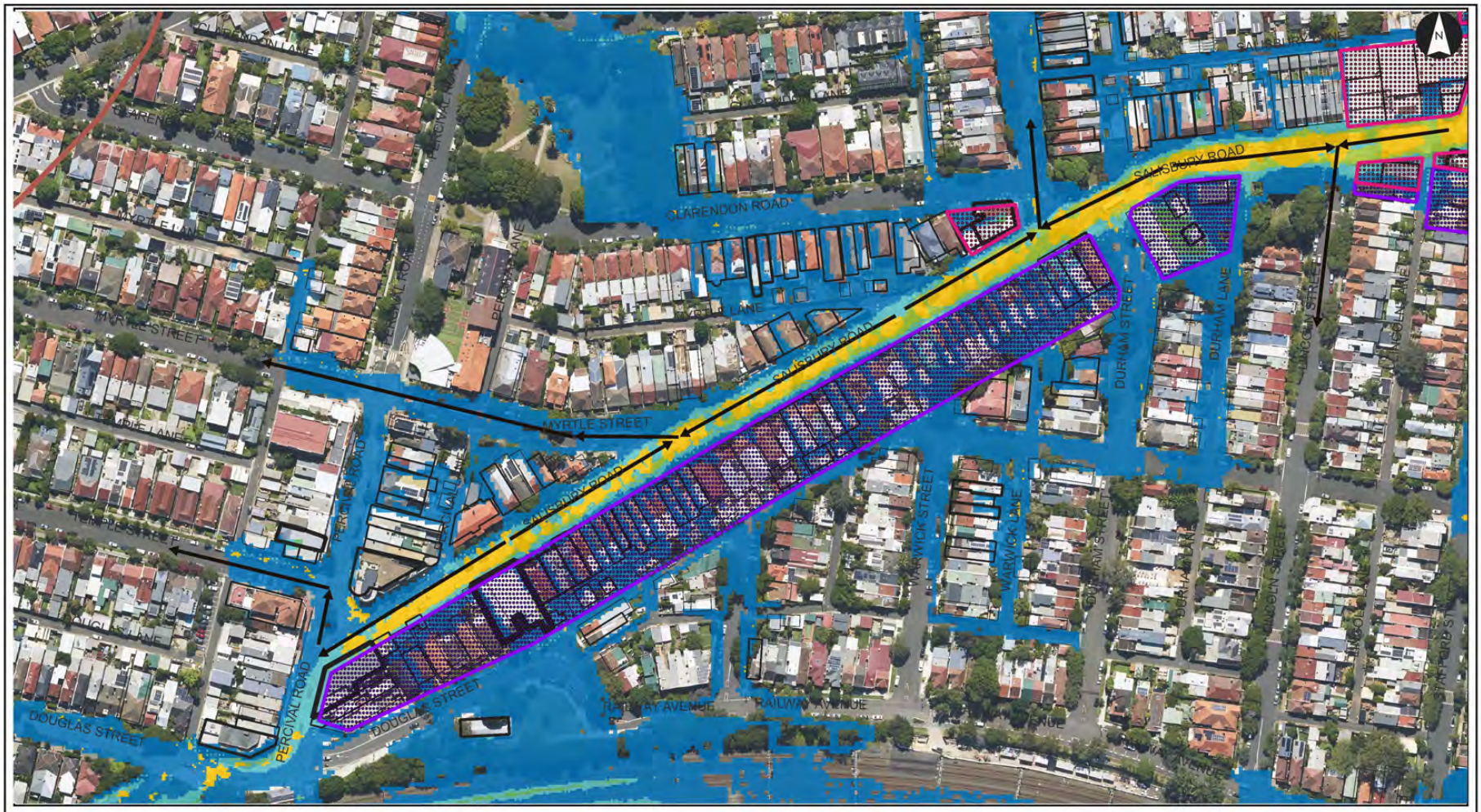

Emergency Management

Hotspot 2 **1% AEP**

Project: Whites Creek and johnstons Flood Risk Management Study and Plan

Client: Inner West Council
Project Code: NW30096
Drawn By: Habba Rahimi. Checked By: Alireza Pouya
Date: (2023-07-07)
Figure No: 5

Stantec

Legend

- Johnstons Creek Study Area
- Whites Creek Study Area

Overfloor Flooding Depth (m)

- <0
- 0 - 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- >1

Evacuation Routes

- Vehicular
- Commercial Low Flood Island
- Low Flood Island

Hazard Category

- H1 - Generally safe for vehicles, people and buildings.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for vehicles, children and the elderly.
- H4 - Unsafe for vehicles and people.
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.

Notes:
1. Map displayed in EPSG:28356

References:
1. Aerial Imagery [MetroMap, 2023]

DRAFT - Not For Construction

0 0.05 0.1 km

Scale at A3: 1:1800



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Emergency Management

Hotspot 3 **20% AEP**

Project: Whites Creek and Johnstons Creek Flood Risk Management Study and Plan

Client: Inner West Council
Project Code: NW30096
Drawn By: Habba Rahimi, Checked By: Alireza Pouya
Date: (2023-07-07)
Figure No: 7

Stantec

Legend

- Johnstons Creek Study Area
- Whites Creek Study Area

Overfloor Flooding Depth (m)

- <0
- 0 - 0.2
- 0.2 - 0.4
- 0.4 - 0.6

Evacuation Routes

- Vehicular
- Low Flood Island

Hazard Category

- H1 - Generally safe for vehicles, people and buildings.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for vehicles, children and the elderly.
- H4 - Unsafe for vehicles and people.
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.

Notes:
1. Map displayed in EPSG:28356

References:
1. Aerial Imagery [MetroMap, 2023]

DRAFT - Not For Construction

0 0.03 0.06 km

Scale at A3: 1:29044

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Emergency Management

Hotspot 3 **1% AEP**

Project: Whites Creek and Johnstons Creek Flood Risk Management Study and Plan

Client: Inner West Council
Project Code: NW30096
Drawn By: Habba Rahimi, Checked By: Alireza Pouya
Date: (2023-07-07)
Figure No: 8

Stantec

Legend

- Johnstons Creek Study Area
- Whites Creek Study Area

Overfloor Flooding Depth (m)

- <0
- 0 - 0.2
- 0.2 - 0.4
- 0.4 - 0.6

Evacuation Routes

- Vehicular
- Low Flood Island

Hazard Category

- H1 - Generally safe for vehicles, people and buildings.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for vehicles, children and the elderly.
- H4 - Unsafe for vehicles and people.
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.

Notes:
1. Map displayed in EPSG:28356

References:
1. Aerial Imagery [MetroMap, 2023]

DRAFT - Not For Construction

0 0.03 0.06 km

Scale at A3: 1:29044

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Emergency Management

Hotspot 3 **PMF**

Project: Whites Creek and Johnstons Creek Flood Risk Management Study and Plan

Client: Inner West Council
Project Code: NW30096
Drawn By: Habba Rahimi, Checked By: Alireza Pouya
Date: (2023-07-07)
Figure No: 9

Stantec

Legend

Johnstons Creek Study Area
Whites Creek Study Area

Overfloor Flooding Depth (m)

<0
0 - 0.2
0.2 - 0.4
0.4 - 0.6
0.6 - 0.8

Evacuation Routes

Vehicular

Low Flood Island

Hazard Category

H1 - Generally safe for vehicles, people and buildings.
H2 - Unsafe for small vehicles.
H3 - Unsafe for vehicles, children and the elderly.
H4 - Unsafe for vehicles and people.
H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.

Notes:
1. Map displayed in EPSG:28356

References:
1. Aerial Imagery [MetroMap, 2023]

DRAFT - Not For Construction

0 0.03 0.06 km

Scale at A3: 1:29044

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Emergency Management

Hotspot 4 **20% AEP**

Project: Whites Creek and Johnstons Creek Flood Risk Management Study and Plan

Client: Inner West Council

Project Code: NW30096

Drawn By: Habba Rahimi, Checked By: Alireza Pouya

Date: (2023-07-07)

Figure No: 10

Stantec

Legend

- Johnstons Creek Study Area
- Low Flood Island

Overfloor Flooding Depth (m)

- <0
- 0 - 0.2
- 0.2 - 0.4
- 0.4 - 0.6

Evacuation Routes

- Vehicular
- Pedestrain
- Commercial Low Flood Island

Hazard Category

- H1 - Generally safe for vehicles, people and buildings.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for vehicles, children and the elderly.
- H4 - Unsafe for vehicles and people.
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.

Notes:
1. Map displayed in EPSG:28356

References:
1. Aerial Imagery [MetroMap, 2023]

DRAFT - Not For Construction

0 0.06 0.12 km

Scale at A3: 1:29044



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Emergency Management

Hotspot 4 **1% AEP**

Project: Whites Creek and Johnstons Creek Flood Risk Management Study and Plan

Client: Inner West Council
Project Code: NW30096
Drawn By: Habba Rahimi Checked By: Alireza Pouya
Date: (2023-07-07)
Figure No: 11

Stantec

Legend

Johnstons Creek Study Area

Overfloor Flooding Depth (m)

- <0
- 0 - 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- 0.8 - 1

Evacuation Routes

- Vehicular
- Pedestrain

- Commercial Low Flood Island
- Low Flood Island

Hazard Category

- H1 - Generally safe for vehicles, people and buildings.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for vehicles, children and the elderly.
- H4 - Unsafe for vehicles and people.
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.

Notes:
1. Map displayed in EPSG:28356

References:
1. Aerial Imagery [MetroMap, 2023]

DRAFT - Not For Construction

0 0.06 0.12 km

Scale at A3: 1:29044

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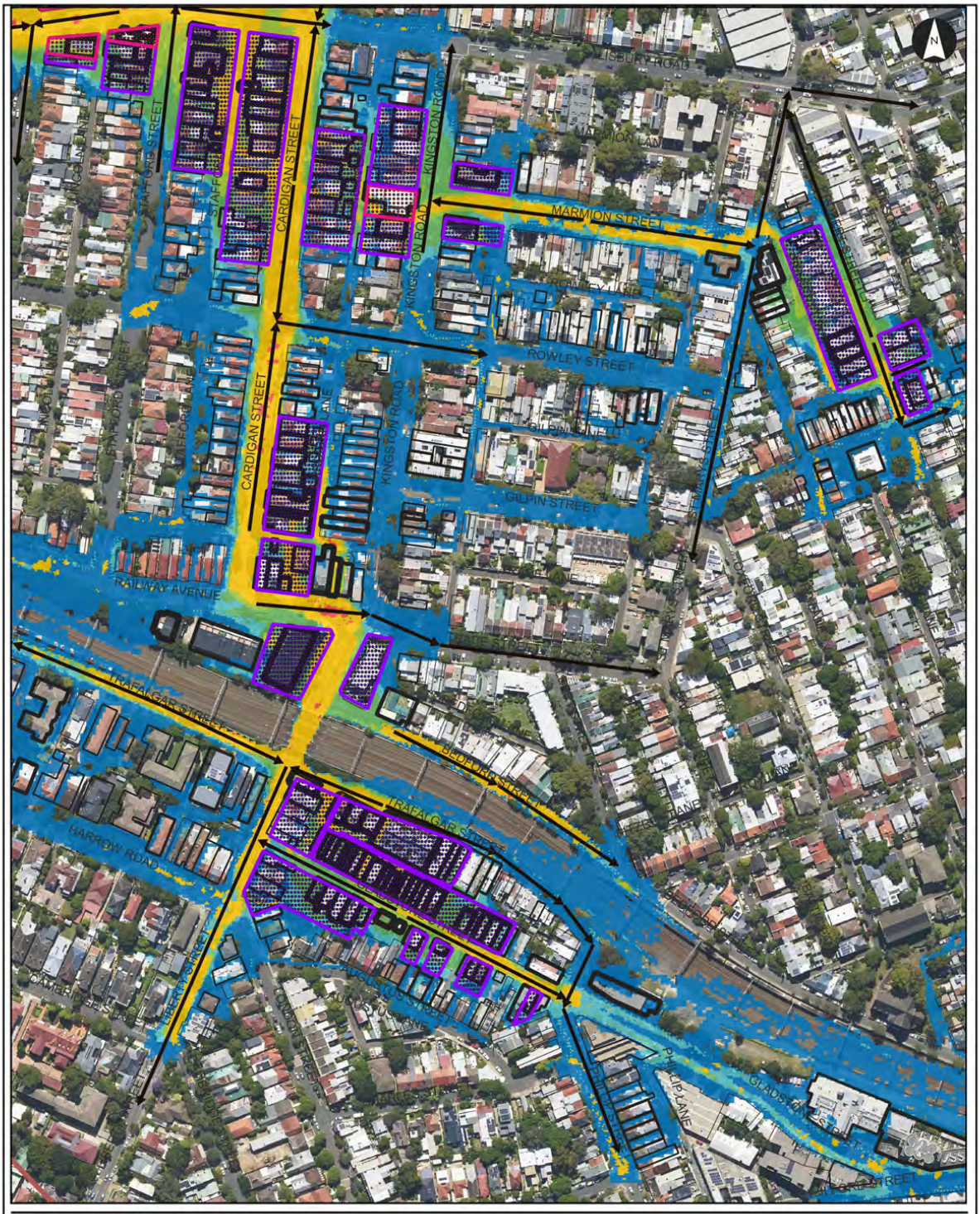

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Emergency Management

Hotspot 5 **1% AEP**

Project: Whites Creek and Johnstons Flood Risk Management Study and Plan

Client: Inner West Council
Project Code: NW30096
Drawn By: Habba Rahimi, Checked By: Alireza Pouya
Date: (2023-07-07)
Figure No: 14

Stantec

Legend

- Johnstons Creek Study Area
- **Overfloor Flooding Depth (m)**
  - <0
  - 0 - 0.2
  - 0.2 - 0.4
  - 0.4 - 0.6
  - 0.6 - 0.8
  - 0.8 - 1
  - >1
- **Evacuation Routes**
  - Vehicular
  - Pedestrain
- Commercial Low Flood Island
- Low Flood Island
- **Hazard Category**
  - H1 - Generally safe for vehicles, people and buildings.
  - H2 - Unsafe for small vehicles.
  - H3 - Unsafe for vehicles, children and the elderly.
  - H4 - Unsafe for vehicles and people.
  - H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
  - H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.

Notes:
1. Map displayed in EPSG:28356

References:
1. Aerial Imagery [MetroMap, 2023]

DRAFT - Not For Construction

0 0.03 0.06 km

Scale at A3: 1:1200



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Emergency Management

Hotspot 5 **PMF**

Project: Whites Creek and Johnstons Flood Risk Management Study and Plan

Client: Inner West Council
Project Code: NW30096
Drawn By: Habba Rahimi, Checked By: Alireza Pouya
Date: (2023-07-07)
Figure No: 15

Stantec

Legend

Johnstons Creek Study Area

Overfloor Flooding Depth (m)

- <0
- 0 - 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- 0.8 - 1
- >1

Evacuation Routes

- Vehicular
- Pedestrain

Commercial Low Flood Island

Low Flood Island

Hazard Category

H1 - Generally safe for vehicles, people and buildings.

H2 - Unsafe for small vehicles.

H3 - Unsafe for vehicles, children and the elderly.

H4 - Unsafe for vehicles and people.

H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.

H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.

Notes:
1. Map displayed in EPSG:28356

References:
1. Aerial Imagery [MetroMap, 2023]

DRAFT - Not For Construction

0 0.03 0.06 km

Scale at A3: 1:1200



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Emergency Management

Hotspot 6 **20% AEP**

Project: Whites Creek and Johnstons Creek Flood Risk Management Study and Plan

Client: Inner West Council
Project Code: NW30096
Drawn By: Habba Rahimi Checked By: Alireza Pouya
Date: (2023-07-07)
Figure No: 16

Stantec

Legend

Johnstons Creek Study Area

Overfloor Flooding Depth (m)

<0
0 - 0.2
0.2 - 0.4
0.4 - 0.6
0.6 - 0.8

Evacuation Routes

Vehicular
Low Flood Island

Hazard Category

H1 - Generally safe for vehicles, people and buildings.
H2 - Unsafe for small vehicles.
H3 - Unsafe for vehicles, children and the elderly.
H4 - Unsafe for vehicles and people.
H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.

Notes:
1. Map displayed in EPSG:28356

References:
1. Aerial Imagery [MetroMap, 2023]

DRAFT - Not For Construction

0 0.04 0.08 km

Scale at A3: 1:29044



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CARILLON AVENUE
CARILLON AVENUE
CARILLON AVENUE
CARILLON AVENUE
CHURCH STREET
CHURCH STREET
CHURCH STREET



Emergency Management

Hotspot 6 **PMF**

Project: Whites Creek and Johnstons Creek Flood Risk Management Study and Plan

Client: Inner West Council
Project Code: NW30096
Drawn By: Habba Rahimi, Checked By: Alireza Pouya
Date: (2023-07-07)
Figure No: 18

Stantec

Legend

Johnstons Creek Study Area

Overfloor Flooding Depth (m)

<0
0 - 0.2
0.2 - 0.4
0.4 - 0.6
0.6 - 0.8
0.8 - 1
>1

Evacuation Routes

Vehicular

Low Flood Island

Hazard Category

H1 - Generally safe for vehicles, people and buildings.
H2 - Unsafe for small vehicles.
H3 - Unsafe for vehicles, children and the elderly.
H4 - Unsafe for vehicles and people.
H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.

Notes:
1. Map displayed in EPSG:28356

References:
1. Aerial Imagery [MetroMap, 2023]

DRAFT - Not For Construction

0 0.04 0.08 km

Scale at A3: 1:29044



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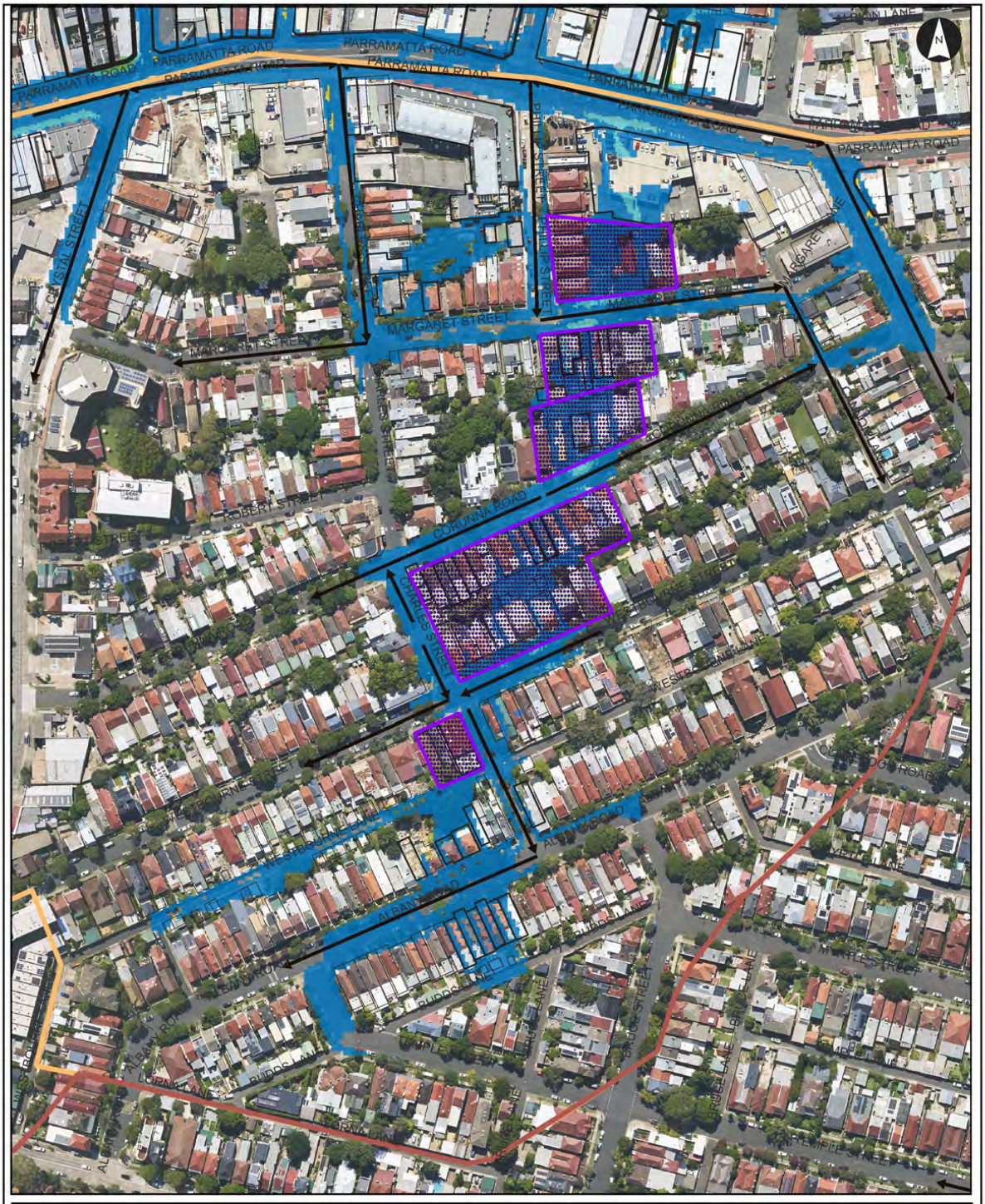

Emergency Management

Hotspot 7 **20% AEP**

Project: Whites Creek and Johnstons Creek Flood Risk Management Study and Plan

Client: Inner West Council
Project Code: NW30096
Drawn By: Habba Rahimi Checked By: Alireza Pouya
Date: (2023-07-07)
Figure No: 19

Stantec

Legend

Johnstons Creek Study Area
Whites Creek Study Area

Overfloor Flooding Depth (m)

<0
0 - 0.2
0.2 - 0.4
0.4 - 0.6
0.6 - 0.8
0.8 - 1

Evacuation Routes

Vehicular

Low Flood Island

Hazard Category

H1 - Generally safe for vehicles, people and buildings.
H2 - Unsafe for small vehicles.
H3 - Unsafe for vehicles, children and the elderly.
H4 - Unsafe for vehicles and people.
H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.

Notes:
1. Map displayed in EPSG:28356

References:
1. Aerial Imagery [MetroMap, 2023]

DRAFT - Not For Construction

0 0.05 0.1 km

Scale at A3: 1:29044



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Emergency Management

Hotspot 8 **20% AEP**

Project: Whites Creek and Johnstons Creek Flood Risk Management Study and Plan

Client: Inner West Council
Project Code: NW30096
Drawn By: Habiba Rahimi; Checked By: Alireza Pouya
Date: (2023-07-07)
Figure No: 22

Stantec

Legend

Whites Creek Study Area

Overfloor Flooding Depth (m)

<0
0 - 0.2
0.2 - 0.4

Evacuation Routes

Vehicular
Commercial Low Flood Island

Hazard Category

H1 - Generally safe for vehicles, people and buildings.
H2 - Unsafe for small vehicles.
H3 - Unsafe for vehicles, children and the elderly.
H4 - Unsafe for vehicles and people.
H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.

Notes:
1. Map displayed in EPSG:28356

References:
1. Aerial Imagery [MetroMap, 2023]

DRAFT - Not For Construction

0 0.02 0.04 km

Scale at A3: 1:29044

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Emergency Management

Hotspot 8 **1% AEP**

Project: Whites Creek and Johnstons Creek Flood Risk Management Study and Plan

Client: Inner West Council
Project Code: NW30096
Drawn By: Habba Rahimi Checked By: Alireza Pouya
Date: (2023-07-07)
Figure No: 23

Stantec

Legend

Whites Creek Study Area

Overfloor Flooding Depth (m)

- <0
- 0 - 0.2
- 0.2 - 0.4
- 0.4 - 0.6

Evacuation Routes

- Vehicular
- Commercial Low Flood Island

Hazard Category

- H1 - Generally safe for vehicles, people and buildings.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for vehicles, children and the elderly.
- H4 - Unsafe for vehicles and people.
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.

Notes:
1. Map displayed in EPSG:28356

References:
1. Aerial Imagery [MetroMap, 2023]

DRAFT - Not For Construction

0 0.02 0.04 km

Scale at A3: 1:29044

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Emergency Management

Hotspot 8 **PMF**

Project: Whites Creek and Johnstons Creek Flood Risk Management Study and Plan

Client: Inner West Council

Project Code: NW30096

Drawn By: Habba Rahimi, Checked By: Alireza Pouya

Date: (2023-07-07)

Figure No: 24

Stantec

Legend

Whites Creek Study Area

Overfloor Flooding Depth (m)

<0

0 - 0.2

0.2 - 0.4

0.4 - 0.6

0.6 - 0.8

>1

Evacuation Routes

Vehicular

Commercial Low Flood Island

Hazard Category

H1 - Generally safe for vehicles, people and buildings.

H2 - Unsafe for small vehicles.

H3 - Unsafe for vehicles, children and the elderly.

H4 - Unsafe for vehicles and people.

H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.

H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.

Notes:
1. Map displayed in EPSG:28356

References:
1. Aerial Imagery [MetroMap, 2023]

DRAFT - Not For Construction

0 0.02 0.04 km

Scale at A3: 1:29044



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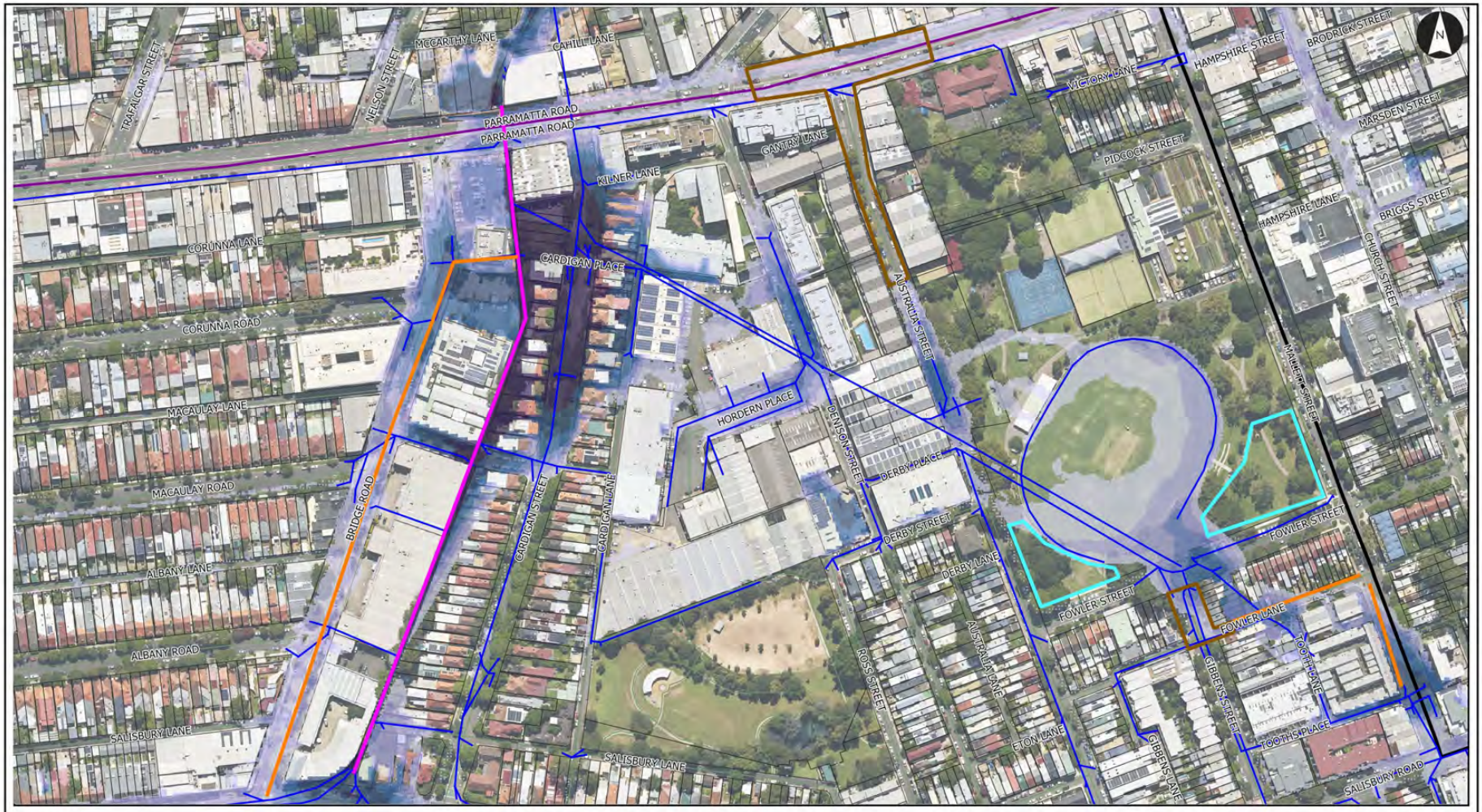
APPENDIX D

PRELIMINARY FLOOD OPTIONS MAPS

Stantec



Preliminary Mitigation Options Hotspot 1

Project: Whites Creek and Johnstons Creek Floodplain Risk Management Study and Plan

Client: Inner West Council
Project Code: NW30096
Drawn By: Anson Chang. Checked By: Alireza Pouya
Date: (2023-07-05)
Figure No: 1

Stantec

Legend

- Existing Council Modelled Stormwater Network
- Cadastre
- Inner West Council LGA Boundary
- Johnstons Creek Study Area

Preliminary Option Type
- Channel Upgrades
- Detention Basin
- Drainage Upgrades
- Road Lowering
- Drainage Maintenance

Flood Depth (m)
- 0.00 to 0.10
- 0.10 to 0.30
- 0.30 to 0.50
- 0.50 to 0.70
- 0.70 to 1.00
- 1.00 to 1.50
- > 1.50

Notes:
1. Map displayed in EPSG:28356

References:
1. Aerial Imagery [Metromap, 2023]

Key Map



DRAFT - Not For Construction

20 0 20 40 60 80 m

Scale at A3: 1:2300

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Preliminary Mitigation Options Hotspot 2

Project: Whites Creek and Johnstons Creek Floodplain Risk Management Study and Plan

Client: Inner West Council
Project Code: NW30096
Drawn By: Anson Chang, Checked By: Alireza Pouya
Date: (2023-07-05)
Figure No: 2

Stantec

Legend

Existing Council Modelled Stormwater Network
Cadastre
Inner West Council LGA Boundary
Johnstons Creek Study Area

Preliminary Option Type
Channel Upgrades
Detention Basin
Drainage Upgrades
Road Lowering
Drainage Maintenance

Flood Depth (m)
0.00 to 0.10
0.10 to 0.30
0.30 to 0.50
0.50 to 0.70
0.70 to 1.00
1.00 to 1.50
> 1.50

Notes:
1. Map displayed in EPSG:28356

References:
1. Aerial Imagery [Metromap, 2023]

DRAFT - Not For Construction

20 0 20 40 60 80 m

Scale at A3: 1:1800



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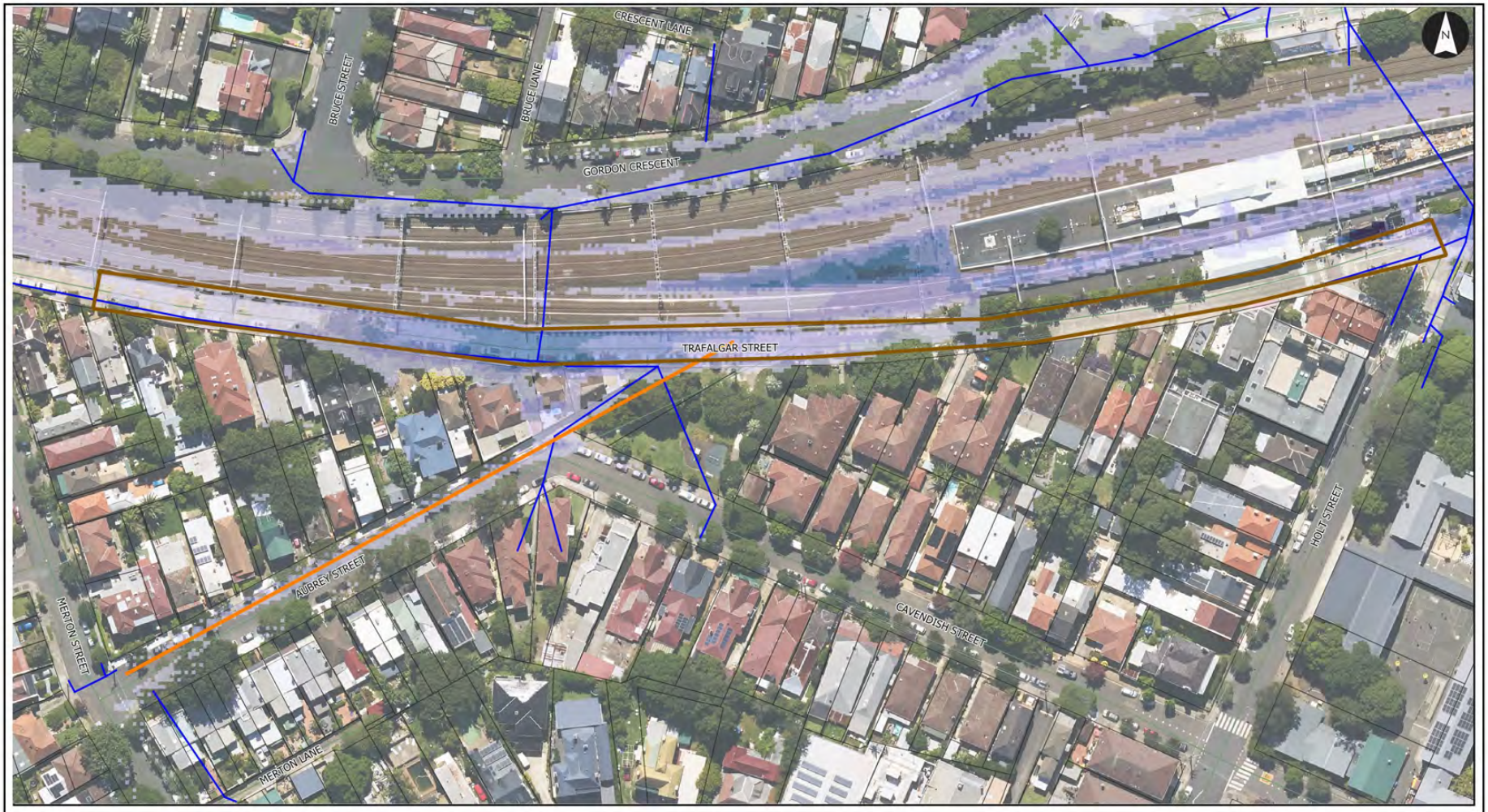

Preliminary Mitigation Options Hotspot 3

Project: Whites Creek and Johnstons Creek Floodplain Risk Management Study and Plan

Client: Inner West Council
Project Code: NW30096
Drawn By: Anson Chang, Checked By: Alireza Pouya
Date: (2023-07-05)
Figure No: 3

Stantec

Legend

- Existing Council Modelled Stormwater Network
- Cadastre
- Inner West Council LGA Boundary
- Johnstons Creek Study Area

Preliminary Option Type
- Channel Upgrades
- Detention Basin
- Drainage Upgrades
- Road Lowering
- Drainage Maintenance

Flood Depth (m)
- 0.00 to 0.10
- 0.10 to 0.30
- 0.30 to 0.50
- 0.50 to 0.70
- 0.70 to 1.00
- 1.00 to 1.50
- > 1.50

Notes:
1. Map displayed in EPSG:28356

References:
1. Aerial Imagery [Metromap, 2023]

DRAFT - Not For Construction

10 0 10 20 30 40 m

Scale at A3: 1:1000

Key Map



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Preliminary Mitigation Options Hotspot 5

Project: Whites Creek and Johnstons Creek Floodplain Risk Management Study and Plan

Client: Inner West Council
Project Code: NW30096
Drawn By: Anson Chang, Checked By: Alireza Pouya
Date: (2023-07-05)
Figure No: 5

Stantec

Legend

- Existing Council Modelled Stormwater Network
- Cadastre
- Inner West Council LGA Boundary
- Johnstons Creek Study Area

Preliminary Option Type
- Channel Upgrades
- Detention Basin
- Drainage Upgrades
- Road Lowering
- Drainage Maintenance

Flood Depth (m)
- 0.00 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- 0.50 to 0.70
- 0.70 to 1.00
- 1.00 to 1.50
- > 1.50

Notes:
1. Map displayed in EPSG:28356

References:
1. Aerial Imagery [Metromap, 2023]

DRAFT - Not For Construction

10 0 10 20 30 40 m

Scale at A3: 1:1200



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Preliminary Mitigation Options
Hotspot 7

Project: Whites Creek and Johnstons Creek Floodplain Risk Management Study and Plan

Client: Inner West Council
Project Code: NW30096
Drawn By: Anson C, Checked By: Alireza Pouya
Date: (2023-07-05)
Figure No: 7

Stantec

Legend

- Existing Council Modelled Stormwater Network
- Cadastre
- Inner West Council LGA Boundary
- Whites Creek Study Area
- Johnstons Creek Study Area

Preliminary Option Type

- Channel Upgrades
- Detention Basin
- Drainage Upgrades
- Road Lowering
- Drainage Maintenance

Flood Depth (m)

- 0.00 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- 0.50 to 0.70
- 0.70 to 1.00
- 1.00 to 1.50
- > 1.50

Notes:
1. Map displayed in EPSG:28356

References:
1. Aerial Imagery [Metromap, 2023]

DRAFT - Not For Construction

20 0 20 40 60 80 m

Scale at A3: 1:1800

Key Map



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Preliminary Mitigation Options
Hotspot 8

Project: Whites Creek and Johnstons Creek Floodplain Risk Management Study and Plan

Client: Inner West Council
Project Code: NW30096
Drawn By: Anson C, Checked By: Alireza Pouya
Date: (2023-07-05)
Figure No: 8

Stantec

Legend

- Existing Council Modelled Stormwater Network
- Cadastre
- Inner West Council LGA Boundary
- Whites Creek Study Area
- Johnstons Creek Study Area

Preliminary Option Type

- Channel Upgrades
- Detention Basin
- Drainage Upgrades
- Road Lowering
- Drainage Maintenance

Flood Depth (m)

- 0.00 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- 0.50 to 0.70
- 0.70 to 1.00
- 1.00 to 1.50
- > 1.50

Notes:
1. Map displayed in EPSG:28356

References:
1. Aerial Imagery [Metromap, 2023]

DRAFT - Not For Construction

10 0 10 20 30 40 m

Scale at A3: 1:900



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APPENDIX

E

DETAILED FLOOD OPTION MAPS

Stantec



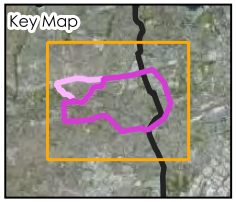
Johnstons Creek Base Case - PM6 Overview

Project: Whites Creek and Johnstons creek FRMS&P

Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 1

Legend

- MJC Study Area
- MWC Study Area
- IWC LGA Boundary
- Unblocked Drainage
- Blocked Drainage, Now Unblocked



DRAFT - Not For Construction

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

120 0 120 240 360 480 m

Scale at A3: 1:15000

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Johnstons Creek Base Case 20% AEP PM6 Pit and Pipes Unblocked

Project: Whites Creek and Johnstons creek FRMS&P

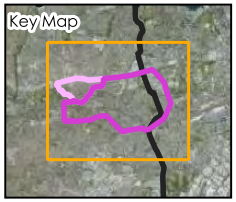
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 2

Legend

- MJC Study Area
- MWC Study Area
- IWC LGA Boundary
- Unblocked Drainage
- Blocked Drainage, Now Unblocked

MJC_5y_PM6-Ext_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_5y_PM6-Ext_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



DRAFT - Not For Construction

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

120 0 120 240 360 480 m

Scale at A3: 1:15000

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Johnstons Creek Base Case 5% AEP
PM6 Pit and Pipes Unblocked

Project: Whites Creek and Johnstons creek FRMS&P

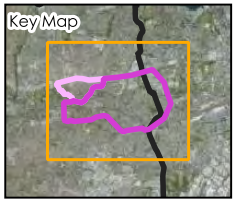
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 3

Legend

- MJC Study Area
- MWC Study Area
- IWC LGA Boundary
- Unblocked Drainage
- Blocked Drainage, Now Unblocked

MJC_20y_PM6-Ext_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_20y_PM6-Ext_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



DRAFT - Not For Construction

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

120 0 120 240 360 480 m

Scale at A3: 1:15000

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Johnstons Creek Base Case 2% AEP
PM6 Pit and Pipes Unblocked

Project: Whites Creek and Johnstons creek FRMS&P

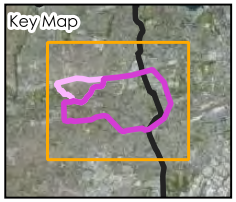
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 4

Legend

- MJC Study Area
- MWC Study Area
- IWC LGA Boundary
- Unblocked Drainage
- Blocked Drainage, Now Unblocked

MJC_50y_PM6-Ext_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_50y_PM6-Ext_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



DRAFT - Not For Construction

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

120 0 120 240 360 480 m

Scale at A3: 1:15000

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Johnstons Creek Base Case 1% AEP
PM6 Pit and Pipes Unblocked

Project: Whites Creek and Johnstons creek FRMS&P

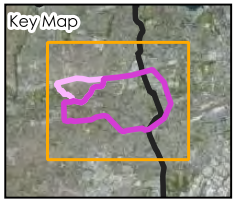
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 5

Legend

- MJC Study Area
- MWC Study Area
- IWC LGA Boundary
- Unblocked Drainage
- Blocked Drainage, Now Unblocked

MJC_100y_PM6-Ext_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_100y_PM6-Ext_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



DRAFT - Not For Construction

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

120 0 120 240 360 480 m

Scale at A3: 1:15000

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Johnstons Creek Base Case PMF
PM6 Pit and Pipes Unblocked

Project: Whites Creek and Johnstons creek FRMS&P

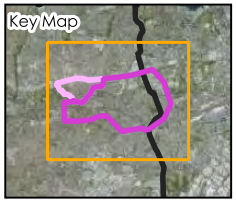
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 6

Legend

- MJC Study Area
- MWC Study Area
- IWC LGA Boundary
- Unblocked Drainage
- Blocked Drainage, Now Unblocked

MJC_PMF_PM6-Ext_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_PMF_PM6-Ext_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



DRAFT - Not For Construction

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

120 0 120 240 360 480 m

Scale at A3: 1:15000

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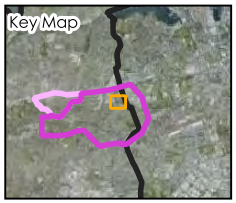
Johnstons Creek Option - JC1 v4 Overview

Project: Whites Creek and Johnstons creek FRMS&P

Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 7

Legend

- MJC Study Area
- IWC LGA Boundary
- Proposed Drainage
- Removed Drainage
- Existing Drainage



DRAFT - Not For Construction

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

13 0 13 26 38 51 m

Scale at A3: 1:1600

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Johnstons Creek Option 20% AEP
JC1 v4 Fowler Street Drainage Upgrade

Project: Whites Creek and Johnstons creek FRMS&P

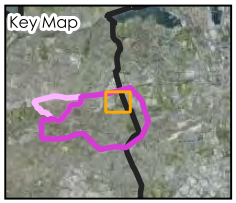
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 8

Legend

- MJC Study Area
- IWC LGA Boundary
- Proposed Drainage
- Removed Drainage
- Existing Drainage

MJC_5y_JC1_v5-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50

MJC_5y_JC1_v4-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet



DRAFT - Not For Construction

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

21 0 21 42 62 83 m

Scale at A3: 1:2600

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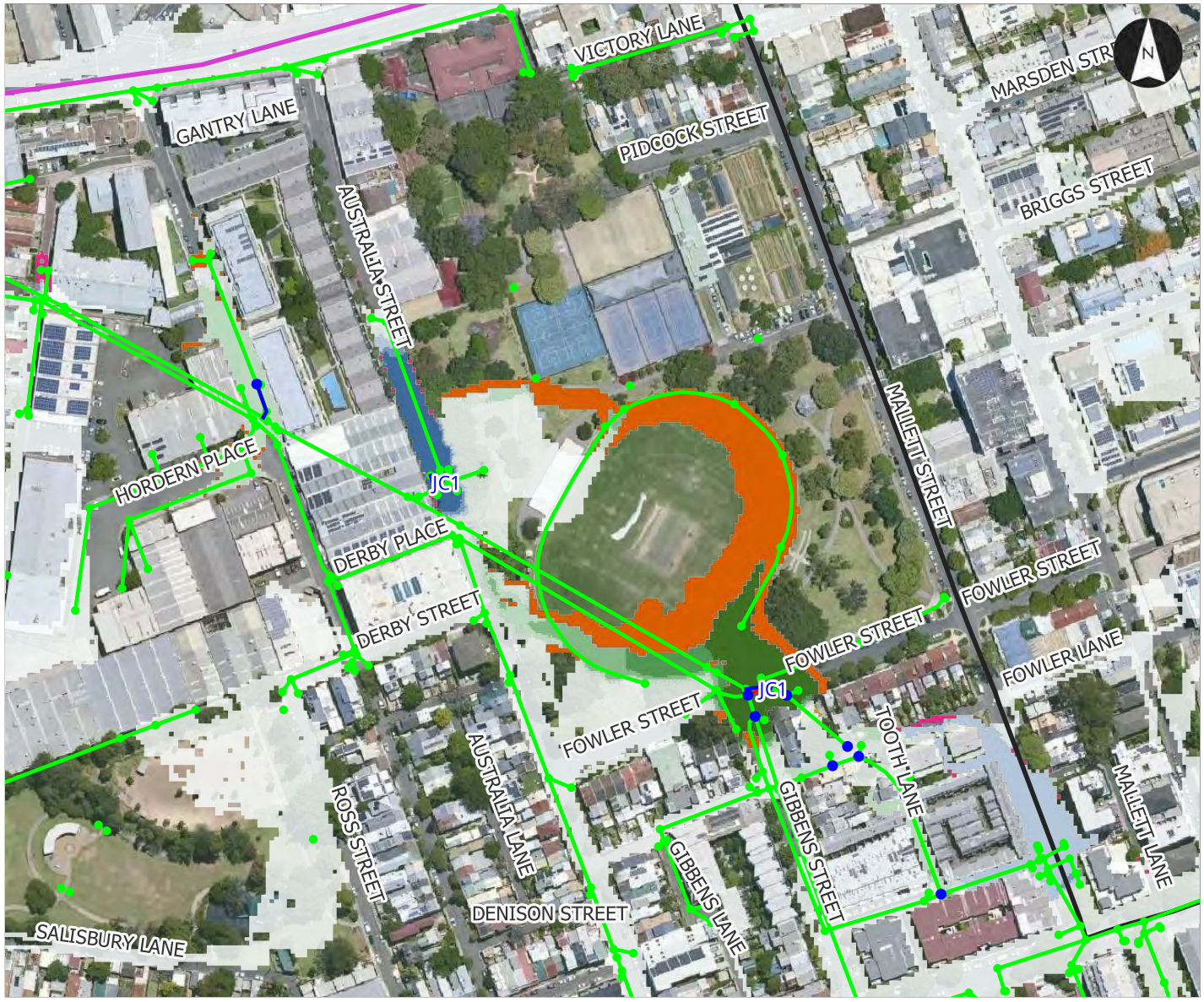


Johnstons Creek Option 5% AEP
JC1 v4 Fowler Street Drainage Upgrade

Project: Whites Creek and Johnstons creek FRMS&P

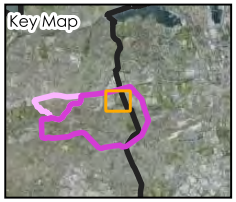
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 9

Legend

- MJC Study Area
- IWC LGA Boundary
- Proposed Drainage
- Removed Drainage
- Existing Drainage

MJC_20y_JC1_v4-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_20y_JC1_v4-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



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Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

21 0 21 42 62 83 m

Scale at A3: 1:2600

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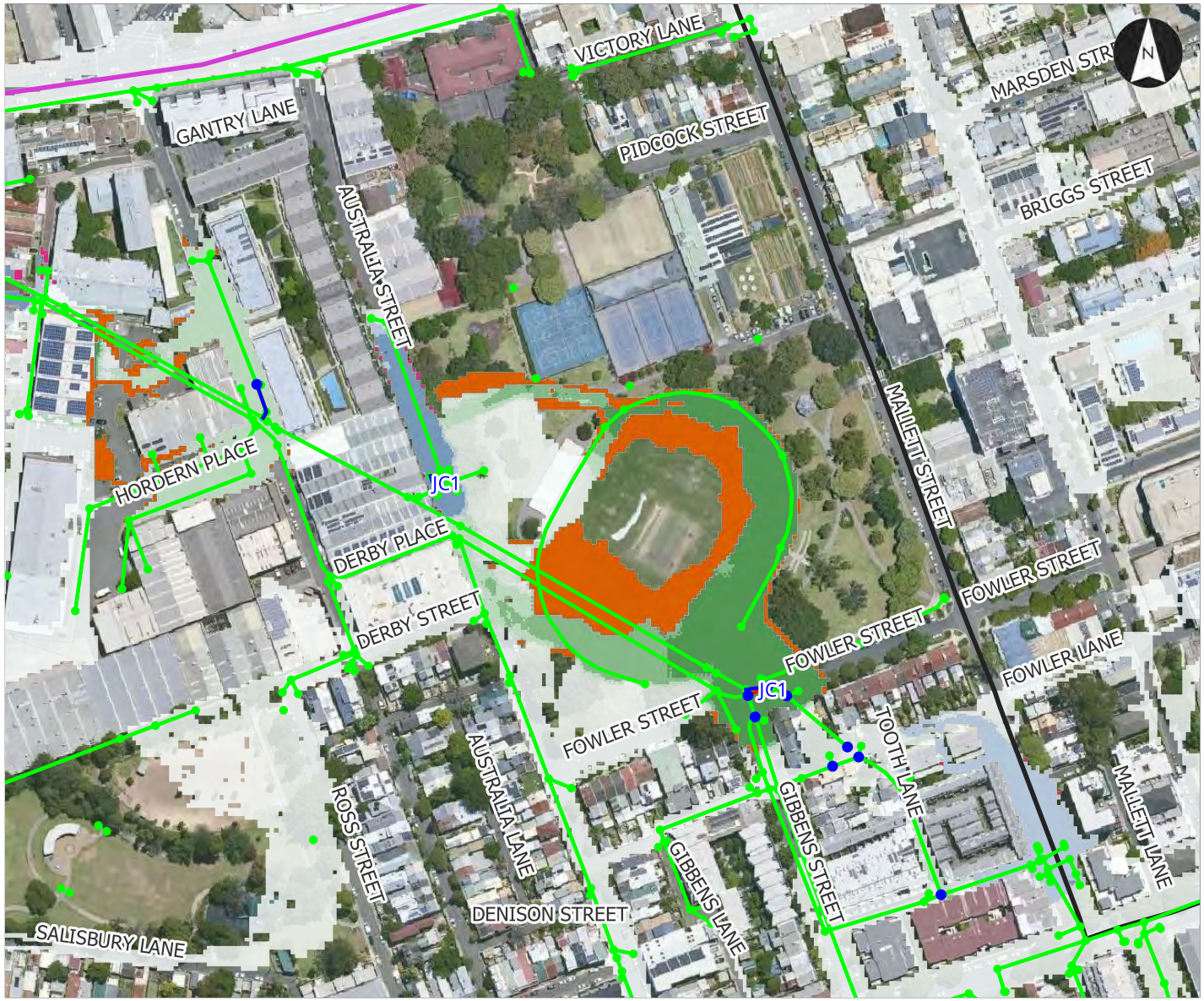


Johnstons Creek Option 2% AEP
JC1 v4 Fowler Street Drainage Upgrade

Project: Whites Creek and Johnstons creek FRMS&P

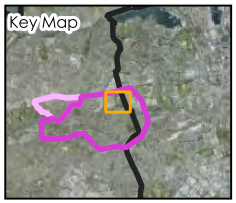
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 10

Legend

- MJC Study Area
- IWC LGA Boundary
- Proposed Drainage
- Removed Drainage
- Existing Drainage

MJC_50y_JC1_v4-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_50y_JC1_v4-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



DRAFT - Not For Construction

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

21 0 21 42 62 83 m

Scale at A3: 1:2600

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Johnstons Creek Option 1% AEP
JC1 v4 Fowler Street Drainage Upgrade

Project: Whites Creek and Johnstons creek FRMS&P

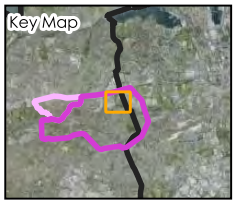
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 11

Legend

- MJC Study Area
- IWC LGA Boundary
- Proposed Drainage
- Removed Drainage
- Existing Drainage

MJC_100y_JC1_v4-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_100y_JC1_v4-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



DRAFT - Not For Construction

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

21 0 21 42 62 83 m

Scale at A3: 1:2600

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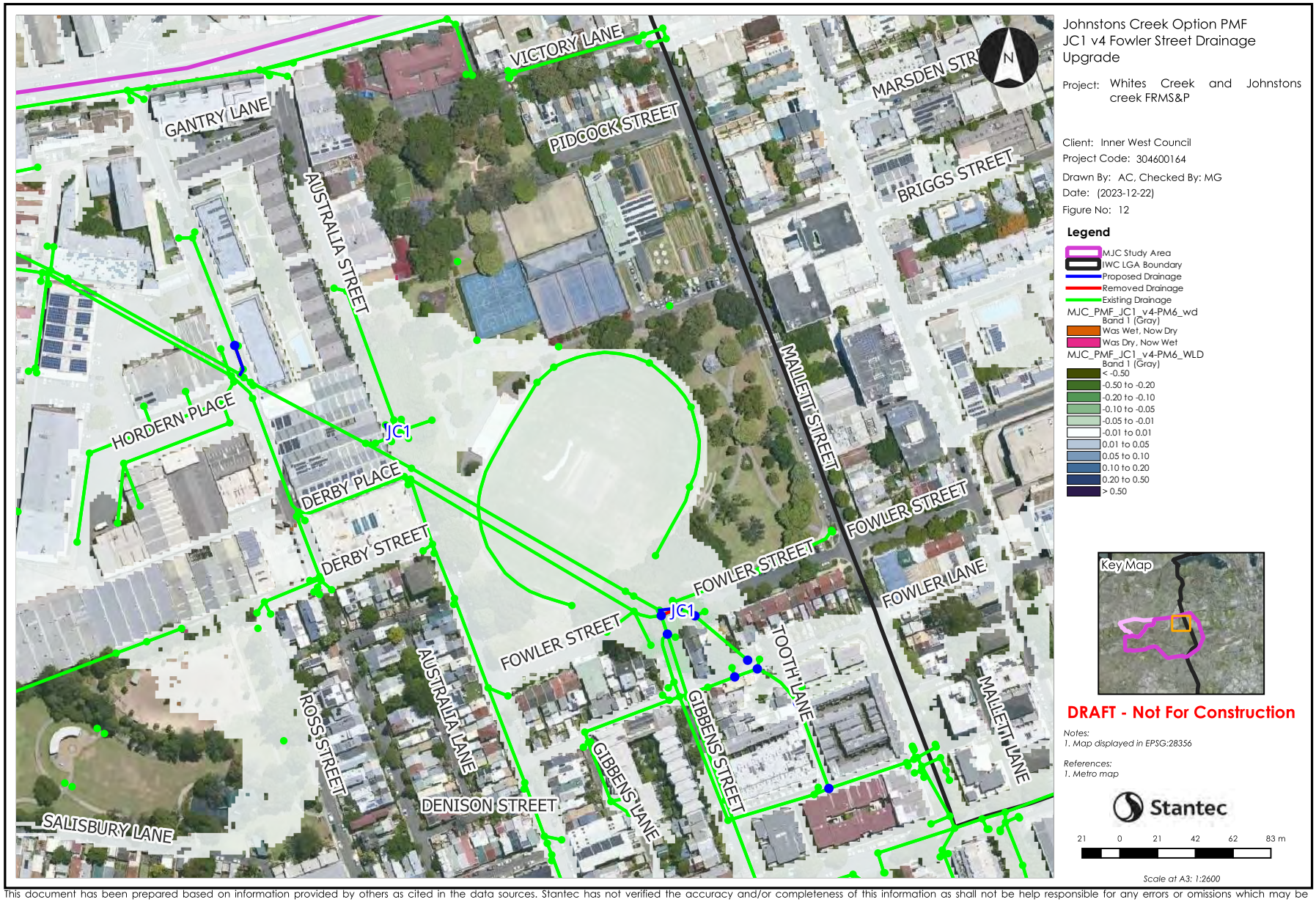

Johnstons Creek Option PMF
JC1 v4 Fowler Street Drainage Upgrade

Project: Whites Creek and Johnstons creek FRMS&P

Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 12

Legend

- MJC Study Area
- IWC LGA Boundary
- Proposed Drainage
- Removed Drainage
- Existing Drainage

MJC_PMF_JC1_v4-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_PMF_JC1_v4-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50

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Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

21 0 21 42 62 83 m

Scale at A3: 1:2600

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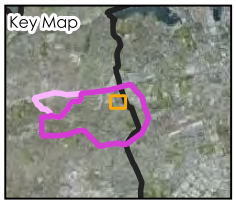
Johnstons Creek Option -
JC1 v5 Overview

Project: Whites Creek and Johnstons creek FRMS&P

Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 13

Legend

- MJC Study Area
- IWC LGA Boundary
- JC1_v4_detbasin
- Detention Basin
- Proposed Drainage
- Removed Drainage
- Existing Drainage



DRAFT - Not For Construction

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

13 0 13 26 38 51 m

Scale at A3: 1:1600

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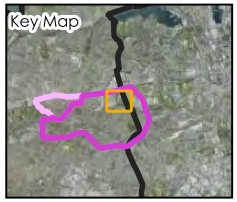
Johnstons Creek Option 20% AEP
JC1 v5 Fowler Street Detention Basin

Project: Whites Creek and Johnstons creek FRMS&P

Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 14

Legend

MJC Study Area
IWC LGA Boundary
JC1_v4_detbasin
Detention Basin
Proposed Drainage
Removed Drainage
Existing Drainage
MJC_5y_JC1_v5-PM6_WLD
Band 1 (Gray)
< -0.50
-0.50 to -0.20
-0.20 to -0.10
-0.10 to -0.05
-0.05 to -0.01
-0.01 to 0.01
0.01 to 0.05
0.05 to 0.10
0.10 to 0.20
0.20 to 0.50
> 0.50
MJC_5y_JC1_v5-PM6_wd
Band 1 (Gray)
Was Wet, Now Dry
Was Dry, Now Wet



DRAFT - Not For Construction

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

21 0 21 42 62 83 m

Scale at A3: 1:2600

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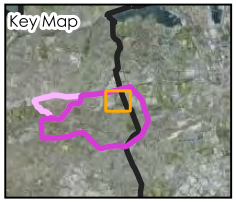
Johnstons Creek Option 5% AEP
JC1 v5 Fowler Street Detention Basin

Project: Whites Creek and Johnstons creek FRMS&P

Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 15

Legend

MJC Study Area
IWC LGA Boundary
JC1_v4_detbasin
Detention Basin
Proposed Drainage
Removed Drainage
Existing Drainage
MJC_20y_JC1_v5-PM6_wd
Band 1 (Gray)
Was Wet, Now Dry
Was Dry, Now Wet
MJC_20y_JC1_v5-PM6_WLD
Band 1 (Gray)
< -0.50
-0.50 to -0.20
-0.20 to -0.10
-0.10 to -0.05
-0.05 to -0.01
-0.01 to 0.01
0.01 to 0.05
0.05 to 0.10
0.10 to 0.20
0.20 to 0.50
> 0.50



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Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

21 0 21 42 62 83 m

Scale at A3: 1:2600

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Johnstons Creek Option 2% AEP
JC1 v5 Fowler Street Detention Basin

Project: Whites Creek and Johnstons creek FRMS&P

Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 16

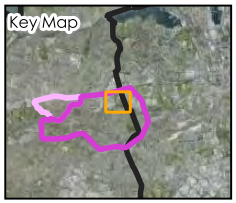
Legend

- MJC Study Area
- IWC LGA Boundary

JC1_v4_detbasin
- Detention Basin
- Proposed Drainage
- Removed Drainage
- Existing Drainage

MJC_50y_JC1_v5-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_50y_JC1_v5-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



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Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

21 0 21 42 62 83 m

Scale at A3: 1:2600

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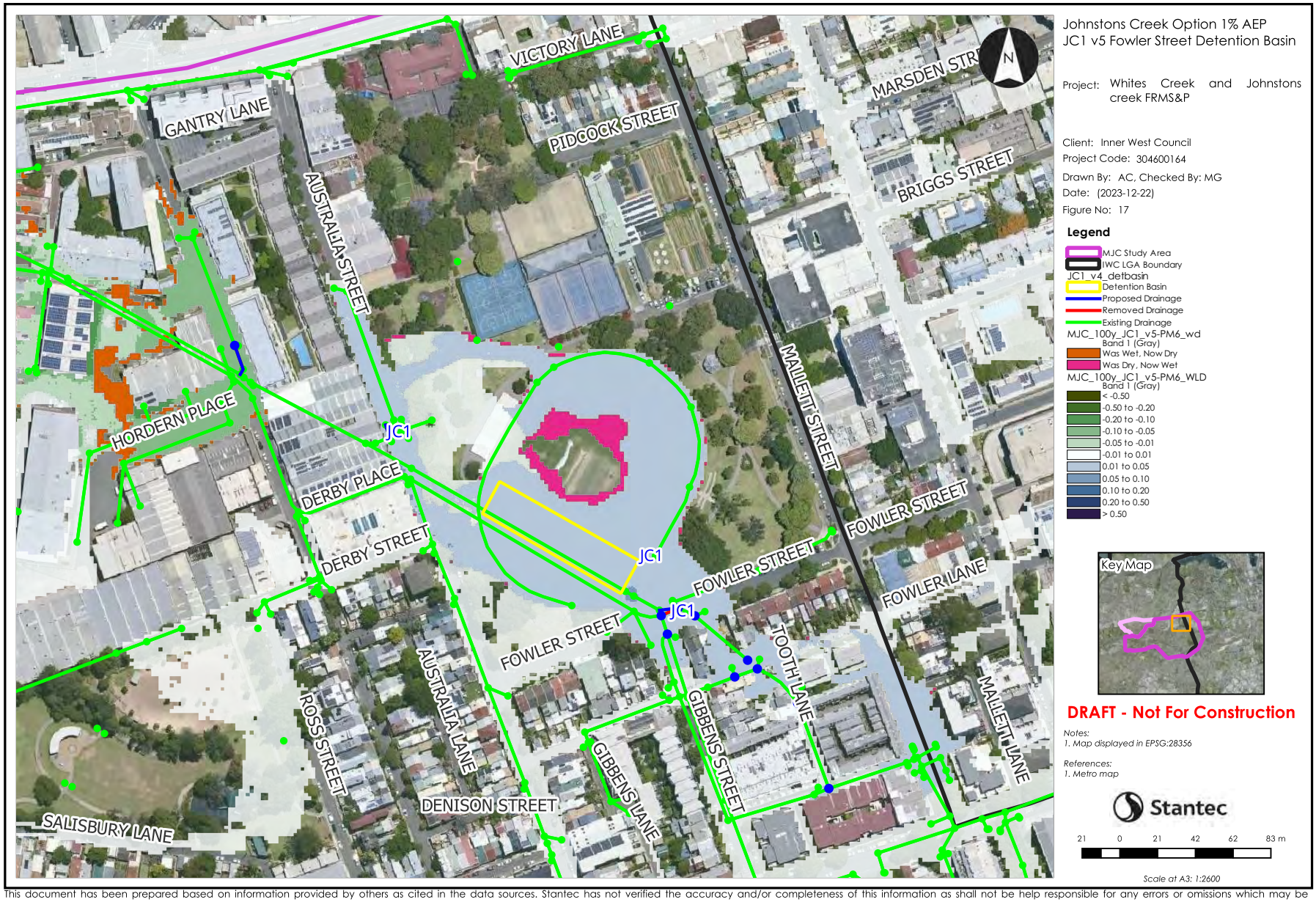

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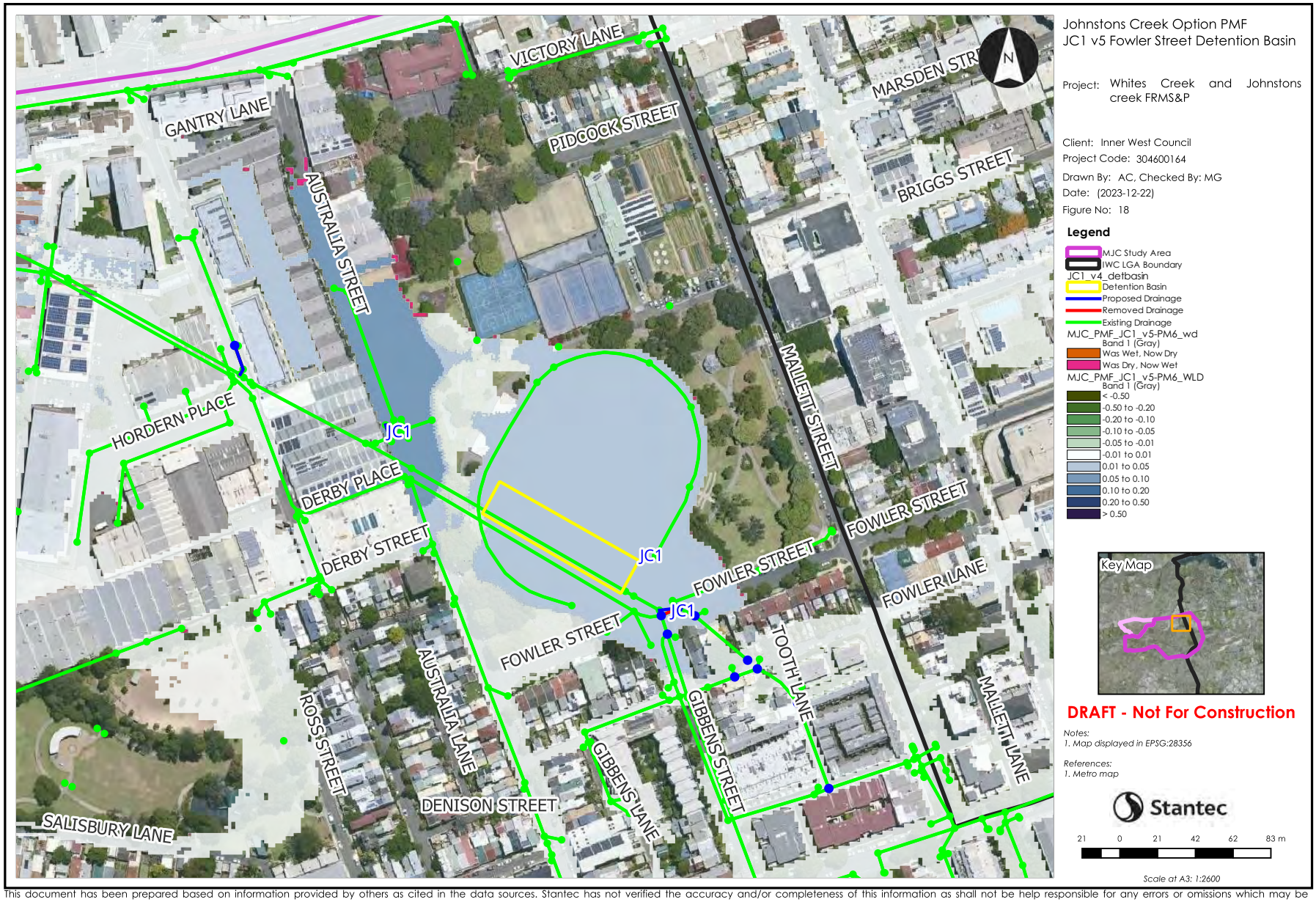

Johnstons Creek Option PMF
JC1 v5 Fowler Street Detention Basin

Project: Whites Creek and Johnstons creek FRMS&P

Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 18

Legend

- MJC Study Area
- IWC LGA Boundary

JC1_v4_detbasin
- Detention Basin
- Proposed Drainage
- Removed Drainage
- Existing Drainage

MJC_PMF_JC1_v5-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_PMF_JC1_v5-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50

DRAFT - Not For Construction

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

21 0 21 42 62 83 m

Scale at A3: 1:2600

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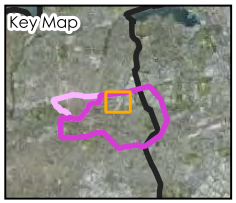
Johnstons Creek Option -
JC5 v6 Overview

Project: Whites Creek and Johnstons creek FRMS&P

Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 19

Legend

- MJC Study Area
- IWC LGA Boundary
- Channel Option
- Proposed Drainage
- Removed Drainage
- Existing Drainage



DRAFT - Not For Construction

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

21 0 21 42 62 83 m

Scale at A3: 1:2600

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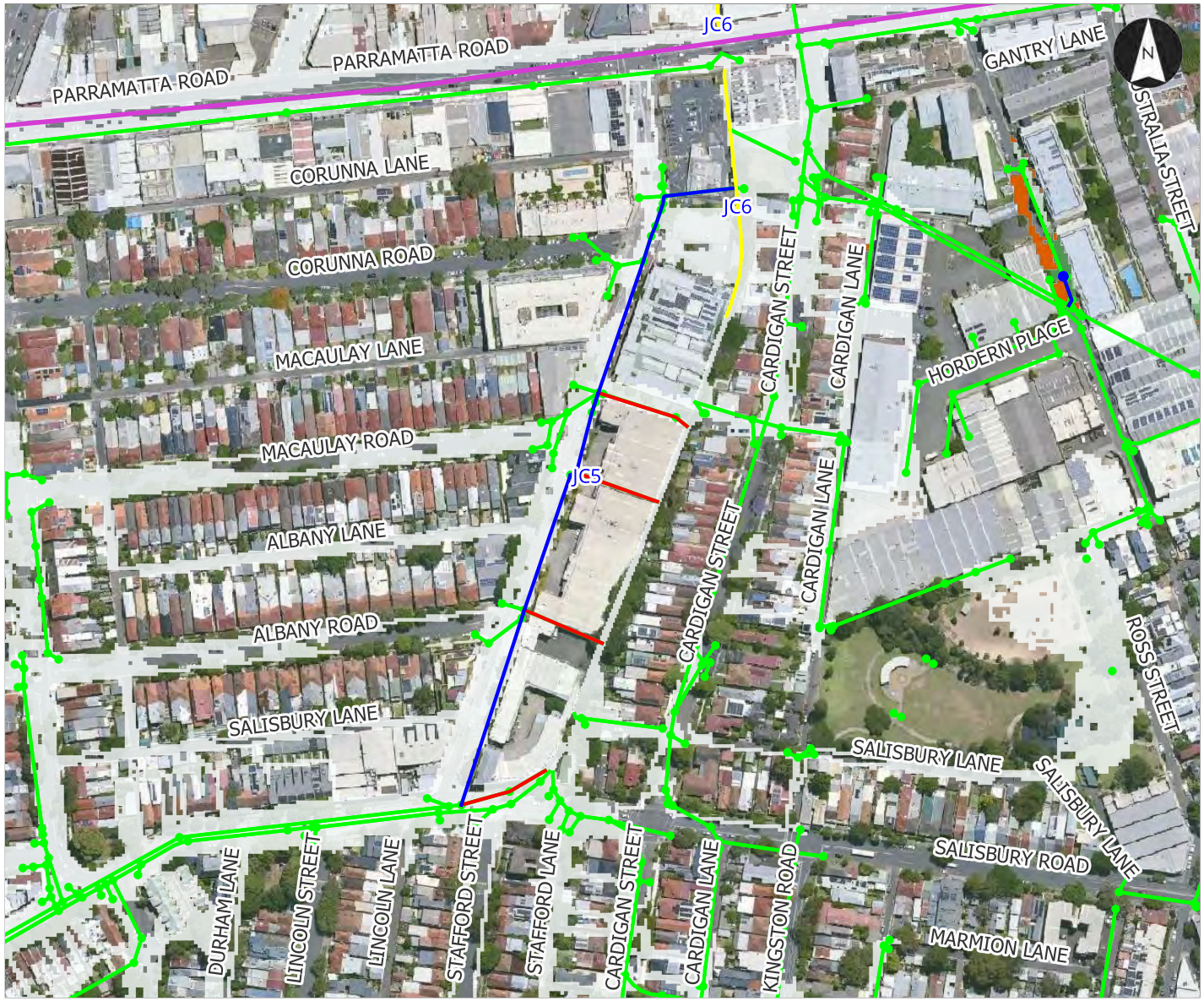


Johnstons Creek Option 20% AEP
JC5 v6 Bridge Road Drainage Upgrade

Project: Whites Creek and Johnstons creek FRMS&P

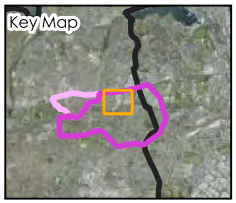
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 20

Legend

- MJC Study Area
- IWC LGA Boundary
- Channel Option
- Proposed Drainage
- Removed Drainage
- Existing Drainage

MJC_5y_JC1_v5-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50

MJC_5y_JC1_v5-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet



DRAFT - Not For Construction

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

24 0 24 48 72 96 m

Scale at A3: 1:3000

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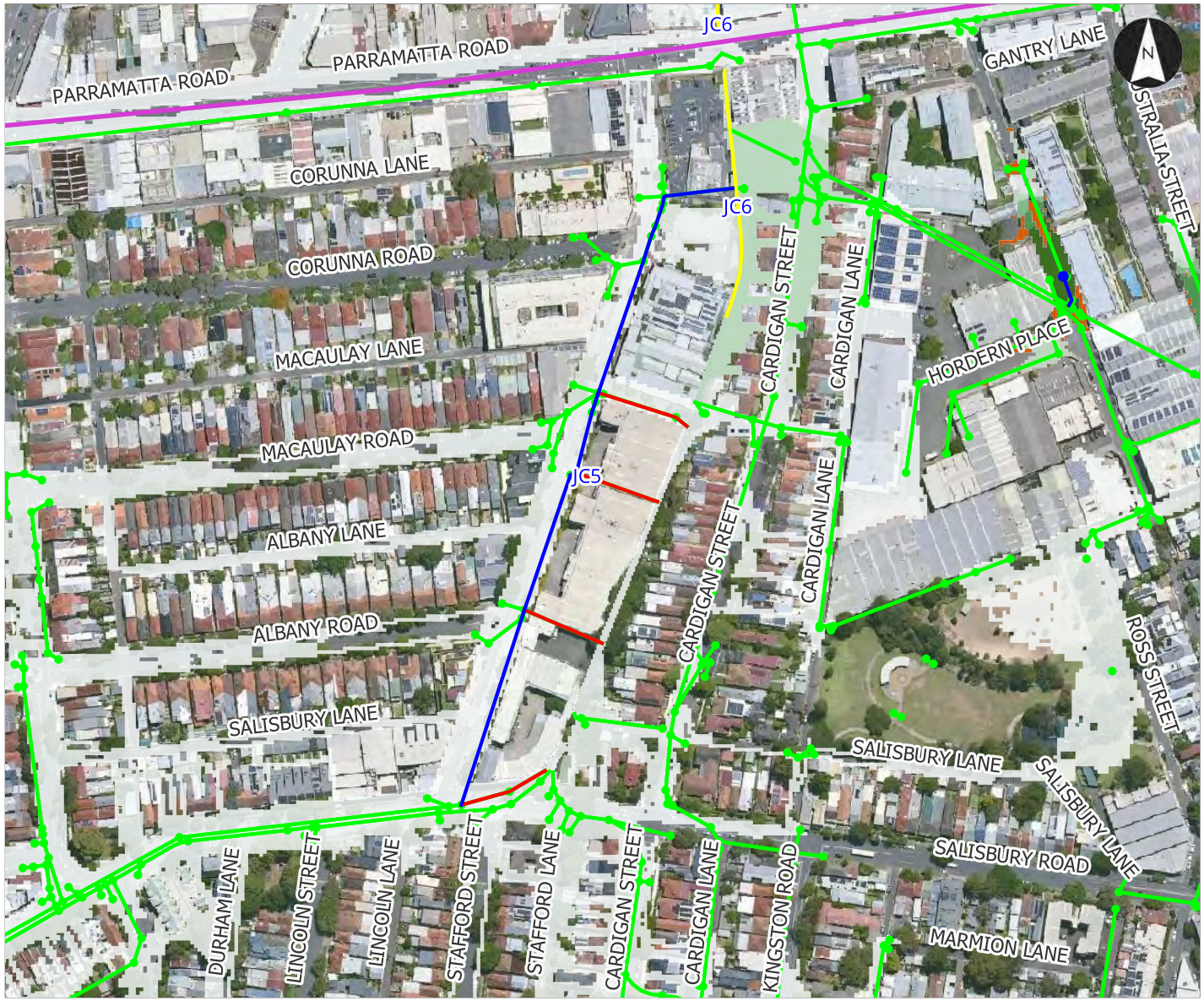


Johnstons Creek Option 5% AEP
JC5 v6 Bridge Road Drainage Upgrade

Project: Whites Creek and Johnstons creek FRMS&P

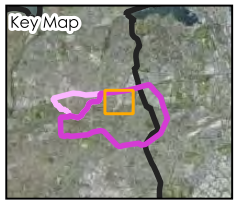
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 21

Legend

- MJC Study Area
- IWC LGA Boundary
- Channel Option
- Proposed Drainage
- Removed Drainage
- Existing Drainage

MJC_20y_JC1_v5-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_20y_JC1_v5-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



DRAFT - Not For Construction

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

24 0 24 48 72 96 m

Scale at A3: 1:3000

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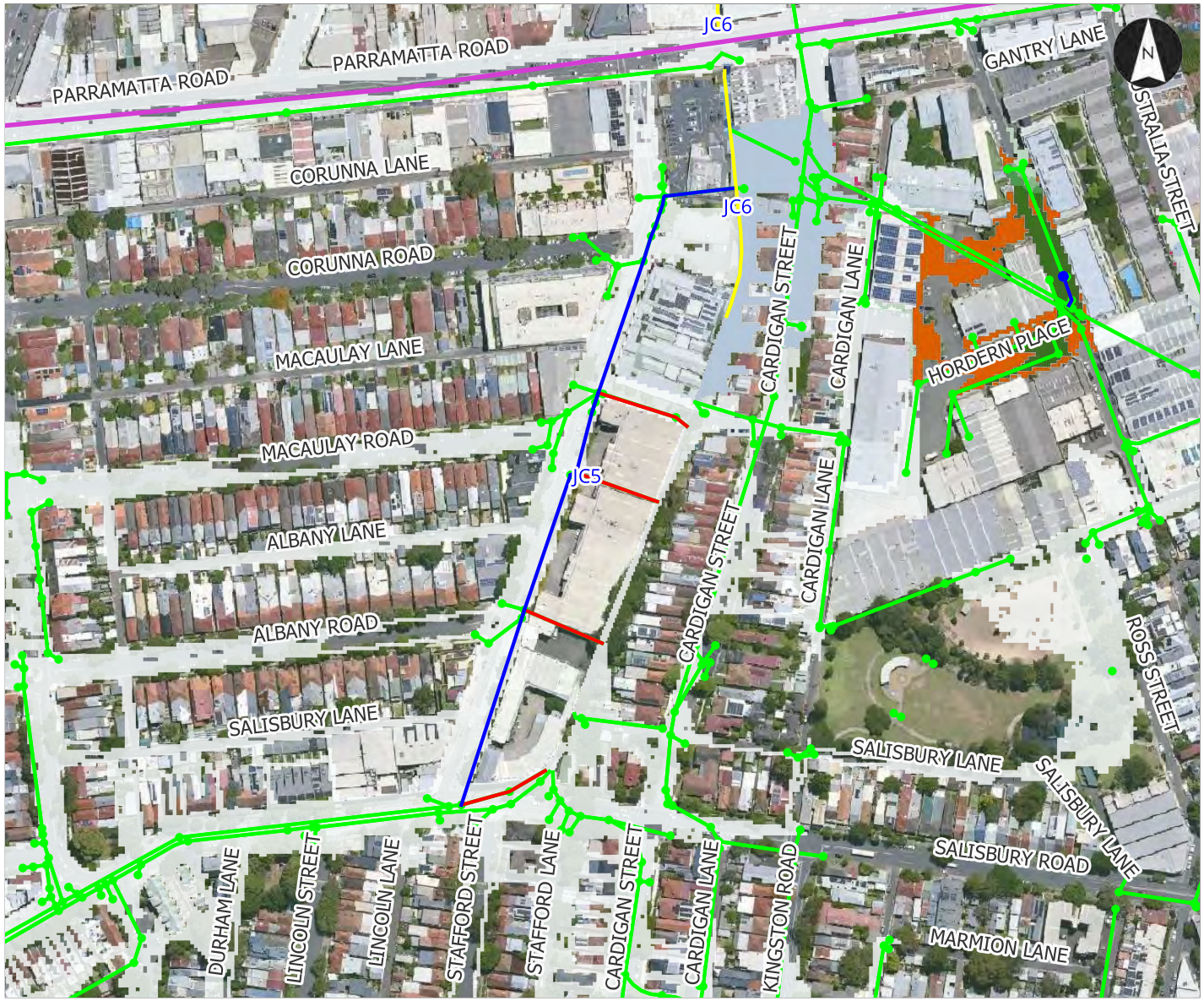


Johnstons Creek Option 2% AEP
JC5 v6 Bridge Road Drainage Upgrade

Project: Whites Creek and Johnstons creek FRMS&P

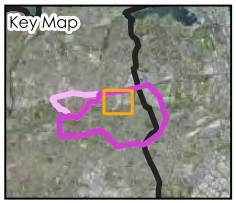
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 22

Legend

- MJC Study Area
- IWC LGA Boundary
- Channel Option
- Proposed Drainage
- Removed Drainage
- Existing Drainage

MJC_50y_JC1_v5-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_50y_JC1_v5-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



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Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

24 0 24 48 72 96 m

Scale at A3: 1:3000

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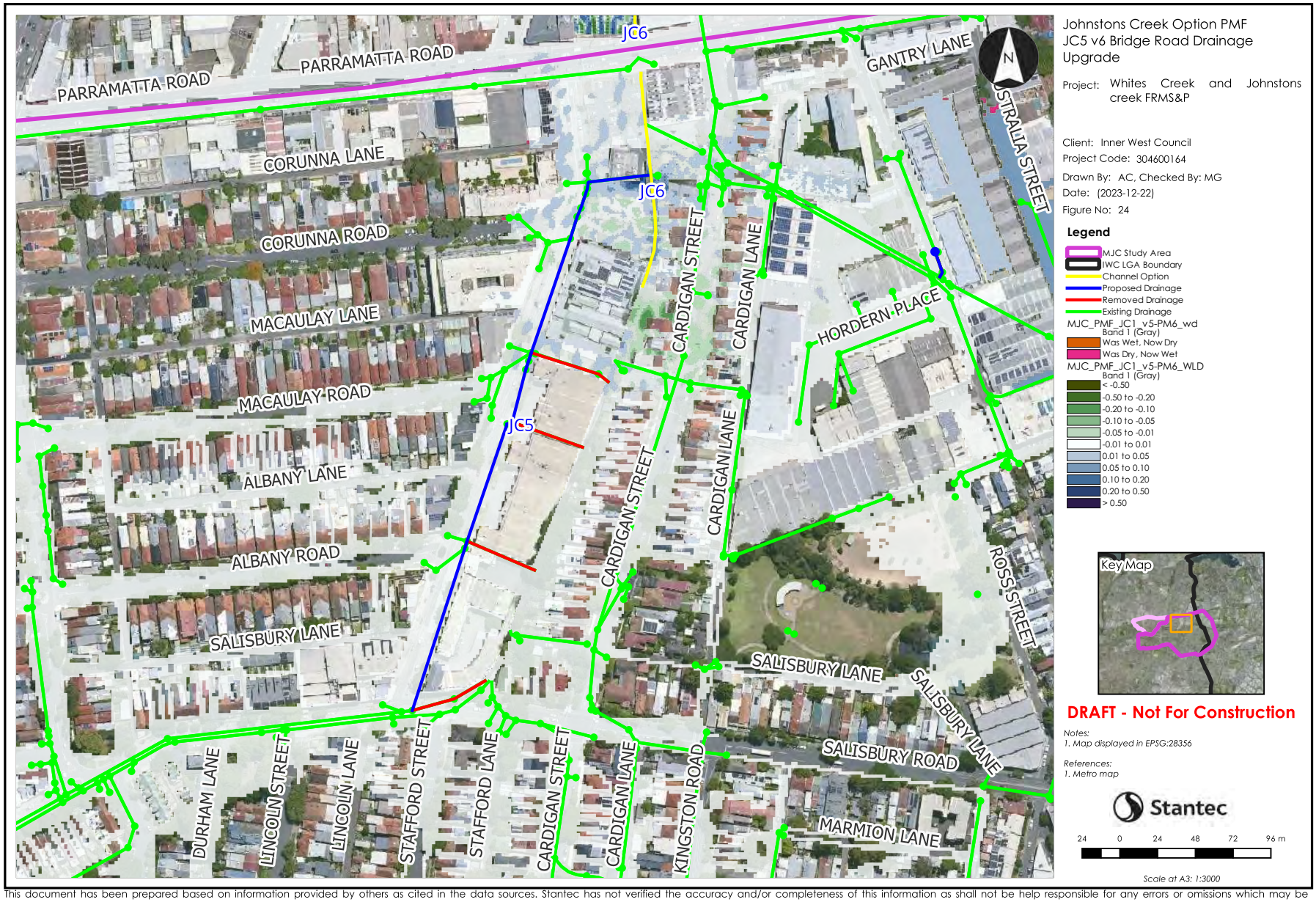

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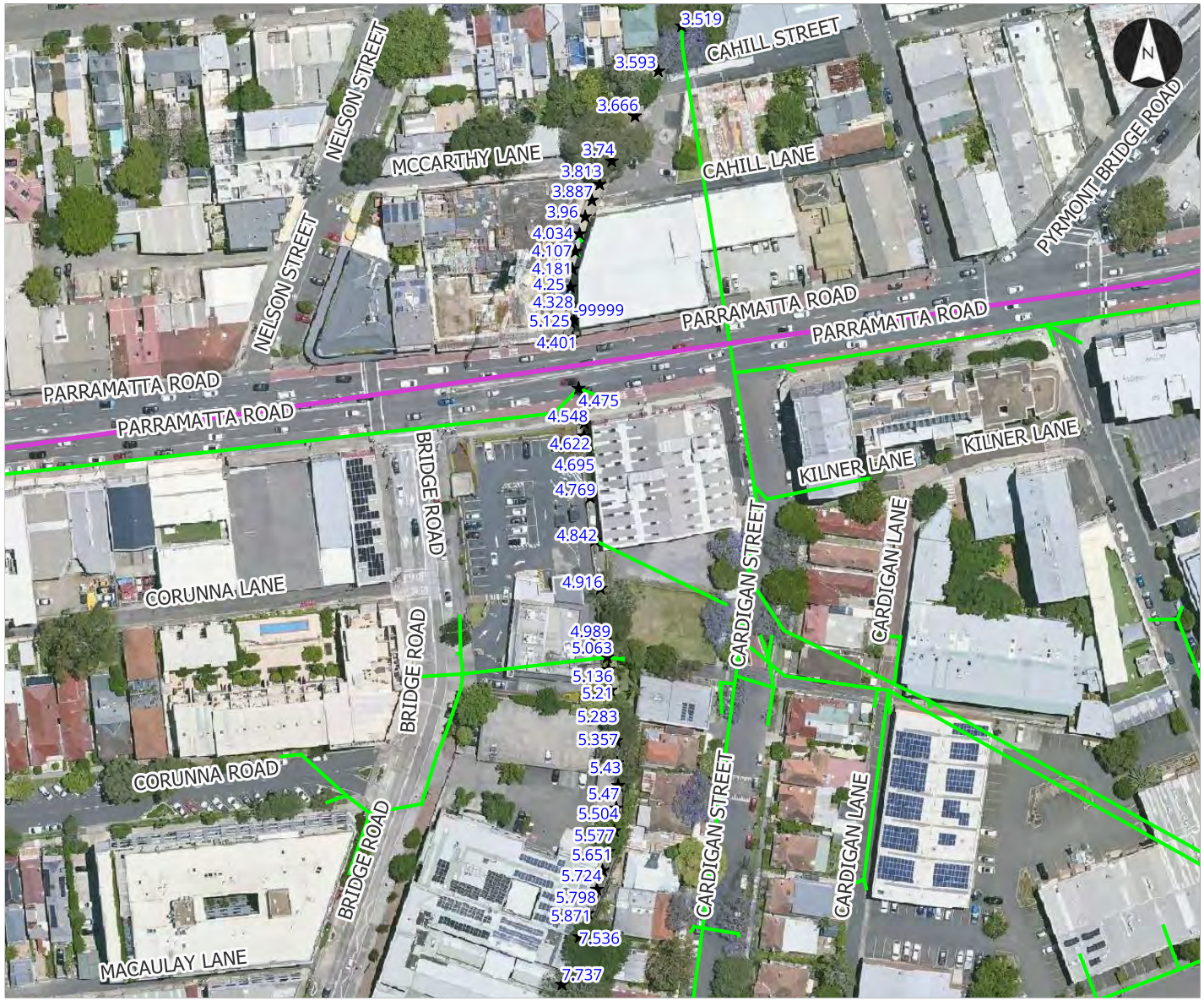


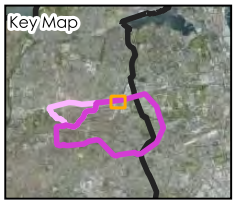
Johnstons Creek Option - JC6 v3 Overview

Project: Whites Creek and Johnstons creek FRMS&P

Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 25

Legend

- MJC Study Area
- IWC LGA Boundary
- Existing Drainage



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Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

12 0 12 24 36 48 m

Scale at A3: 1:1500

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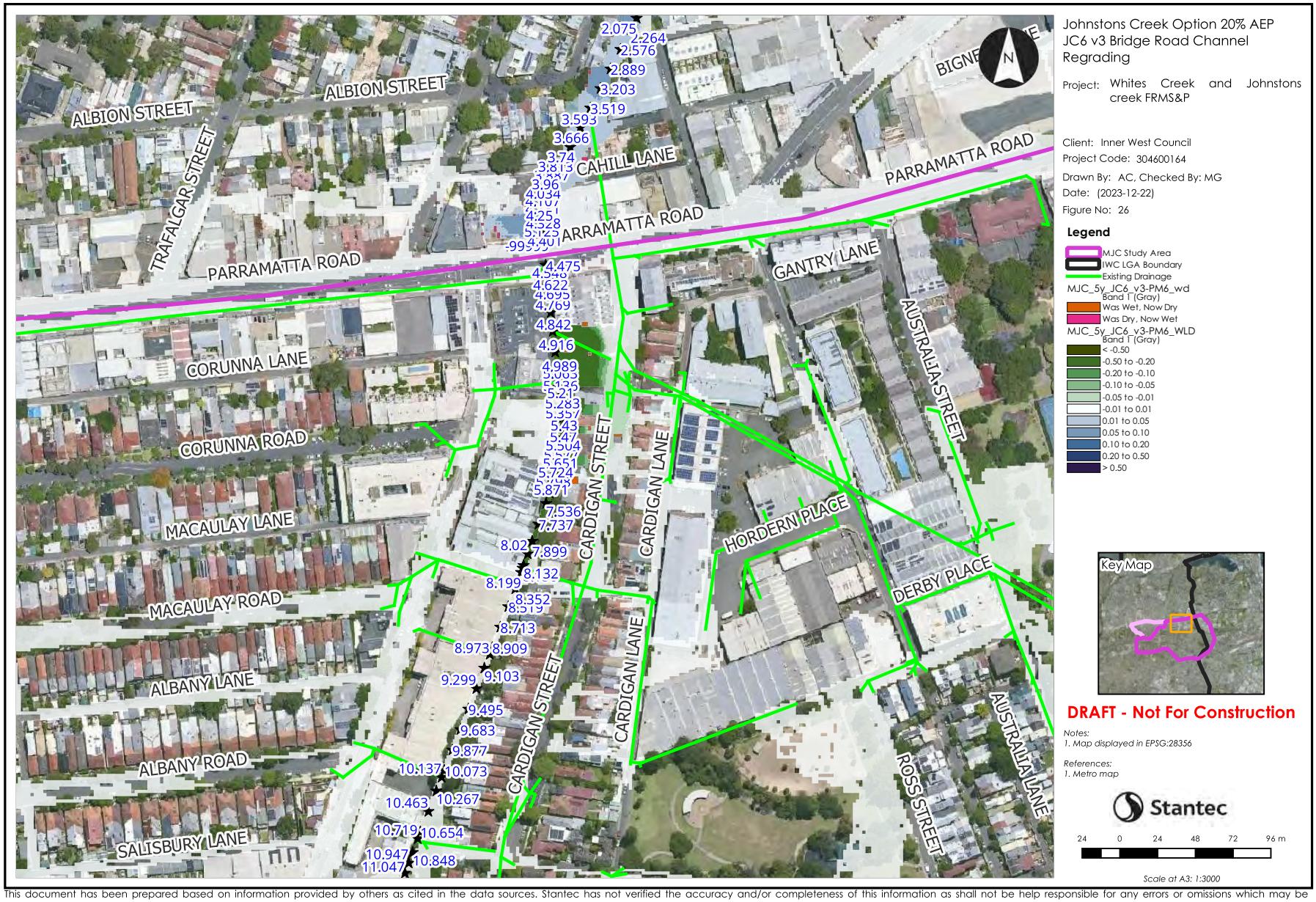

Johnstons Creek Option 20% AEP JC6 v3 Bridge Road Channel Regrading

Project: Whites Creek and Johnstons creek FRMS&P

Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 26

Legend

- MJC Study Area
- IWC LGA Boundary
- Existing Drainage

MJC_5y_JC6_v3-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_5y_JC6_v3-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50

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Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

24 0 24 48 72 96 m

Scale at A3: 1:3000

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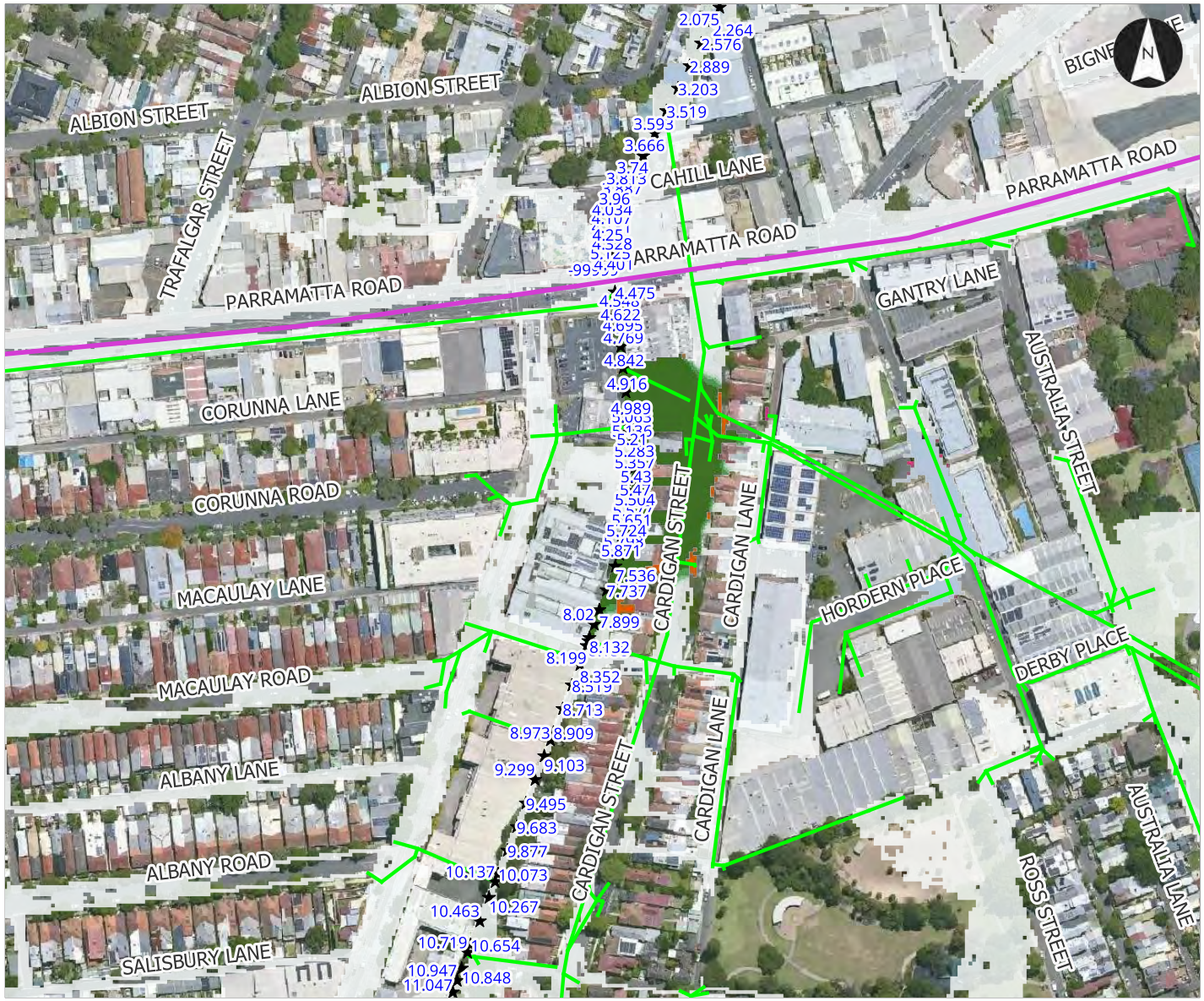


Johnstons Creek Option 5% AEP JC6 v3 Bridge Road Channel Regrading

Project: Whites Creek and Johnstons creek FRMS&P

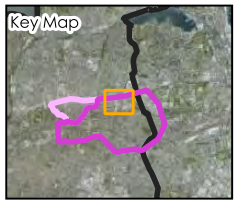
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 27

Legend

- MJC Study Area
- IWC LGA Boundary
- Existing Drainage

MJC_20y_JC6_v3-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_20y_JC6_v3-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



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Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

24 0 24 48 72 96 m

Scale at A3: 1:3000

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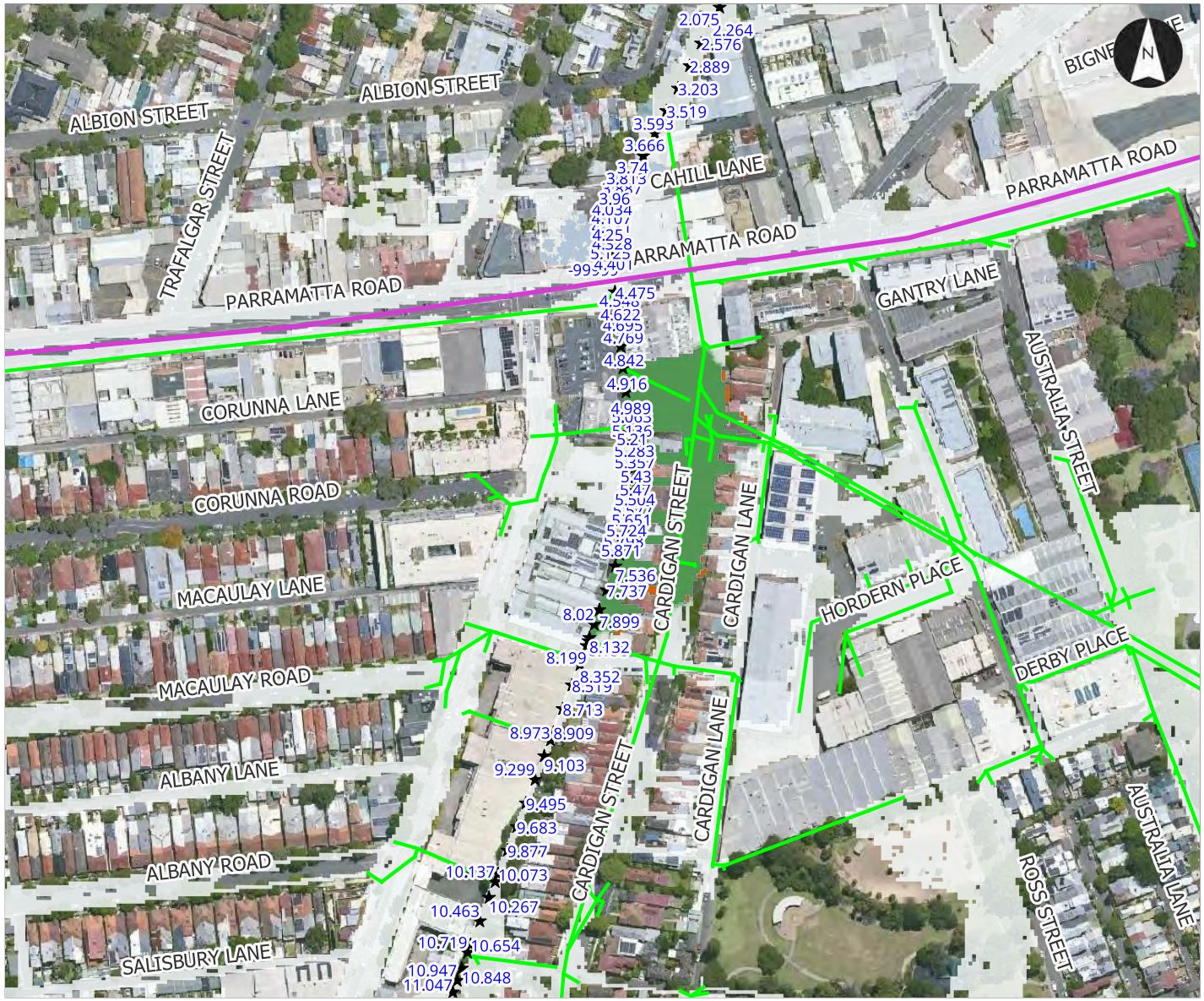


Johnstons Creek Option 2% AEP JC6 v3 Bridge Road Channel Regrading

Project: Whites Creek and Johnstons creek FRMS&P

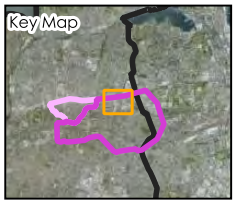
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 28

Legend

- MJC Study Area
- IWC LGA Boundary
- Existing Drainage

MJC_50y_JC6_v3-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_50y_JC6_v3-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



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Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

24 0 24 48 72 96 m

Scale at A3: 1:3000

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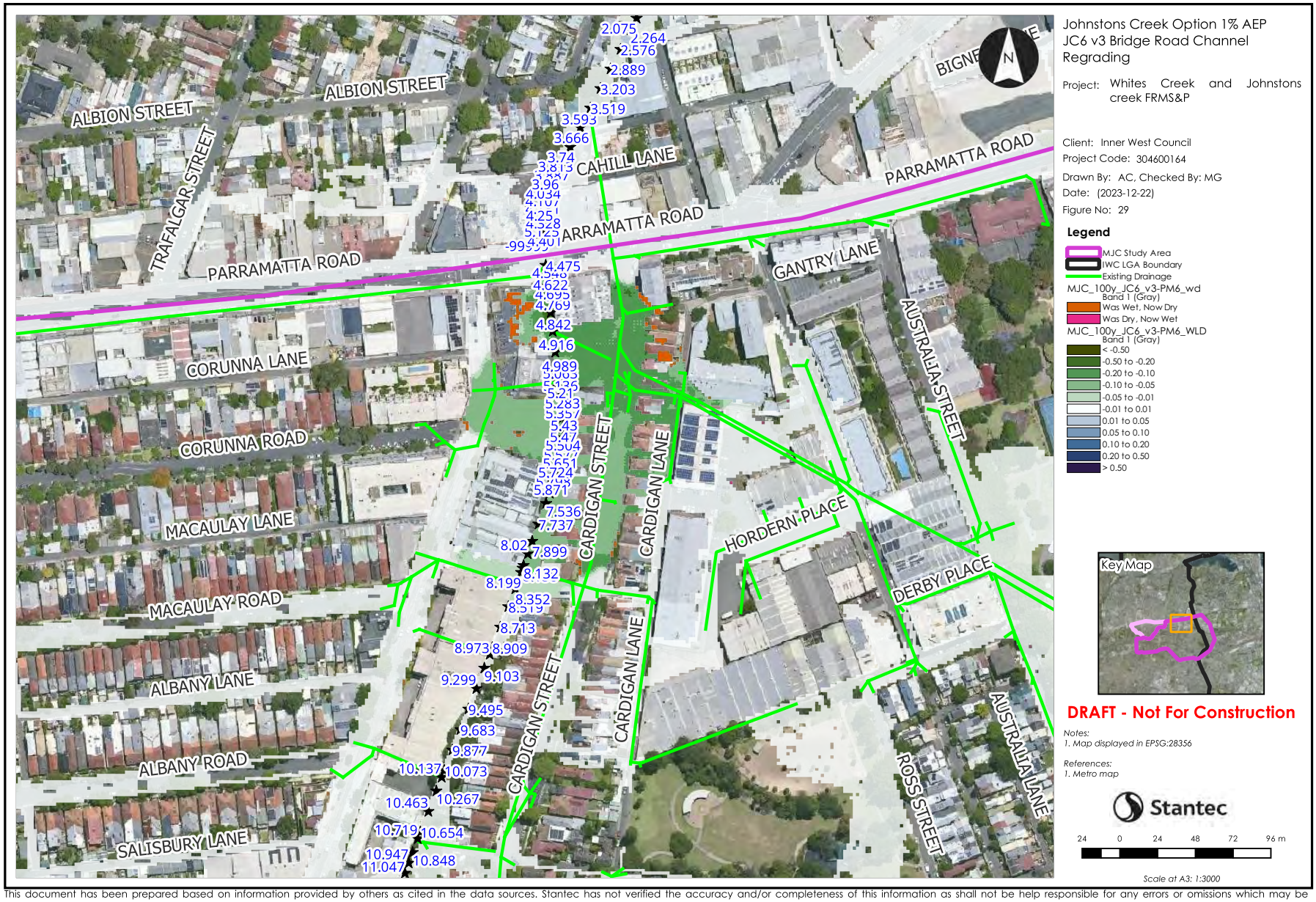

Johnstons Creek Option 1% AEP JC6 v3 Bridge Road Channel Regrading

Project: Whites Creek and Johnstons creek FRMS&P

Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 29

Legend

- MJC Study Area
- IWC LGA Boundary
- Existing Drainage

MJC_100y_JC6_v3-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_100y_JC6_v3-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50

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Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

24 0 24 48 72 96 m

Scale at A3: 1:3000

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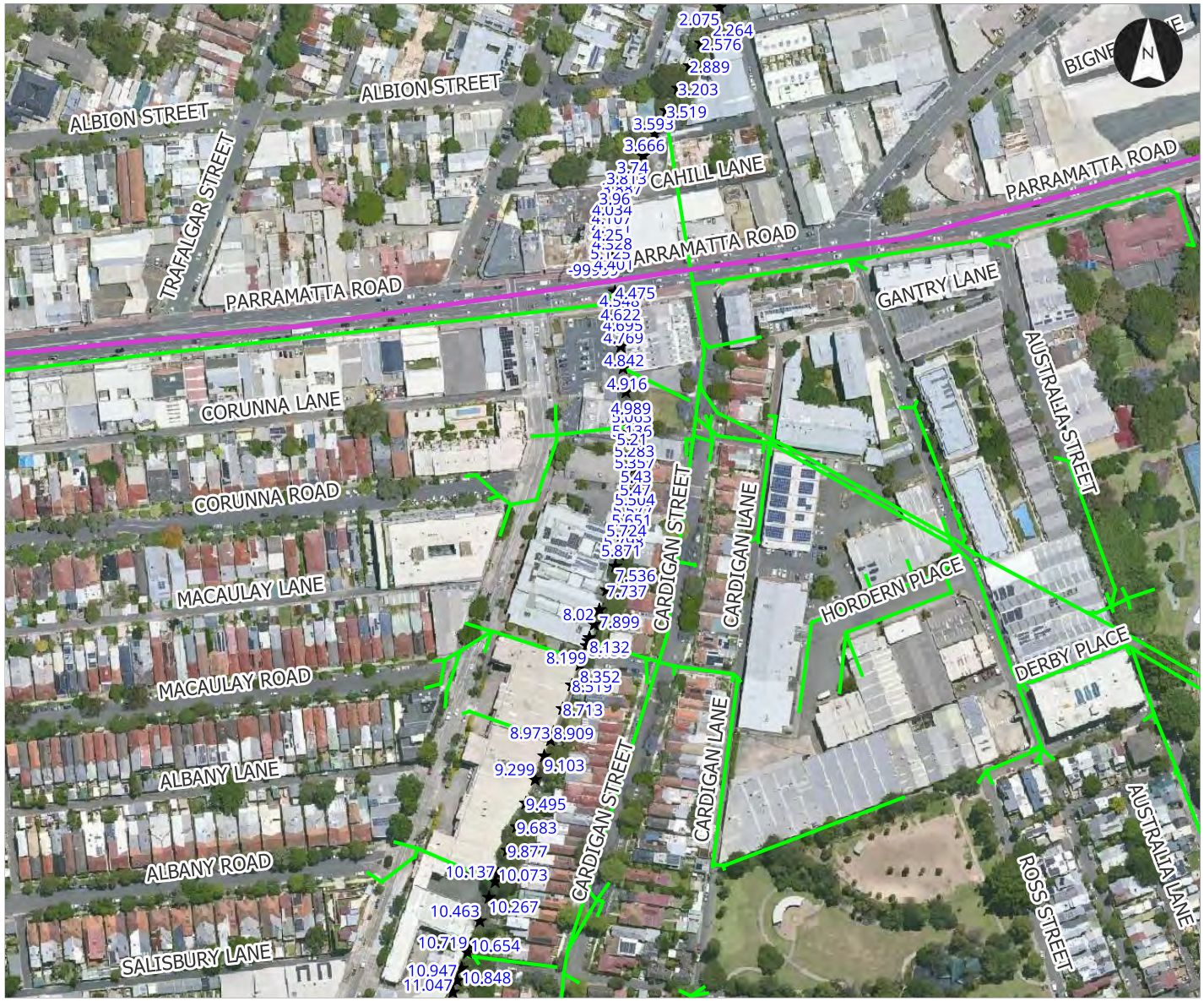


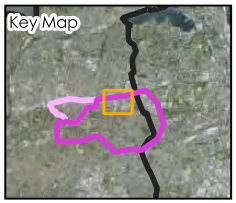
Johnstons Creek Option PMF
JC6 v3 Bridge Road Channel Regrading

Project: Whites Creek and Johnstons creek FRMS&P

Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 30

Legend

- MJC Study Area
- IWC LGA Boundary
- Existing Drainage



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Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

24 0 24 48 72 96 m

Scale at A3: 1:3000

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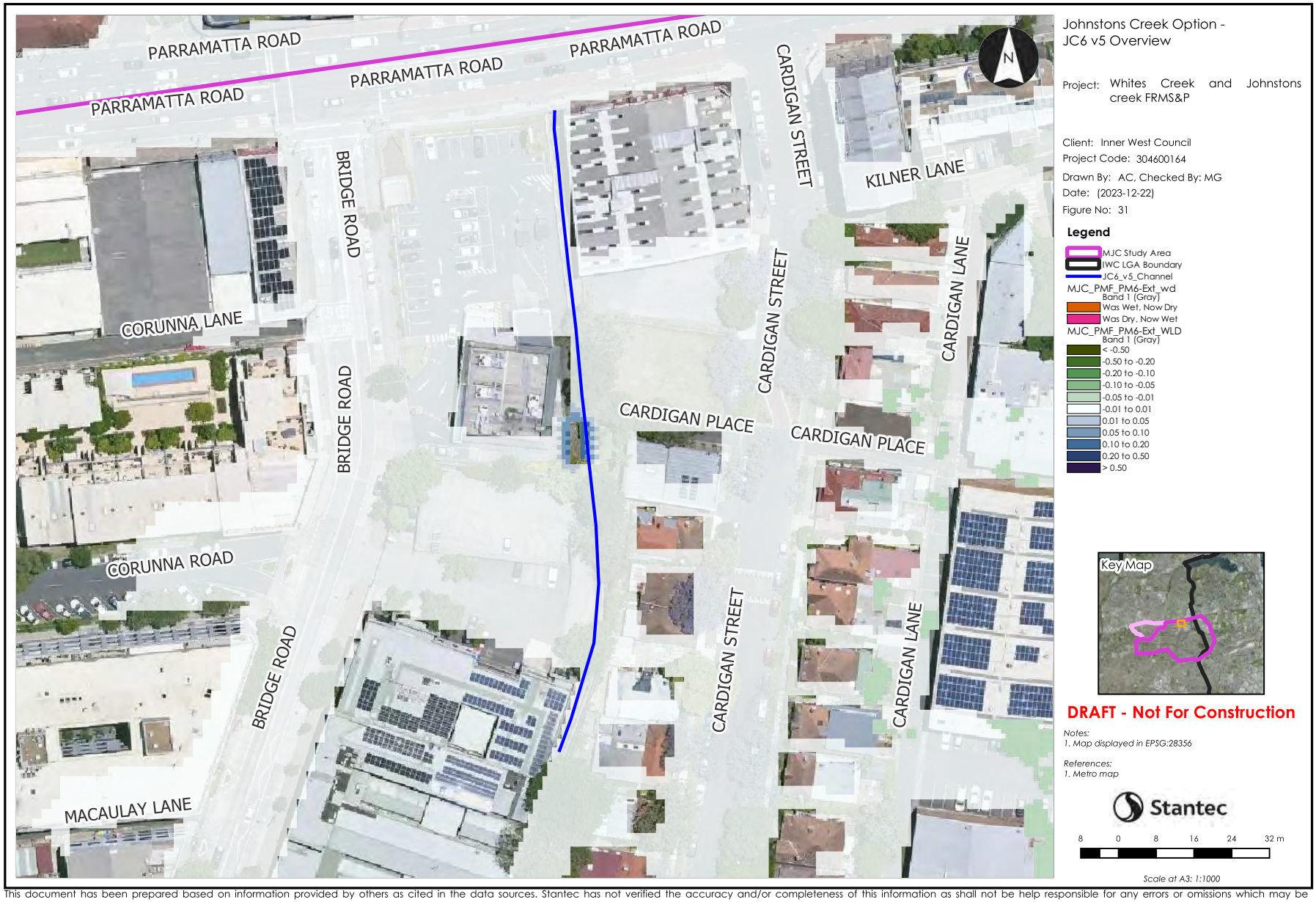

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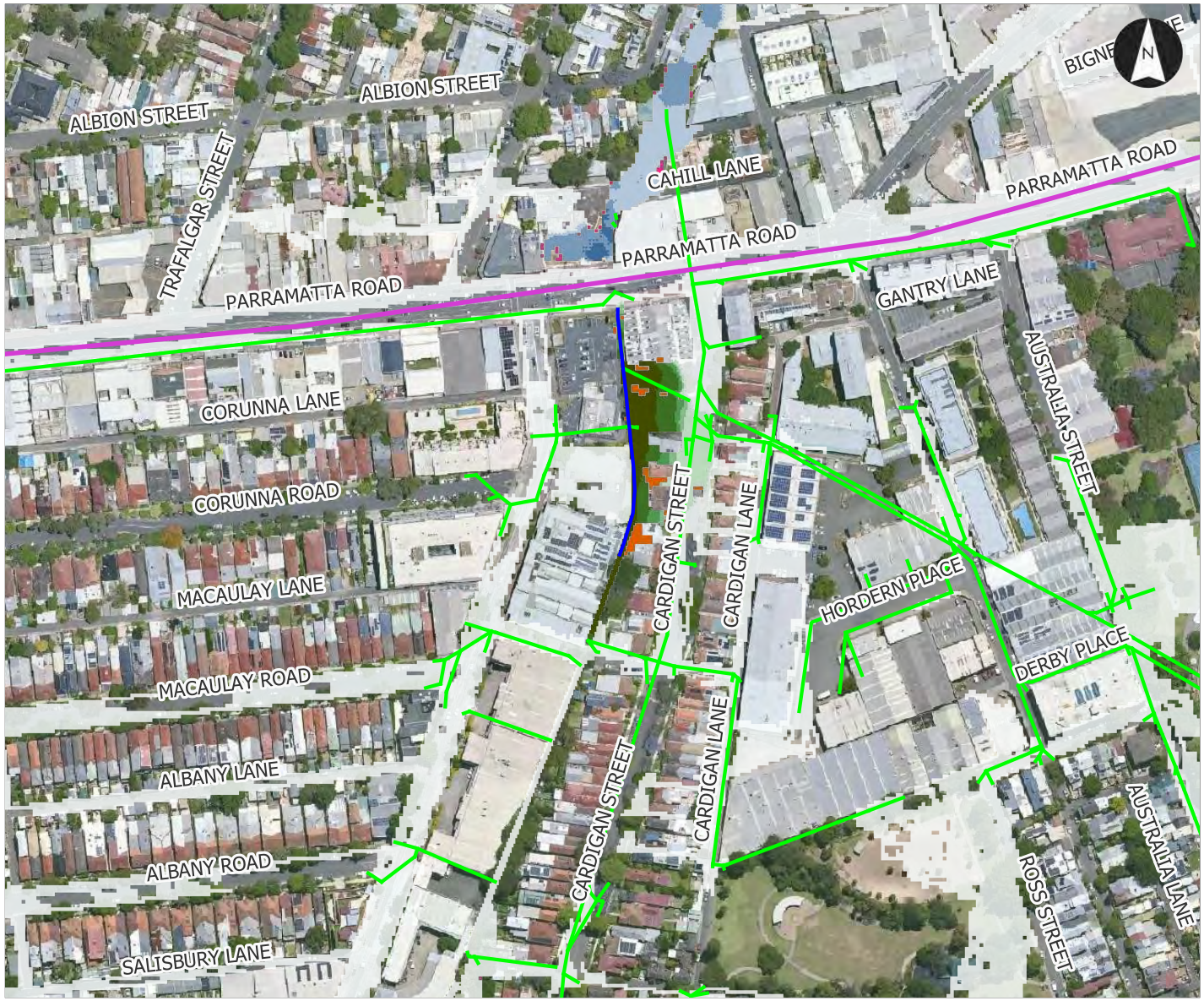


Johnstons Creek Option 20% AEP JC6 v5 Bridge Road Channel Widening

Project: Whites Creek and Johnstons creek FRMS&P

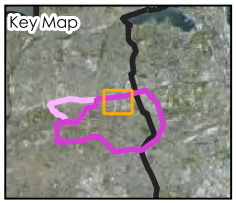
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 32

Legend

- MJC Study Area
- IWC LGA Boundary
- JC6_v5_Channel
- Existing Drainage

MJC_5y_JC6_v5-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_5y_JC6_v5-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



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Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

24 0 24 48 72 96 m

Scale at A3: 1:3000

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Johnstons Creek Option 5% AEP
JC6 v5 Bridge Road Channel Widening

Project: Whites Creek and Johnstons creek FRMS&P

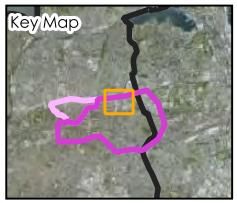
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 33

Legend

- MJC Study Area
- IWC LGA Boundary
- JC6_v5_Channel
- Existing Drainage

MJC_20y_JC6_v5-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_20y_JC6_v5-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



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Notes:
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References:
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Stantec

24 0 24 48 72 96 m

Scale at A3: 1:3000

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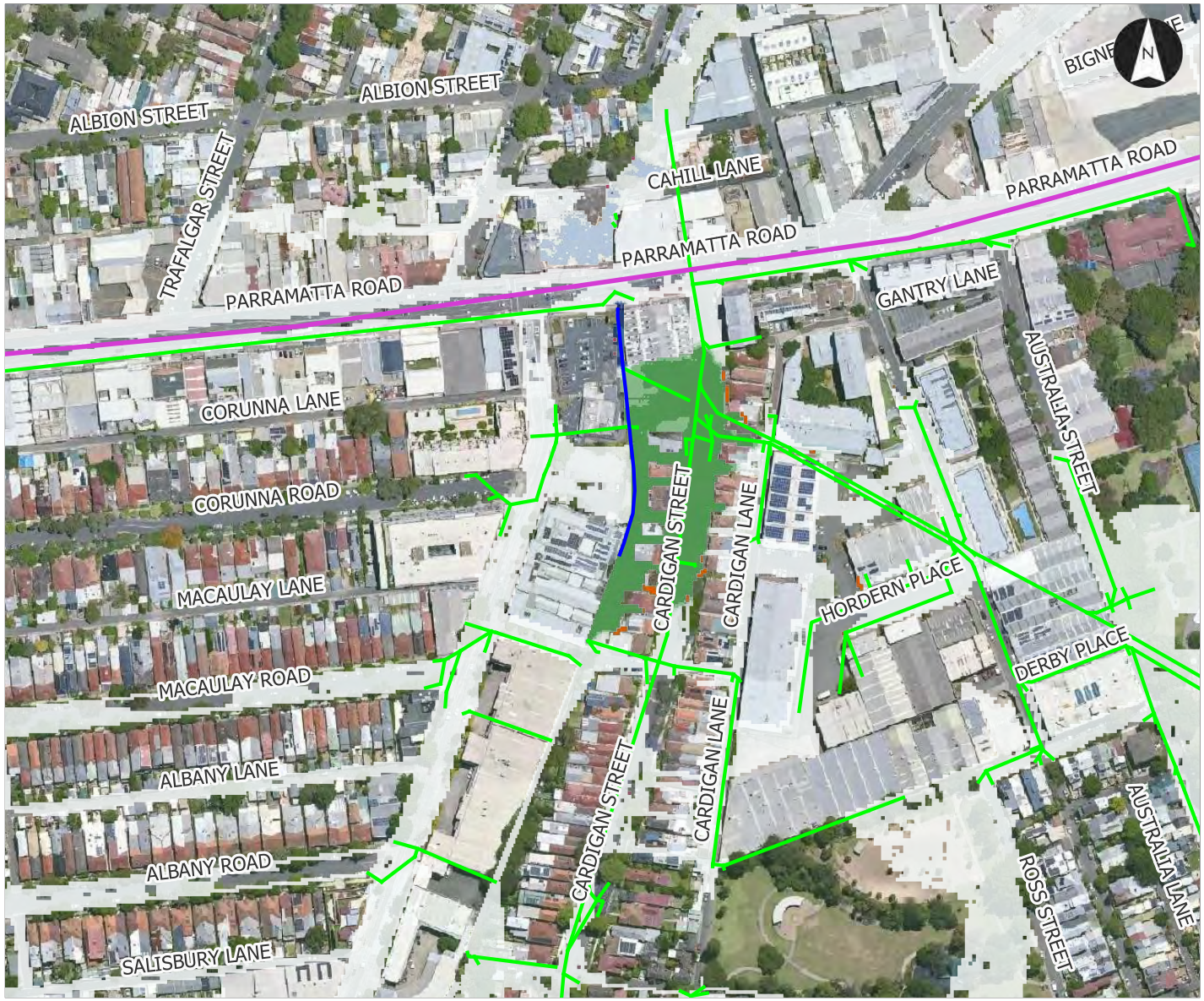


Johnstons Creek Option 2% AEP JC6 v5 Bridge Road Channel Widening

Project: Whites Creek and Johnstons creek FRMS&P

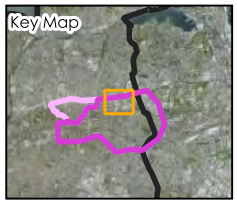
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 34

Legend

- MJC Study Area
- IWC LGA Boundary
- JC6_v5_Channel
- Existing Drainage

MJC_50y_JC6_v5-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_50y_JC6_v5-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



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Notes:
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References:
1. Metro map

Stantec

24 0 24 48 72 96 m

Scale at A3: 1:3000

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Johnstons Creek Option 1% AEP
JC6 v5 Bridge Road Channel Widening

Project: Whites Creek and Johnstons creek FRMS&P

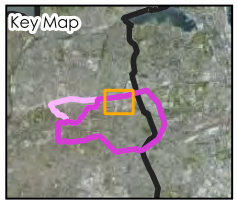
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 35

Legend

- MJC Study Area
- IWC LGA Boundary
- JC6_v5_Channel
- Existing Drainage

MJC_100y_JC6_v5-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_100y_JC6_v5-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



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Notes:
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References:
1. Metro map

Stantec

24 0 24 48 72 96 m

Scale at A3: 1:3000

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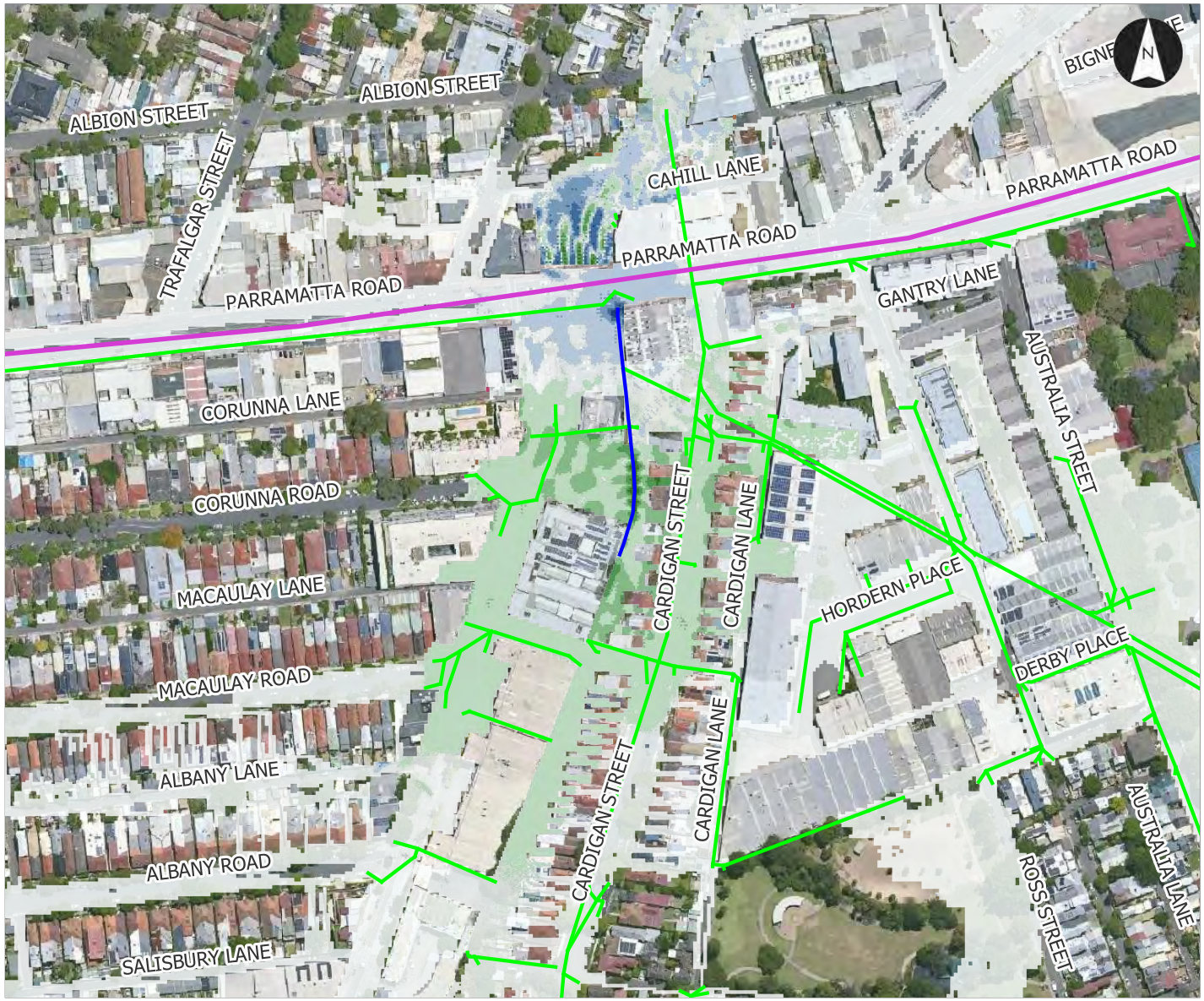


Johnstons Creek Option PMF
JC6 v5 Bridge Road Channel
Widening

Project: Whites Creek and Johnstons creek FRMS&P

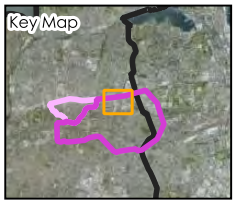
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 36

Legend

- MJC Study Area
- IWC LGA Boundary
- JC6_v5_Channel
- Existing Drainage

MJC_PMF_JC6_v5-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_PMF_JC6_v5-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



DRAFT - Not For Construction

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

24 0 24 48 72 96 m

Scale at A3: 1:3000

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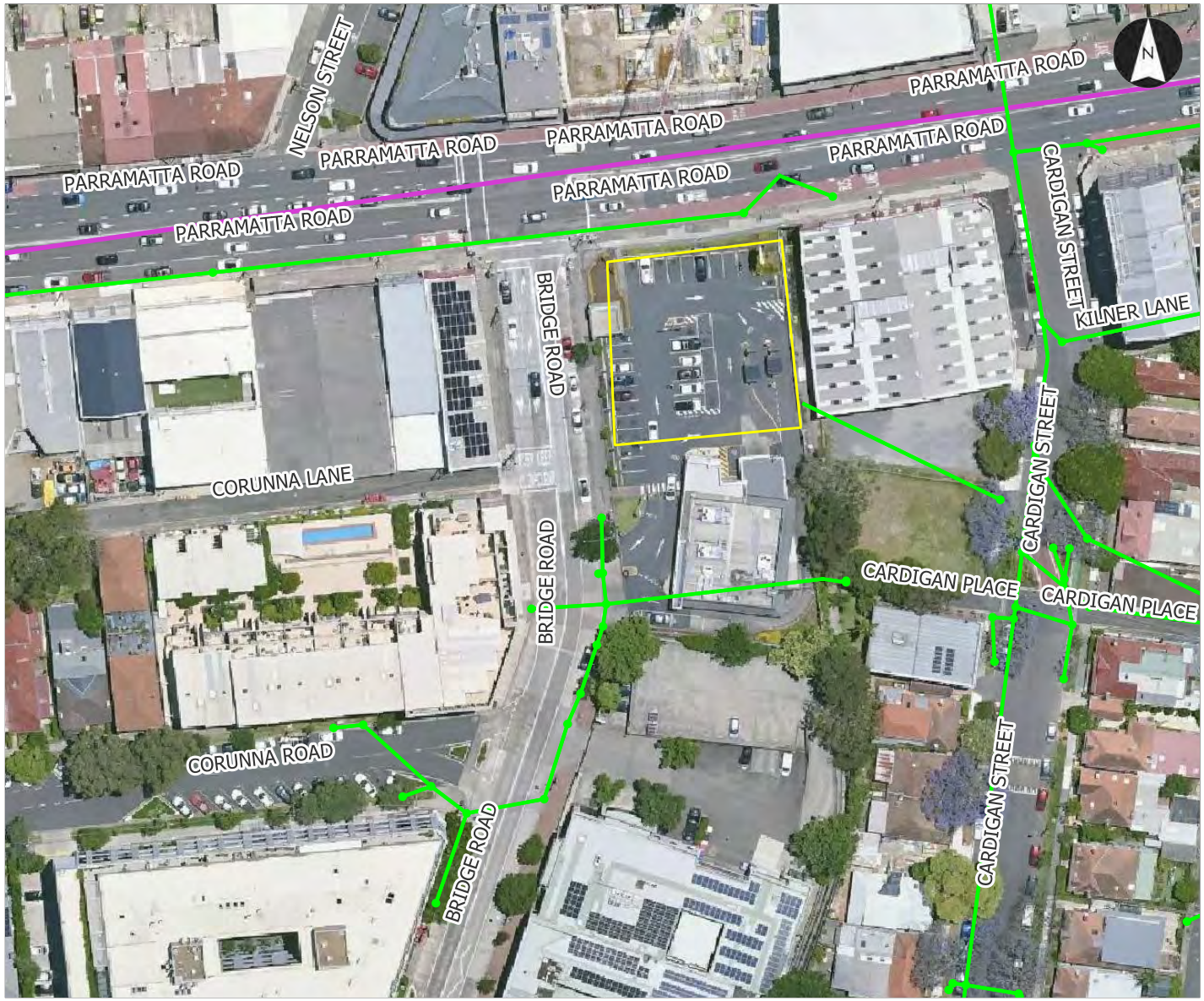


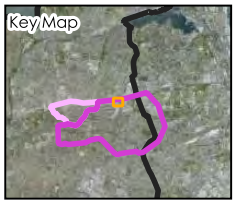
Johnstons Creek Option - JC7 v1 Overview

Project: Whites Creek and Johnstons creek FRMS&P

Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 37

Legend

- MJC Study Area
- IWC LGA Boundary
- Existing Drainage
- 2d_zsh_JC7_v1



DRAFT - Not For Construction

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

8 0 8 16 24 32 m

Scale at A3: 1:1000

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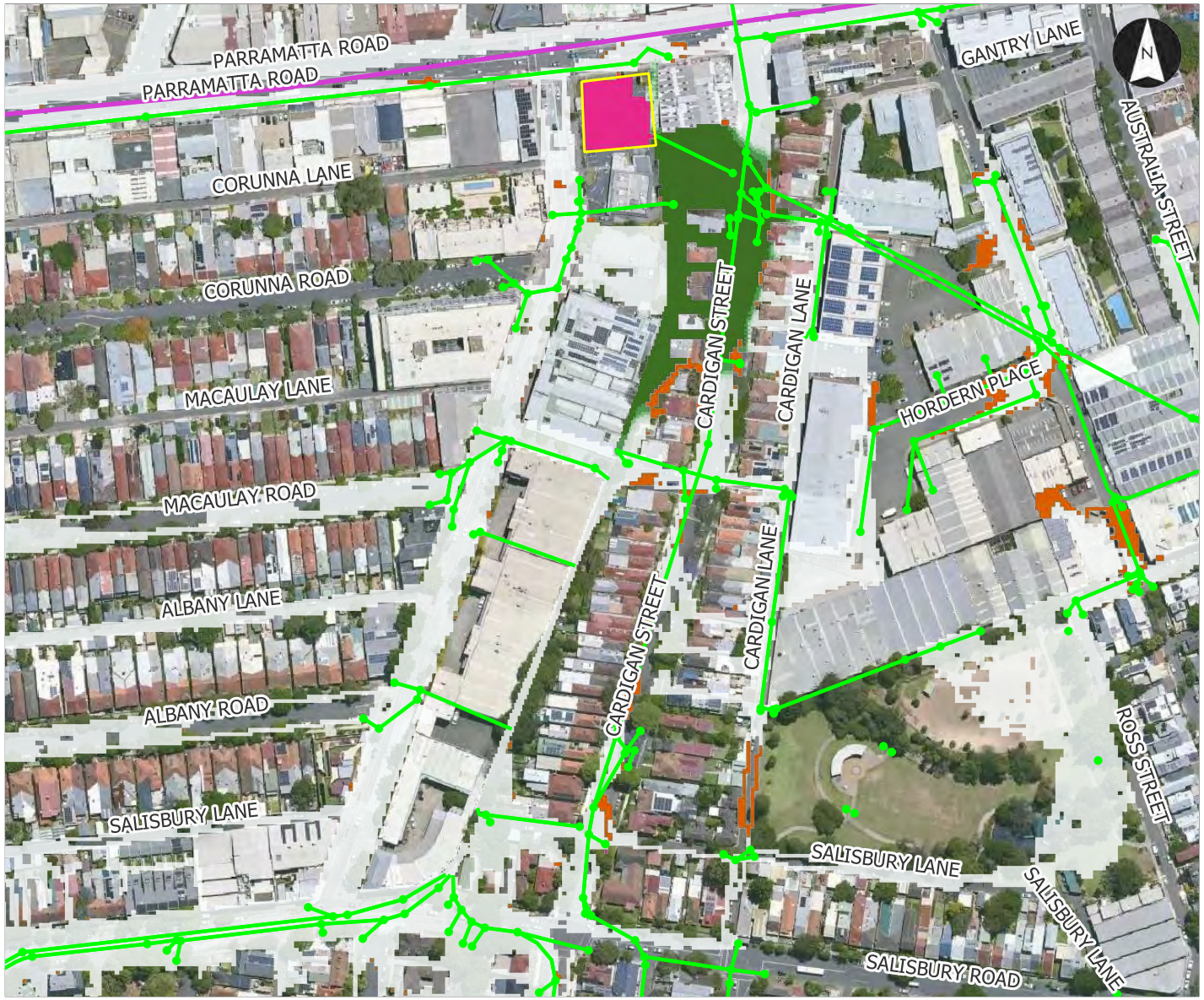


Johnstons Creek Option 20% AEP
JC7 v1 Bridge Road Detention Basin

Project: Whites Creek and Johnstons creek FRMS&P

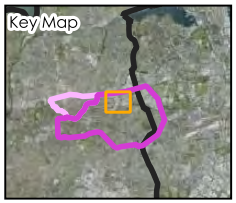
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 38

Legend

- MJC Study Area
- IWC LGA Boundary
- Existing Drainage
- 2d_zsh_JC7_v1

MJC_5y_JC7_v1-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_5y_JC7_v1-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



DRAFT - Not For Construction

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

21 0 21 42 62 83 m

Scale at A3: 1:2600

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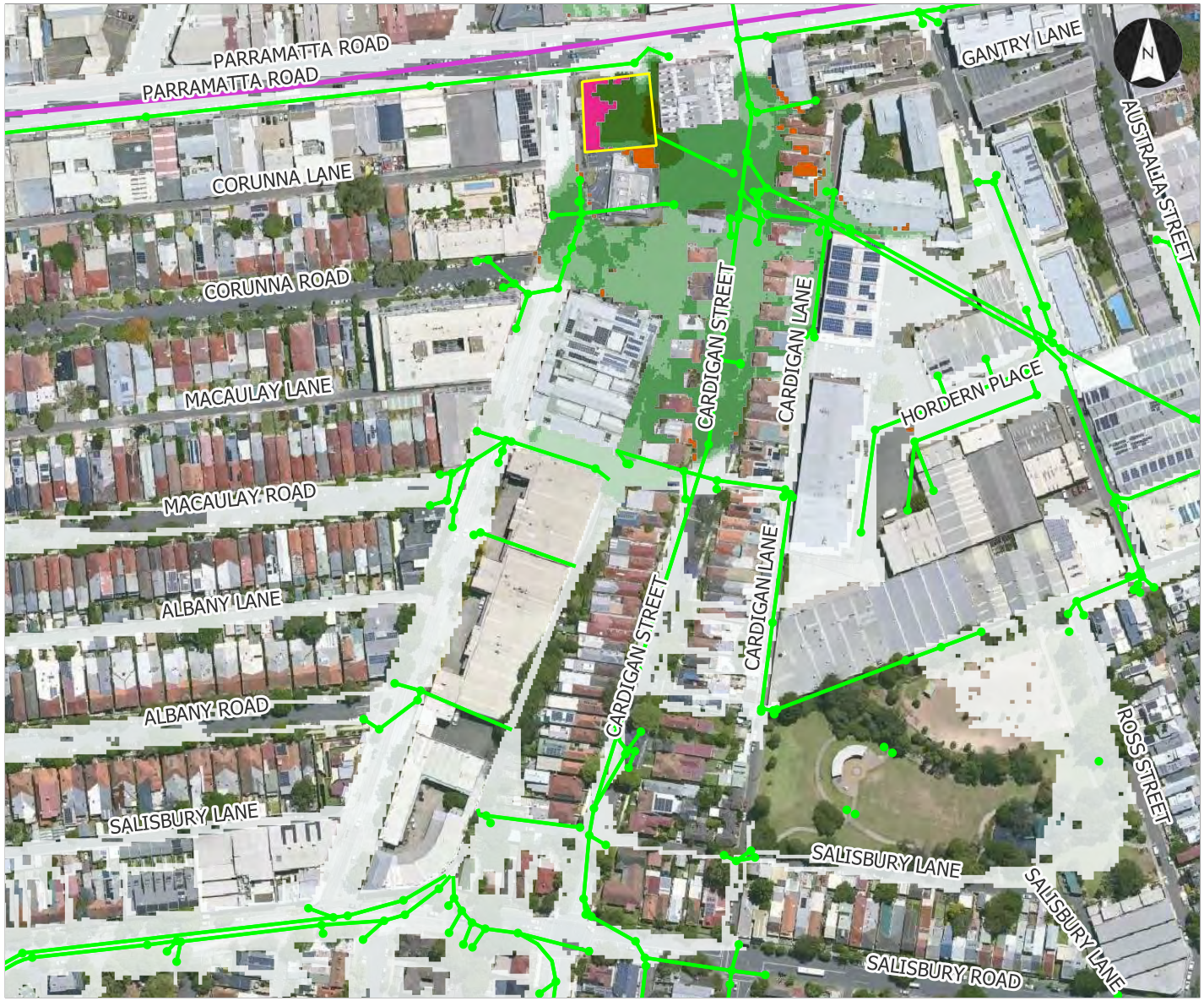


Johnstons Creek Option 5% AEP
JC7 v1 Bridge Road Detention Basin

Project: Whites Creek and Johnstons creek FRMS&P

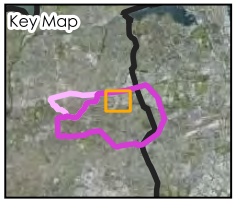
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 39

Legend

- MJC Study Area
- IWC LGA Boundary
- Existing Drainage
- 2d_zsh_JC7_v1

MJC_20y_JC7_v1-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_20y_JC7_v1-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



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Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

21 0 21 42 62 83 m

Scale at A3: 1:2600

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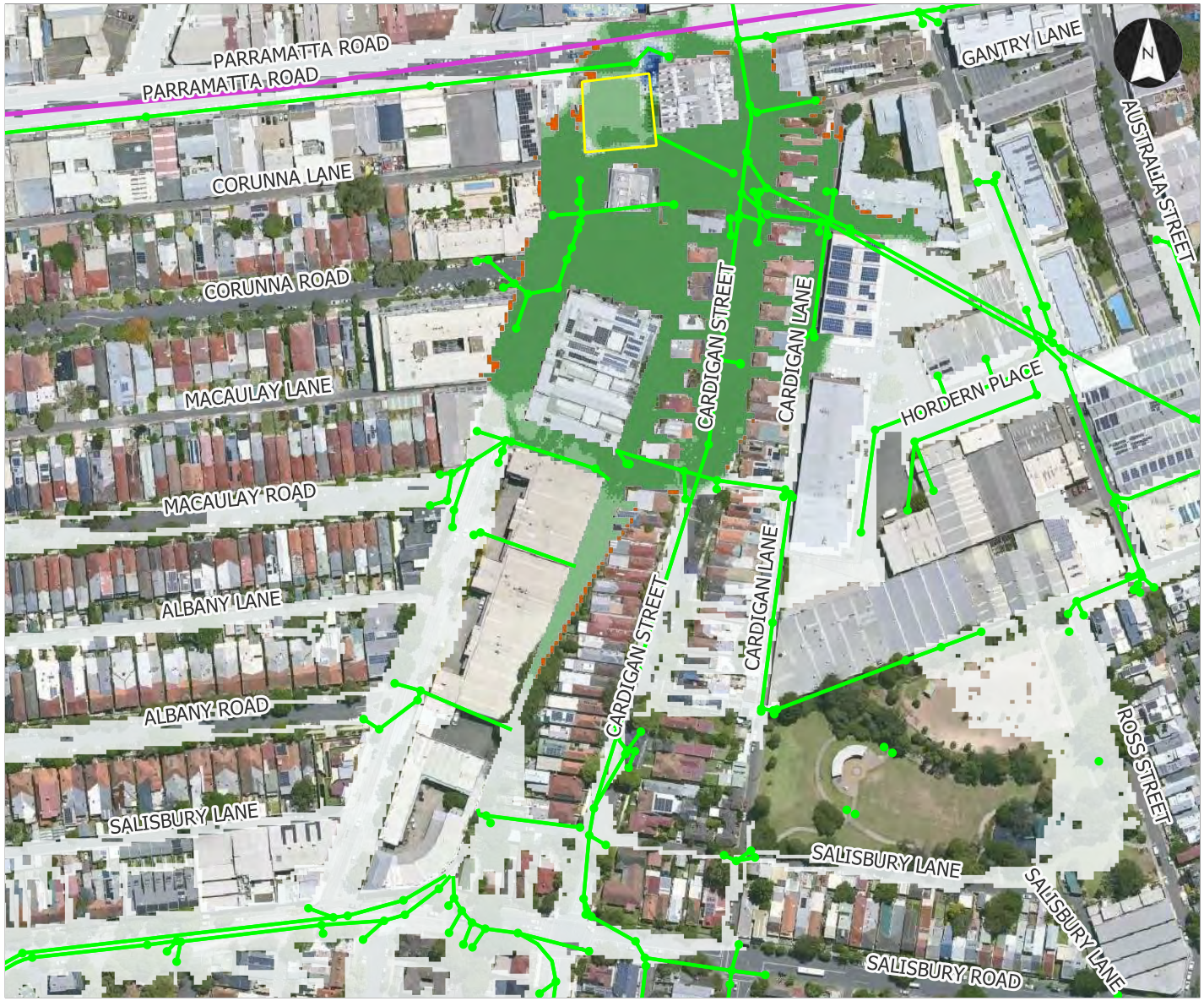


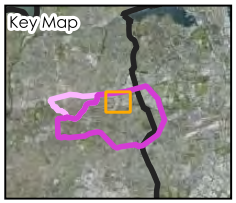
Johnstons Creek Option 2% AEP
JC7 v1 Bridge Road Detention Basin

Project: Whites Creek and Johnstons creek FRMS&P

Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 40

Legend

- MJC Study Area
- IWC LGA Boundary
- Existing Drainage
- 2d_zsh_JC7_v1
- MJC_50y_JC7_v1-PM6_wd Band 1 (Gray)
  - Was Wet, Now Dry
  - Was Dry, Now Wet
- MJC_50y_JC7_v1-PM6_WLD Band 1 (Gray)
  - < -0.50
  - -0.50 to -0.20
  - -0.20 to -0.10
  - -0.10 to -0.05
  - -0.05 to -0.01
  - -0.01 to 0.01
  - 0.01 to 0.05
  - 0.05 to 0.10
  - 0.10 to 0.20
  - 0.20 to 0.50
  - > 0.50



DRAFT - Not For Construction

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

21 0 21 42 62 83 m

Scale at A3: 1:2600

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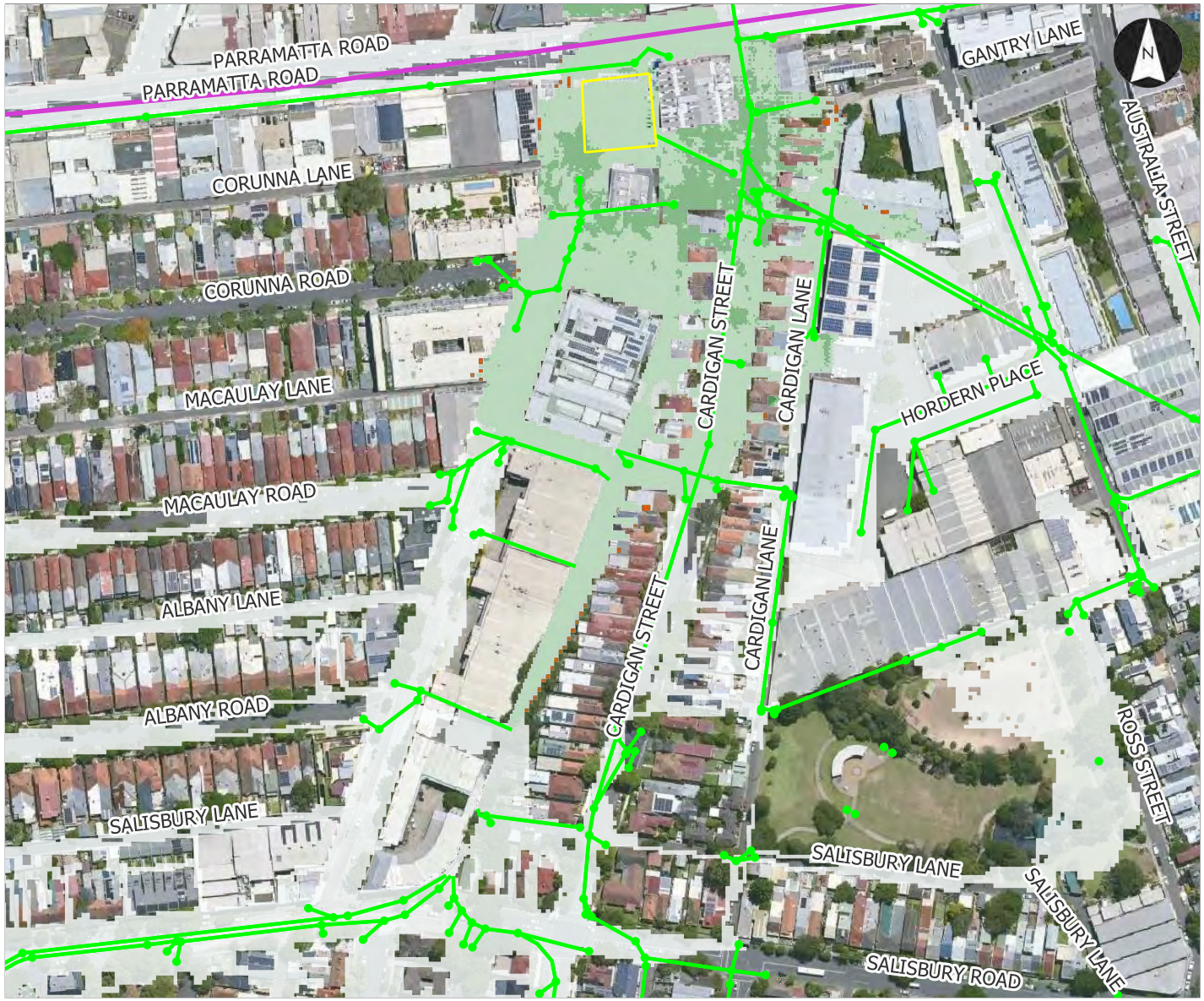


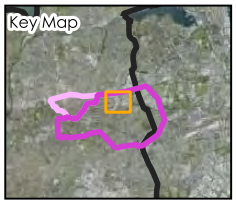
Johnstons Creek Option 1% AEP
JC7 v1 Bridge Road Detention Basin

Project: Whites Creek and Johnstons creek FRMS&P

Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 41

Legend

- MJC Study Area
- IWC LGA Boundary
- Existing Drainage
- 2d_zsh_JC7_v1
- MJC_100y_JC7_v1-PM6_wd Band 1 (Gray)
  - Was Wet, Now Dry
  - Was Dry, Now Wet
- MJC_100y_JC7_v1-PM6_WLD Band 1 (Gray)
  - < -0.50
  - -0.50 to -0.20
  - -0.20 to -0.10
  - -0.10 to -0.05
  - -0.05 to -0.01
  - -0.01 to 0.01
  - 0.01 to 0.05
  - 0.05 to 0.10
  - 0.10 to 0.20
  - 0.20 to 0.50
  - > 0.50



DRAFT - Not For Construction

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

21 0 21 42 62 83 m

Scale at A3: 1:2600

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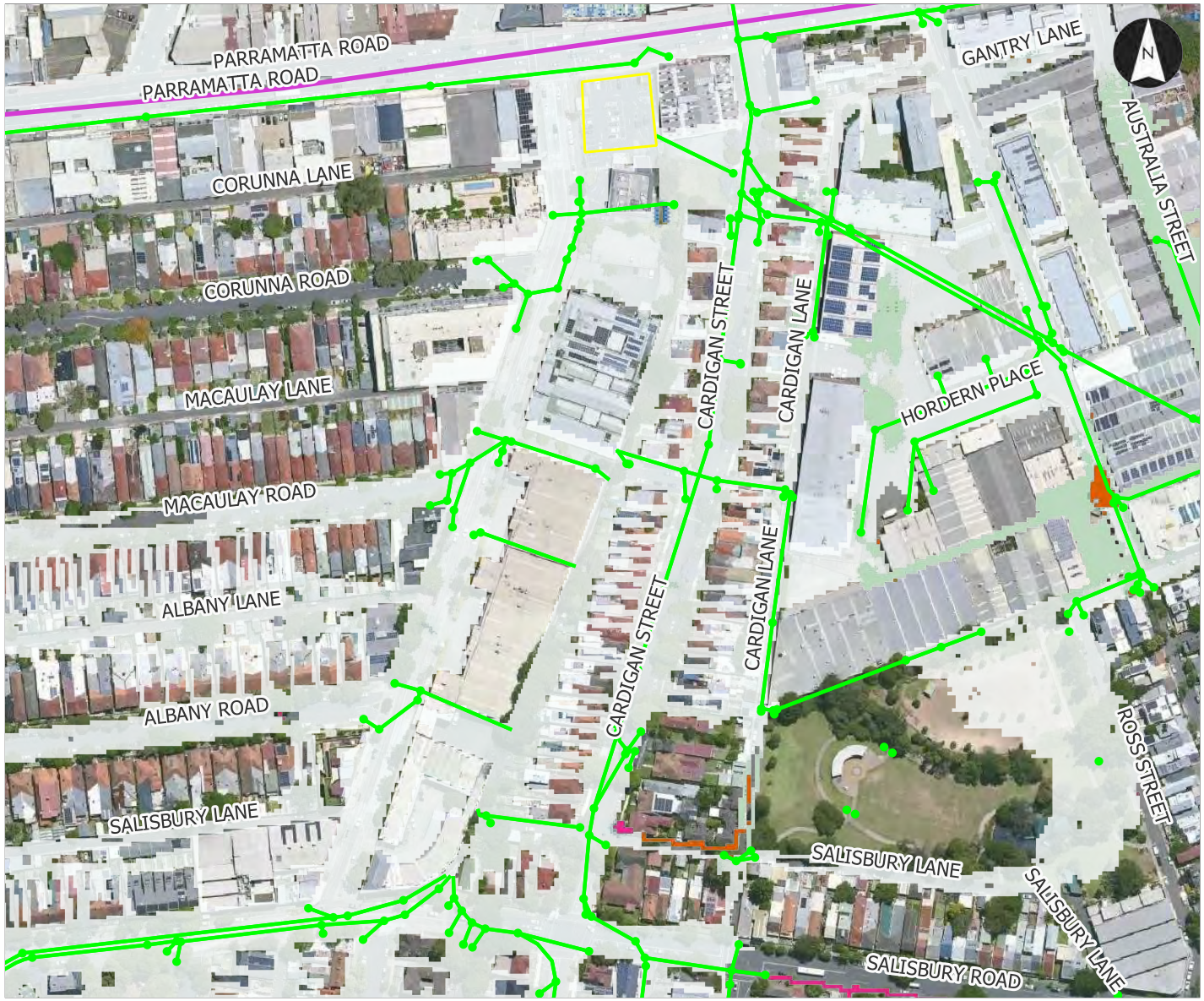


Johnstons Creek Option PMF
JC7 v1 Bridge Road Detention Basin

Project: Whites Creek and Johnstons creek FRMS&P

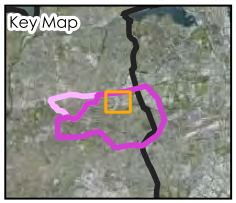
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 42

Legend

- MJC Study Area
- IWC LGA Boundary
- Existing Drainage

MJC_PMF_PM6-Ext_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_PMF_PM6-Ext_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50
- 2d_zsh_JC7_v1



DRAFT - Not For Construction

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

21 0 21 42 62 83 m

Scale at A3: 1:2600

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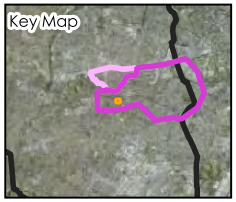
Johnstons Creek Option - JC10 v3 Overview

Project: Whites Creek and Johnstons creek FRMS&P

Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 43

Legend

- MJC Study Area
- IWC LGA Boundary
- Proposed Drainage
- Existing Drainage



DRAFT - Not For Construction

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

4 0 4 8 12 16 m

Scale at A3: 1:500

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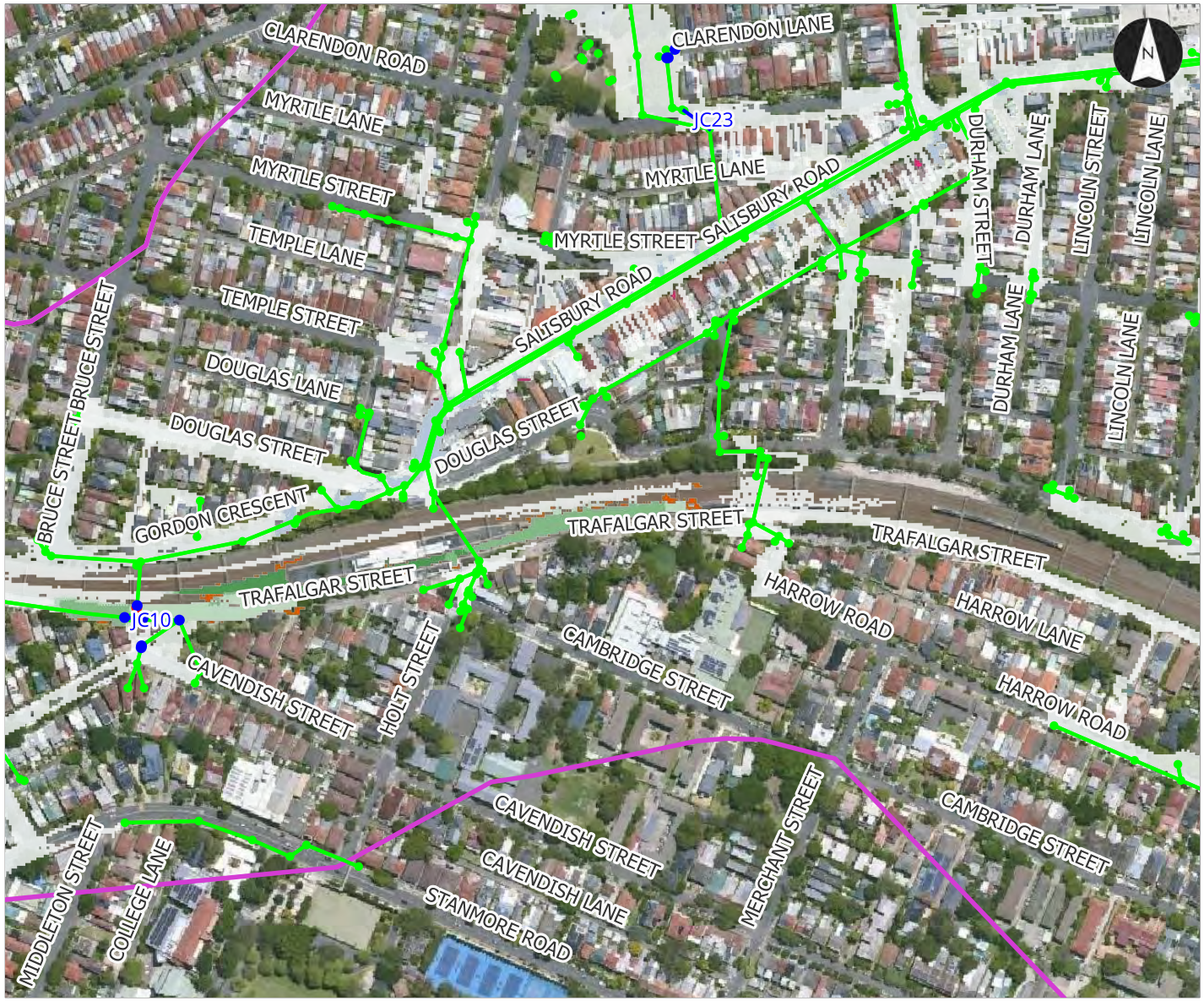


Johnstons Creek Option 20% AEP JC10 v3 Trafalgar Street Drainage Upgrade

Project: Whites Creek and Johnstons creek FRMS&P

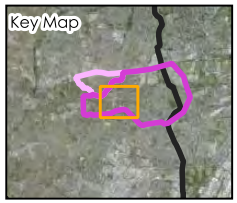
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 44

Legend

- MJC Study Area
- MWC Study Area
- IWC LGA Boundary
- Proposed Drainage
- Existing Drainage

MJC_5y_JC10_v3-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_5y_JC10_v3-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



DRAFT - Not For Construction

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

32 0 32 64 96 128 m

Scale at A3: 1:4000

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Johnstons Creek Option 5% AEP
JC10 v3 Trafalgar Street Drainage Upgrade

Project: Whites Creek and Johnstons creek FRMS&P

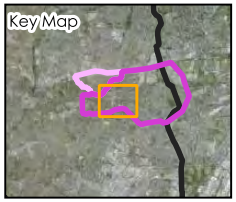
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 45

Legend

- MJC Study Area
- MWC Study Area
- IWC LGA Boundary
- Proposed Drainage
- Existing Drainage

MJC_20y_JC10_v3-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_20y_JC10_v3-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



DRAFT - Not For Construction

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

32 0 32 64 96 128 m

Scale at A3: 1:4000

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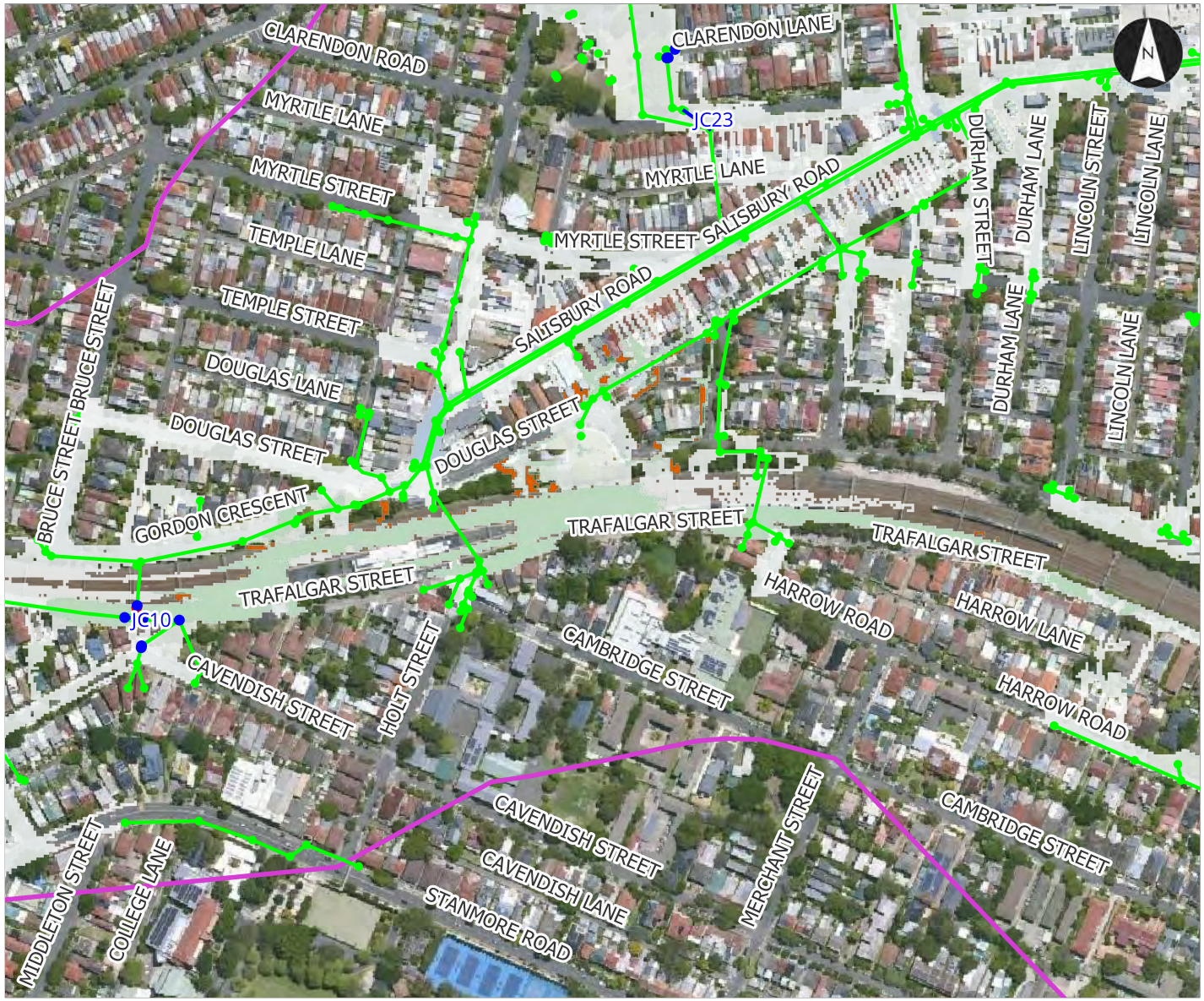


Johnstons Creek Option 2% AEP
JC10 v3 Trafalgar Street Drainage Upgrade

Project: Whites Creek and Johnstons creek FRMS&P

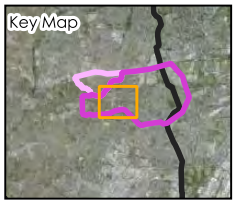
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 46

Legend

- MJC Study Area
- MWC Study Area
- IWC LGA Boundary
- Proposed Drainage
- Existing Drainage

MJC_50y_JC10_v3-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_50y_JC10_v3-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



DRAFT - Not For Construction

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

32 0 32 64 96 128 m

Scale at A3: 1:4000

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Johnstons Creek Option 1% AEP
JC10 v3 Trafalgar Street Drainage Upgrade

Project: Whites Creek and Johnstons creek FRMS&P

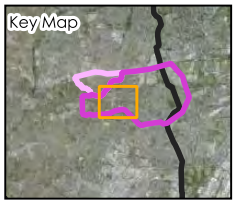
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 47

Legend

- MJC Study Area
- MWC Study Area
- IWC LGA Boundary
- Proposed Drainage
- Existing Drainage

MJC_100y_JC10_v3-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_100y_JC10_v3-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



DRAFT - Not For Construction

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

32 0 32 64 96 128 m

Scale at A3: 1:4000

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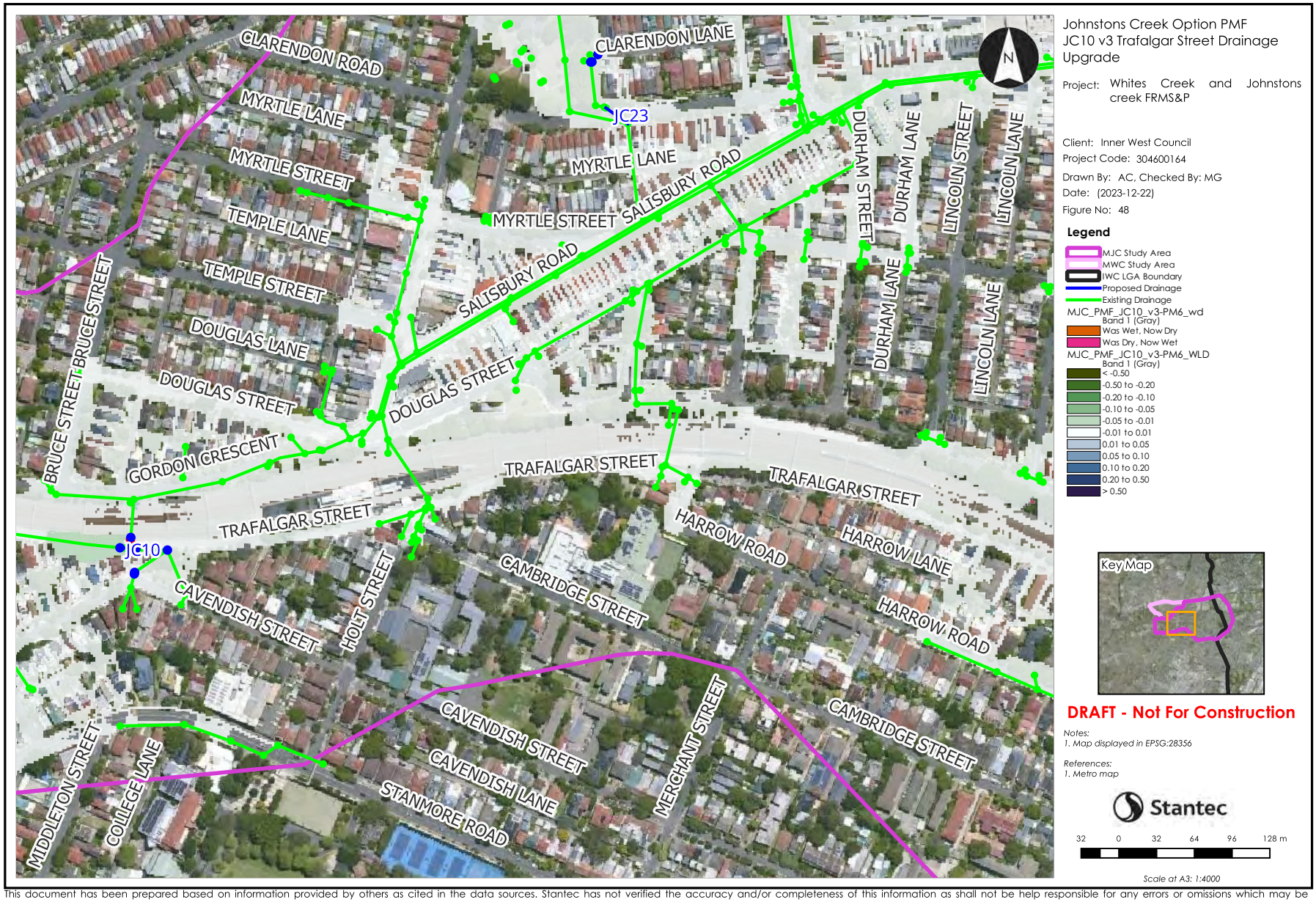

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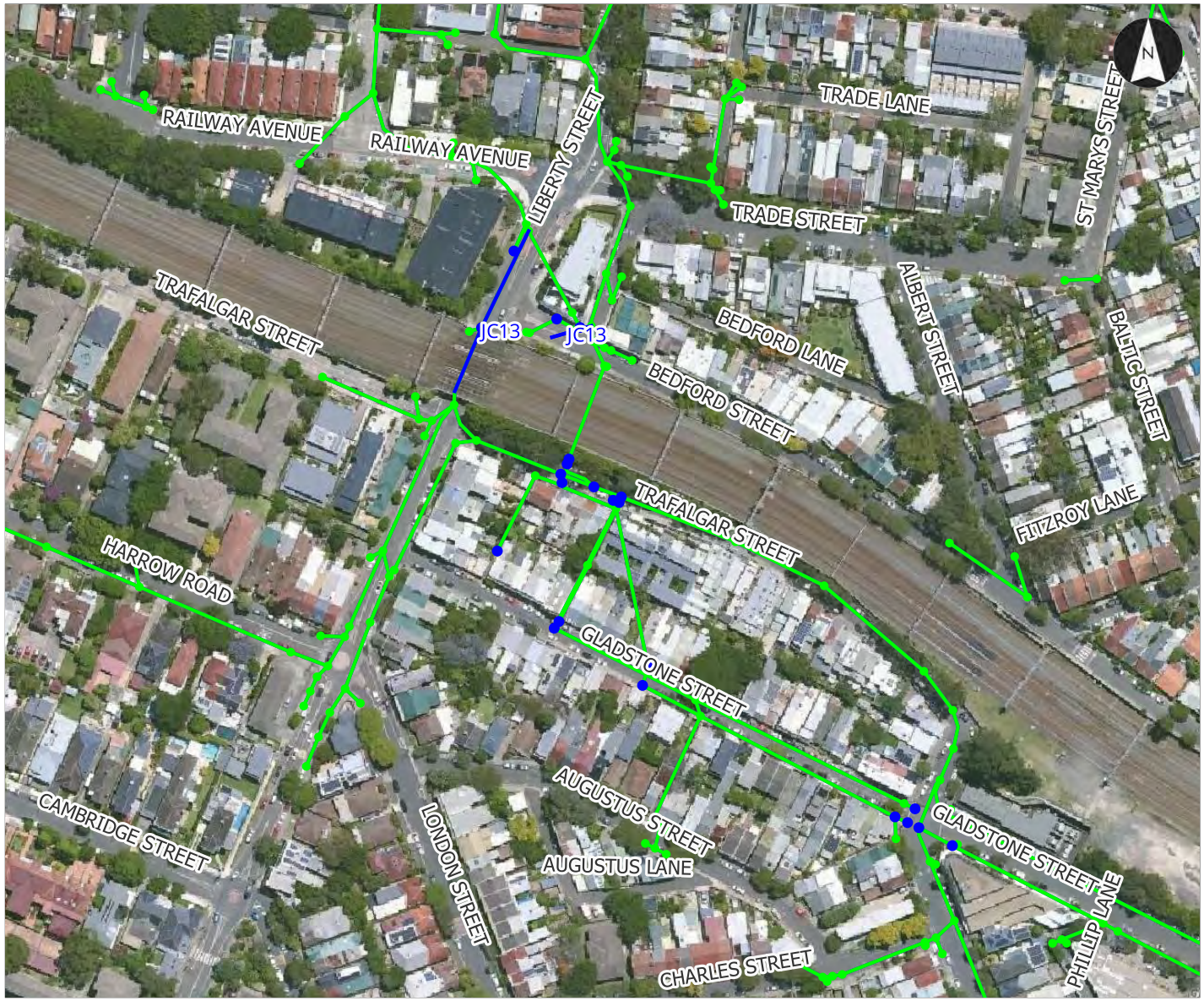


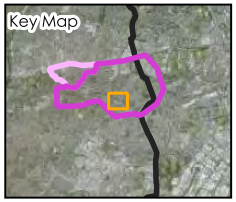
Johnstons Creek Option - JC13 v4 Overview

Project: Whites Creek and Johnstons creek FRMS&P

Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 49

Legend

- MJC Study Area
- IWC LGA Boundary
- Proposed Drainage
- Existing Drainage
- 1d_nwk_MJC_pipes_012_JC13_v4



DRAFT - Not For Construction

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

16 0 16 32 48 64 m

Scale at A3: 1:2000

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Johnstons Creek Option 20% AEP
JC13 v4 Gladstone Street Drainage Upgrade

Project: Whites Creek and Johnstons creek FRMS&P

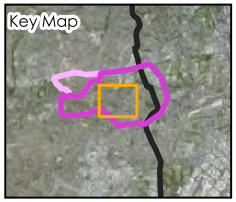
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 50

Legend

- MJC Study Area
- IWC LGA Boundary
- Drainage Option
- Proposed Drainage
- Removed Drainage
- Existing Drainage
- 1d_nwk_MJC_pipes_012_JC13_v4

MJC_5y_JC13_v4-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_5y_JC13_v4-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



DRAFT - Not For Construction

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

32 0 32 64 96 128 m

Scale at A3: 1:4000

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Johnstons Creek Option 5% AEP
JC13 v4 Gladstone Street Drainage Upgrade

Project: Whites Creek and Johnstons creek FRMS&P

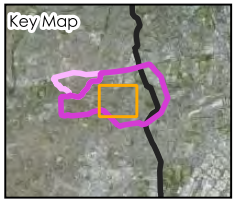
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 51

Legend

- MJC Study Area
- IWC LGA Boundary
- Drainage Option
- Proposed Drainage
- Removed Drainage
- Existing Drainage

MJC_20y_JC13_v4-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_20y_JC13_v4-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



DRAFT - Not For Construction

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

32 0 32 64 96 128 m

Scale at A3: 1:4000

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Johnstons Creek Option 2% AEP
JC13 v4 Gladstone Street Drainage Upgrade

Project: Whites Creek and Johnstons creek FRMS&P

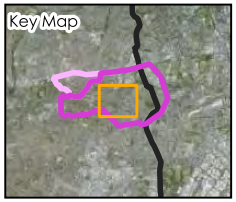
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 52

Legend

- MJC Study Area
- IWC LGA Boundary
- Drainage Option
- Proposed Drainage
- Removed Drainage
- Existing Drainage

MJC_50y_JC13_v4-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_50y_JC13_v4-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



DRAFT - Not For Construction

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

32 0 32 64 96 128 m

Scale at A3: 1:4000

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Johnstons Creek Option 1% AEP
JC13 v4 Gladstone Street Drainage Upgrade

Project: Whites Creek and Johnstons creek FRMS&P

Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 53

Legend

- MJC Study Area
- IWC LGA Boundary
- Drainage Option
- Proposed Drainage
- Removed Drainage
- Existing Drainage

MJC_100y_JC13_v4-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_100y_JC13_v4-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50

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Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

32 0 32 64 96 128 m

Scale at A3: 1:4000

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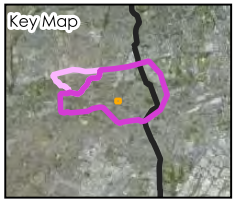
Johnstons Creek Option - JC14 v1 Overview

Project: Whites Creek and Johnstons creek FRMS&P

Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 55

Legend

- MJC Study Area
- IWC LGA Boundary
- 2d_zsh_JC14_v1



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Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

4 0 4 8 12 16 m

Scale at A3: 1:500

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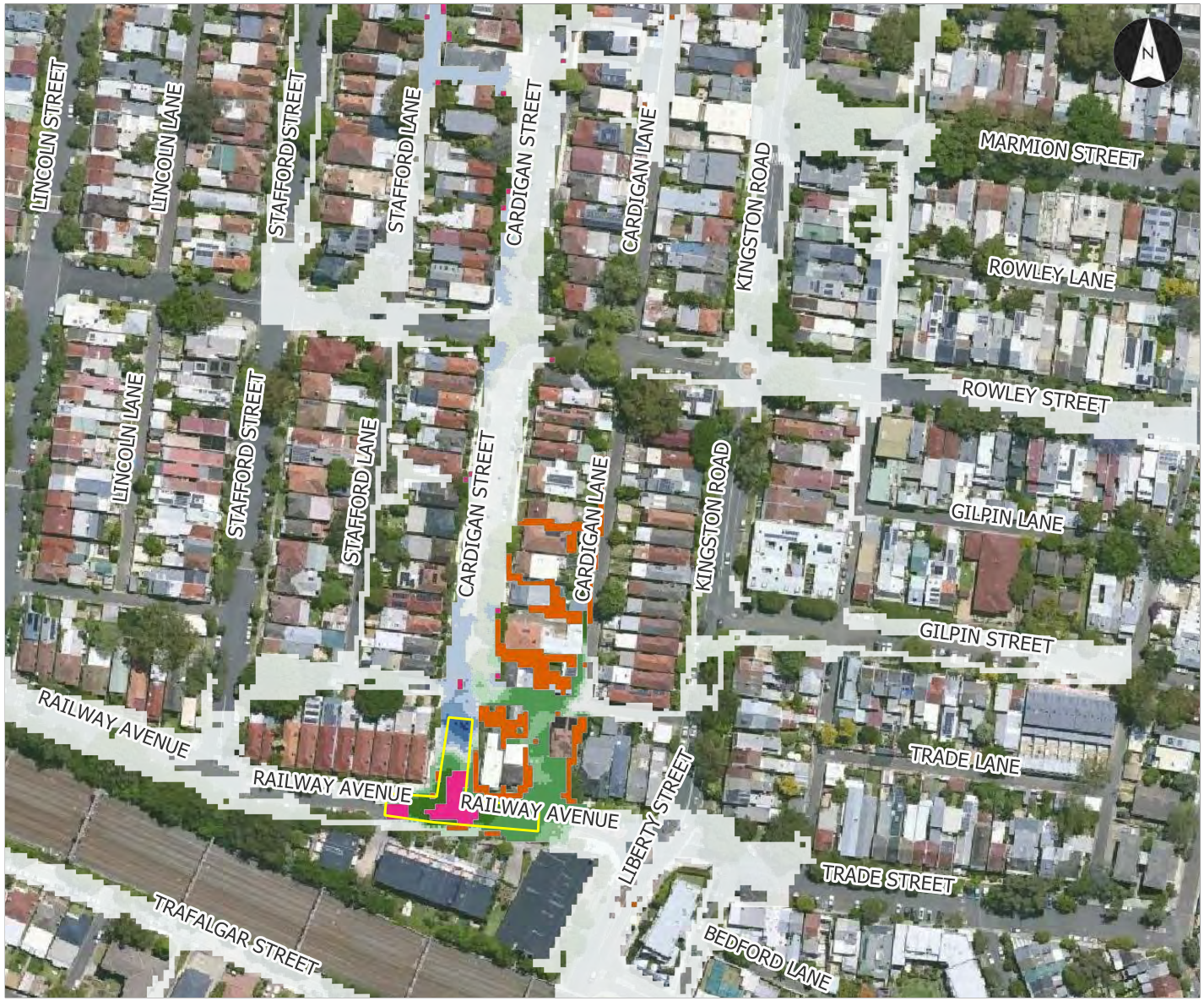


Johnstons Creek Option 20% AEP JC14 v1 Railway Street Road Regrading

Project: Whites Creek and Johnstons creek FRMS&P

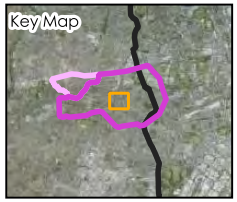
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 56

Legend

- MJC Study Area
- IWC LGA Boundary
- 2d_zsh_JC14_v1

MJC_5y_JC14_v1-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_5y_JC14_v1-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



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Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

16 0 16 32 48 64 m

Scale at A3: 1:2000

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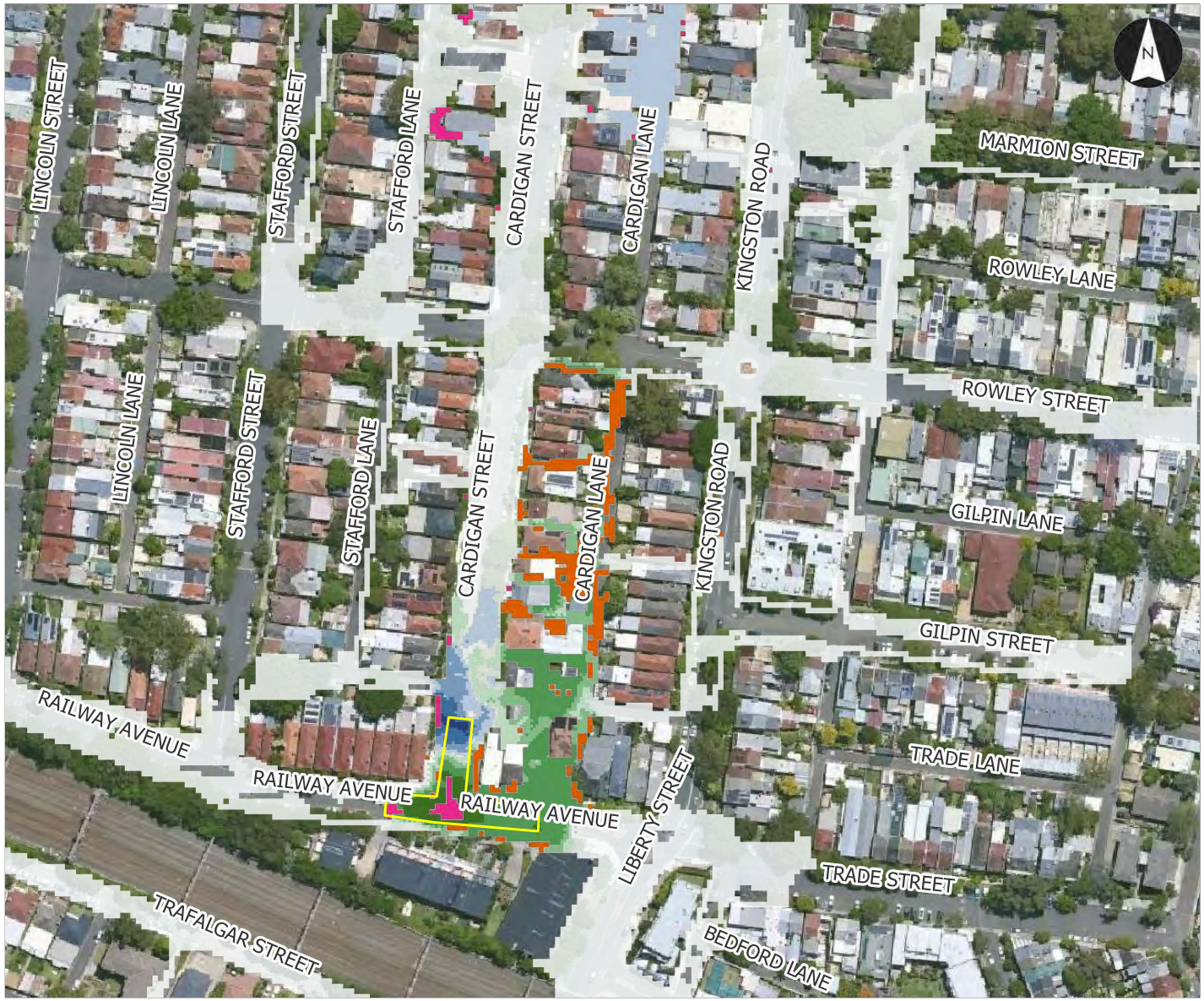


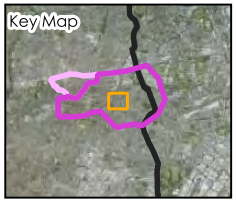
Johnstons Creek Option 5% AEP JC14 v1 Railway Street Road Regrading

Project: Whites Creek and Johnstons creek FRMS&P

Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 57

Legend

- MJC Study Area
- IWC LGA Boundary
- 2d_zsh_JC14_v1
- MJC_20y_JC14_v1-PM6_wd Band 1 (Gray)
  - Was Wet, Now Dry
  - Was Dry, Now Wet
- MJC_20y_JC14_v1-PM6_WLD Band 1 (Gray)
  - < -0.50
  - -0.50 to -0.20
  - -0.20 to -0.10
  - -0.10 to -0.05
  - -0.05 to -0.01
  - -0.01 to 0.01
  - 0.01 to 0.05
  - 0.05 to 0.10
  - 0.10 to 0.20
  - 0.20 to 0.50
  - > 0.50



DRAFT - Not For Construction

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

16 0 16 32 48 64 m

Scale at A3: 1:2000

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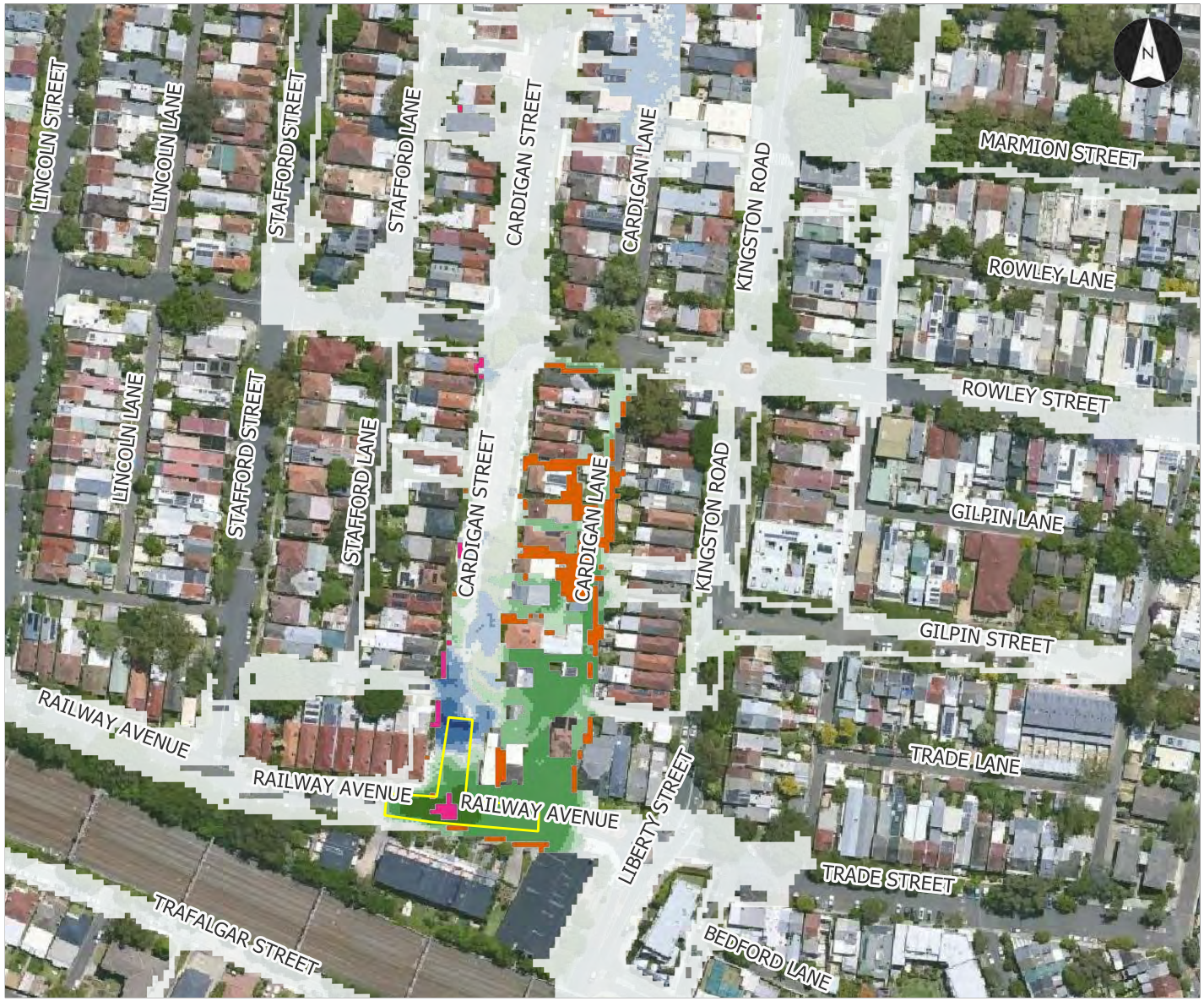


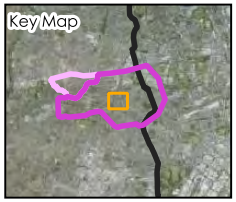
Johnstons Creek Option 2% AEP JC14 v1 Railway Street Road Regrading

Project: Whites Creek and Johnstons creek FRMS&P

Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 58

Legend

- MJC Study Area
- IWC LGA Boundary
- 2d_zsh_JC14_v1
- MJC_50y_JC14_v1-PM6_wd
  - Band 1 (Gray)
  - Was Wet, Now Dry
  - Was Dry, Now Wet
- MJC_50y_JC14_v1-PM6_WLD
  - Band 1 (Gray)
  - < -0.50
  - -0.50 to -0.20
  - -0.20 to -0.10
  - -0.10 to -0.05
  - -0.05 to -0.01
  - -0.01 to 0.01
  - 0.01 to 0.05
  - 0.05 to 0.10
  - 0.10 to 0.20
  - 0.20 to 0.50
  - > 0.50



DRAFT - Not For Construction

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

16 0 16 32 48 64 m

Scale at A3: 1:2000

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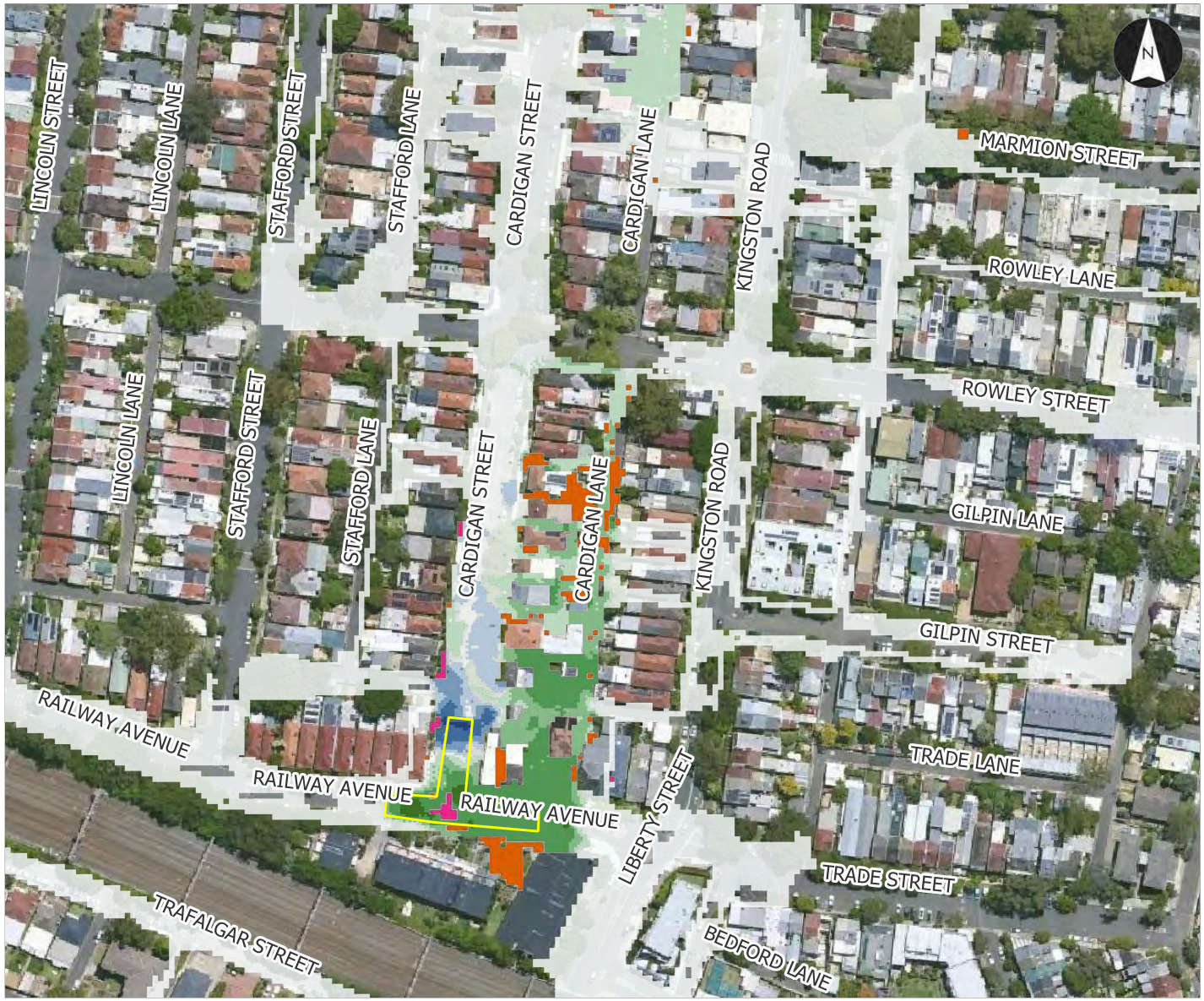


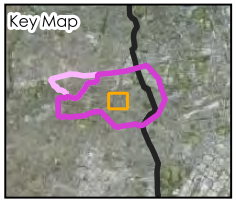
Johnstons Creek Option 1% AEP JC14 v1 Railway Street Road Regrading

Project: Whites Creek and Johnstons creek FRMS&P

Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 59

Legend

- MJC Study Area
- IWC LGA Boundary
- 2d_zsh_JC14_v1
- MJC_100y_JC14_v1-PM6_wd Band 1 (Gray)
  - Was Wet, Now Dry
  - Was Dry, Now Wet
- MJC_100y_JC14_v1-PM6_WLD Band 1 (Gray)
  - < -0.50
  - -0.50 to -0.20
  - -0.20 to -0.10
  - -0.10 to -0.05
  - -0.05 to -0.01
  - -0.01 to 0.01
  - 0.01 to 0.05
  - 0.05 to 0.10
  - 0.10 to 0.20
  - 0.20 to 0.50
  - > 0.50



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Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

16 0 16 32 48 64 m

Scale at A3: 1:2000

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Johnstons Creek Option PMF JC14 v1 Railway Street Road Regrading

Project: Whites Creek and Johnstons creek FRMS&P

Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 60

Legend

- MJC Study Area
- IWC LGA Boundary
- 2d_zsh_JC14_v1

MJC_PMF_JC14_v1-PM6_WLD
Band 1 (Gray)

- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50

DRAFT - Not For Construction

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

16 0 16 32 48 64 m

Scale at A3: 1:2000

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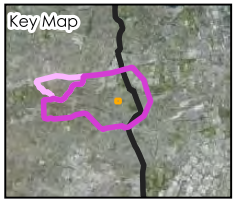
Johnstons Creek Option - JC15 v2 Overview

Project: Whites Creek and Johnstons creek FRMS&P

Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 61

Legend

- MJC Study Area
- IWC LGA Boundary
- Proposed Drainage
- Removed Drainage
- Existing Drainage



DRAFT - Not For Construction

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

4 0 4 8 12 16 m

Scale at A3: 1:500

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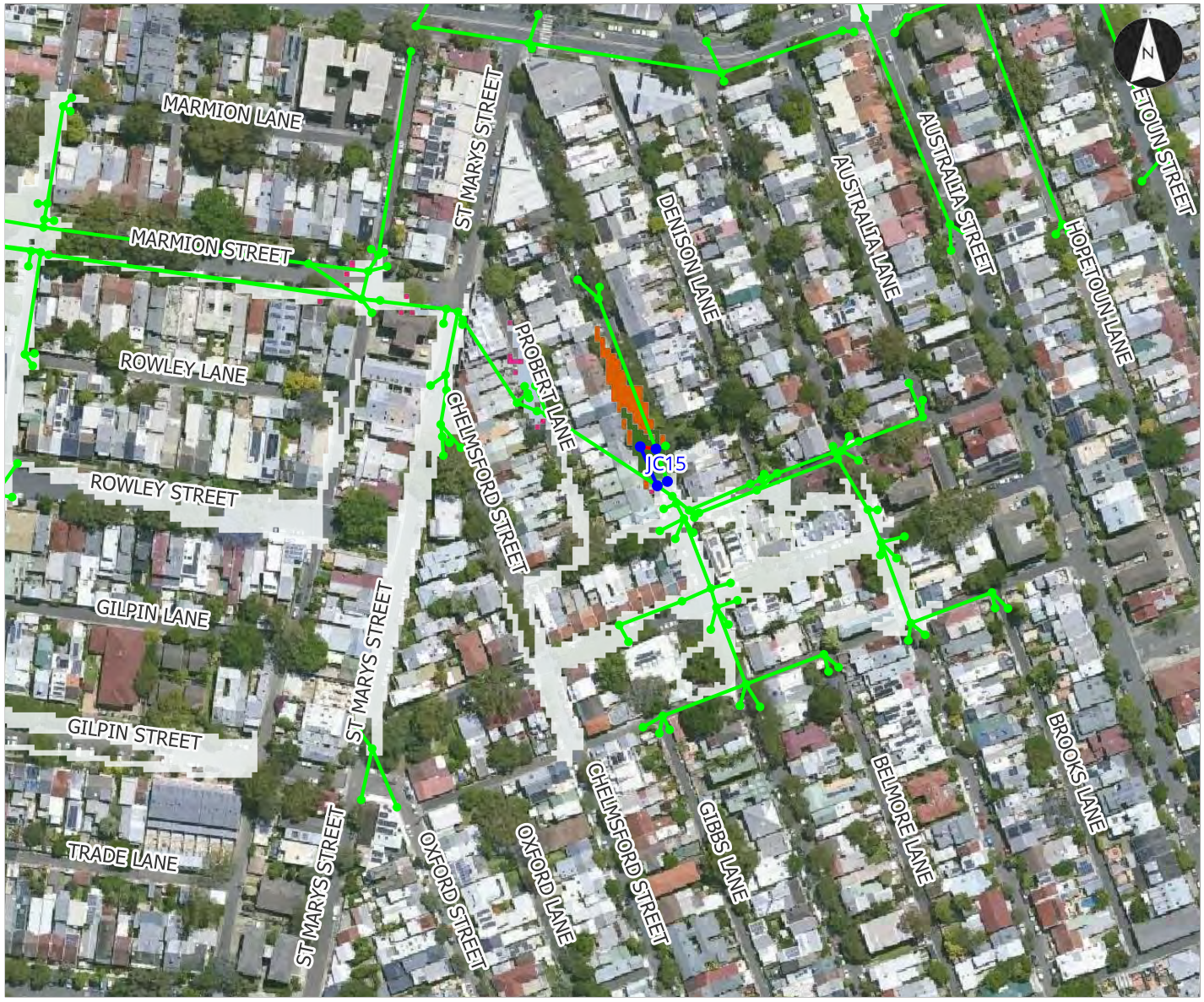


Johnstons Creek Option 20% AEP
JC15 v2 Probert Street Drainage Upgrade

Project: Whites Creek and Johnstons creek FRMS&P

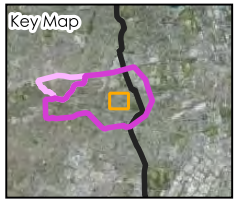
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 62

Legend

- MJC Study Area
- IWC LGA Boundary
- Proposed Drainage
- Removed Drainage
- Existing Drainage

MJC_5y_JC15_v2-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_5y_JC15_v2-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



DRAFT - Not For Construction

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

16 0 16 32 48 64 m

Scale at A3: 1:2000

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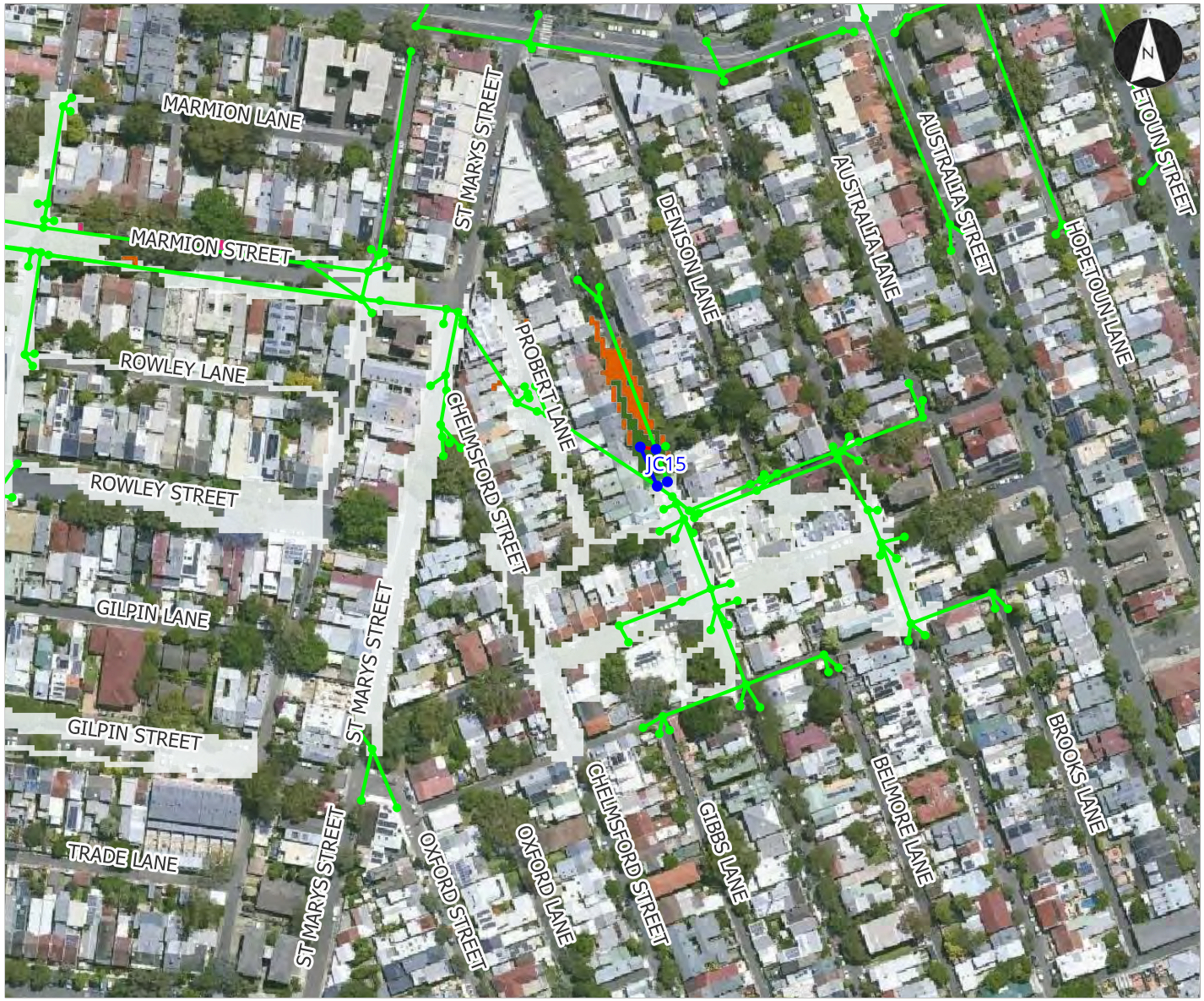


Johnstons Creek Option 5% AEP
JC15 v2 Probert Street Drainage Upgrade

Project: Whites Creek and Johnstons creek FRMS&P

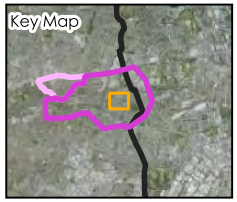
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 63

Legend

- MJC Study Area
- IWC LGA Boundary
- Proposed Drainage
- Removed Drainage
- Existing Drainage

MJC_20y_JC15_v2-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_20y_JC15_v2-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



DRAFT - Not For Construction

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

16 0 16 32 48 64 m

Scale at A3: 1:2000

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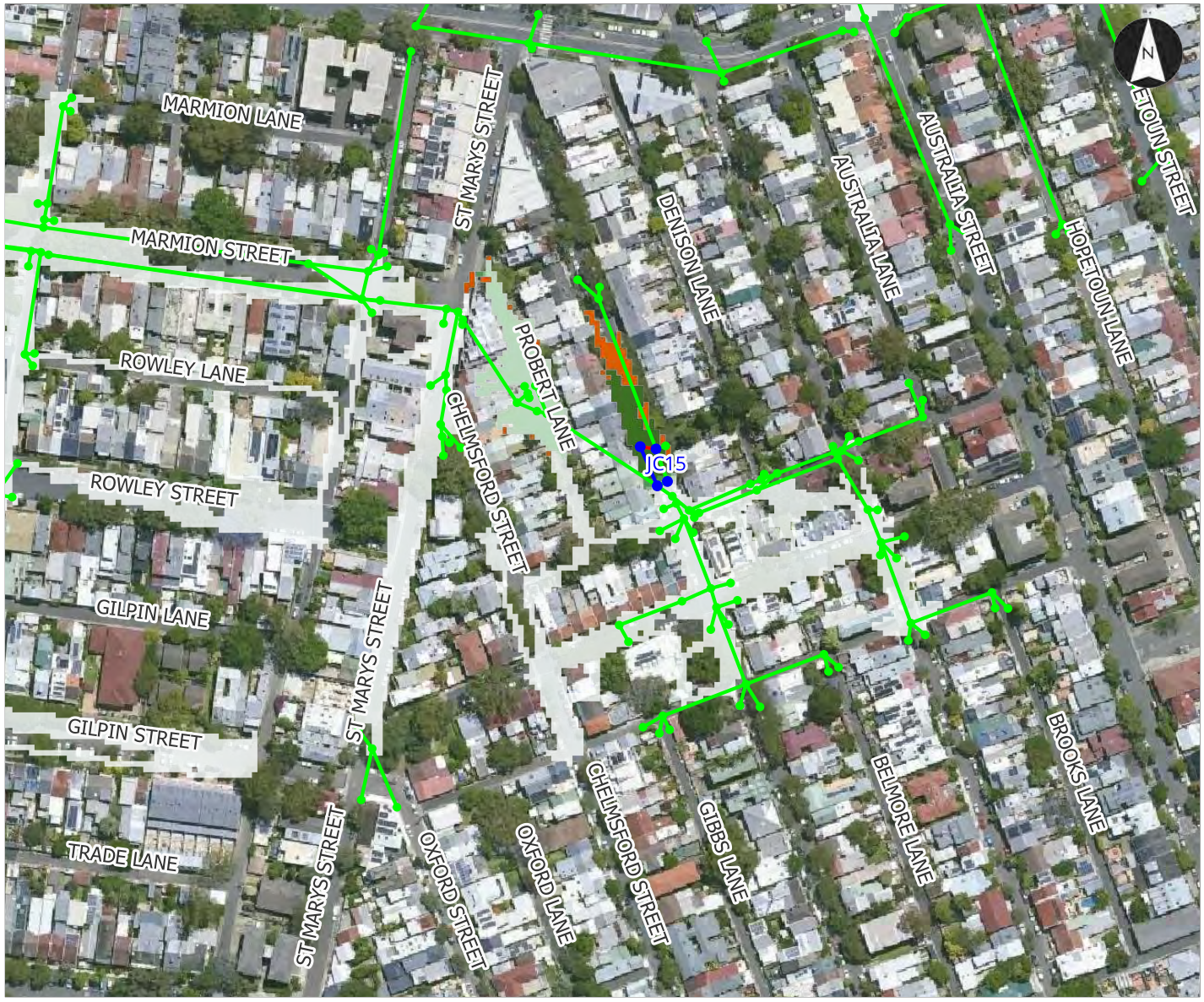


Johnstons Creek Option 2% AEP
JC15 v2 Probert Street Drainage Upgrade

Project: Whites Creek and Johnstons creek FRMS&P

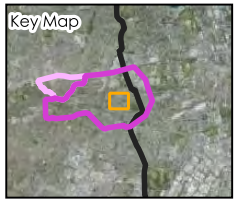
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 64

Legend

- MJC Study Area
- IWC LGA Boundary
- Proposed Drainage
- Removed Drainage
- Existing Drainage

MJC_50y_JC15_v2-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_50y_JC15_v2-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



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Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

16 0 16 32 48 64 m

Scale at A3: 1:2000

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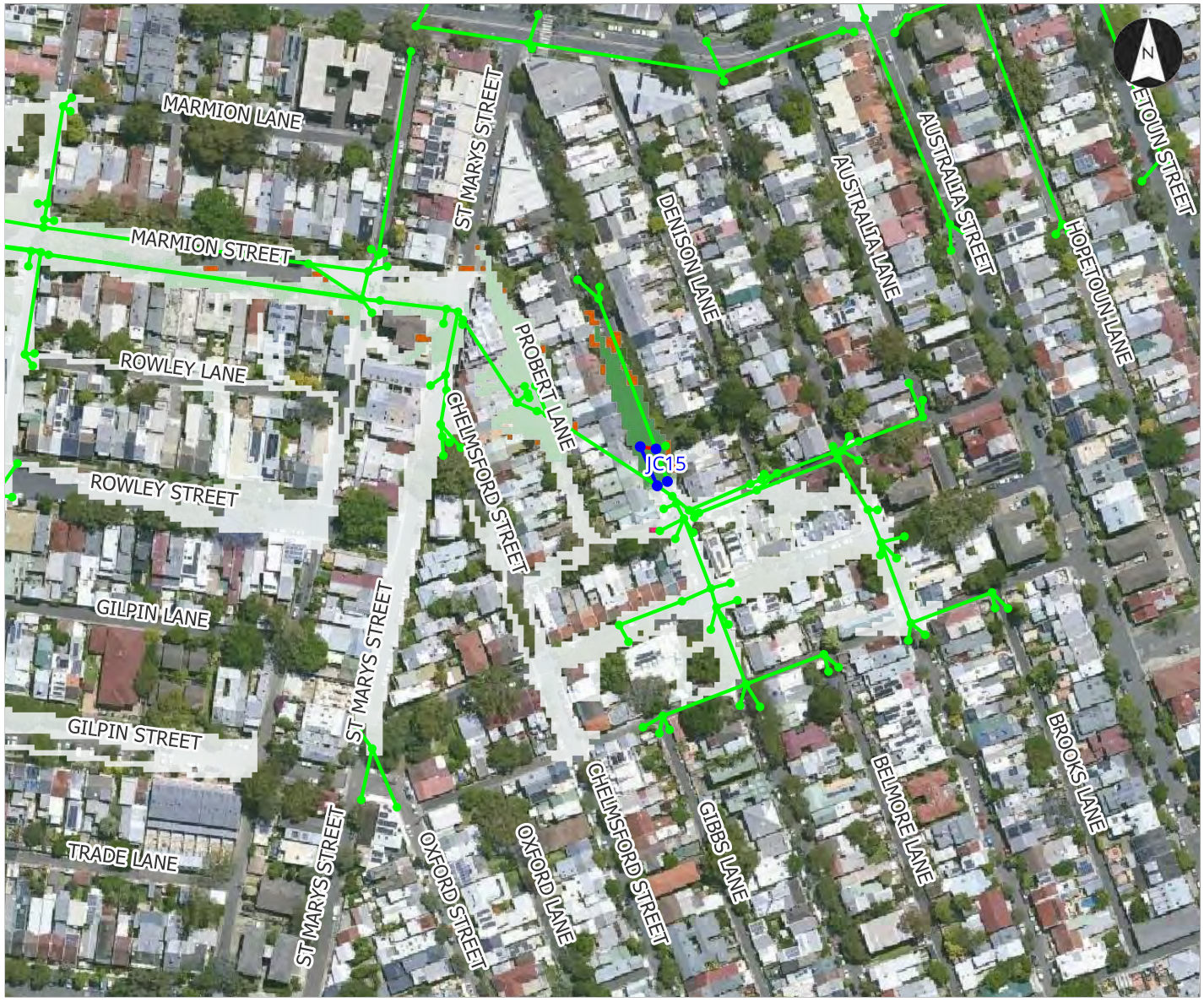


Johnstons Creek Option 1% AEP
JC15 v2 Probert Street Drainage Upgrade

Project: Whites Creek and Johnstons creek FRMS&P

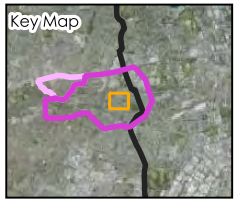
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 65

Legend

- MJC Study Area
- IWC LGA Boundary
- Proposed Drainage
- Removed Drainage
- Existing Drainage

MJC_100y_JC15_v2-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_100y_JC15_v2-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



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Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

16 0 16 32 48 64 m

Scale at A3: 1:2000

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Johnstons Creek Option PMF
JC15 v2 Probert Street Drainage Upgrade

Project: Whites Creek and Johnstons creek FRMS&P

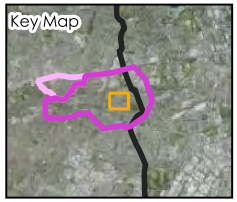
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 66

Legend

- MJC Study Area
- IWC LGA Boundary
- Proposed Drainage
- Removed Drainage
- Existing Drainage

MJC_PMF_JC15_v2-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_PMF_JC15_v2-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



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Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

16 0 16 32 48 64 m

Scale at A3: 1:2000

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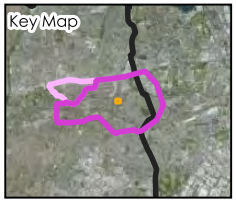
Johnstons Creek Option - JC18 v2 Overview

Project: Whites Creek and Johnstons creek FRMS&P

Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 67

Legend

- MJC Study Area
- IWC LGA Boundary
- JC6_v5_Channel
- Existing Drainage



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Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

4 0 4 8 12 16 m

Scale at A3: 1:500

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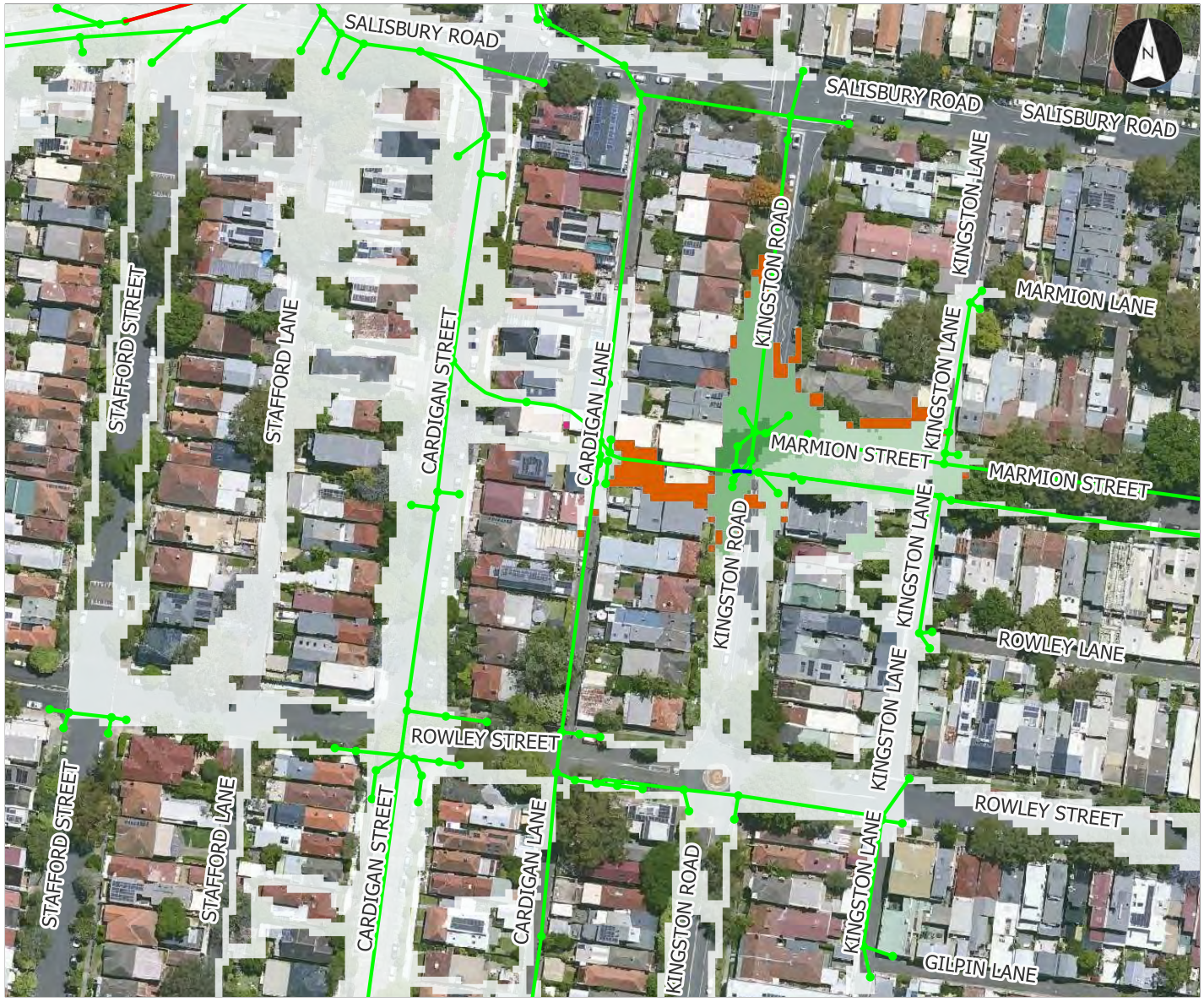


Johnstons Creek Option 20% AEP JC18 v2 Kingston Road Drainage Upgrade

Project: Whites Creek and Johnstons creek FRMS&P

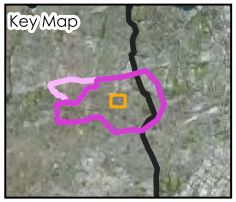
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 68

Legend

- MJC Study Area
- IWC LGA Boundary
- JC6_v5_Channel
- Removed Drainage
- Existing Drainage

MJC_5y_JC18_v2-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_5y_JC18_v2-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



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Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

12 0 12 24 36 48 m

Scale at A3: 1:1500

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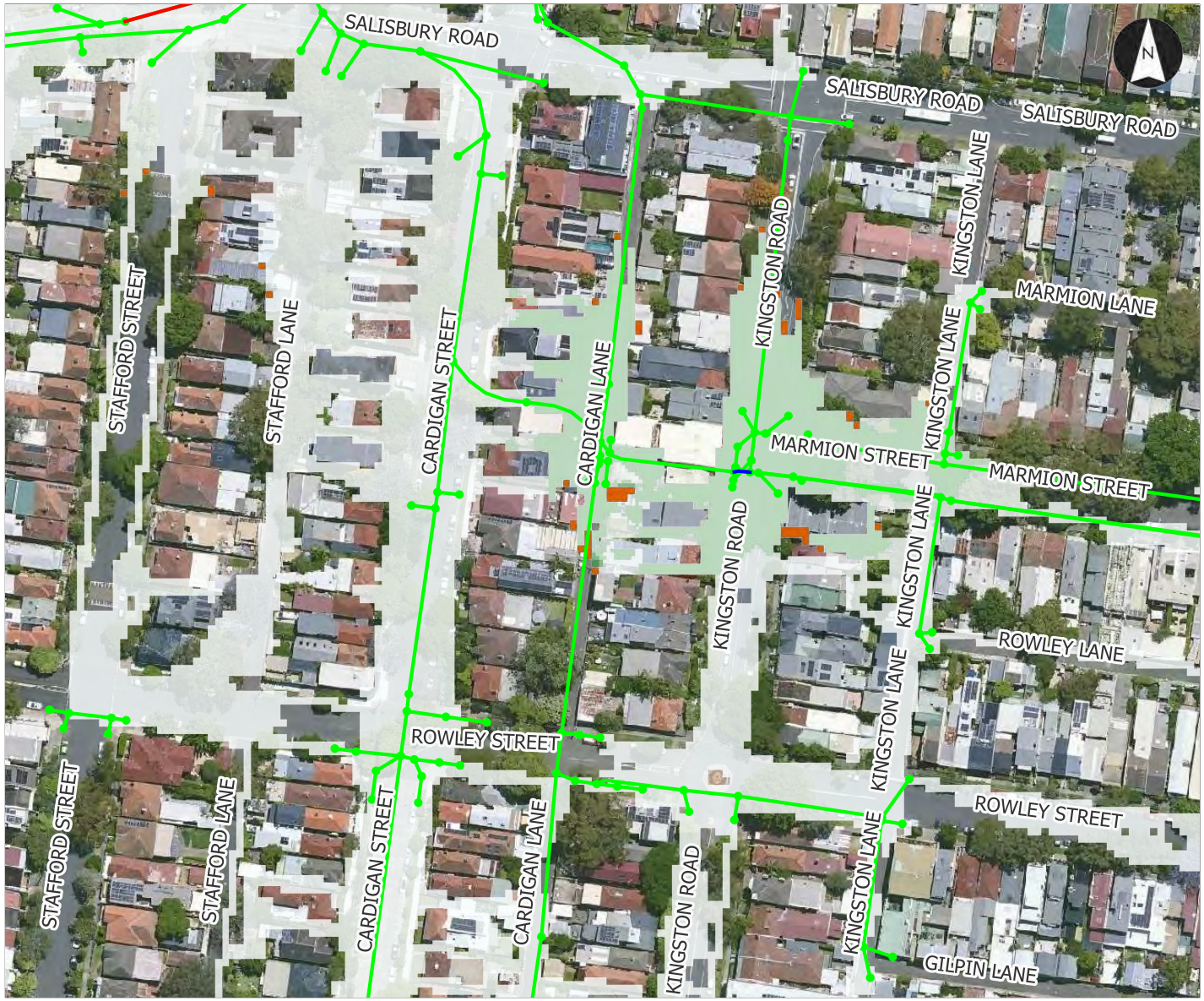


Johnstons Creek Option 5% AEP
JC18 v2 Kingston Road Drainage Upgrade

Project: Whites Creek and Johnstons creek FRMS&P

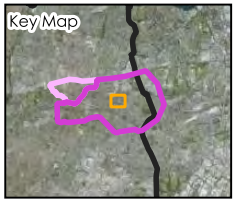
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 69

Legend

- MJC Study Area
- IWC LGA Boundary
- JC6_v5_Channel
- Removed Drainage
- Existing Drainage

MJC_20y_JC18_v2-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_20y_JC18_v2-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



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Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

12 0 12 24 36 48 m

Scale at A3: 1:1500

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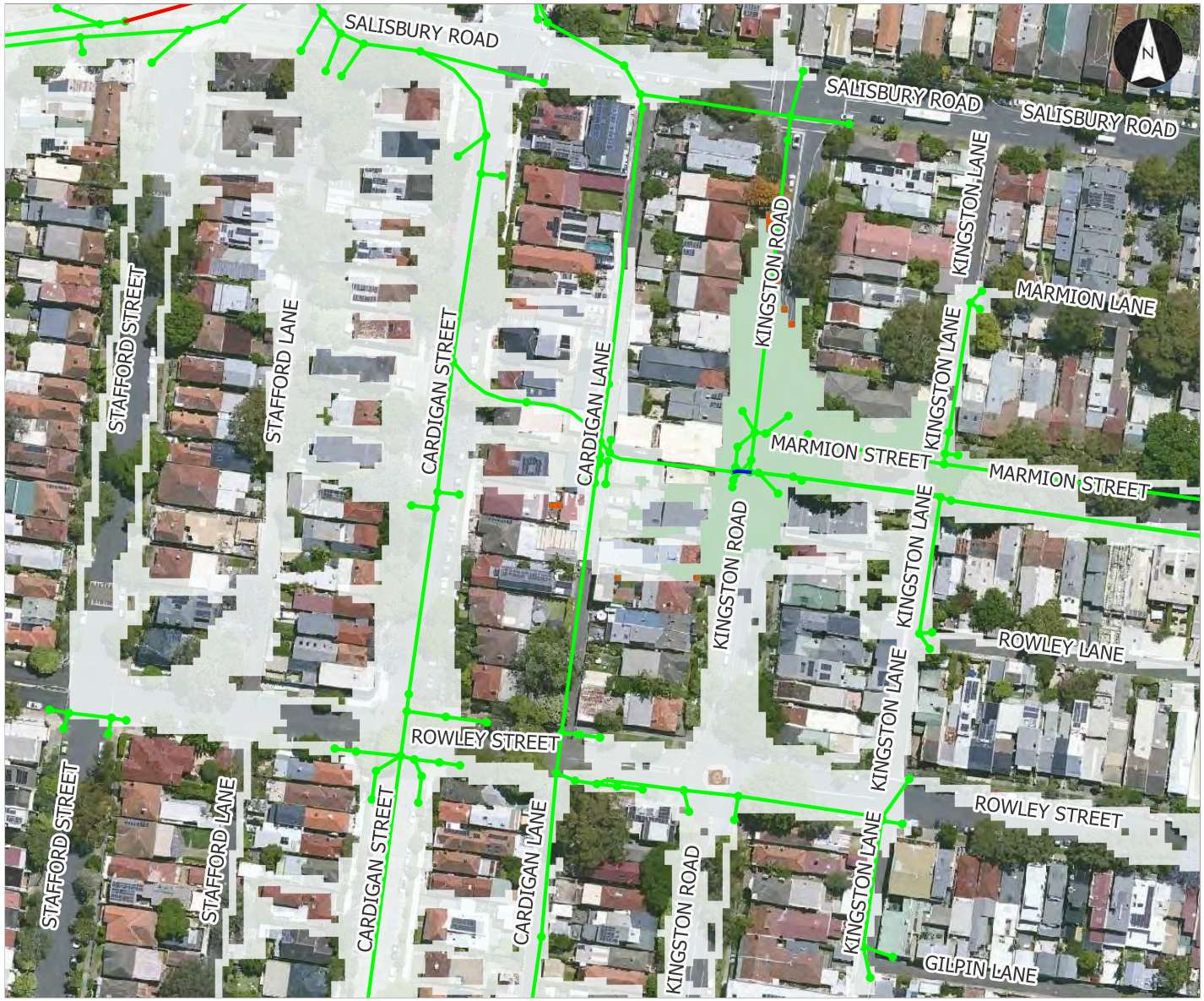


Johnstons Creek Option 2% AEP
JC18 v2 Kingston Road Drainage Upgrade

Project: Whites Creek and Johnstons creek FRMS&P

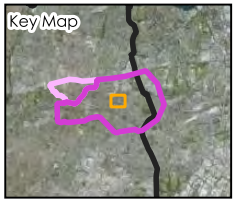
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 70

Legend

- MJC Study Area
- IWC LGA Boundary
- JC6_v5_Channel
- Removed Drainage
- Existing Drainage

MJC_50y_JC18_v2-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_50y_JC18_v2-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



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Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

12 0 12 24 36 48 m

Scale at A3: 1:1500

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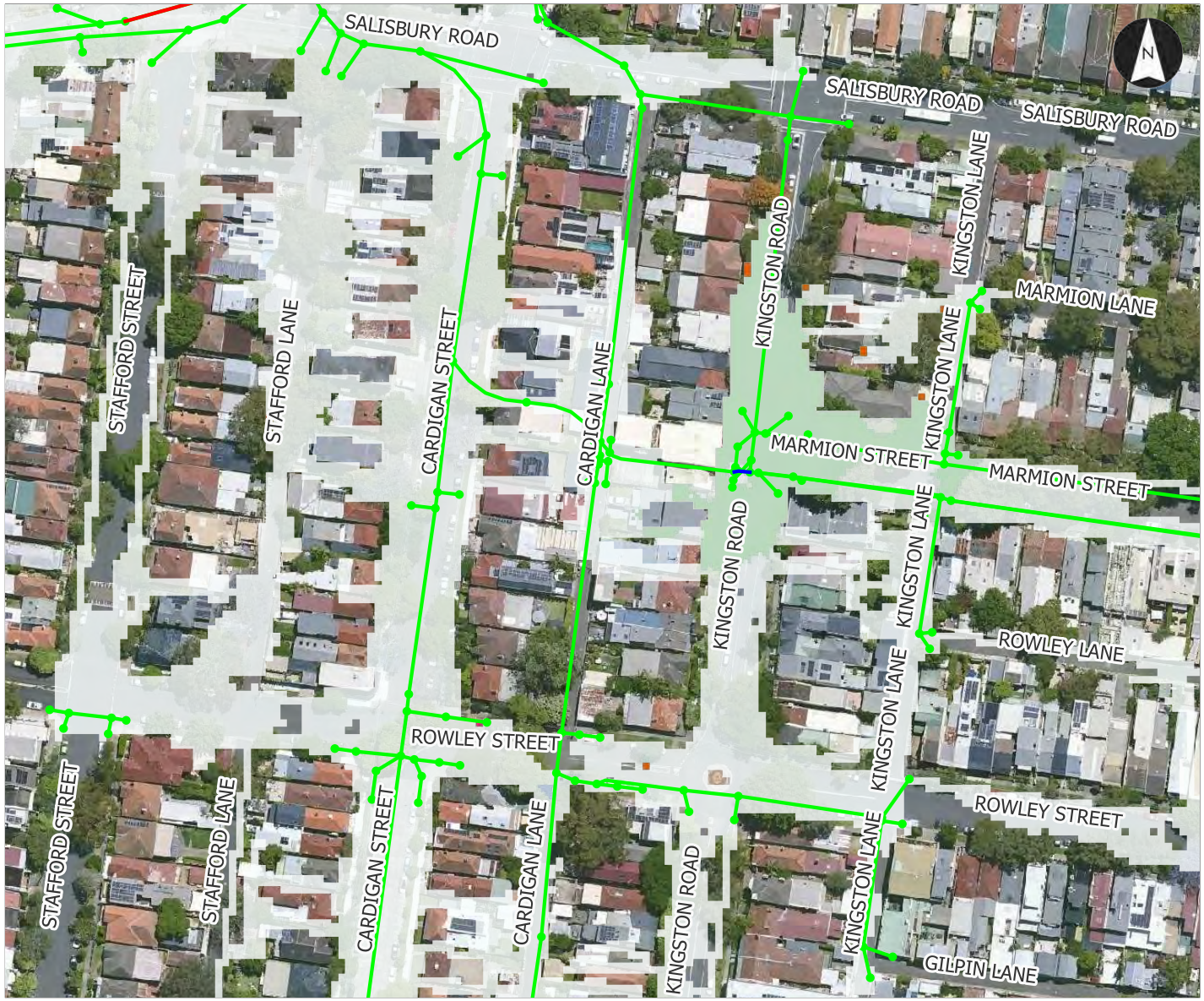


Johnstons Creek Option 1% AEP
JC18 v2 Kingston Road Drainage Upgrade

Project: Whites Creek and Johnstons creek FRMS&P

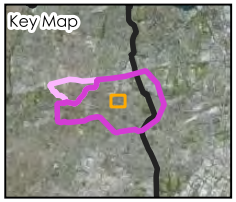
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 71

Legend

- MJC Study Area
- IWC LGA Boundary
- JC6_v5_Channel
- Removed Drainage
- Existing Drainage

MJC_100y_JC18_v2-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_100y_JC18_v2-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



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Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

12 0 12 24 36 48 m

Scale at A3: 1:1500

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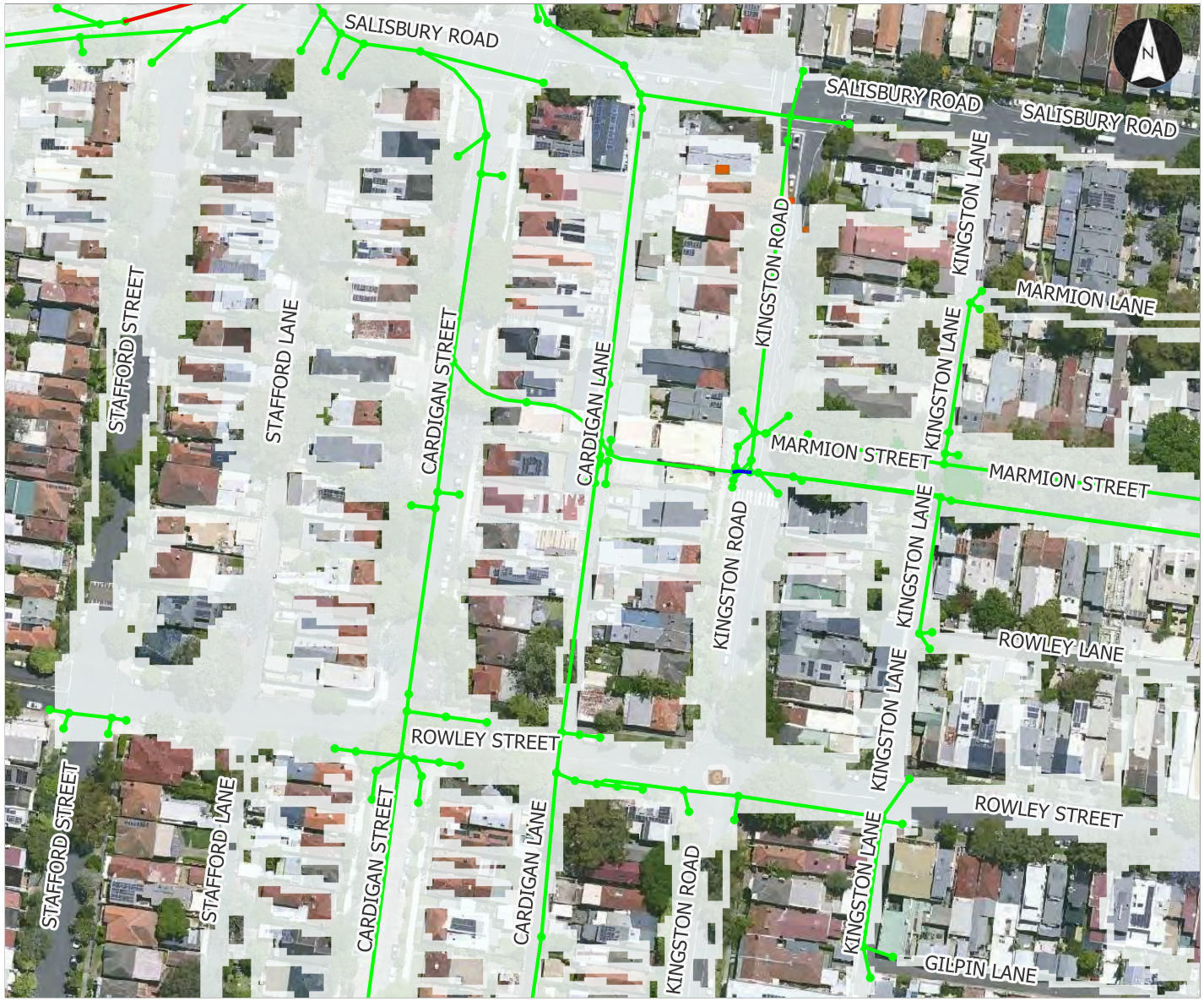


Johnstons Creek Option PMF
JC18 v2 Kingston Road Drainage Upgrade

Project: Whites Creek and Johnstons creek FRMS&P

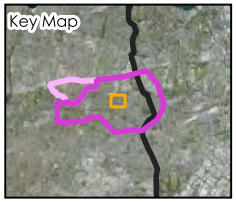
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 72

Legend

- MJC Study Area
- IWC LGA Boundary
- JC6_v5_Channel
- Removed Drainage
- Existing Drainage

MJC_PMF_JC18_v2-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_PMF_JC18_v2-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



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Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

12 0 12 24 36 48 m

Scale at A3: 1:1500

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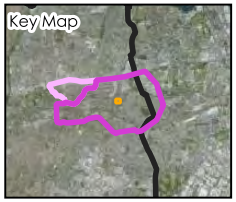
Johnstons Creek Option -
JC18 v3 Overview

Project: Whites Creek and Johnstons creek FRMS&P

Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 73

Legend

- MJC Study Area
- IWC LGA Boundary
- Drainage Option
- Proposed Drainage
- Existing Drainage



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Notes:
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References:
1. Metro map

Stantec

4 0 4 8 12 16 m

Scale at A3: 1:500

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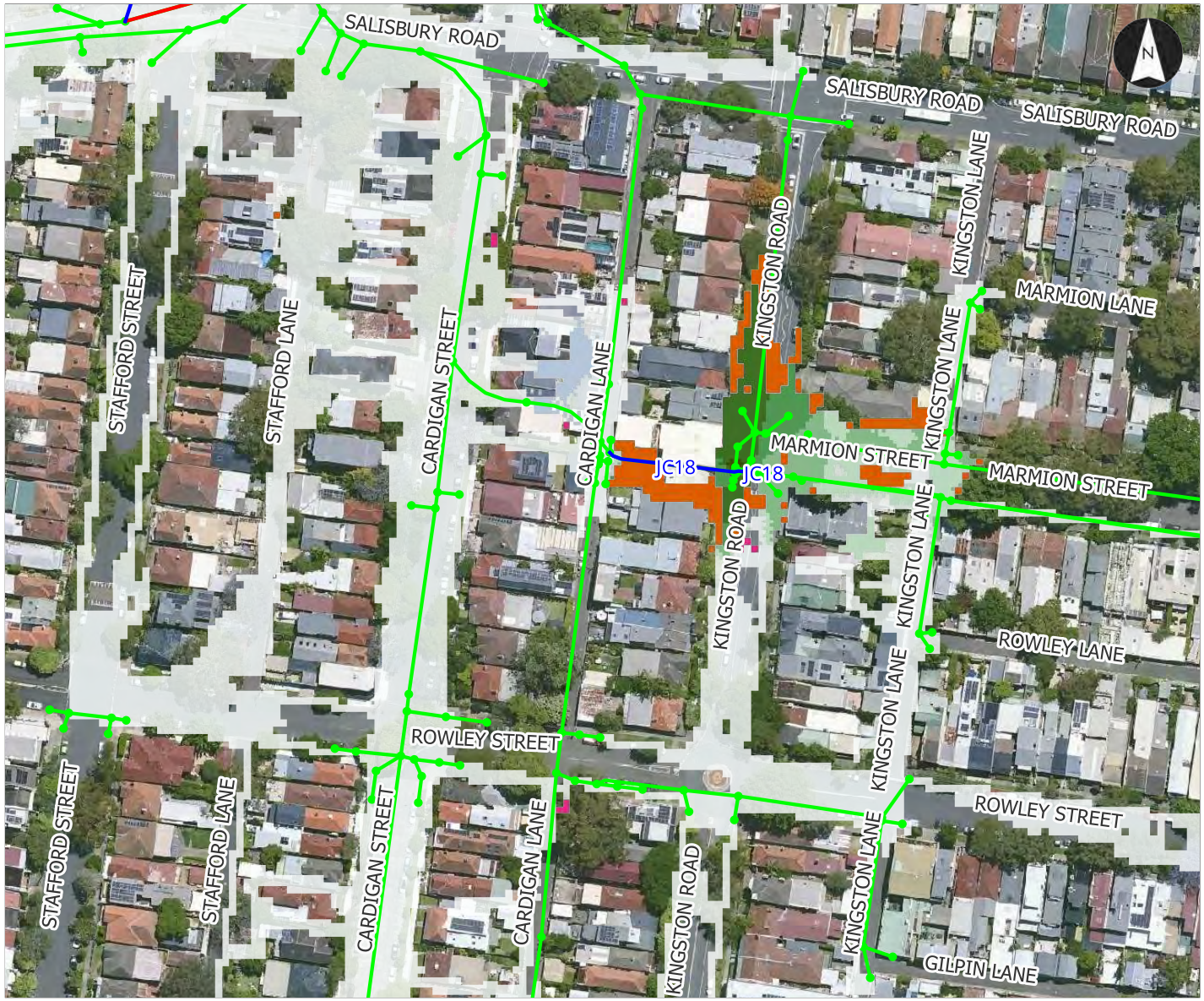


Johnstons Creek Option 20% AEP
JC18 v3 Kingston Road Drainage Upgrade

Project: Whites Creek and Johnstons creek FRMS&P

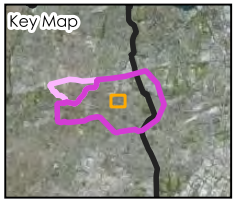
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 74

Legend

- MJC Study Area
- IWC LGA Boundary
- Drainage Option
- Proposed Drainage
- Removed Drainage
- Existing Drainage

MJC_5y_JC18_v3-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_5y_JC18_v3-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



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Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

12 0 12 24 36 48 m

Scale at A3: 1:1500

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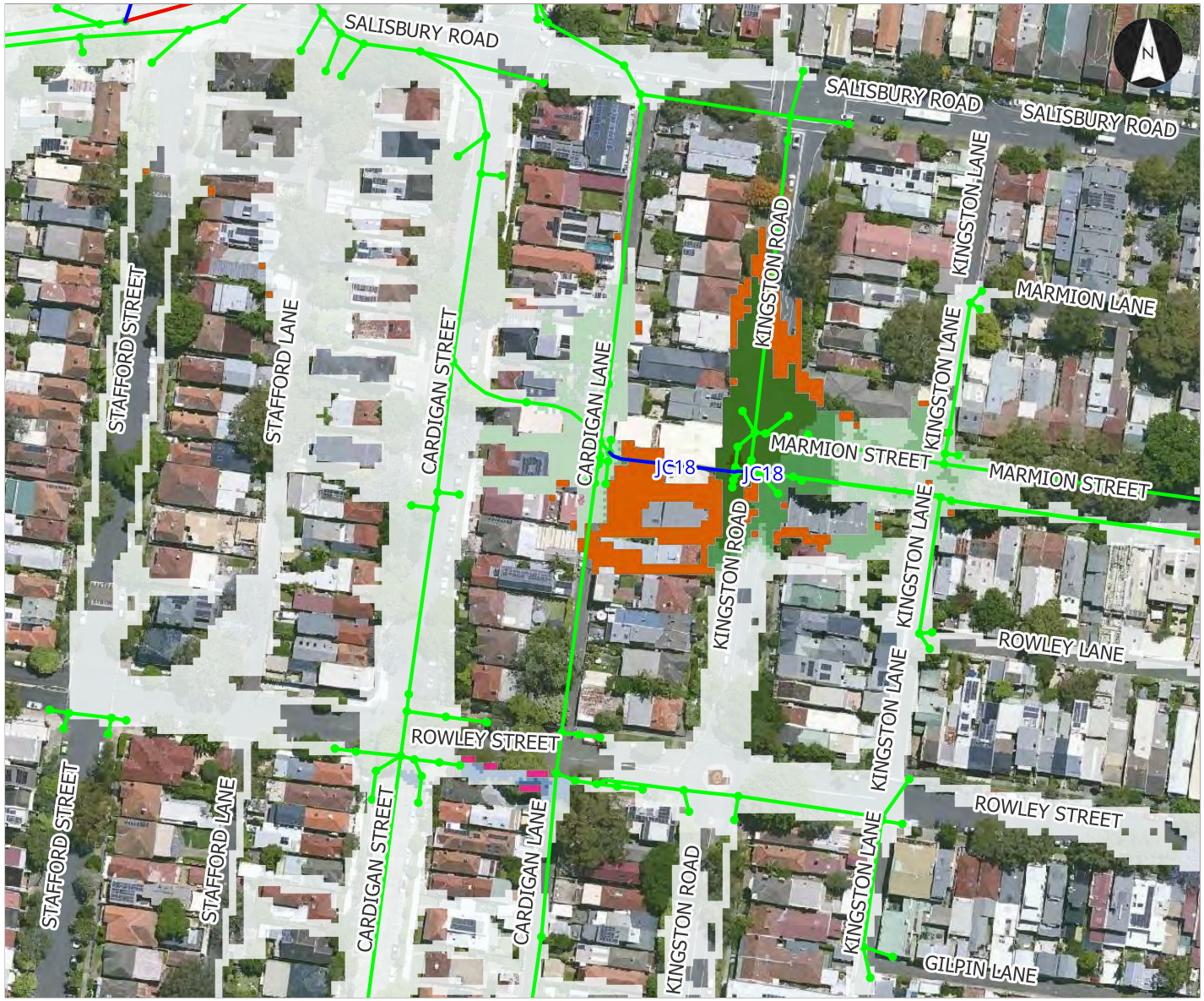


Johnstons Creek Option 5% AEP
JC18 v3 Kingston Road Drainage Upgrade

Project: Whites Creek and Johnstons creek FRMS&P

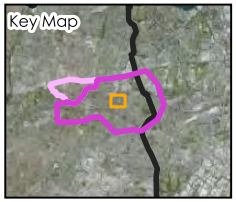
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 75

Legend

- MJC Study Area
- IWC LGA Boundary
- Drainage Option
- Proposed Drainage
- Removed Drainage
- Existing Drainage

MJC_20y_JC18_v3-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_20y_JC18_v3-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



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Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

12 0 12 24 36 48 m

Scale at A3: 1:1500

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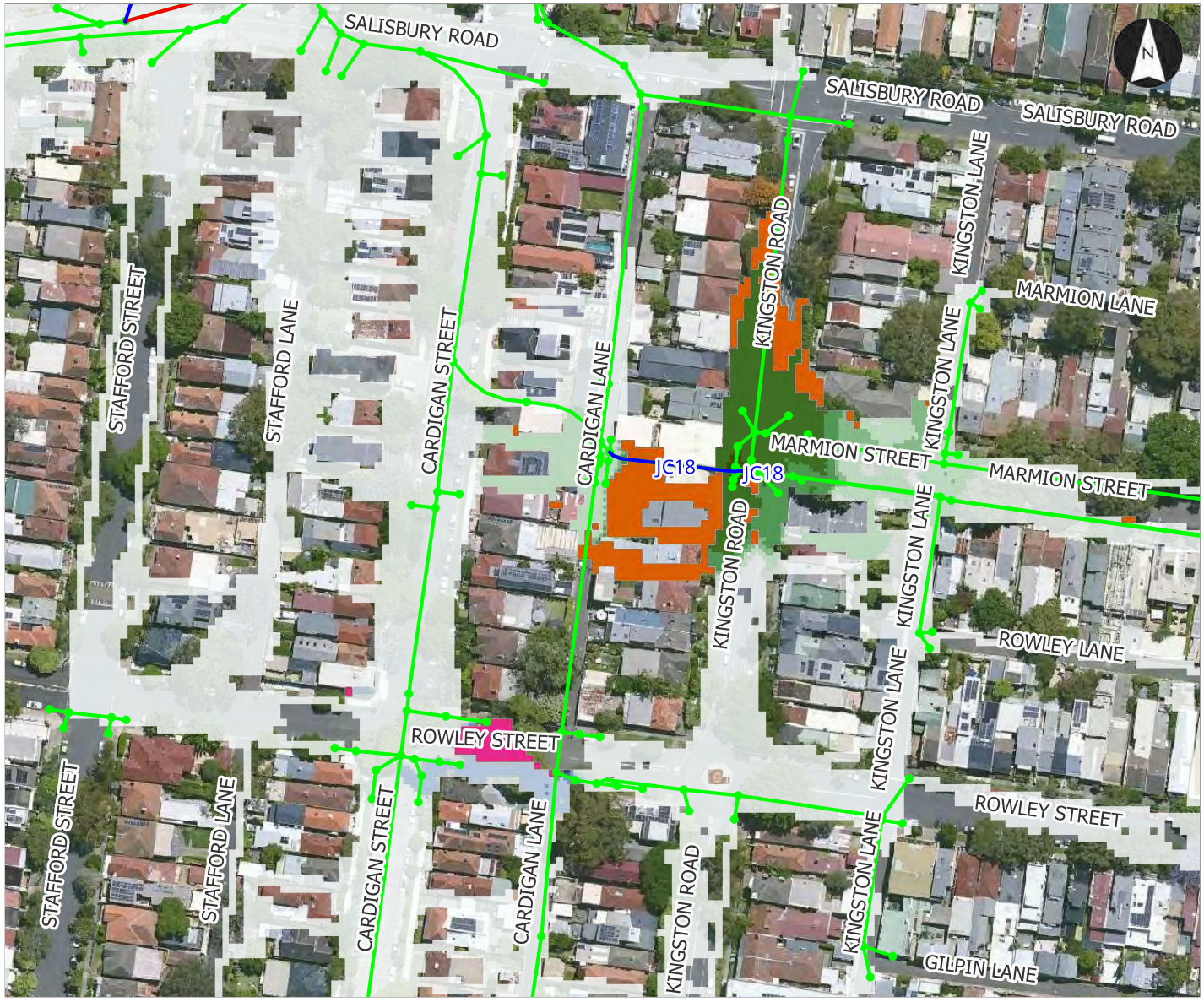


Johnstons Creek Option 2% AEP
JC18 v3 Kingston Road Drainage Upgrade

Project: Whites Creek and Johnstons creek FRMS&P

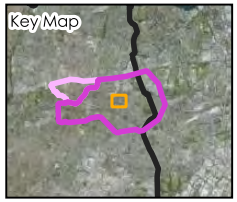
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 76

Legend

- MJC Study Area
- IWC LGA Boundary
- Drainage Option
- Proposed Drainage
- Removed Drainage
- Existing Drainage

MJC_50y_JC18_v3-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_50y_JC18_v3-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



DRAFT - Not For Construction

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

12 0 12 24 36 48 m

Scale at A3: 1:1500

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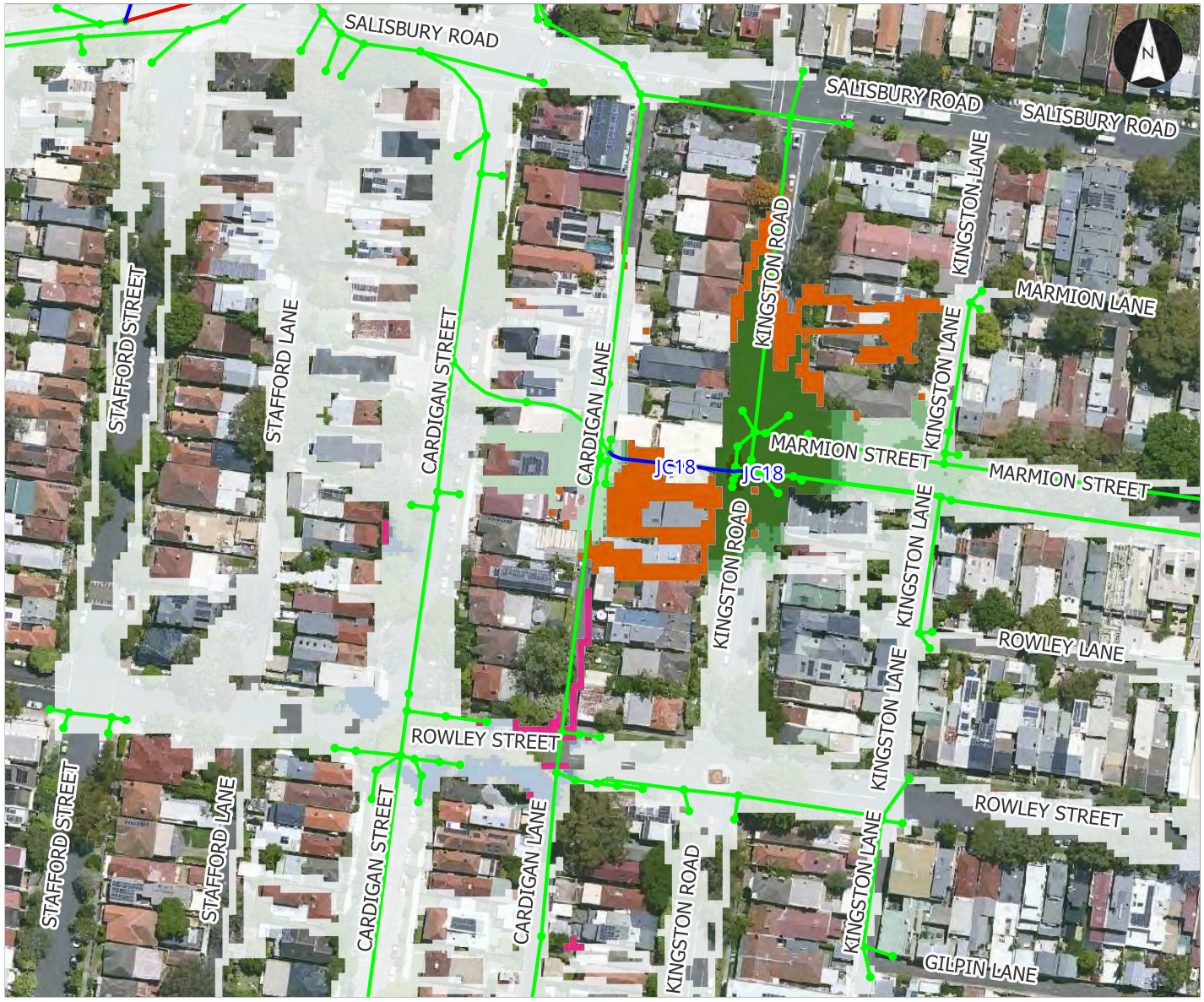


Johnstons Creek Option 1% AEP
JC18 v3 Kingston Road Drainage Upgrade

Project: Whites Creek and Johnstons creek FRMS&P

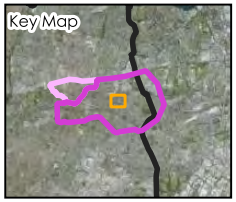
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 77

Legend

- MJC Study Area
- IWC LGA Boundary
- Drainage Option
- Proposed Drainage
- Removed Drainage
- Existing Drainage

MJC_100y_JC18_v3-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_100y_JC18_v3-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



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Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

12 0 12 24 36 48 m

Scale at A3: 1:1500

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Johnstons Creek Option PMF
JC18 v3 Kingston Road Drainage Upgrade

Project: Whites Creek and Johnstons creek FRMS&P

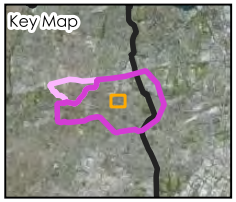
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 78

Legend

- MJC Study Area
- IWC LGA Boundary
- Drainage Option
- Proposed Drainage
- Removed Drainage

MJC_PMF_JC18_v3-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_PMF_JC18_v3-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



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Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

12 0 12 24 36 48 m

Scale at A3: 1:1500

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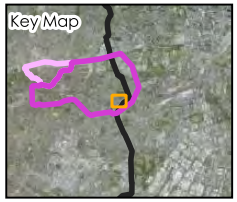
Johnstons Creek Option - JC20 v2 Overview

Project: Whites Creek and Johnstons creek FRMS&P

Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 79

Legend

- MJC Study Area
- IWC LGA Boundary
- Proposed Drainage
- Existing Drainage



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Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

12 0 12 24 36 48 m

Scale at A3: 1:1500

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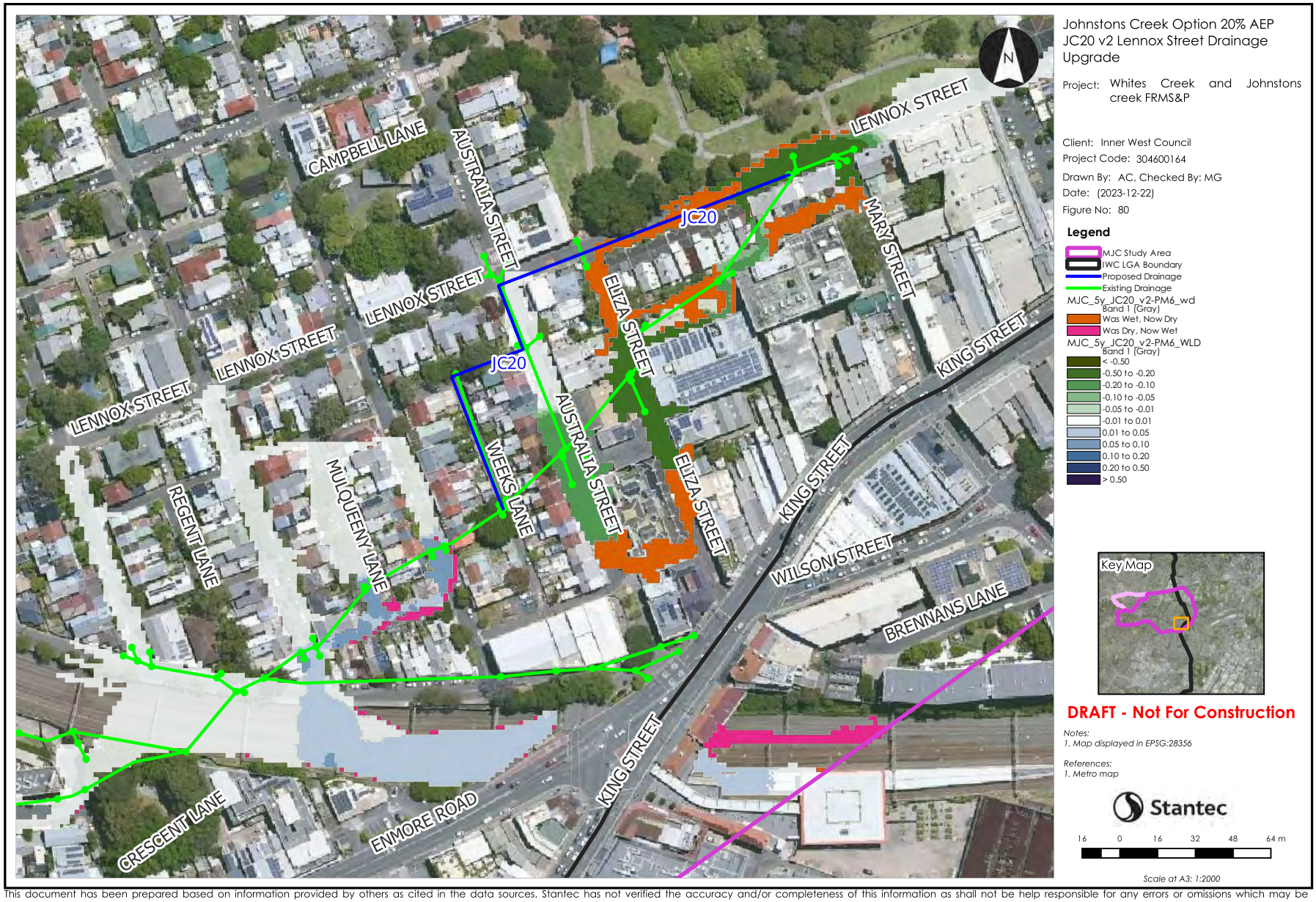

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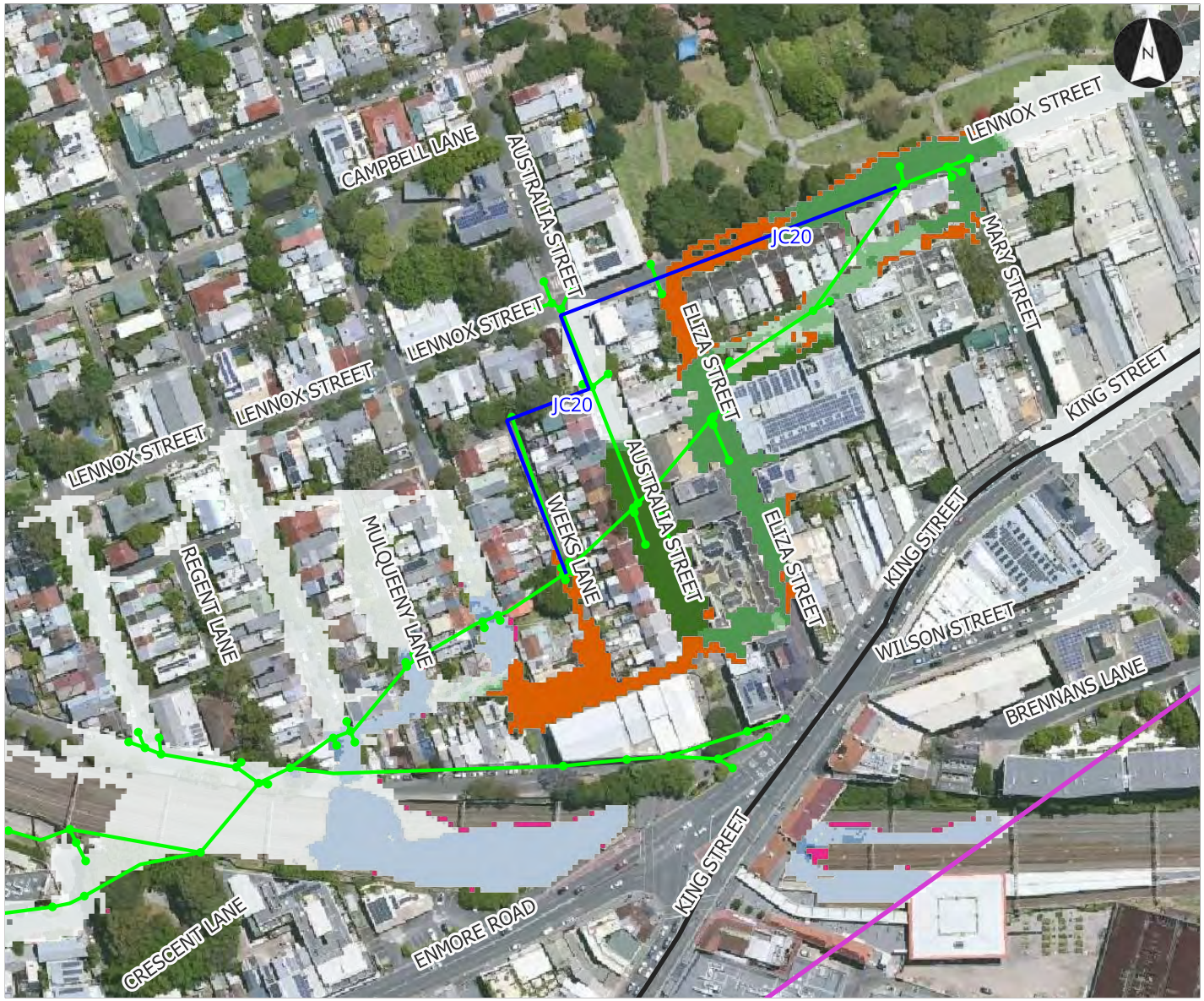


Johnstons Creek Option 5% AEP
JC20 v2 Lennox Street Drainage Upgrade

Project: Whites Creek and Johnstons creek FRMS&P

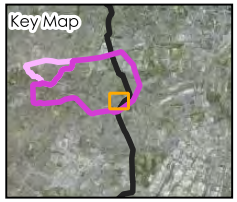
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 81

Legend

- MJC Study Area
- IWC LGA Boundary
- Proposed Drainage
- Existing Drainage

MJC_20y_JC20_v2-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_20y_JC20_v2-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



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Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

16 0 16 32 48 64 m

Scale at A3: 1:2000

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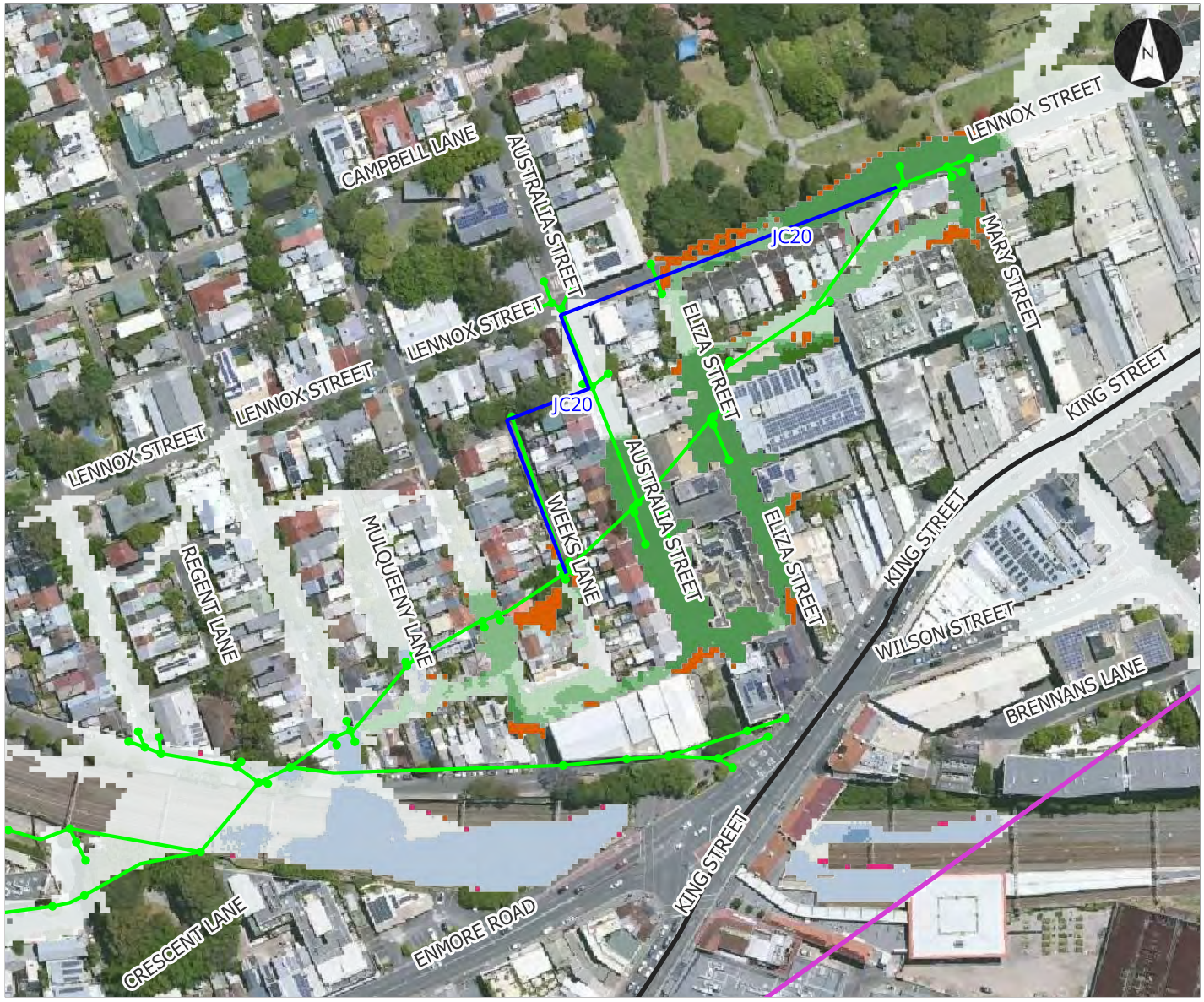


Johnstons Creek Option 2% AEP
JC20 v2 Lennox Street Drainage Upgrade

Project: Whites Creek and Johnstons creek FRMS&P

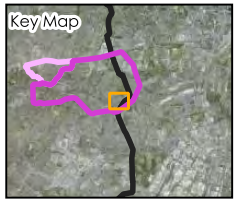
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 82

Legend

- MJC Study Area
- IWC LGA Boundary
- Proposed Drainage
- Existing Drainage

MJC_50y_JC20_v2-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_50y_JC20_v2-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



DRAFT - Not For Construction

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

16 0 16 32 48 64 m

Scale at A3: 1:2000

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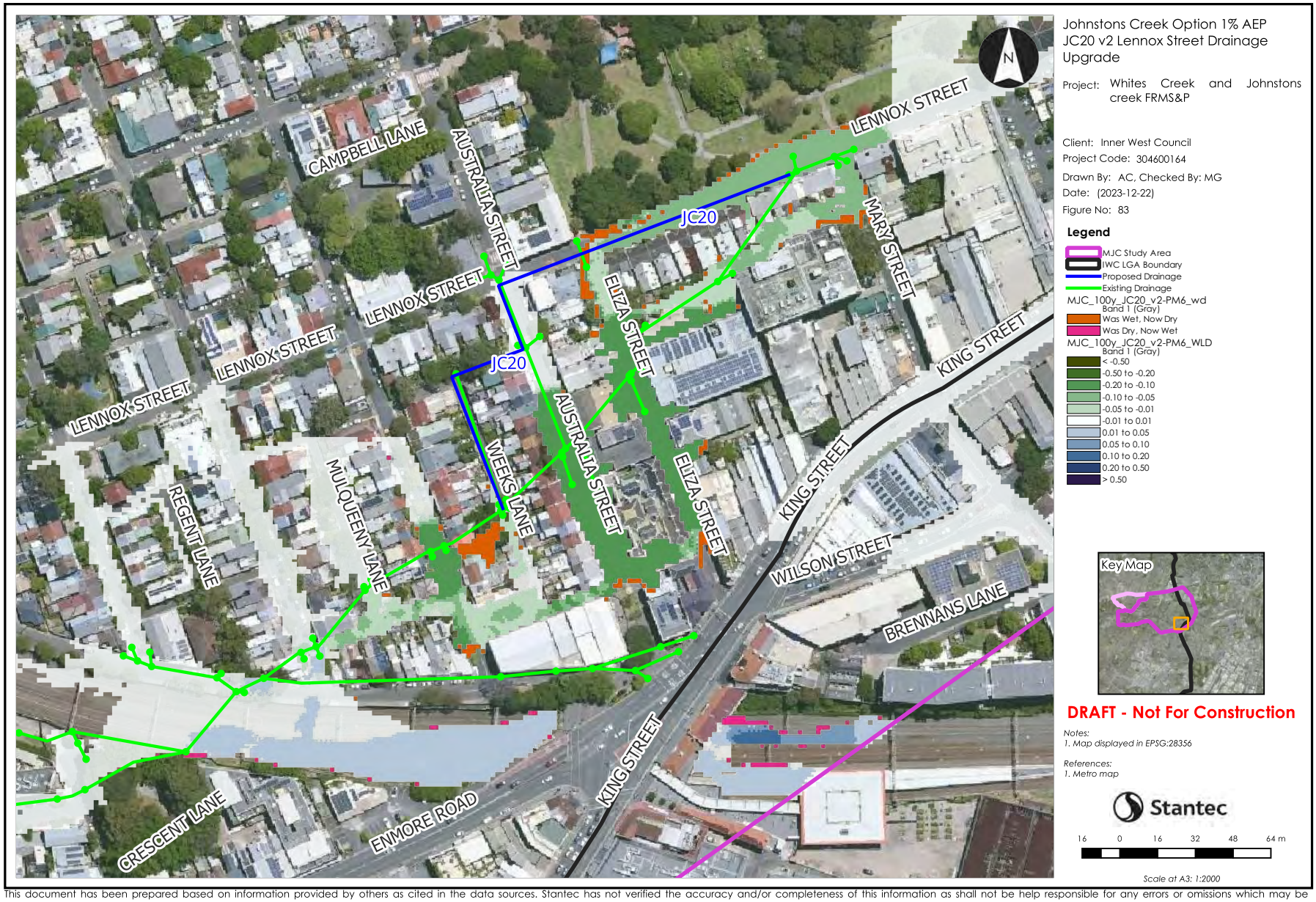

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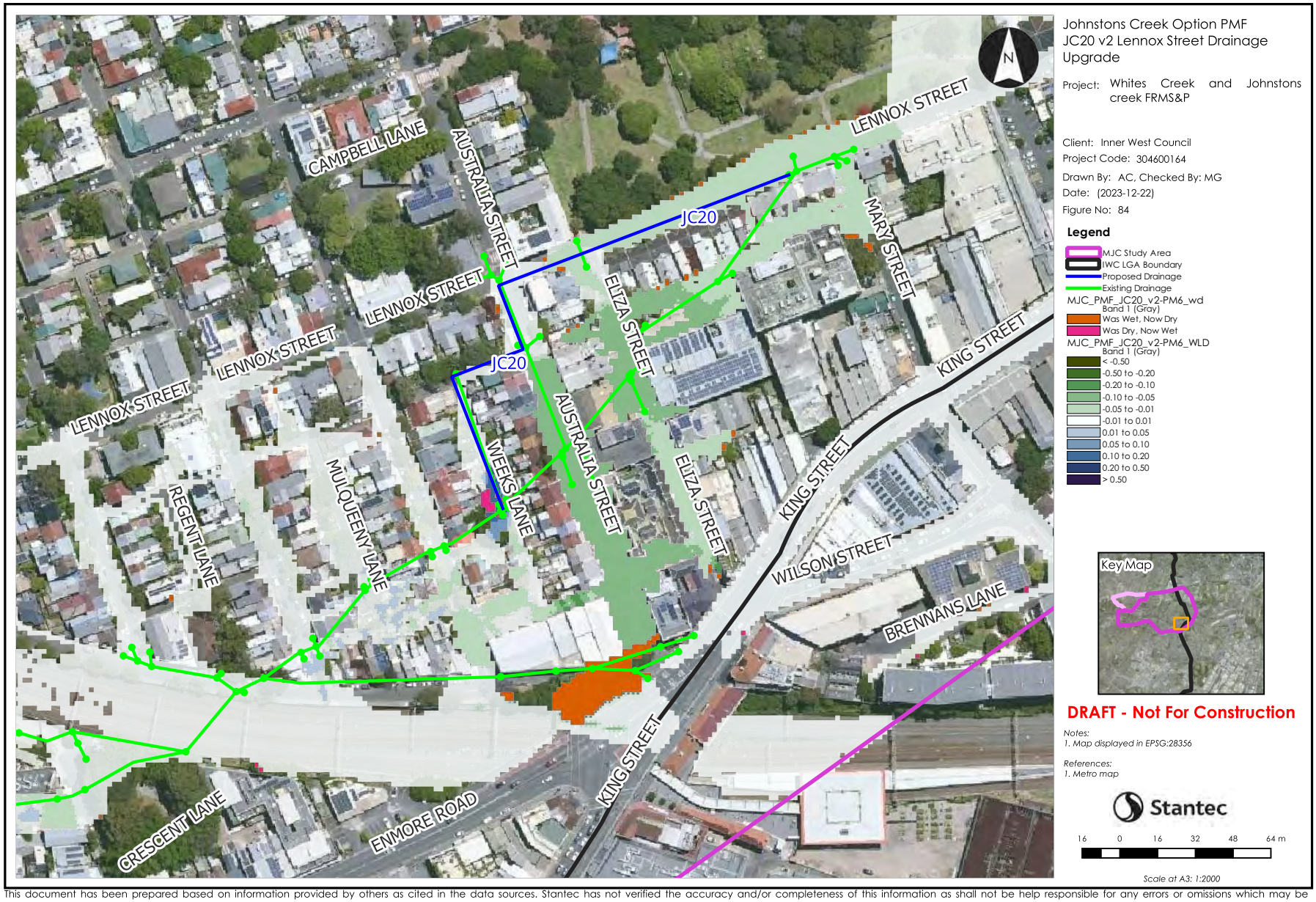

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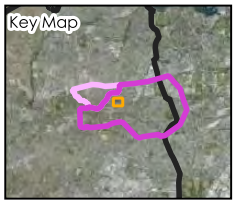
Johnstons Creek Option - JC23 v1 Overview

Project: Whites Creek and Johnstons creek FRMS&P

Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 85

Legend

- MJC Study Area
- IWC LGA Boundary
- Proposed Drainage
- Existing Drainage



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Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

8 0 8 16 24 32 m

Scale at A3: 1:1000

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Johnstons Creek Option 20% AEP
JC23 v1 Clarendon Lane Drainage Upgrade

Project: Whites Creek and Johnstons creek FRMS&P

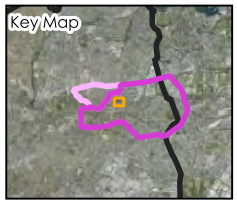
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 86

Legend

- MJC Study Area
- IWC LGA Boundary
- Proposed Drainage
- Existing Drainage

MJC_5y_JC23_v1-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_5y_JC23_v1-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



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Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

8 0 8 16 24 32 m

Scale at A3: 1:1000

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Johnstons Creek Option 5% AEP
JC23 v1 Clarendon Lane Drainage Upgrade

Project: Whites Creek and Johnstons creek FRMS&P

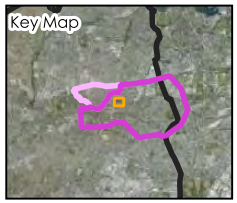
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 87

Legend

- MJC Study Area
- IWC LGA Boundary
- Proposed Drainage
- Existing Drainage

MJC_20y_JC23_v1-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_20y_JC23_v1-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



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Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

8 0 8 16 24 32 m

Scale at A3: 1:1000

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Johnstons Creek Option 2% AEP
JC23 v1 Clarendon Lane Drainage Upgrade

Project: Whites Creek and Johnstons creek FRMS&P

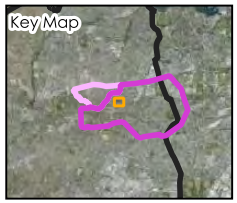
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 88

Legend

- MJC Study Area
- IWC LGA Boundary
- Proposed Drainage
- Existing Drainage

MJC_50y_JC23_v1-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_50y_JC23_v1-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



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Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

8 0 8 16 24 32 m

Scale at A3: 1:1000

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Johnstons Creek Option 1% AEP
JC23 v1 Clarendon Lane Drainage Upgrade

Project: Whites Creek and Johnstons creek FRMS&P

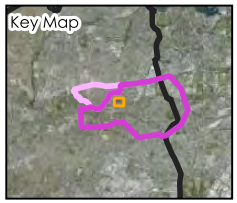
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 89

Legend

- MJC Study Area
- IWC LGA Boundary
- Proposed Drainage
- Existing Drainage

MJC_100y_JC23_v1-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_100y_JC23_v1-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



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Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

8 0 8 16 24 32 m

Scale at A3: 1:1000

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Johnstons Creek Option PMF
JC23 v1 Clarendon Lane Drainage Upgrade

Project: Whites Creek and Johnstons creek FRMS&P

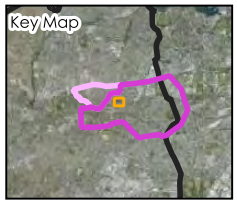
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 90

Legend

- MJC Study Area
- IWC LGA Boundary
- Proposed Drainage
- Existing Drainage

MJC_PMF_JC23_v1-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MJC_PMF_JC23_v1-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



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Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

8 0 8 16 24 32 m

Scale at A3: 1:1000

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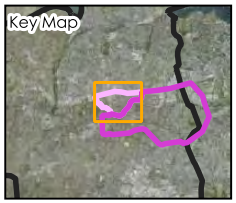
Whites Creek Base Case - PM6 Overview

Project: Whites Creek and Johnstons creek FRMS&P

Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 91

Legend

- MJC Study Area
- MWC Study Area
- IWC LGA Boundary
- Unblocked Drainage
- Blocked Drainage, Now Unblocked



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Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

40 0 40 80 120 160 m

Scale at A3: 1:5000

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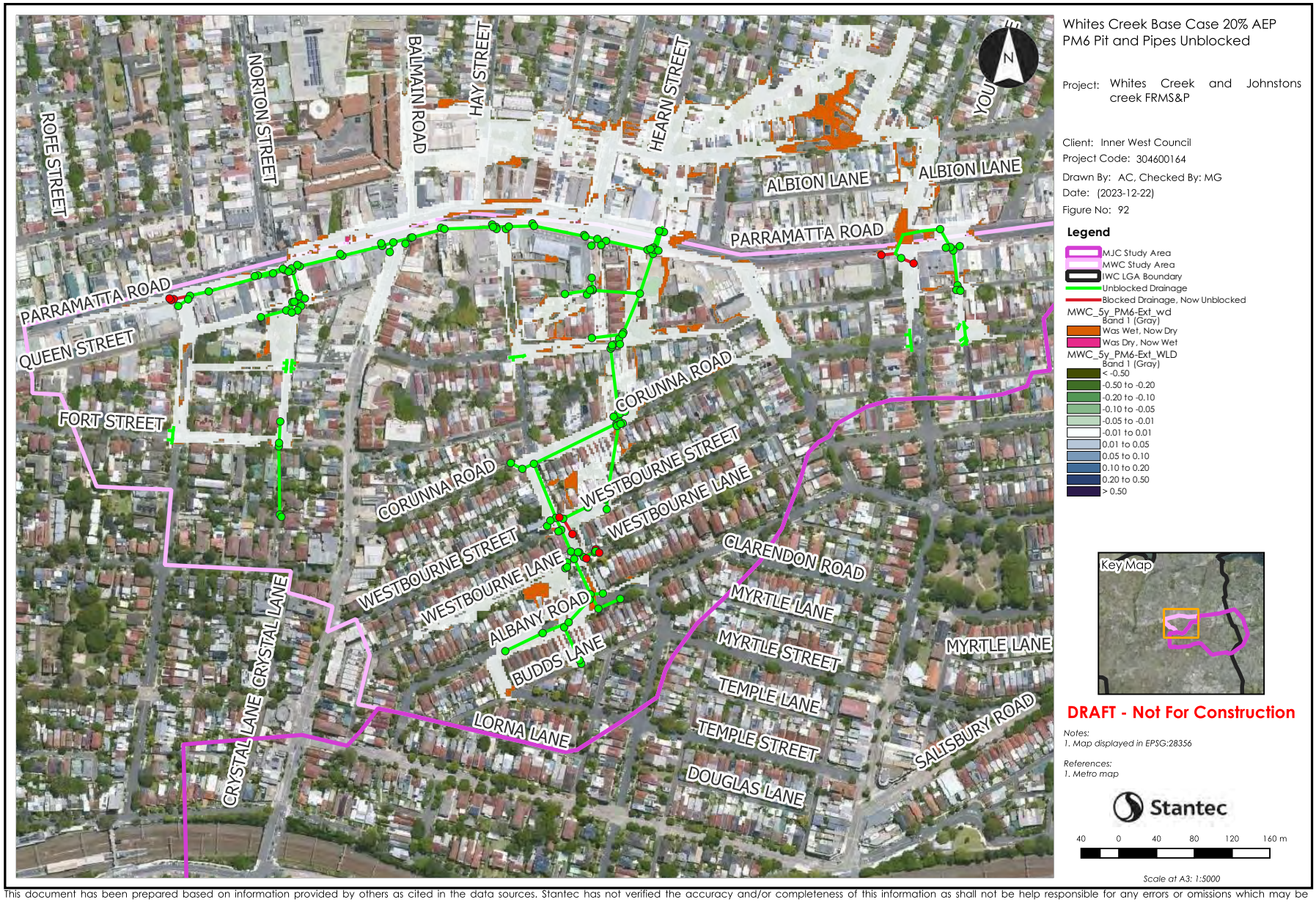

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Whites Creek Base Case 5% AEP
PM6 Pit and Pipes Unblocked

Project: Whites Creek and Johnstons creek FRMS&P

Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 93

Legend

- MJC Study Area
- MWC Study Area
- IWC LGA Boundary
- Unblocked Drainage
- Blocked Drainage, Now Unblocked

MWC_20y_PM6-Ext_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MWC_20y_PM6-Ext_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50

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Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

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40 0 40 80 120 160 m

Scale at A3: 1:5000

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Whites Creek Base Case 1% AEP
PM6 Pit and Pipes Unblocked

Project: Whites Creek and Johnstons creek FRMS&P

Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 95

Legend

- MJC Study Area
- MWC Study Area
- IWC LGA Boundary
- Unblocked Drainage
- Blocked Drainage, Now Unblocked

MWC_100y_PM6-Ext_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MWC_100y_PM6-Ext_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50

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Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

40 0 40 80 120 160 m

Scale at A3: 1:5000

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Whites Creek Base Case PMF
PM6 Pit and Pipes Unblocked

Project: Whites Creek and Johnstons creek FRMS&P

Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 96

Legend

- MJC Study Area
- MWC Study Area
- IWC LGA Boundary
- Unblocked Drainage
- Blocked Drainage, Now Unblocked

MWC_PMF_PM6-Ext_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MWC_PMF_PM6-Ext_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50

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Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Stantec

40 0 40 80 120 160 m

Scale at A3: 1:5000

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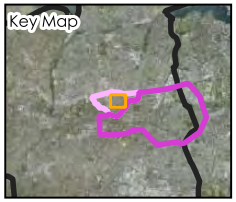
Whites Creek Option -
WC1 v5 Overview

Project: Whites Creek and Johnstons creek FRMS&P

Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 97

Legend

- MWC Study Area
- IWC LGA Boundary
- Proposed Drainage
- Existing Drainage



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Notes:
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References:
1. Metro map

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13 0 13 26 38 51 m

Scale at A3: 1:1600

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Whites Creek Option 20% AEP
WC1 v5 Albany Road Drainage Upgrade

Project: Whites Creek and Johnstons creek FRMS&P

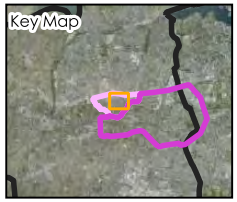
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 98

Legend

- MJC Study Area
- MWC Study Area
- IWC LGA Boundary
- Proposed Drainage
- Existing Drainage

MWC_5y_WC1_v5-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MWC_5y_WC1_v5-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



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Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

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16 0 16 32 48 64 m

Scale at A3: 1:2000

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Whites Creek Option 5% AEP
WC1 v5 Albany Road Drainage Upgrade

Project: Whites Creek and Johnstons creek FRMS&P

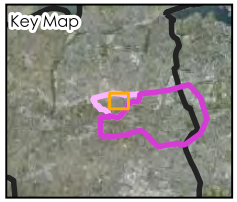
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 99

Legend

- MJC Study Area
- MWC Study Area
- IWC LGA Boundary
- Proposed Drainage
- Existing Drainage

MWC_20y_WC1_v5-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MWC_20y_WC1_v5-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



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References:
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Whites Creek Option 2% AEP
WC1 v5 Albany Road Drainage Upgrade

Project: Whites Creek and Johnstons creek FRMS&P

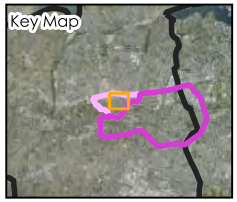
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 100

Legend

- MJC Study Area
- MWC Study Area
- IWC LGA Boundary
- Proposed Drainage
- Existing Drainage

MWC_50y_WC1_v5-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MWC_50y_WC1_v5-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



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References:
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Whites Creek Option 1% AEP
WC1 v5 Albany Road Drainage Upgrade

Project: Whites Creek and Johnstons creek FRMS&P

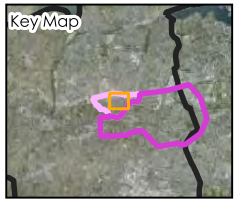
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 101

Legend

- MJC Study Area
- MWC Study Area
- IWC LGA Boundary
- Proposed Drainage
- Existing Drainage

MWC_100y_WC1_v5-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MWC_100y_WC1_v5-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



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Whites Creek Option PMF
WC1 v5 Albany Road Drainage Upgrade

Project: Whites Creek and Johnstons creek FRMS&P

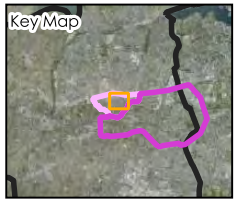
Client: Inner West Council
Project Code: 304600164
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 102

Legend

- MJC Study Area
- MWC Study Area
- IWC LGA Boundary
- Proposed Drainage
- Existing Drainage

MWC_PMF_WC1_v5-PM6_wd
Band 1 (Gray)
- Was Wet, Now Dry
- Was Dry, Now Wet

MWC_PMF_WC1_v5-PM6_WLD
Band 1 (Gray)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50



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Scale at A3: 1:2000

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APPENDIX

F

MCA SCORING AND IMPLEMENTATION

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Table - Multi-Criteria Assessment – Scoring System

Category	Criterion	Weighting	Description of Criterion Assessment	Score				
				-2	-1	0	1	2
Economic	Benefit-Cost Ratio	20%	The cost effectiveness of the scheme, i.e. the tangible return on investment	0 to 0.25	0.25 to 0.5	0.5 to 1.5	1.5 to 3.0	>3.0
	Reduction in Risk to Property	5%	Based on reduction in AAD, it establishes the tangible benefit of an option	Major increase in AAD (>$200,000)	Slight increase in AAD ($200k to $100k)	Negligible Improvement (less than $100k AAD impact)	Slight decrease in AAD ($200k to $100k)	Major decrease in AAD ($>200,000)
	Technical Feasibility	10%	Establishes the feasibility of options based on likely service constraints, environmental hazards, and programming contingincies such as land acquisition or agreements with external agencies	There are a number of significant factors that pose an impact on the feasibility of the project	There is a single significant factor or multiple smaller factors that pose a potential impact on the feasibility of the project	May or may not be feasible	Likely to be feasible with management of constraints	Very likely to be feasible with no significant restraint
	Implementation Complexity	5%	Ease of constructability within Council's standard Capital Works Planning	Construction timeframe greater than 1 year Project can not be broken down into sequential components	Construction timeframe greater than	Key components can be completed in isolation within 12 months	Overall construction timeframe less than 12 months Minor components can be staged	Construction timeframe less than 6 months Major components can be staged
	Adaptability and long-term performance	10%	The impact the option will have both in terms of feasibility, benefits and cost over the life of the option, and adaptability to climate change conditions	Significantly diminished performance long-term or under climate change	Slightly diminished performance long-term or under climate change	Unchanged performance long-term or under climate change	Unchanged or improved performance long-term or under climate change with minor ongoing costs	Unchanged or improved performance long-term or under climate change with negligible ongoing costs
Social	Reduction in Risk to Life	15%	The impact on risk to life from the 20% AEP up to the PMF event	Widespread or significant localised increase in risk to life	Localised or slight increase in risk to life	Negligible change in risk to life	Localised or slight reduction of risk to life	Widespread or significant localised reduction of risk to life
	Emergency Access and Evacuation	10%	The impact on the ability to evacuate or for NSW SES or emergency services under extreme flood conditions	Widespread or significant localised impact on evacuation and emergency services	Localised or slight localised impact on evacuation and emergency services	Negligible impact on evacuation and emergency services	Localised or slight improvement for evacuation and emergency services	Widespread or significant localised improvement for evacuation and emergency services
	Social Disruption and Public Open Spaces	5%	The impact of the risk management option on social disruption and the use of public spaces	Signficiant increase in the frequency of flooding or limitation of the use of a public space or causes significant social disruption	Increase in the frequency of flooding or limitation of the use of a public space or causes social disruption	Negligible impact on public space or social disruption	Reduces the frequency of flooding or provides enhanced use of a public space or causes social benefit	Significantly reduces the frequency of flooding or enhanced use of a public space or causes significant social benefit
	Community and Stakeholder Support	10%	Support for the option based on FRM Committee meeting, stakeholder engagement and community consultation outcomes	Strong opposition to the option in multiple submissions	Slight opposition to the option	No response	Slight support to the option	Significant support to the option
Environment	Impact on Fauna/Flora	5%	Likely impacts on Threatened Ecological Communities and Threatened Species	High negative impact	Slight negative impact	Negligible impact	Some benefit	Considerable benefit
	Impact on Heritage	5%	Impact to Heritage items	Likely impact on State, National, or Aboriginal Heritage item	Likely impact or increased impact on a local heritage item	No impact	Reduces the impact of flooding to heritage item or heritage conservation area	Heritage item no longer flooded

Table - Multi Criteria Assessment Outcomes – Flood Modification Options - Johnstons Creek and Whites Creek

Category	Criterion	Weighting	Description of Criterion Assessment	JC1 – Fowler Street Drainage Upgrade		JC1 – Fowler Street Detention Basin		JC5 – Bridge Road Drainage Upgrade		JC6 – Bridge Road Channel Regrading		JC6– Bridge Road Channel Widening	
				Score	Comment	Score	Comment	Score	Comment	Score	Comment	Score	Comment
Economic	Benefit-Cost Ratio	20%	The cost effectiveness of the scheme, i.e. the tangible return on investment	2	BCR = 3.98	0	BCR = 1.12	-1	BCR = 0.27	2	BCR = 3.76	0	BCR = 1.36
	Reduction in Risk to Property	5%	Based on reduction in AAD, it establishes the tangible benefit of an option	1	AAD increase $100k-200k	1	AAD increase $100k-200k	1	AAD increase $100k-200k	2	AAD increase >$200k	2	AAD increase >$200k
	Technical Feasibility	10%	Establishes the feasibility of options based on likely service constraints, environmental hazards, and programming contingincies such as land acquisition or agreements with external agencies	0	Two utility (Sydney Water Main and Sewer) services crossing proposed option, and close proximity to various other utilities in three areas such as other Sydney Water assets, Sydney Trains HV and NBN though drainage lengths are short. Can be feasible depending on clearance between the channel and utilties or possible relocation.	0	Two utility (Sydney Water Main and Sewer) services crossing proposed option, and close proximity to various other utilities in three areas such as other Sydney Water assets, Sydney Trains HV and NBN though drainage lengths are short. Can be feasible depending on clearance between the channel and utilties or possible relocation.	-2	Long sections of drainage works with close proximity alongside and crossing utilities in multiple locations such as Sydney Water assets, NBN. Can be feasible depending on clearance between the channel and utilties or possible relocation.	-2	Vocus assets in close proximity running alongside the channel is likely to be impacted due to regrading. Highly constrained channel with residential and commercial buildings on either side. Stabilisation required due to close proximity of buildings to the channel.	-2	Vocus assets in close proximity running alongside the channel will be impacted due to widening. Property impacts up to 3m for multiple commercial lots and buildings, may require stabilisation or demolition. Can be feasible depending on clearance between existing pipes and utilties or possible relocation. Stabilisation may be required due to close proximity of buildings to the channel.
	Implementation Complexity	5%	Ease of constructability within Council's standard Capital Works Planning	2	Construction timeframe less than 6 months, minor drainage upgrades only	2	Construction timeframe less than 6 months, can easily stage the drainage works at different locations and detention basin within Council owned land	-2	Construction timeframe greater than 12 months, large culvert size and various utility coordinations required	-2	Highly constrained channel with residential and commercial buildings on either side. Sydney Water owned channel, approvals required	-2	Highly constrained channel with residential and commercial buildings on either side. Sydney Water owned channel, approvals required. Commercial property acquisitions and stabilization required.
	Adaptability and long-term performance	10%	The impact the option will have both in terms of feasibility, benefits and cost over the life of the option, and adaptability to climate change conditions	0	Climate change may increase frequency of flooding (considering a lifespan of 30-50 years), though this option will help to reduce that flooding severity	0	Climate change may increase frequency of flooding (considering a lifespan of 30-50 years), though this option will help to reduce that flooding severity	0	Climate change may increase frequency of flooding (considering a lifespan of 30-50 years), though this option will help to reduce that flooding severity	0	Climate change may increase frequency of flooding (considering a lifespan of 30-50 years), though this option will help to reduce that flooding severity	0	Climate change may increase frequency of flooding (considering a lifespan of 30-50 years), though this option will help to reduce that flooding severity
Social	Reduction in Risk to Life	15%	The impact on risk to life from the 20% AEP up to the PMF event	-1	Slight reductions in water level in localised H4-H5 spots. Increase to H5 in PMF	2	Significiant decreases in H3 areas downstream with increases in H4-H6 areas due to the detention basin (majority within public open spaces)	1	Slight reductions in upstream H5 along Bridge Rd, with slight increases in downstream H3 areas. Slight increases to H5 in 20% AEP	2	Slight reductions in H5 on Cardigan St in 1% and 20% AEP	2	Significant reduction in H5 on Cardigan St in 1% and 20% AEP
	Emergency Access and Evacuation	10%	The impact on the ability to evacuate or for NSW SES or emergency services under extreme flood conditions	-1	Slight and balanced increases and decreases in road corridor. Overall increase across events on Australia Street	1	Slight and balanced increases and decreases in road corridor	1	Slight reductions throughout Bridge Rd and also on Salisbury Rd	2	Reductions in the surrounding road corridor and access to inundated properties	2	Reductions in the surrounding road corridor and access to inundated properties
	Social Disruption and Public Open Spaces	5%	The impact of the risk management option on social disruption and the use of public spaces	0	Reduced flooding on Camperdown Oval. Some increases to the road corridor	-1	Increased flooding on Camperdown Oval. Also short term closure of Camperdown Oval for drainage works	0	Increases and decreases in road corridor	1	Reductions in the surrounding road corridor	1	Reductions in the surrounding road corridor
	Community and Stakeholder Support	10%	Support for the option based on FRM Committee meeting, stakeholder engagement and community consultation outcomes	0	No response	0	No response	2	Noted area of flooding from responses in Flood Study, Council acknowledged area of flooding	-1	Involves Sydney Water Asset in the stormwater channel to be altered. In noted area of flooding from the Flood Study	-1	Involves Sydney Water Asset in the stormwater channel to be altered. In noted area of flooding from the Flood Study
Environment	Impact on Fauna/Flora	5%	Likely impacts on Threatened Ecological Communities and Threatened Species	0	Potential slight negative impacts (temporary) to nearby trees due to drainage works	-1	Potential slight impacts to threatened mammalia species in Camperdown Oval, nearby trees/parklands due to drainage works	0	Negligible known impacts on fauna and flora	0	Negligible known impacts on fauna and flora	0	Negligible known impacts on fauna and flora
	Impact on Heritage	5%	Impact to Heritage items	1	Reduces the impact of flooding to heritage conservation area. HCA 11 North Kingston Estate Heritage Conservation Area	1	Slightly reduces the impact of flooding to heritage conservation area. HCA 11 North Kingston Estate Heritage Conservation Area	0	Both positive and negative impacts to flooding in different locations within heritage conservation area. HCA 8 Cardigan Street Heritage Conservation Area	1	Reduces the impact of flooding to heritage conservation area. HCA 8 Cardigan Street Heritage Conservation Area	1	Reduces the impact of flooding to heritage conservation area. HCA 8 Cardigan Street Heritage Conservation Area
Total Score (from -22 to 22				**4**		**5**		**0**		**5**		**3**	
Total Weighted Score (from -2.00 to 2.00)				**0.35**		**0.50**		**0.00**		**0.70**		**0.30**	

Category	Criterion	Weighting	Description of Criterion Assessment	JC7 – Bridge Road Detention Basin		JC10– Trafalgar Street Drainage Upgrade		JC13 – Gladstone Street Drainage Upgrade		JC14 – Railway Street Road Regrading		JC15 – Probert Street Drainage Upgrade	
				Score	Comment	Score	Comment	Score	Comment	Score	Comment	Score	Comment
Economic	Benefit-Cost Ratio	20%	The cost effectiveness of the scheme, i.e. the tangible return on investment	2	BCR = 5.50	-2	BCR = 0.09	2	BCR = 4.00	1	BCR = 2.36	2	BCR = 3.92
	Reduction in Risk to Property	5%	Based on reduction in AAD, it establishes the tangible benefit of an option	2	AAD increase >$200k	0	AAD increase <$100k	2	AAD increase >$200k	2	AAD increase >$200k	1	AAD increase $100k-200k
	Technical Feasibility	10%	Establishes the feasibility of options based on likely service constraints, environmental hazards, and programming contingincies such as land acquisition or agreements with external agencies	0	Vocus assets in close proximity running alongside detention basin. Unlikely for Vocus assets to be impacted within the private property basement carpark. Straightfoward construction method to convert existing basement parking into detention basin. Property acquisition may be required	2	Three utility (Sydney Water Main/Sewer and NBN) services crossing proposed option, may be feasible depending on clearance between existing pipes and utilties or possible relocation. Short drainage length.	0	Crosses Sydney Water Sewer/Main in one location. Likely to be feasible depending on clearance between existing pipes and utilties or possible relocation.	0	Sydney Water Sewer/Main and Sydney Trains HV under the road regrading section and intersection. May be feasible depending on required adjustments to the intersection, existing cover or relocation/increasing cover.	2	Proximity to Sydney Water assets, unlikely to be impacted. Short drainage length
	Implementation Complexity	5%	Ease of constructability within Council's standard Capital Works Planning	1	Straightforward construction timeframe, though property acquisition is required	1	Straightforward drainage upgrade, though approvals may take time due to connection into ARTC culvert under the railway	-1	Drainage upgrades in multiple locations, can be staged	-1	Road regrading will require utility coordination for multiple assets	2	Construction timeframe less than 6 months, minor drainage upgrades only
	Adaptability and long-term performance	10%	The impact the option will have both in terms of feasibility, benefits and cost over the life of the option, and adaptability to climate change conditions	0	Climate change may increase frequency of flooding (considering a lifespan of 30-50 years), though this option will help to reduce that flooding severity	0	Climate change may increase frequency of flooding (considering a lifespan of 30-50 years), though this option will help to reduce that flooding severity	0	Climate change may increase frequency of flooding (considering a lifespan of 30-50 years), though this option will help to reduce that flooding severity	2	Unlike drainage upgrades, this surface flow diversion will provide more lasting flood mitigation in the event of climate change	0	Climate change may increase frequency of flooding (considering a lifespan of 30-50 years), though this option will help to reduce that flooding severity
Social	Reduction in Risk to Life	15%	The impact on risk to life from the 20% AEP up to the PMF event	2	Slight reductions in H5 on Cardigan St in 1% and 20% AEP	0	Negligible impact	1	Reductions to H5 areas in both 1% and PMF, widespread reductions in flooding	2	Slight reduction to localised H5 in private properties, diverted flow (increases) in road corridor. Both increases and decreases to H5 in PMF. Reduction in flooding near basement carpark entry	1	Slight reduction to H3 in road corridor only. Some increases to H4-H5 in the road corridor for PMF. Reduced flooding of residential properties
	Emergency Access and Evacuation	10%	The impact on the ability to evacuate or for NSW SES or emergency services under extreme flood conditions	2	Reductions in the surrounding road corridor and access to inundated properties	1	Reduction in flooding of roadway	2	Significant reductions in the road corridor at several locations	1	Reduction in flooding near basement carpark entry	1	Slight reduction to H3 in road corridor only. Some increases to H4-H5 in the road corridor for PMF
	Social Disruption and Public Open Spaces	5%	The impact of the risk management option on social disruption and the use of public spaces	1	Reductions in the surrounding road corridor	1	Reduced flooding of rail corridor and train station, improving serviceability of these services	0	Increases and decreases in road corridor	0	Increases and decreases in road corridor	0	Increases and decreases in road corridor
	Community and Stakeholder Support	10%	Support for the option based on FRM Committee meeting, stakeholder engagement and community consultation outcomes	0	Private property impacted. Noted area of flooding from responses in Flood Study, Council acknowledged area of flooding	1	Tying into ARTC assets, reduces flooding of the rail corridor and train station which will be beneficial for ARTC	2	Noted area of flooding from responses in Flood Study, Council acknowledged area of flooding	0	No response	2	Noted area of flooding from responses in Flood Study, Council acknowledged area of flooding
Environment	Impact on Fauna/Flora	5%	Likely impacts on Threatened Ecological Communities and Threatened Species	0	Negligible known impacts on fauna and flora	0	Negligible known impacts on fauna and flora	0	Negligible known impacts on fauna and flora	0	Negligible known impacts on fauna and flora	0	Negligible known impacts on fauna and flora
	Impact on Heritage	5%	Impact to Heritage items	1	Reduces the impact of flooding to heritage conservation area. HCA 8 Cardigan Street Heritage Conservation Area	1	Slightly reduces the impact of flooding to heritage conservation area. HCA 17 Kingston South Heritage Conservation Area	1	Slightly reduces the impact of flooding to heritage conservation area. HCA 7 Kingston West Heritage Conservation Area	0	No impact	1	Slightly reduces the impact of flooding to heritage conservation area. HCA 11 North Kingston Estate Heritage Conservation Area (Newtown/Camperdown)
Total Score (from -22 to 22				**11**		**5**		**9**		**7**		**12**	
Total Weighted Score (from -2.00 to 2.00)				**1.15**		**0.15**		**1.05**		**0.85**		**1.25**	

Category	Criterion	Weighting	Description of Criterion Assessment	JC18 – Kingston Road Drainage Upgrade 1		JC18 – Kingston Road Drainage Upgrade 2 (with upgrades under private properties)		JC20– Lennox Street Drainage Upgrade		JC23 – Clarendon Lane Drainage Upgrade		WC1 – Margaret Street Drainage Upgrade	
				Score	Comment	Score	Comment	Score	Comment	Score	Comment	Score	Comment
Economic	Benefit-Cost Ratio	20%	The cost effectiveness of the scheme, i.e. the tangible return on investment	2	BCR = 8.72	2	BCR = 3.91	2	BCR = 3.64	0	BCR = 0.81	1	BCR = 2.12
	Reduction in Risk to Property	5%	Based on reduction in AAD, it establishes the tangible benefit of an option	2	AAD increase >$200k	2	AAD increase >$200k	2	AAD increase >$200k	0	AAD increase <$100k	2	AAD increase >$200k
	Technical Feasibility	10%	Establishes the feasibility of options based on likely service constraints, environmental hazards, and programming contingincies such as land acquisition or agreements with external agencies	0	Crosses Sydney Water Sewer/Main in one location, short drainage length. Likely to be feasible depending on clearance between existing pipes and utilties or possible relocation.	-1	Crosses Sydney Water Sewer/Main in one location, short drainage length. Likely to be feasible depending on clearance between existing pipes and utilties or possible relocation. Proposed stormwater pipes under the private properties to be upgraded are Sydney Water Assets.	-1	Close proximity of long sections of drainage and crossing of utilities at multiple locations including Sydney Trains HV, NBN and Sydney Water Mains/Sewer. Through multiple local intersections	2	Crosses Sydney Water Main and NBN, short drainage length. Likely to be feasible depending on clearance between existing pipes and utilties or possible relocation.	-1	Crosses multiple services including Sydney Water assets and NBN at 5 locations including under private properties
	Implementation Complexity	5%	Ease of constructability within Council's standard Capital Works Planning	2	Construction timeframe less than 6 months, minor drainage upgrades only	-2	works under private properties, acquisition/easement required, Sydney Water asset so relevant approvals will be required.	-1	Long sections of drainage through multiple intersections, can be staged	2	Construction timeframe less than 6 months, minor drainage upgrades only	-1	works under private properties, acquistion/easement required
	Adaptability and long-term performance	10%	The impact the option will have both in terms of feasibility, benefits and cost over the life of the option, and adaptability to climate change conditions	0	Climate change may increase frequency of flooding (considering a lifespan of 30-50 years), though this option will help to reduce that flooding severity	0	Climate change may increase frequency of flooding (considering a lifespan of 30-50 years), though this option will help to reduce that flooding severity	0	Climate change may increase frequency of flooding (considering a lifespan of 30-50 years), though this option will help to reduce that flooding severity	0	Climate change may increase frequency of flooding (considering a lifespan of 30-50 years), though this option will help to reduce that flooding severity	0	Climate change may increase frequency of flooding (considering a lifespan of 30-50 years), though this option will help to reduce that flooding severity
Social	Reduction in Risk to Life	15%	The impact on risk to life from the 20% AEP up to the PMF event	1	Slight reduction to H3 in road corridor and for commercial and residential properties fronting the intersection	2	Slight reduction H3 in road corridor only and very localised H5 in two properties	2	Slight reduction in H3 in the road corridor (and very localised H5 in small lanes) only. Slight reduction to H4-H5 in PMF	0	Slight reductions to H1 and very localised H2 in low number of private properties	1	Reductions to localised H3. Slight reductions to H5 in PMF
	Emergency Access and Evacuation	10%	The impact on the ability to evacuate or for NSW SES or emergency services under extreme flood conditions	0	Slight reductions in road corridor but H3 only	0	Reductions in road corridor but H3 only	1	Reductions in road corridor but H3 and very localised H5 in local lanes only. Slight reduction to H4-H5 in PMF	0	No impact to road corridor	1	Some reductions on Margaret St but H3 only. Slight reductions to H5 in PMF
	Social Disruption and Public Open Spaces	5%	The impact of the risk management option on social disruption and the use of public spaces	1	Slight decreases in road corridor	2	Decreases in road corridor	2	Decreases in road corridor	0	No impacts to public open spaces	0	Increases and decreases in road corridor
	Community and Stakeholder Support	10%	Support for the option based on FRM Committee meeting, stakeholder engagement and community consultation outcomes	0	Would require tie in to existing Sydney Water asset	-1	Private property and Sydney Water asset impacted	2	a submission noting that road and footpaths on Lennox St are regularly flooded, even during moderate rainfalls and attached a photo from 2 April 2023 showing over flowing drains and gutters.	2	Noted area of nuisance flooding by residents and Council.	0	Private property impacted, however likely support for option for flooding in upper Whites Creek
Environment	Impact on Fauna/Flora	5%	Likely impacts on Threatened Ecological Communities and Threatened Species	-1	Potential slight impacts to threatened mammalia species due to drainage works	-1	Potential slight impacts to threatened mammalia species due to drainage works	0	Negligible known impacts on fauna and flora	0	Potential slight negative impacts (temporary) to nearby trees due to drainage works	0	Negligible known impacts on fauna and flora
	Impact on Heritage	5%	Impact to Heritage items	0	No impact	0	No impact	1	Slightly reduces the impact of flooding to heritage conservation area. HCA 11 North Kingston Estate Heritage Conservation Area (Newtown/Camperdown)	1	Slightly reduces the impact of flooding to heritage conservation area. HCA 6 Annandale Farm Heritage Conservation Area	0	Both positive and negative impacts to flooding in different locations within heritage conservation area. HCA 5 Parramatta Road Commercial Precinct Heritage Conservation Area
			Total Score (from -22 to 22	**7**		**3**		**10**		**7**		**3**	
			Total Weighted Score (from -2.00 to 2.00)	**0.75**		**0.55**		**1.10**		**0.55**		**0.40**	

Table - Multi Criteria Assessment Outcomes – Property Modification and Emergency Management Options - All Sub-Catchments

Category	Criterion	Weighting	Description of Criterion Assessment	Property Modification (PM) Options				Emergency Management (EM) Options							
				PM6 -JC Stormwater System Maintenance		PM6 -WC Stormwater System Maintenance		EM2 - Review of Local Flood Planning and Info to SES		EM3 - Community Flood Awareness		EM5 - Flood Markers and Signage		EM6 - Flood Data and Debrief	
				Score	Comment	Score	Comment	Score	Comment	Score	Comment	Score	Comment	Score	Comment
Economic	Benefit-Cost Ratio	20%	The cost effectiveness of the scheme, i.e. the tangible return on investment	1	JC BCR = 3.61, , though the efficacy of maintenance is dependent on timing, it is difficult to guarantee these benefits	1	WC BCR = 1.58, though the efficacy of maintenance is dependent on timing, it is difficult to guarantee these benefits	0	BCR = 1.0	0	BCR = 1.0	0	BCR = 1.0	0	BCR = 1.0
	Reduction in Risk to Property	5%	Based on reduction in AAD, it establishes the tangible benefit of an option	1	AAD increase >$200k, though the efficacy of maintenance is dependent on timing, it is difficult to guarantee these benefits	0	AAD increase <$100k	0	Unknown impacts on flood damages, conservatively assumed to be negligible	0	Unknown impacts on flood damages, conservatively assumed to be negligible	0	Unknown impacts on flood damages, conservatively assumed to be negligible	0	Unknown impacts on flood damages, conservatively assumed to be negligible
	Technical Feasibility	10%	Establishes the feasibility of options based on likely service constraints, environmental hazards, and programming contingincies such as land acquisition or agreements with external agencies	2	Council would already have a maintenance schedule in place and can consider increasing frequency. However, should be noted that effectiveness of the maintenance schedule of stormwater system is dependent on timing of a rainfall event and may or may not have a significant impact	2	Council would already have a maintenance schedule in place and can consider increasing frequency. However, should be noted that effectiveness of the maintenance schedule of stormwater system is dependent on timing of a rainfall event and may or may not have a significant impact	2	Easy to implement a local flood planning review and allow for sharing of information with NSW SES	1	Depending on the awareness program to be developed, could be some complications with regards to encouraging community engagement with such a program	2	Easy to implement and install flood markers and signage	1	Council should already have a flood data collection scheme. Would need to ensure the availability of Council staff to respond to and record flooding at any time
	Implementation Complexity	5%	Ease of constructability within Council's standard Capital Works Planning	2	Easy to increase maintenance schedule	2	Easy to increase maintenance schedule	2	Easy to implement a local flood planning review and allow for sharing of information with NSW SES	1	Depending on the awareness program to be developed, could be some complications with regards to encouraging community engagement with such a program	2	Easy to implement and install flood markers and signage	1	Council should already have a flood data collection scheme. Would need to ensure the availability of Council staff to respond to and record flooding at any time
	Adaptability and long-term performance	10%	The impact the option will have both in terms of feasibility, benefits and cost over the life of the option, and adaptability to climate change conditions	0	No impact of adaptibility of maintenance to climate change conditions	0	No impact of adaptibility of maintenance to climate change conditions	2	Minimal ongoing costs for review. Review can be revised to consider climate change impacts in the future	1	Ongoing costs to maintain the flood awareness program, however following initial engagement ongoing information should be more straightforward. Can be adapted to climate change	2	Minimal ongoing costs for flood markers and signage. Signs can be altered to account for climate change if necessary, however unlikely to be needed	2	Ongoing costs will be variable based on flood event occurrence. Climate change should not significantly influence scheme
Social	Reduction in Risk to Life	15%	The impact on risk to life from the 20% AEP up to the PMF event	1	Increased frequency of stormwater system management may or may not have an effect depending on timing of a rainfall event. Slight benefits if a rainfall event occurs right after scheduled maintenance	1	Increased frequency of stormwater system management may or may not have an effect depending on timing of a rainfall event. Slight benefits if a rainfall event occurs right after scheduled maintenance	2	Providing information to SES will assist them in their planning and consequently reduce risk to life	2	Expected reduction in risk to life through better responses of majority of residents	1	Expected reduction in risk to life through residents not attempting to enter floodwaters	0	Negligible direct impact on risk to life
	Emergency Access and Evacuation	10.0%	The impact on the ability to evacuate or for NSW SES or emergency services under extreme flood conditions	1	Increased frequency of stormwater system management may or may not have an effect depending on timing of a rainfall event. Slight benefits if a rainfall event occurs right after scheduled maintenance	1	Increased frequency of stormwater system management may or may not have an effect depending on timing of a rainfall event. Slight benefits if a rainfall event occurs right after scheduled maintenance	2	Providing information to SES will assist them in their planning	2	A flood aware community will limit the number of instances of residents entering floodwaters	2	Will assist residents and the NSW SES identify depth of flooding for some crossings on evacuation routes	0	Negligible direct impact on emergency access and evacuation
	Social Disruption and Public Open Spaces	5.0%	The impact of the risk management option on social disruption and the use of public spaces	0	Near neglible social disruption of residences with more frequent maintenance, no impact on open space or increase in flooding.	0	Near neglible social disruption of residences with more frequent maintenance, no impact on open space or increase in flooding.	0	No direct impact on social disruption or public open space	2	Improved community awareness seen as a social benefit	0	No direct impact on social disruption or public open space	0	No direct impact on social disruption or public open space
	Community and Stakeholder Support	10%	Support for the option based on FRM Committee meeting, stakeholder engagement and community consultation outcomes	1	Two responses received during community consultation requesting more frequent stormwater maintenance. Supported by Council engineers	1	Two responses received during community consultation requesting more frequent stormwater maintenance. Supported by Council engineers	1	NSW SES confirmed support for continued data provision in light of Flood Plan development	1	NSW SES supports the development of a Council led flood awareness program	1	NSW SES supports the development of this measure. Would require TfNSW agreement for signage on major TfNSW roads	1	NSW SES supports continued flood debrief and recording of information
Environment	Impact on Fauna/Flora	5%	Likely impacts on Threatened Ecological Communities and Threatened Species	0	Negligible impact	0	Negligible impact	0	Negligible impact	0	Negligible impact	0	Negligible impact	0	Negligible impact
	Impact on Heritage	5%	Impact to Heritage items	0	Several heritage sites within catchment, negligible impact would be expected from stormwater maintenance	0	Several heritage sites within catchment, negligible impact would be expected from stormwater maintenance	0	Negligible impact	0	Negligible impact	0	Negligible impact	0	Negligible impact
Total Score (from -22 to 22				**9**		**8**		**11**		**10**		**10**		**5**	
Total Weighted Score (from -2.00 to 2.00)				**0.90**		**0.85**		**1.10**		**0.95**		**0.95**		**0.45**	

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APPENDIX

F

MCA SCORING AND IMPLEMENTATION

Stantec

Final FRMS&P Report

Alexandra Canal Flood Risk Management Study and Plan

304600163



Prepared for
Inner West Council

16 July 2024

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Version	Effective Date	Description of Revision	Prepared by	Reviewed by
R001	21/05/2021	Stage 1 Draft Report	MG	SC
R002	7/07/2023	Interim Stage 4 Report	AP	MG
R003	23/12/2023	Draft FRMSP	AP, AC, & HR	MG
R004	6/02/2024	Draft Final FRMS&P	AP, AC, HR & MG	TWG (NSW DCCEW & IWC)
R005	16/07/2024	Final FRMSP	AP, AC, HR & MG	TWG (NSW DCCEW & IWC)

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Foreword

The primary objective of the NSW Flood Prone Land Policy 2021 is to reduce the impact of flooding and flood liability on communities and individual owners and occupiers of flood prone property, and to reduce private and public losses resulting from floods, utilising ecologically positive methods wherever possible.

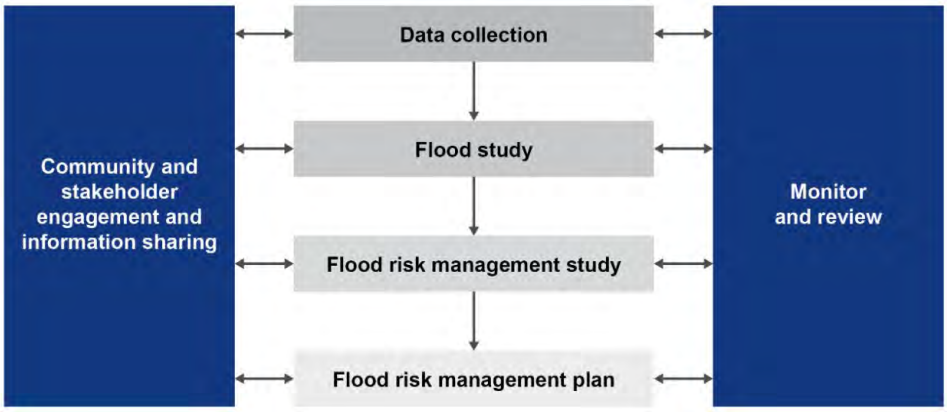
The previous policy formed part of the New South Wales (NSW) Floodplain Development Manual (FDM) in 2005. Recently, two changes have occurred in flood risk management in NSW:

- The 2021 Flood Prone Land Package Update was released in July 2021. The Flood Prone Land package included a new planning direction, planning circular, guideline, standard flood-related Local Environment Plan (LEP) instruments, and several planning legislation changes.
- The finalised and gazetted Flood Risk Management (FRM) Manual was adopted on 30 June 2023. The Manual replaces the FDM 2005 and a number of previous technical guides. The manual provides advice to local councils on the management of flood risk in their local government areas through the flood risk management framework and flood risk management process. This update builds on the 2005 manual and guides. It considers lessons learnt from floods and the application of the flood risk management process and manual since 2005. It considers a range of work on managing natural hazards across government, including relevant national and international frameworks, strategies and best practice guidance. Accompanying the manual is eight FRM Guidelines that comprise a new toolkit to provide guidance for local councils and their consultants.

Under the 2021 policy, councils are primarily responsible for managing flood risk to reduce the risk to life, property damage and other impacts in their local government areas. The State Government subsidises flood management measures to alleviate existing flooding problems and provides specialist technical advice to assist councils in the discharge of their flood risk management responsibilities. The Commonwealth Government also assists with the subsidy of floodplain modification measures. The new policy identifies the following flood risk management 'process' for the identification and management of flood risks:

1. Data Collection - Aims to gather the information needed to support the study being undertaken.
2. Flood Study - Aims to define flood behaviour in sufficient detail to support the understanding and management of flood risk.
3. *Flood Risk Management Study (FRMS) - Provides the basis for examining and recommending FRM measures to manage risks to the existing and growing community, people and built environment. The measures aim to limit the residual flood risk to the community and how this may change over time.*
4. *Flood Risk Management Plan (FRMP) - Builds on the recommendations of the FRM study by clearly outlining council's decision on how it intends to effectively manage flood risk in the study area.*

This Alexandra Canal Flood Risk Management Study and Plan falls within steps 3 and 4 in the FRM process and has been developed from the previous Flood Study, completed in 2017. An illustration of the FRM process from the FRM Manual is shown below. Beyond the FRM process, councils must also implement, review and update the studies.



Executive Summary

Stantec Australia Pty Ltd (formerly Cardno) was commissioned by Inner West Council ('Council', or IWC) to undertake a Flood Risk Management Study and Plan (FRMS&P) for the Alexandra Canal Study Area. The Study Area is focused around the part of the Alexandra Canal catchment that is contained within the former Marrickville Council LGA, and extends from Gardeners Road crossing of the Canal upstream, to the confluence with the Cooks River downstream.

Community Consultation

Consultation with the community and stakeholders is an important component in the development of a Flood Risk Management Study and Plan. Consultation provides an opportunity to collect feedback and observations from the community on problem areas and potential flood risk management measures. It also provides a mechanism to inform the community about the current study and flood risk within the Study Area and seeks to improve their awareness and readiness for dealing with flooding.

The consultation strategy has been divided into three key sections:

- Consultation in FRMS&P development: This occurred during the initial stages of the project (**Section 1.4**) and involves both informing the community and stakeholders of the project and gathering information on existing flooding issues and suggestions for flood risk management options.
- Review of possible flood management options with key stakeholder groups including Council Engineers, Council Planners, NSW SES, NSW DCCEW and community representatives within Council's Flood Risk Management Advisory Committee.
- Public exhibition of Draft FRMS&P: This occurred in the final stage of the project, with comments sought from the community and stakeholders on the Draft FRMS&P report with this input reviewed and incorporated into the final FRMS&P.

Across the initial consultation period, information regarding the projects was advertised on Councils website on the Your Say portal. For Alexandra Canal, 414 unique visitors engaged with the public consultation materials online, with three attendees at in-person drop in sessions and one online submission.

For the public exhibition period in June and July 2024, there were 23 recorded responses across this Study and Whites Creek and Johnstons Creek FRMSP through Your Say uploads (3 submissions and 1 questionnaire response), phone calls (4), and emails (4), along with two in-person sessions (11 attendees). Across all response methods, 1 comment (1 Your Say upload) related to Alexandra Canal FRMSP. All other responses were related to Whites Creek and Johnstons Creek catchment areas.

Impact of Flooding

The number of flood affected properties for five design events are summarised in the below table. Two forms of property tagging analysis have been considered – tagging of properties with any flood affectation, and tagging of properties where the flood extent covers at least 10% of the property area, as was applied under the Alexandra Canal Flood Study.

A review of the number of properties affected between the "10% affectation" and the "any affectation" scenarios, and the relative flood hazard affecting these properties, it was considered that the 10% affectation scenario sufficiently addressed the flood risk, requiring no updates to the flood affected lot tagging currently adopted by Council.

Property Tagging	Base Case Flood Affected Property				
	20% AEP	5% AEP	2% AEP	1% AEP	PMF
Flood Affected	134	167	180	188	303
>10% Area Affectation	36	42	51	56	147
				Total Properties in Catchment	1023

In the PMF event using the 10% property area approach, there are a total of 147 flood affected properties, or 14.4% of the total 1,023 properties in the study area. In the 1% AEP the total number of affected properties is 56, or 5.5% of all properties.

With respect to economic impacts of flooding in the study area, the Average Annual Damages (AAD) and damage totals for five design flood events is summarised in the following table. The AAD for Alexandra

Canal Catchment is over $6.3 million. More than half (56%) of this AAD is a result of the most frequent 20% AEP event, with the next most frequent event, the 5% AEP contributing a further 26% of the AAD. The less frequent events, the 2% and 1% AEP and PMF provide between 2 – 9% of AAD contribution. Though these events result in far higher flood damage totals, particularly the PMF event, their relatively low likelihood means they contribute less to the AAD.

AEP	Probability	Total Damages	AAD Contribution	AAD Contribution %
20%	0.20	$8,852,340	**$3,558,226**	56%
5%	0.05	$12,955,774	**$1,642,015**	26%
2%	0.02	$14,167,888	**$406,855**	6%
1%	0.01	$16,101,295	**$151,625**	2%
PMF	0.0000001	$98,917,671	**$574,520**	9%
		Total AAD	**$6,333,241**	

Flood Emergency Response Review

Due to the short duration of both the critical storm affecting the catchment and the time to peak flood depth, there is limited opportunity to stand up an emergency management centre and begin directed evacuation of residents prior to the onset of flooding. Based on a detailed review of flood emergency response provisions and the flash flooding nature of the study area, it is unlikely, almost impossible, that SES doorknocked evacuation will be able to effectively evacuate residents prior to flooding. From this review, potential measures have been identified that could improve flood emergency response potential for the study area:

- Improved flood awareness – Limited knowledge of an individual's potential risk from flooding and the associated lack of planning can cause significant delays to community evacuation due to both acceptance and lag time. A comprehensive flood awareness program for the Study Area, educating residents of the seriousness of the flood risk and the flash flooding nature of the catchment could improve the flood risk to the community.
- Alternative flood warning systems - There are noted difficulties of flood warning systems in flash flooding environments. As forecasting and modelling technology improves, options may be considered for the development of flood warning systems for the Study Area, particularly in the emergency management hotspot areas.
- Self-managed evacuation - Where SES assisted evacuation is not an option, self-managed evacuation is a potential alternative. This describes where people make their own decision to evacuate earlier and move to alternate accommodation, using their own transport. These plans would typically be prepared using information available from Council and with support of the local SES unit, using SES templates such as FloodSafe. The advantage of this approach would be that people can evacuate more quickly than SES assisted evacuation, and as a result reduces the strain on SES and does not rely on a centralised evacuation order. However, self-managed evacuation can also pose a risk if not conducted in an appropriate way. Residents could place themselves at higher risk for example if they evacuate to a location which is even more flood affected, drive through flood waters, or could increase traffic congestion if the wrong route is selected.

Flood Planning Review

The outcomes of the flood planning review were as follows:

- Compared to the requirements for planning proposals outlined within the 2021 Flood Prone Land Policy Update, the current development controls are generally in agreement.
- Compared to the Flood Planning Constraints Categories (FPCC) approach from the 2023 Flood Risk Management (FRM) Manual Guide FB01, current Flood Risk Precincts of the Development Control Plan (DCP) are generally aligned however potentially adopting FPCC offers some potential benefits. These benefits include splitting the current High-risk precinct into FPCC1 and FPCC2 where development can be precluded in FPCC1 and more tailored controls can be applied to FPCC2 areas.
- Compared to the requirements for Flood Impact Risk Assessment (FIRA) from the 2023 FRM Manual Guide LU01. Generally, the current development controls are in agreement with the proposed requirements in the guide with some exceptions:
  - The current controls do not require consideration of climate change in assessments.

- The current controls do not specify flood impacts be considered not just for flood levels but also duration, velocity, evacuation, flood function or hazard categorisation.
- The current controls do not specifically require a consideration of residual risk of proposed developments to confirm if flood risk is lower than existing based on proposed risk management measures for developments.

Ultimately the current development controls are considered suitable, and generally in accordance with recent guidance both within the 2021 Flood Prone Land Policy Update and the 2023 FRM Manual Guide LU01. However, there are some minor alterations listed in the bullet points above that may improve an applicant's understanding of the controls and provide a more comprehensive assessment of flood risk in future development submissions.

Flood Risk Management Options Background

Three main types of Flood Risk Management (FRM) options were considered:

> Flood modification measures – Flood modification measures are options aimed at preventing / avoiding or reducing the likelihood of flood risks. These options reduce the risk through modification of the flood behaviour in the catchment.

> Property modification measures – Property modification measures are focused on preventing / avoiding and reducing consequences of flood risks. Rather than necessarily modify the flood behaviour, these options aim to modify properties (both existing and future) so that there is a reduction in flood risk.

> Emergency response modification measures – Emergency response modification measures aim to reduce the consequences of flood risks. These measures generally aim to modify the behaviour of people during a flood event.

The assessment of FRM options should consider inputs from people in the community, the economy, social and cultural aspects, services to the community and the natural environment. Relating to the development of FRM options, the following stages were applied in this project:

> Option identification and preliminary option assessment and optimisation – The identification of an inclusive range of FRM options to address local or broad FRM issues for the existing community and new development. Having identified the FRM issues to address and an inclusive range of FRM options worthy of consideration, the viability of these options was discussed with Council, the Committee and other stakeholders in several workshops to determine if they warranted more detailed assessment.

> Detailed option assessment – Detailed assessment and subsequent optimisation of FRM options and packages of options needs to consider their costs, benefits and disbenefits in managing risk. The detailed assessment included flood modelling of options, damages assessment of option benefits, preliminary costing and a Multi-Criteria Assessment (MCA) that considers a broad range of factors quantitatively or qualitatively.

> Recommendation in FRM studies and decision-making in FRM plans

Detailed Assessment of Options

Following the preliminary option assessment, nine options were selected for detailed assessment, with the final options listed in the table below.

Option Type	Option ID/Name
Flood Modification (FM)	AC4 – Station Street, Tempe Drainage Upgrade
	AC6 – Bay Street, Tempe Drainage Upgrade
	AC11 – Princes Highway, St Peters Drainage Upgrade
	AC14 – Talbot Street, Sydenham Drainage Upgrade
Property Modification (PM)	PM6 – Targeted Stormwater Maintenance
Emergency Management Modification (EM)	EM2 – Review of Local Flood Planning and Information Transfer to NSW SES
	EM3 – Community Flood Awareness
	EM5 – Flood Markers and Signage
	EM6 – Flood Data and Debrief

The detailed assessment of these 9 FRM options was conducted including:

- Hydraulic modelling of five design events – 20%, 5%, 2%, 1% AEP and PMF (for FM options),
- Flood damages benefits assessment (for FM options) involving adopting water level impact results compared to the existing flood damages to determine the potential benefits of the option in the 5 modelled events. The AAD of damage benefits were calculated and the Net Present Worth (NPW) of benefits for all options were calculated assuming a 5% discount rate and 30 year life cycle for the option.
- Cost estimation was conducted for all options for both capital and ongoing / maintenance costs. The process for capital cost estimation was based on quantities for construction estimated from preliminary design for the 4 FM options as they were modelled in the TUFLOW model. Unit rates were initially estimated by Stantec and reviewed and updated by Council staff in some instances to match current cost rates for the local area. A 50% contingency has been applied to all estimates given uncertainty on eventual design refinement and quantities. For other measures (EM and PM), costs were estimated only on the basis of cost to implement, and were done for the purpose of comparison in the multi-criteria assessment. The total cost of the options was calculated for Net Present Worth using a 5% discount rate and an implementation period of 30 years.
- Benefit Cost Ratio - The economic evaluation of each option was performed by considering the reduction in the amount of flood damages incurred for the design events and then comparing this value with the cost of implementing the option. The benefit-cost ratio provides an insight into how the damage savings from a measure relate to its cost of construction and maintenance. Where the benefit-cost ratio is greater than one (BCR >1) the economic benefits are greater than the cost of implementing the measure. For all FM options it is possible to quantify, at least at a high-level, both damage benefits and costs of implementation for each option, therefore a BCR is able to be calculated. For PM and EM options, the damage benefits are not easily quantifiable, though there would be some economic benefits of these options in the form of reduced risk to life and resultant reduction in flood damage for loss of life. Therefore in lieu of any damage benefit information, the economic analysis of these options has assumed that BCR is 1.0. The Benefit Cost Ration outcomes for all detailed options have been summarised in the table below.

Option	NPW of AAD Reduction Benefits	NPW of Cost of Implementation of Option	Benefit Cost Ratio
AC4 – Station Street Drainage Upgrade	$291,418	$1,065,173	0.27
AC6 – Bay Street Drainage Upgrade	$925,163	$1,122,555	0.82
AC11 – Princes Highway Drainage Upgrade**	$69,216	$828,821	0.08
AC14 – Talbot Street Drainage Upgrade	$1,731,887	$1,970,291	0.88
PM6 – Targeted Stormwater Maintenance	*	$2,334,873	1.0*
EM2 – Review of Local Flood Planning and Info Transfer to NSW SES		$137,794	1.0*
EM3 – Community Flood Awareness		$751,761	1.0*
EM5 – Flood Markers and Signage		$265,294	1.0*
EM6 – Flood Data and Debrief		$275,587	1.0*

*In lieu of benefit values for EM options, due to flood risk reduction BCR value assumed to be 1.0

**AC11 has potential flood damage benefits for buildings outside of the study area, therefore this damage benefit may be an underestimate.

The BCR results show that of FM options, AC6 and AC14 both have BCR values slightly under 1.0, therefore the costs only slightly exceed the calculated benefits. For AC11, the potential benefits of this option for private properties on the west side of Princes Highway have not been quantified and considered in damages assessment. Therefore, it is likely that the BCR score for that option is an underestimate.

Option PM6 is for the targeted increased maintenance of the stormwater network. Inner West Council, in accordance with its responsibility as owner of the majority of the drainage assets within the study area, has a significant maintenance schedule already in place for all of its stormwater assets. This includes timely responses to community requests or notes relating to any drainage blockage or damage. Option PM6 involves potential additional targeted maintenance of greater frequency than is currently applied at key locations. The potential benefits of the PM6 option for targeted stormwater maintenance was assessed using modelling assuming no blockage of pipes. This is a best-case scenario, that in reality is unlikely to be achievable. Nevertheless, it does provide an indication of areas of potential benefits, even if the scale of benefits may

exceed expected outcomes. Therefore, due to this uncertainty, the modelling outcomes in the form of damage benefits were not applied to the BCR outcome for this option PM6.

Multi-Criteria Assessment

To assist Council in identifying the FRM options that provide the most benefits for the society, environment and economy all options need to be compared against each other based on factors relevant to the study area. Evaluating what constitutes an appropriate strategy for floodplain management is a significant analytical and policy challenge. Such challenges have led to the exploration of alternative policy analysis tools, one being Multi Criteria Assessments (MCA). The goal of MCA is to attempt to directly incorporate multiple values held by community and stakeholders into the analysis of management alternatives while avoiding the reduction of those values into a standard monetary unit. In doing so, one can consider different FRM options in the context of economic criteria as well as other criteria such as social, or environmental aspects. Community and stakeholders can also assign explicit weights to those values to reflect their preferences and priorities. Therefore, MCA provides opportunities for the direct participation of community and stakeholders in the analysis.

An MCA approach has been used for the comparative assessment of all options identified. Each option is given a score according to how well the option meets specific considerations. In order to keep the scoring system simple, a framework has been developed for each criterion.

The selection of criteria and weighting has been completed by involving the technical working group (TWG). A scoring system with 11 criteria (five economic, four social and two environmental) was established for each criterion with scores ranging from +2 for options that represented a significant improvement on existing conditions for any given criteria, to -2 for options that represented a significant worsening of existing conditions. It is noted that for two criteria (Benefit-Cost Ratio and Reduction in Risk to Property or damage) scoring systems was based on quantifiable assessment outcomes, for all other criteria scoring was more qualitative although supported by sound judgement.

The highest scoring options were all emergency management modification options (EM) due to their relatively minor cost involvement and ease of implementation. In the top half of ranked options, three of the four were EM options.

Option AC6 Bay Street drainage upgrade was the highest scoring FM option due to this being an area of noted frequent flooding (even during king tide events), its relative ease in terms of feasibility and complexity for relatively greater benefits compared to other FM options.

The lowest scoring options were AC14 Talbot Street drainage upgrade which was marginally lower due to its complexity, and AC4 Station Street drainage upgrade which was much lower due to low relative benefits and BCR.

Implementation Plan

The list of recommended management options has been transformed into an implementation plan provided in the table below. It lists the following information relevant to the implementation of each adopted FRM option:

- Type and sub-catchment location of option and MCA score;
- The priority for implementation (high, medium, or low) and rank as an outcome of the FRMS&P;
- An estimate of implementation costs including capital and ongoing costs per annum;
- Potential funding mechanism or organisation; and
- Required economic assessment level during Investigation and Design (I&D) stage.

The flood risk management options identified in the table below represent a capital cost of approximately $5.3M, with the flood modification options making up $4.9M of this cost. High priority options have combined capital costs of $1.33M.

It is noted that the implementation plan does not outline a specific timeframe for each project. Rather, the implementation plan provides a body of projects to inform future advocacy, budgeting, and planning in order that Council may be able to undertake works in a prioritised manner as funding becomes available, or other opportunities arise in a specific location associated with a proposed option.

Option ID	Option Type	MCA Weighted Score	Option Rank	Implementation Priority	Capital Costs (incl. GST)	Ongoing Costs (p.a incl. GST)	Economic Assessment Level for I&D
EM2 – Review of Local Flood Planning and Info Transfer to NSW SES	Emergency Management (EM)	1.10	1	High	$ 22,500	$7,500	Level 1 (FRMS&P)
EM3 – Community Flood Awareness	EM	0.95	2	High	$ 60,000	$ 45,000	Level 1
EM5 – Flood Markers and Signage	EM	0.95	2	High	$ 150,000	$ 7,500	Level 1=
Option AC6 - Bay Street, Tempe Drainage Upgrade	Flood Management (FM)	0.60	4	High	$ 1,094,884	$ 1,800	Level 2 (Detailed damages)
PM6 –AC Targeted Stormwater Maintenance	Property Modification (PM)	0.50	5	Medium	$ 142,610	$ 142,610	Level 1
EM6 – Flood Data and Debrief	EM	0.45	6	Medium	$ 45,000	$ 15,000	Level 1
Option AC11 - Princes Highway, St Peters Drainage Upgrade	FM	0.45	6	Medium	$ 828,821	$ -	Level 1
Option AC14 - Talbot Street, Sydenham Drainage Upgrade	FM	0.40	8	Medium	$ 1,947,232	$ 1,500	Level 2
Option AC4 - Station Street, Tempe Drainage Upgrade	FM	-0.40	9	Low	$ 1,053,643	$ 750	Level 2
				Total	**$5,344,690.00**	**$2,250.00**	

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Abbreviations

1D	One-dimensional
2D	Two-dimensional
ABS	Australian Bureau of Statistics
AEP	Annual Exceedance Probability
AHD	Australian Height Datum
AHIP	Aboriginal Heritage Impact Permit
AMC	Antecedent Moisture Content
ARI	Average Recurrence Interval
AR&R	Australian Rainfall and Runoff
ASS	Acid Sulfate Soils
BCR	Benefit Cost Ratio
BoM	Australian Bureau of Meteorology
DAWE	Australian Department of Agriculture, Water and Environment.
DCCEW	NSW Department of Climate Change, Energy and Water
DCP	Development Control Plan
DEM	Digital Elevation Model
DPHI	NSW Department of Planning, Housing and Infrastructure
ELVIS	Elevation Information System
EPA	NSW Environmental Protection Authority
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
FDM	Floodplain Development Manual
FRM	Flood Risk Management
FRMS&P	Flood Risk Management Study and Plan
FPL	Flood Planning Level
FPA	Flood Planning Area
GIS	Geographical Information Systems
IFD	Intensity-Frequency-Duration
IWC	Inner West Council
LEP	Local Environment Plan
LGA	Local Government Area
LIDAR	Light Detection and Ranging
NPV	Net Present Value
NSW	New South Wales
PCT	Plant Community Types
PMF	Probable Maximum Flood
PMST	Protected Matters Search Tool
SEPP	State Environmental Planning Policy
SES	NSW State Emergency Service
TEC	Threatened Ecological Community

Glossary

Acid Sulfate Soils (ASS)	Acid sulfate soils (ASS) are naturally occurring sediments and soils containing iron sulfides (mostly pyrite). When these sediments are exposed to the air by excavation or drainage of overlying water, the iron sulfides oxidise and form sulphuric acid. ASSs are widespread among low lying coastal areas of NSW, in estuarine floodplains and coastal lowlands.
Annual Exceedance Probability (AEP)	The probability of an event occurring or being exceeded within a year. For example, a 5% AEP flood would have a 5% chance of occurring in any year. An approximate conversion between ARI and AEP is provided.
Australian Height Datum (AHD)	A standard national surface level datum approximately corresponding to mean sea level.
Average Recurrence Interval (ARI)	The long-term average period between occurrences equalling or exceeding a given value. For example, a 20 year ARI flood would occur on average once every 20 years.
Cadastre, cadastral base	Information in map or digital form showing the extent and usage of land, including streets, lot boundaries, water courses etc.
Catchment	The area draining to a site. It always relates to a particular location and may include the catchments of tributary streams as well as the main stream.
Design flood	A significant event to be considered in the design process; various works within the floodplain may have different design events. E.g. some roads may be designed to be overtopped in the 1% AEP flood event.
Development	The erection of a building or the carrying out of work; or the use of land or of a building or work; or the subdivision of land.
Discharge	The rate of flow of water measured in terms of volume over time. It is to be distinguished from the speed or velocity of flow, which is a measure of how fast the water is moving rather than how much is moving.
Elevation Information System (ELVIS)	ELVIS was launched by Geoscience Australia in 2016 to replace the existing National Elevation Data Framework (NEDF) and to open access to elevation datasets to a wider user base. With the online ELVIS portal, users can now easily download continent-wide elevation data.
Flash flooding	Flooding which is sudden and often unexpected because it is caused by sudden local heavy rainfall or rainfall in another area. Often defined as flooding which occurs within 6 hours of the rain which causes it.
Flood	Relatively high stream flow which overtops the natural or artificial banks in any part of a stream, river, estuary, lake or dam, and/or overland runoff before entering a watercourse and/or coastal inundation resulting from super elevated sea levels and/or waves overtopping coastline defences.

AEP	ARI
63.2 %	1 year
39.3 %	2 year
18.1 %	5 year
10 %	10 year
5 %	20 year
2 %	50 year
1 %	100 year
0.5 %	200 year
0.2 %	500 year

Flood fringe	The remaining area of flood prone land after floodway and flood storage areas have been defined.
Flood hazard	Potential risk to life and limb caused by flooding.
Flood prone land	Land susceptible to inundation by the probable maximum flood (PMF) event, i.e. the maximum extent of flood liable land. Flood Risk Management Plans encompass all flood prone land, rather than being restricted to land subject to designated flood events.
Floodplain	Area of land which is subject to inundation by floods up to the probable maximum flood event, i.e. flood prone land.
Floodplain management measures	The full range of techniques available to floodplain managers.
Floodplain management options	The measures which might be feasible for the management of a particular area.
Flood Planning Area (FPA)	The area of land below the flood planning level and thus subject to flood related development controls.
Flood planning levels (FPLs)	Flood levels selected for planning purposes, as determined in floodplain management studies and incorporated in floodplain management plans. Selection should be based on an understanding of the full range of flood behaviour and the associated flood risk. It should also take into account the social, economic and ecological consequences associated with floods of different severities. Different FPLs may be appropriate for different categories of land use and for different flood plains. The concept of FPLs supersedes the “Standard flood event” of the first edition of the Manual. As FPLs do not necessarily extend to the limits of flood prone land (as defined by the probable maximum flood), floodplain management plans may apply to flood prone land beyond the defined FPLs.
Flood storages	Those parts of the floodplain that are important for the temporary storage of floodwaters during the passage of a flood.
Floodway areas	Those areas of the floodplain where a significant discharge of water occurs during floods. They are often, but not always, aligned with naturally defined channels. Floodways are areas which, even if only partially blocked, would cause a significant redistribution of flood flow, or significant increase in flood levels. Floodways are often, but not necessarily, areas of deeper flow or areas where higher velocities occur. As for flood storage areas, the extent and behaviour of floodways may change with flood severity. Areas that are benign for small floods may cater for much greater and more hazardous flows during larger floods. Hence, it is necessary to investigate a range of flood sizes before adopting a design flood event to define floodway areas.
Geographical Information Systems (GIS)	A system of software and procedures designed to support the management, manipulation, analysis and display of spatially referenced data.
High hazard	Flood conditions that pose a possible danger to personal safety; evacuation by trucks difficult; able-bodied adults would have difficulty wading to safety; potential for significant structural damage to buildings.
Hydraulics	The term given to the study of water flow in a river, channel or pipe, in particular, the evaluation of flow parameters such as stage and velocity.
Hydrograph	A graph that shows how the discharge changes with time at any particular location.
Hydrology	The term given to the study of the rainfall and runoff process as it relates to the derivation of hydrographs for given floods.
Low hazard	Flood conditions such that should it be necessary, people and their possessions could be evacuated by trucks; able-bodied adults would have little difficulty wading to safety.
Mainstream flooding	Inundation of normally dry land occurring when water overflows the natural or artificial banks of the principal watercourses in a catchment. Mainstream flooding generally excludes watercourses constructed with pipes or artificial channels considered as stormwater channels.

Management plan	A document including, as appropriate, both written and diagrammatic information describing how a particular area of land is to be used and managed to achieve defined objectives. It may also include description and discussion of various issues, special features and values of the area, the specific management measures which are to apply and the means and timing by which the plan will be implemented.
Mathematical/computer models	The mathematical representation of the physical processes involved in runoff and stream flow. These models are often run on computers due to the complexity of the mathematical relationships. In this report, the models referred to are mainly involved with rainfall, runoff, pipe and overland stream flow.
Overland Flow	The local runoff, travelling through properties and /or roads, before it discharges into a stream, river, estuary, lake or dam.
Peak discharge	The maximum discharge occurring during a flood event.
Probable maximum flood (PMF)	The flood calculated to be the maximum that is likely to occur.
Probability	A statistical measure of the expected frequency or occurrence of flooding. For a more detailed explanation see AEP and Average Recurrence Interval.
Risk	Chance of something happening that will have an impact. It is measured in terms of consequences and likelihood. For this study, it is the likelihood of consequences arising from the interaction of floods, communities and the environment.
Runoff	The amount of rainfall that actually ends up as stream or pipe flow, also known as rainfall excess.
Stage	Equivalent to 'water level'. Both are measured with reference to a specified datum.
Stage hydrograph	A graph that shows how the water level changes with time. It must be referenced to a particular location and datum.
Stormwater flooding	Inundation by local runoff. Stormwater flooding can be caused by local runoff exceeding the capacity of an urban stormwater drainage system or by the backwater effects of mainstream flooding causing the urban stormwater drainage system to overflow.
Topography	A surface which defines the ground level of a chosen area.

1 Introduction

Stantec Australia Pty Ltd (formerly Cardno (NSW/ACT) Pty Ltd) ('Stantec') was commissioned by Inner West Council ('Council') to undertake a Flood Risk Management Study and Plan (FRMS&P) for the Alexandra Canal Study Area (**Figure 2-1**). The Study Area is within the Inner West Local Government Area (LGA), located approximately 7.5km south of the Sydney Central Business District (CBD). The Study Area is focused around the part of the Alexandra Canal catchment that is contained within the former Marrickville Council LGA, and extends from Gardeners Road crossing of the Canal upstream, to the confluence with the Cooks River downstream.

This report is the Final FRMS&P report for Alexandra Canal, incorporating comments from stakeholder agencies and the comments received from the community during public exhibition.

1.1 Study Context

As outlined within the Floodplain Risk Management (FRM) Manual 2023, like all councils in NSW, Inner West Council is responsible for local land use planning including management of both mainstream and overland flooding within the LGA. In response to the objectives of the New South Wales (NSW) Government's Flood Prone Land Policy, Council has an ongoing commitment to reduce the impact of flooding and flood liability on individual owners and occupiers of flood prone property, and to reduce public losses resulting from floods, utilising ecologically positive methods wherever possible.

Through the Department of Climate Change, Energy and Water (DCCEW, formerly Department of Planning and Environment, DPE) and the State Emergency Service (SES), the NSW Government provides specialist technical assistance to local government on all flooding and land use planning matters. The FRM Manual 2023 guides councils in the strategic management of flood risk across their LGAs through the FRM framework. This supports councils in meeting their responsibilities for a range of FRM activities and their strategic consideration of flooding.

The FRM process is a key element of the FRM framework. Studies and plans under the process support the understanding of flooding, the examination of measures to manage flood risk and informed decisions on how to manage flood risk into the future. They also support the consideration of flooding in broader activities under the FRM framework. The FRM process progresses through four (4) steps in an iterative process:

1. Data Collection
2. Flood Study
3. ***Flood Risk Management Study***
4. ***Flood Risk Management Plan***

The study currently being undertaken addresses steps three and four of the process. The Alexandra Canal Flood Study was prepared in 2017 by WMAwater for Inner West Council provide the second step listed above to define the flood behaviour in the Study Area. The Flood Study form the basis of the flood data used for this FRMS&P.

1.2 Study Objectives

The primary objective of this study is to develop a Flood Risk Management Study & Plan that addresses the existing, future and continuing flood problems, taking into account the potential impacts of climate change, in accordance with the NSW Government's Flood Prone Land Policy and the FRM Manual 2023.

The specific project objectives are to:

- Review the Alexandra Canal Flood Study (WMAwater 2017) in accordance with the updated requirements of AR&R 2019 and any recent changes in topography in the Study Area;
- Review Council's adopted flood planning area mapping;
- Review the existing emergency response situation and limitations;
- Review effectiveness of current flood management measures;
- Identify floodplain management measures aimed at reducing the social, environmental and economic impacts of flooding and the losses caused by flooding on development and the community, both existing and future;
- Examination of the existing flood warning systems, community flood awareness and emergency response measures in the context of the NSW State Emergency Service's (SES's) developments and disaster planning requirements;
- Reduce the flood hazard and risk to people and property in the existing community and to ensure future development is controlled in a manner consistent with the flood hazard and risk (taking into account the potential impacts of climate change);
- Reduce private and public losses due to flooding; and
- Establish a program for implementation and suggest a mechanism for the funding of the plan which should include funding sources, priorities, staging, funding, responsibilities, constraints, and monitoring.

1.3 Flood Risk Management Principles

Beyond the specific objectives of this study listed above, the FRM Manual 2023 outlines ten (10) principles for flood risk management in NSW:

1. Establish sustainable governance arrangements,
2. Think and plan strategically,
3. Be consultative,
4. Make flood information available,
5. Understand flood behaviour and constraints,
6. Understand flood risk and how it may change,
7. Consider variability and uncertainty,
8. Maintain natural flood functions,
9. Manage flood risk effectively, and,
10. Continually improve the management of flood risk.

The objectives of this study align with these principles, and through the proposed study methodology attempts to account for all of these principles, either directly or indirectly.

1.4 Project Summary

The Alexandra Canal Flood Risk Management Study and Plan project includes the following stages:

- Stage 1 – Data Collection and Review;
- Stage 2 – Additional Data Collection;
- Stage 3 – Community Engagement;
- Stage 4 – Options Identification and Assessment;
- Stage 5 – Draft Flood Risk Management Study and Plan;
- Stage 6 – Public Exhibition of Study and Plan; and
- Stage 7 – Completion of Flood Risk Management Study and Plan.

The Alexandra Canal Flood Risk Management Study and Plan has been undertaken across seven stages, outlined in the sections below:

- Study Area description including topography, flora and fauna, heritage, demographics (**Section 2**);
- Initial data collection and review process including review of the Flood Study model in accordance with the updated analysis of ARR2019 (**Section 3**);
- Summary of the community consultation process including public exhibition in June and July 2024 (**Section 4**);
- Existing flood risk review including flood planning review (**Section 5**), economic impacts of flooding (**Section 6**), and a flood emergency response review (**Section 7**).
- Summary of flood modification options development and selection of detailed options (**Section 8**).
- Description of detailed assessment of options including modelling, cost estimation, damages benefits and Multi-Criteria Assessment (MCA) (**Section 9**), and implementation program for these detailed options to provide Council guidance on the future implementation of these options (**Section 10**).

2 Study Area Description

2.1 Catchment Background

Alexandra Canal which drains a large portion of inner south Sydney has a total catchment area of approximately 1,565 ha, which drains into the Alexandra Canal and Cooks River. The catchment area comprises local government areas under the management of:

- City of Sydney Council (1,140ha);
- Inner West Council (230ha);
- Bayside Council (51ha); and,
- Randwick Council (51ha).

The Study Area for this FRMS&P, shown in **Figure 2-1**, contains the portion of the Alexandra Canal catchment that lies within the Inner West LGA (or the former Marrickville LGA). The Study Area is a fully developed urban area, with predominantly industrial areas and semi-detached and terrace housing. There are some areas of large open space located within the Study Area such as:

- Tempe Recreational Reserve;
- Kendrick Park;
- Tempe Golf Driving Range;
- Tempe Park; and
- Other open industrial use areas such as Boral Concrete.

2.1.1 History of the Catchment and Flooding

Located in one of the older areas of Sydney, the Study Areas were first settled in the early 19th Century. The original natural drainage system comprised rock gullies draining to small pockets of mangroves along the shoreline at the head of various bays. As development proceeded, the natural drainage lines were subsumed into the constructed drainage system of open channels. Eventually, by the late 19th Century, much of the channel system was progressively covered over and piped, with much of the original system forming the backbone of the present-day stormwater drainage system.

Given the age of the existing stormwater drainage network, there is a prevalence of antiquated drainage systems. In many streets, underground pipe systems do not exist and in their place are high kerbs and/or dish gutters to convey the stormwater, with - minor converter networks only located beneath intersections to carry stormwater below the road at the intersection.

Where there are existing drainage pipelines within a street, many of these pipelines are running at capacity by the 50% AEP and 20% AEP flood events, resulting in high volumes of surface flows runoff. In addition, the canal is tidal and areas of the catchment at the mouth of the canal and adjacent to Cooks River may be subject to tidal overtopping and king tides.

Historical records indicate flooding within the catchment for events approximating the magnitude of the 20% AEP from the year 2003 onwards. These include 13 May 2003, 7 March 2012, 5 March 2014, 14 October 2014, 25 April 2015 and 30 January 2016. Prior to 2003, there is an estimated 5% to 2% AEP event that occurred on 10 April 1998.

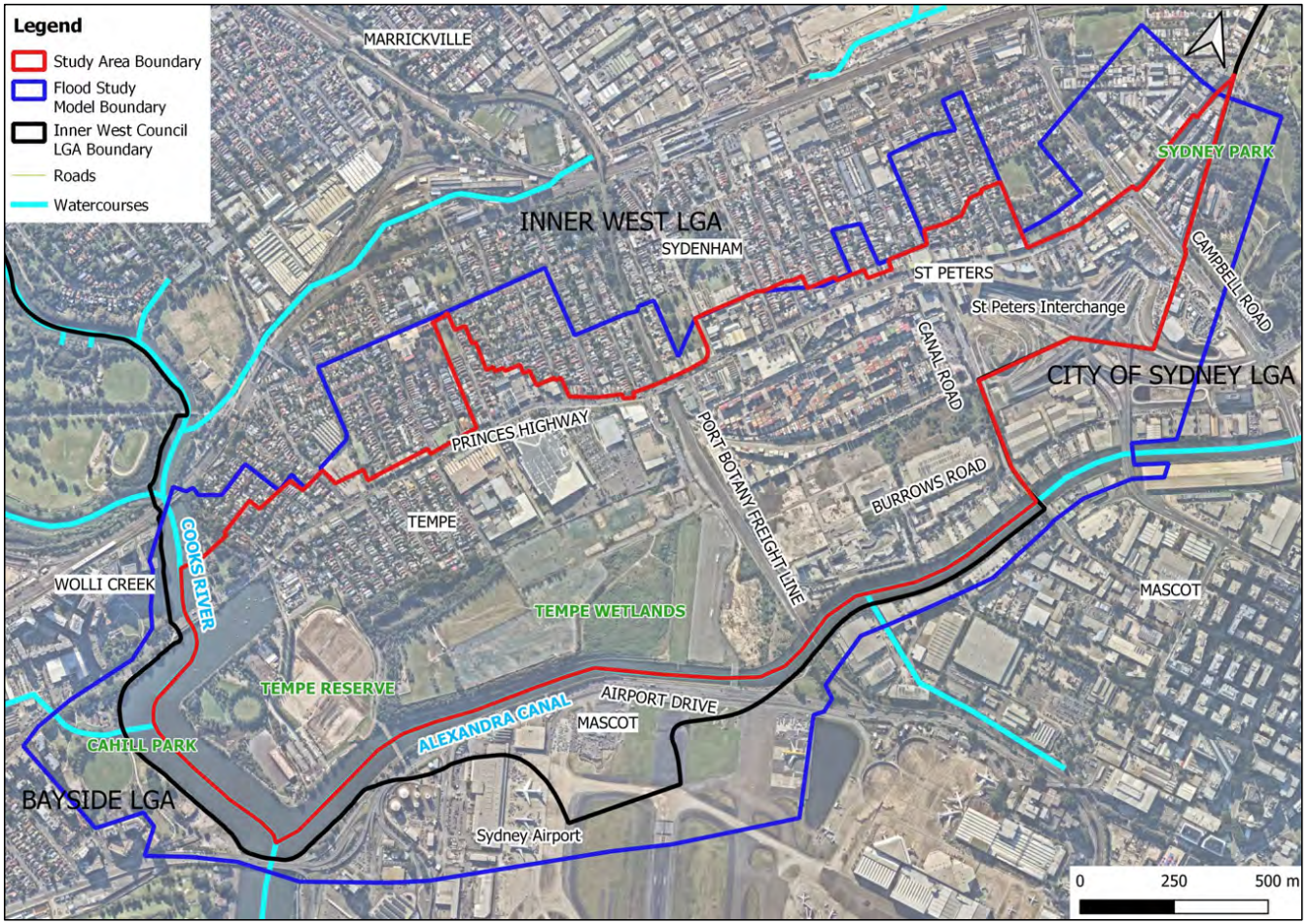

Figure 2-1 Alexandra Canal Study Area

2.1.2 Topography

The Study Area has steep slopes along the north-western boundary, with a low-lying floodplain located in the southern and eastern portions of the catchment. The topography of the Alexandra Canal Study Area is shown in **Figure 2-2**.

The ridgeline that runs along the north-western boundary is up to around 25 m Australian Height Datum (m AHD) in elevation, sloping down to flat floodplain in the eastern and southern portions. The low-lying land adjacent to the canal is around 0-5 m AHD.

The ridgeline along the north-western boundary separates the Alexandra Canal catchment from the Marrickville Valley catchment. A rail line, the Port Botany Freight Line, traverses through the centre of the catchment, which runs under the Princes Highway and adjacent to Bellevue Street. Due to the low-lying nature of the track, it is anticipated that water from the surrounding areas would be directed along the route to the canal to the south-east.

The north-western portion of the Study Area is generally comprised of residential dwellings, with land use in the low-lying south-eastern portion comprised of industrial buildings, storage yard and road corridors. The catchment area is highly disturbed by human activity, with a high proportion of impervious area.

2.1.3 Soil Erosion Potential

A review of soil landscapes mapping from eSpade (DCCEW, 2021) indicates that the Alexandra Canal Study Area contains one soil landscape group; Disturbed Terrain. Disturbed Terrain is characterised by artificial fill materials which can include dredged estuarine sand and mud, demolition rubble, industrial and household waste, but can also include rock and local soil materials. Soil erosion hazard ranges from low to extreme for non-concentrated flow, and low-to-high for concentrated flow.

2.1.4 Acid Sulfate Soils

Acid Sulfate Soils (ASS) is the common name for soils that contain metal sulfides. The presence of these soils is more likely in low-lying areas of the floodplain. In an undisturbed and waterlogged state, ASS generally pose no or low risk to the environment. However, when disturbed, an oxidation reaction occurs to produce sulfuric acid which can negatively impact the surrounding environment in a number of ways such as a decline in water quality, fish kills and plant death. Sulfuric acid produced by the soils can also corrode and weaken certain structures and building foundations. Part 6.1 of the *Marrickville LEP 2011* outlines general provisions for development near ASS.

Potential ASS within the former Marrickville LGA are classified into five land classes with each land class indicating the depth where potential ASS may occur. Development consent is required for work in those five classes as described in **Table 2-1**.

Table 2-1 Acid Sulfate Soil Land Classes (Source: Marrickville LEP 2011)

Class of land	Works
1	Any works.
2	Works below the natural ground surface. Works by which the watertable is likely to be lowered.
3	Works more than 1 metre below the natural ground surface. Works by which the watertable is likely to be lowered more than 1 metre below the natural ground surface.
4	Works more than 2 metres below the natural ground surface. Works by which the watertable is likely to be lowered more than 2 metres below the natural ground surface.
5	Works within 500 metres of adjacent Class 1, 2, 3 or 4 land that is below 5 metres Australian Height Datum and by which the watertable is likely to be lowered below 1 metre Australian Height Datum on adjacent Class 1, 2, 3 or 4 land.

All waterside areas of the catchment are located within Class 1 ASS mapped areas in the LEP. Class 2 ASS mapped areas are located in the low-lying areas of the Study Area, primarily either side of the Alexandra Canal. The remaining area is Class 5 ASS mapped areas which coincide with the higher elevation areas.

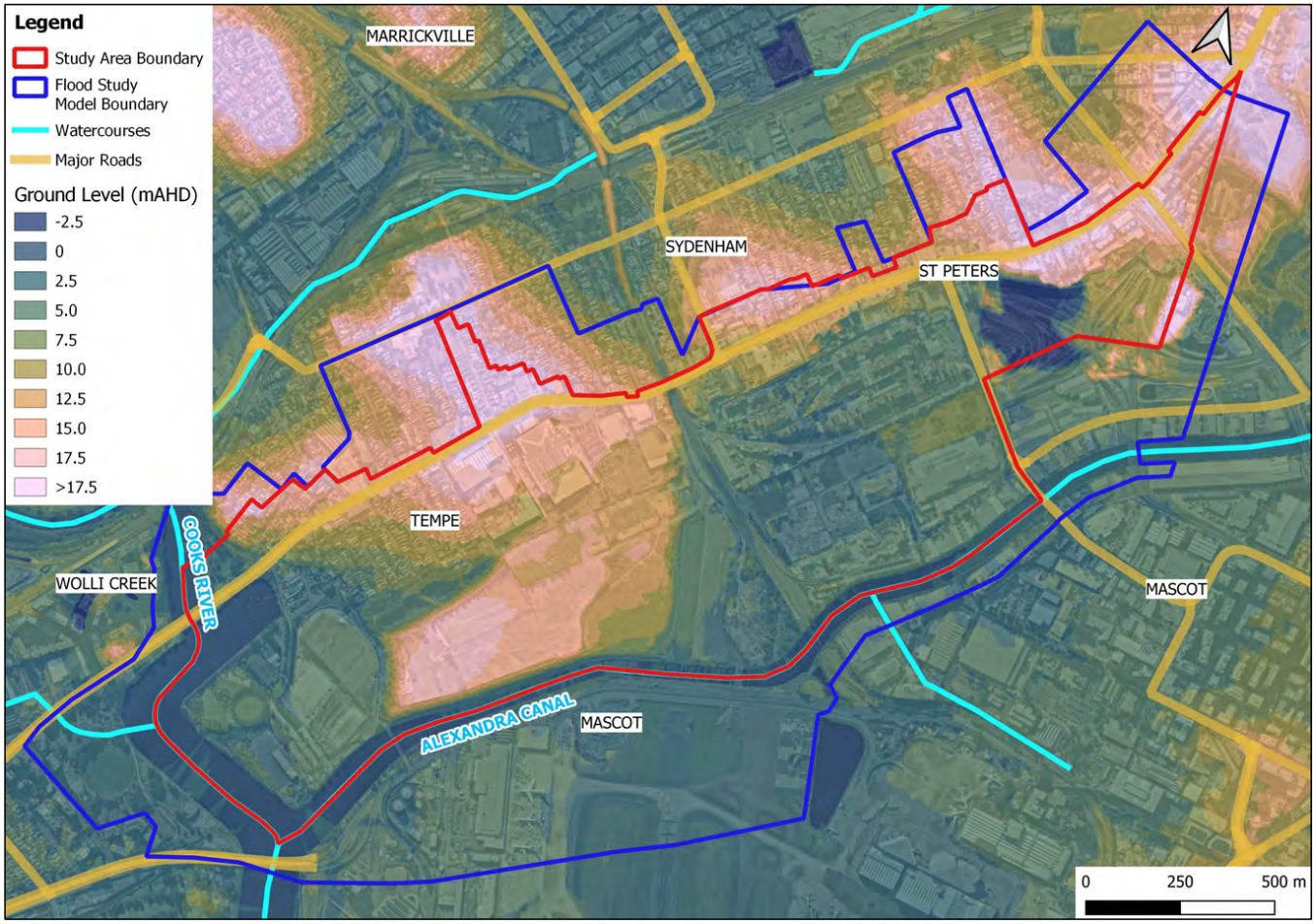

Figure 2-2 Topography of Alexandra Canal Study Area

2.1.5 Contaminated Land

Contaminated land refers to any land which contains a substance at concentrations sufficient to present a human or environmental health risk, as defined in the *Contaminated Land Management Act 1997*. Contamination issues need to be considered at the flood management options development and design stage.

DCCEW regulates contaminated land sites and maintains a record of written notices issued by the NSW Environmental Protection Authority (EPA) in relation to the investigation or remediation of site contamination. Searches were undertaken of the online Contaminated Land Record and the List of NSW Contaminated Sites notified to the EPA on 18 March 2021. A total of three premises were listed within the Study Area:

- Former Tidyburn Facility, 53 Barwon Park Road, St Peters;
- Caltex Service Station, 775 Princes Highway, Tempe; and
- Former Tempe Tip, South Street, Tempe.

Each of these sites have been formerly regulated under the *Contamination Land Management Act 1997*. It is important to note that there are limitations to the registers and there may be contaminated sites that are not listed.

2.2 Threatened Flora and Fauna

There are areas of open space along the northern bank of the Alexandra Canal.

A review of DCCEW's vegetation mapping for the Sydney Metropolitan Area (NSW OEH, 2016) identified the following Plant Community Types (PCTs) as occurring within the Study Area (refer **Figure 2-3**):

- Estuarine Swamp Oak Forest (PCT 1234), which corresponds with Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions which is listed under the NSW Biodiversity Conservation Act 2016 (BC Act);
- Estuarine Reedland (PCT 1808), which corresponds with Sydney Freshwater Wetlands in the Sydney Basin Bioregion and Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions which is listed under the BC Act;
- Coastal Sandstone Heath-Mallee (PCT 1824) which is not associated with a TEC;
- Estuarine Mangrove Forest (PCT 920), which may correspond with Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions listed under the BC Act; and
- Estuarine Saltmarsh (PCT 1126), which corresponds with Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions listed under the BC Act.

A search of the Australian Department of Agriculture, Water and Environment Protected Matters Search Tool (PMST) (DAWE, 2021a) for matters listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) was undertaken on 17 March 2021 adopting a 5 km buffer.

The PMST indicated that ten Threatened Ecological Communities (TECs) listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) are likely to or may occur in the area, namely:

- Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community (Endangered under the BC Act and EPBC Act) – this TEC may occur within the Study Area, potentially as PCT 1234 – Estuarine Swamp Oak Forest;
- Coastal Upland Swamps in the Sydney Basin Bioregion (Endangered under the BC Act and EPBC Act);
- Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion (Endangered under the BC Act and Critically Endangered under the EPBC Act);
- Eastern Suburbs Banksia Scrub of the Sydney Basin Bioregion (Critically Endangered under the BC Act and Endangered under the EPBC Act);
- River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria (Endangered under the BC Act and Critically Endangered under the EPBC Act); and
- Turpentine-Ironbark Forest of the Sydney Basin Bioregion (Critically Endangered under the BC Act and EPBC Act);

- Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion (Critically Endangered under the BC Act and Endangered under the EPBC Act);
- Shale Sandstone Transition Forest of the Sydney Basin Bioregion (Critically Endangered under the BC Act and EPBC Act);
- Upland Basalt Eucalypt Forests of the Sydney Basin Bioregion (Endangered under the EPBC Act); and
- Western Sydney Dry Rainforest and Moist Woodland on Shale (Endangered under the BC Act and Critically Endangered under the EPBC Act).

The search identified 21 TECs listed under the BC Act that are known to occur within the LGA.

Of the PCTs present in the Study Area, some have potential to comprise vegetation communities commensurate with TECs listed under the BC Act and/or EPBC Act, including those identified as being likely to occur within the LGA. The following TECs may therefore be present in the Study Area, pending confirmation via ground-truthing by a suitably qualified ecologist:

- Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland ecological community (Endangered).

The PMST results indicated a total of 89 threatened species and 79 migratory species listed under the EPBC Act are known, likely or have potential to occur in the area.

- A search of the DCCEW BioNet database was undertaken to obtain flora and fauna records for the Inner West LGA. Results are displayed in **Figure 2-3**. A total of 97 threatened flora species have been recorded in the LGA. A total of 108 threatened and migratory fauna sightings have been recorded in the LGA consisting of:

- Six amphibian species;
- Five reptiles species;
- 70 bird species;
- 23 mammal species;
- Three gastropod species; and
- One insect species.

Of these, the following species have records in the Study Area:

- *Limosa lapponica* (Bar-tailed Godwit) listed as vulnerable under the EPBC Act;
- *Melaleuca deanei* (Deane's Paperbark) listed as vulnerable under the BC Act and EPBC Act;
- *Ranoidea aurea* (Green and Golden Bell Frog) listed as endangered under the BC Act and vulnerable under the EPBC Act;
- *Pteropus poliocephalus* (Grey-headed Flying Fox) listed as vulnerable under the BC Act and EPBC Act;
- *Persoonia hirsute* (Hairy Geebung) listed as endangered under the BC Act and EPBC Act;
- *Miniopterus orianae oceanensis* (Large Bent-winged Bat) listed as vulnerable under the BC Act;
- *Gillinago hardwickii* (Latham's Snipe);
- *Ninox strenua* (Powerful Owl) listed as vulnerable under the BC Act; and
- *Ptilinopus superbus* (Superb Fruit Dove) listed as vulnerable under the BC Act.

The presence of TECs and threatened species that occur (or have the potential to occur) within the Study Area should be considered in the development and implementation of any proposed flood modifications options or flood protection works. The potential for any impacts to threatened communities or species can have implications for the approvals pathway for any structural flood mitigation proposals, and further investigations or offsetting of impacts may be required.

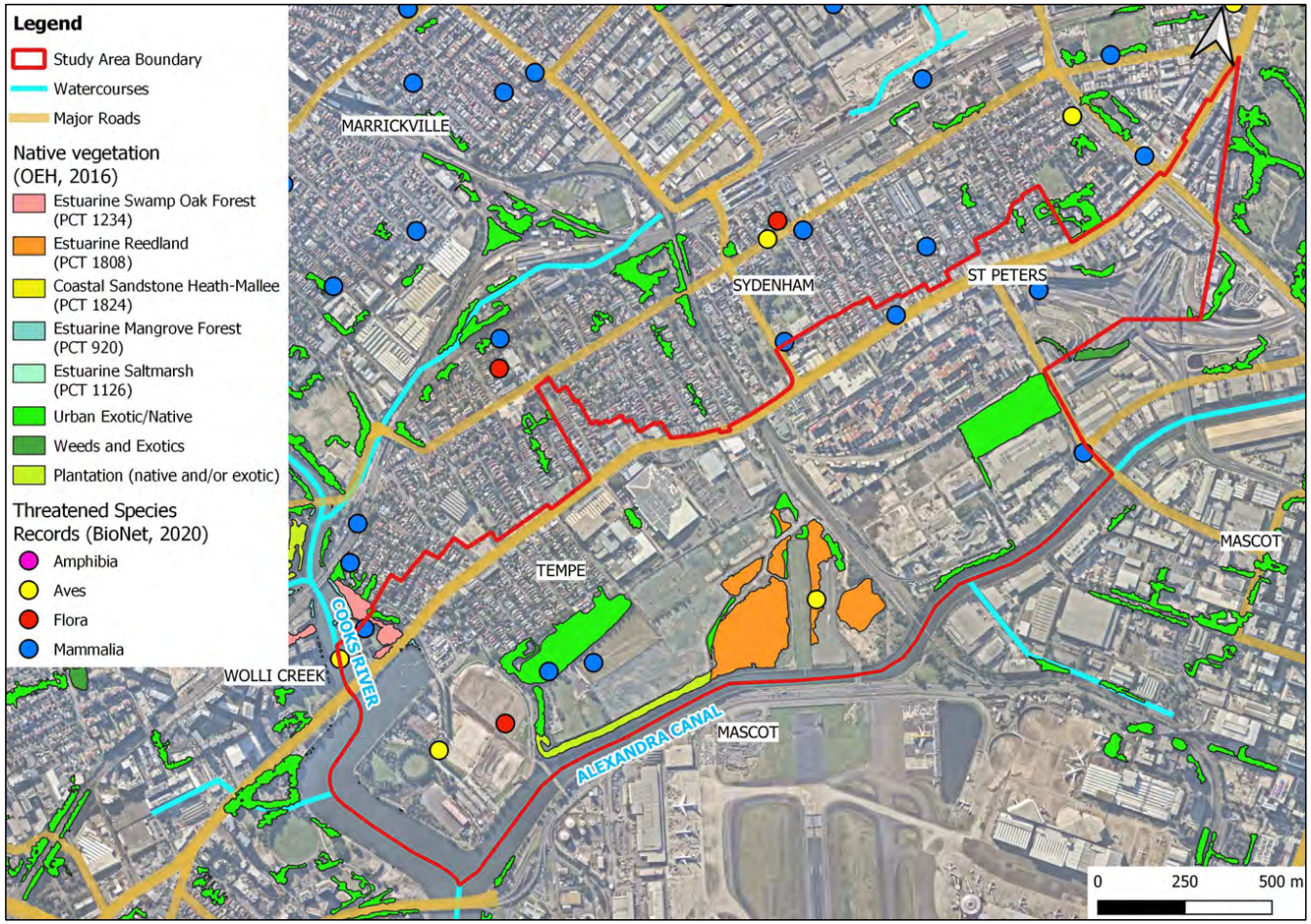

Figure 2-3 Mapping of Alexandra Canal Biodiversity Constraints

2.3 Heritage

2.3.1 Aboriginal Heritage

Australia contains many different and distinct Aboriginal and Torres Strait Islander groups, each with their own culture, language, beliefs and practices (AIATSIS, 2021). The Inner West LGA is situated on the traditional land of the Gadigal and Wangal peoples of the Eora nation. The Study Area is located on Gadigal land and has the Aboriginal name Bulanaming, with the suburbs of St Peters, Sydenham and Tempe known as Gumbramorra swamp (IWC, 2021). The swamp wetlands in this area were important for Aboriginal people as they provided a good source of plants and animals for various uses. Following European settlement, the swamp was drained in the 1890s to facilitate development of the suburb.

At least six sites of Aboriginal archaeological and cultural heritage significance are known from the Study Area based on a search of the Aboriginal Heritage Information Management System. According to the Marrickville Development Control Plan 2011, an Aboriginal Site Survey has identified places of Aboriginal heritage significance with the former Marrickville LGA. Therefore, there is potential for Aboriginal sites and archaeology to exist across the Study Area even though they have not been formally recorded.

All Aboriginal sites are protected under the *National Parks and Wildlife Act 1974* (NPW Act) and therefore any floodplain management options that have potential to impact on protected sites should be assessed via the Aboriginal cultural heritage due diligence assessment process detailed in the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (Department of Environment, Climate Change and Water NSW, 2010). Impacts to sites should be avoided in the first instance. In the vent a management option would impact an item or site listed under the NPW Act, an Aboriginal Heritage Impact Permit (AHIP) must be sought from DCCEW.

In addition, the Marrickville Development Control Plan 2011 outlines provisions and provides guidance on conservation of Aboriginal heritage.

2.3.2 Non-Aboriginal Heritage

Non-Indigenous heritage can be classified into three statutory listing classifications based on significance, namely Commonwealth, State and local. The significance of an item is a status determined by assessing its historical, scientific, cultural, social, archaeological, architectural, natural or aesthetic value.

- A desktop review of non-Indigenous heritage was undertaken for the Inner West LGA. Searches were undertaken of the following databases:
- Australian Heritage Database which incorporates World Heritage List; National Heritage List; Commonwealth Heritage List (DAWE, 2021b);
- State Heritage Register (DCCEW, 2021b); and
- Local Council Heritage as listed on the *Marrickville Local Environmental Plan 2011* (Marrickville Council, 2011a).
- There were no Commonwealth heritage items identified within the Study Area.

The search of the State Heritage Register (DCCEW, 2021) identified 55 items in the Inner West LGA as being listed under the NSW *Heritage Act 1977*, with an additional 29 being listed by Sydney Water under Section 170 of the Act. Of these, two items have been identified within the Study Area (refer **Figure 2-4**):

- Alexandra Canal (SHR no. 01621, Marrickville LEP item I270); and
- St Peters' Anglican Church (SHR no. 00032, Marrickville LEP item I275).

There are more than 300 items of local significance and 36 Heritage Conservation Areas listed on the *Marrickville Local Environmental Plan 2011*, with numerous items located within the Study Area (refer **Figure 2-4**).

Where it is proposed to undertake works that either directly or indirectly impact on a locally listed heritage item or site, the proponent must refer to the *Marrickville Local Environmental Plan 2011* and Part 8 of the *Marrickville Development Control Plan 2011* for heritage provisions and development guidelines relating to locally listed heritage items.

Depending on the nature of any structural food risk management works proposed, a more detailed Statement of Heritage Impact prepared by a suitably qualified specialist may be required to assess potential impacts on these features. Where impacts to listed heritage items are identified, a permit may be required under the NSW *Heritage Act 1977*.

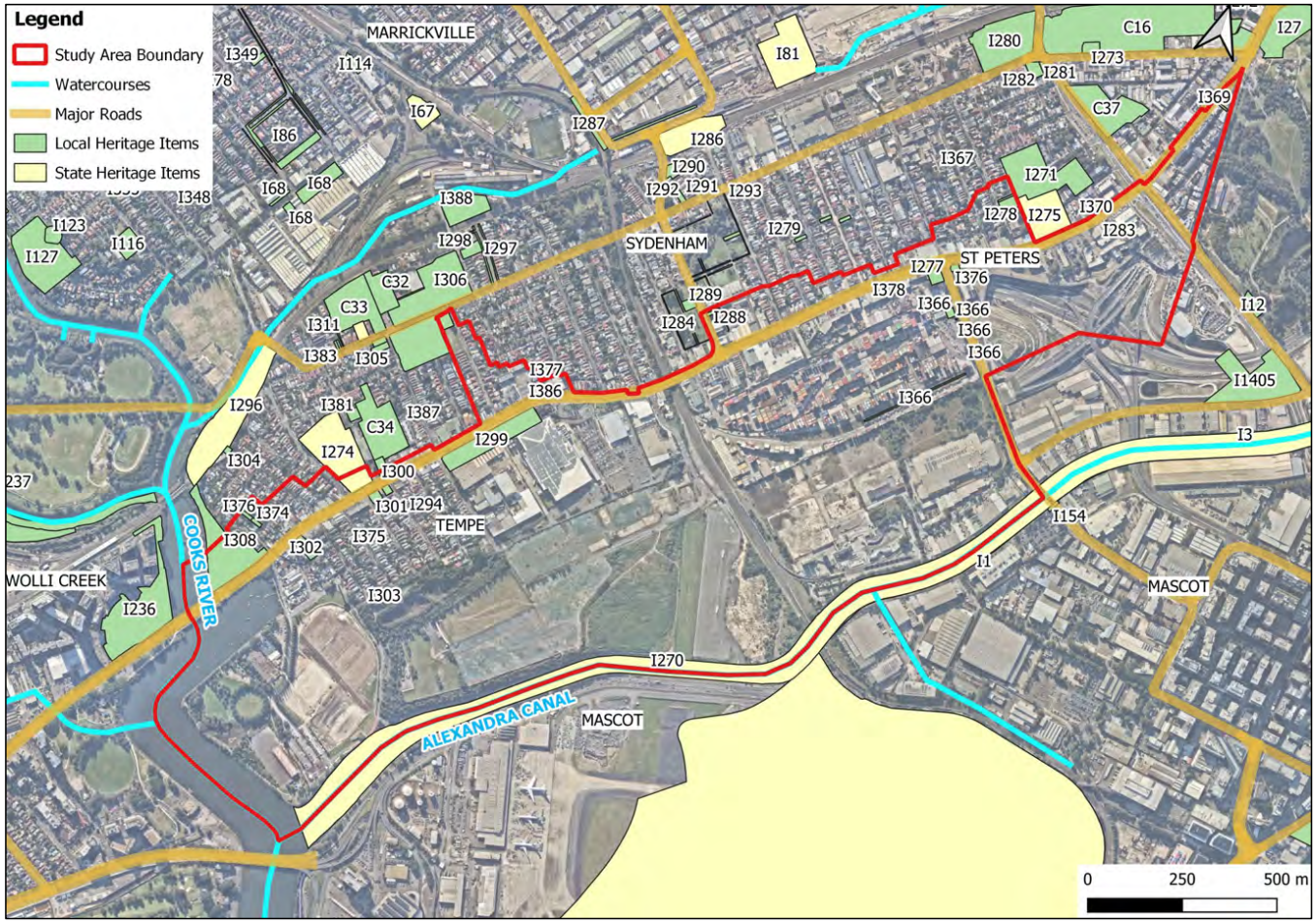

Figure 2-4 Mapping of Alexandra Canal Heritage Constraints

2.4 Demographic Profile

Knowledge of the demographic character of an area enables preparation and evaluation of floodplain management options that are appropriate for the local community. For example, in the consideration of emergency response or evacuation procedures, information may need to be presented in languages other than English and/or additional arrangements may need to be made for less mobile members of the community who may not be able to evacuate efficiently.

Demographic data for Marrickville, Sydenham and Petersham Statistical Area 3 (SA3) from the Australian Bureau of Statistics (ABS) 2016 census was used to identify the social characteristics of the Study Area. All, or part, of the following suburbs are located within the Study Area:

- Dulwich Hill;
- Enmore;
- Lewisham;
- Marrickville;
- Petersham;
- Stanmore;
- St Peters;
- Sydenham; and
- Tempe.

The census data showed that the population of the Marrickville, Sydenham and Petersham SA3 area in 2016 was approximately 54,609, with a median age of 35 years, which is lower than the median for NSW (38 years). Approximately two thirds of the people living in the Marrickville area are aged between 15-54 years, which suggests that the community is likely to be generally able-bodied and able to evacuate effectively. However, very young children (0-4 years) and the elderly (>75 years) make up approximately 11% of the population (approximately 5,900 people) so it is important to consider these members of the community in flood risk management planning.

English was the only language spoken in nearly two-thirds (62%) of homes in the Marrickville SA3. Other languages spoken at home included Greek (5.2%), Vietnamese (4.6%), Arabic (1.9%), Portuguese (1.9%) and Cantonese (1.7%). This suggests that language barriers (e.g. during evacuation, or for flood education) have the potential to be an issue for some households. The inclusion of multi-lingual brochures and personnel may be required in this instance.

Consideration of house prices in Tempe and St Peters may assist in the calculation of economic damages incurred during a flood event. According to data from realestate.com.au (realestate.com.au, 2021) the average median property prices across the Study Area are approximately $1,295,000 for houses and $780,000 for units.

2.5 Major Development Sites

Since the completion of the Flood Study in 2017 there have been two major transport projects within the Study Area that have already or are in the process of significantly changing the landform within portions of the Study Area. A brief summary of these two projects and the impact on the Flood Risk Management Study is included in the following sub-sections.

2.5.1 St Peters Interchange

The St Peters Interchange of Westconnex was transformed from undeveloped industrial area in 2013 to major road interchange site by 2020, with the majority of site alteration assumed to be at or near completion at the date of this report. This has resulted in the significant terrain changes from 2013 to 2020 LiDAR data, not only within the interchange site, but also along portions of Campbell Road north of the interchange that underwent road upgrades. The terrain differences shown in **Figure 3-2** show that there is both significant depths of both cut and fill in the interchange site comparing 2013 and 2020 LiDAR.

Figure 2-5 and **Figure 2-6**, which shows aerial imagery sourced from Google Earth, show the land use and functions of the site have been considerably changed. The pre-development site was mostly an undeveloped industrial land, used as a low-lying stockpiling area. The post-development site is a motorway interchange site which has the following key features:

- To the north of the site there is a tunnel entry to the M8 Motorway towards Parramatta
- To the west of the site there is a tunnel entry to the M8 Motorway towards Liverpool.
- To the east there is a road connection to the intersection of Euston Road and Campbell Road
- To the south-east there is a new road bridge crossing of Alexandra Canal connecting to Gardeners Road.
- To the south-west there is an elevated crossing over Canal Road currently being constructed that will connect to the Sydney Gateway project (see next sub-section).

At the time of this report, the St Peter's Interchange is near completion and nearly fully operational. The only remaining component not to be fully opened is the link to the Sydney Gateway project, which as shown in the 2023 aerial imagery, the landform and roadway are set, and due for operation soon.



Figure 2-5 St Peters Interchange 2013 Aerial Imagery Showing Mostly Undeveloped Industrial Site (Source:Nearmap)



Figure 2-6 St Peters Interchange 2023 Aerial Imagery Showing Major Motorway Interchange Site near Completion (Source: Nearmap)

Stantec reviewed the Westconnex New M5 – Flood Mitigation Strategy report dated 28 May 2020 sourced from the Westconnex website. The report provided the following summary of the flooding conditions for the St Peter's Interchange site (page 16):

> *The land use of this catchment is highly urbanised with around 50% of the catchment used as industrial sites. The highly urbanised catchments and relatively steep slopes result in rapidly responsive hydrographs, with large amounts of run-off being generated from short duration storm events.*
>
> *In the 1% AEP existing situation areas of the site become inundated from two sources, the first is the regional flooding from the Alexandra Canal. The banks of the canal are overtopped in several locations in the 1% AEP event, particularly near the AusGrid site (off Burrows Road) and upstream of Canal Road, near the Staging Rentals industrial units. The regional flooding from the canal is not able to reach the Quarry. The second source of the flooding is surface water (overland flow), which flooding does inundate the Quarry.*
>
> *The surface water occurs when the drainage network capacity has been exceeded, due to the high intensity rainfall event and possible tidal impacts. The Princes Highway marks the upstream limit of the catchment for the northern side of the site and therefore receives a relatively small volume of overland flow.*
>
> *There is little existing drainage infrastructure in the local road network in the vicinity of Campbell Street from the Princess Highway to the Illawarra Railway line. As such, Campbell Street acts as an overland flow path in minor rain events, with flooding at the intersection of Campbell and May Streets, before the water enters the existing drainage network and the Camdenville detention basin. The basin discharges by the operation of pumps into the existing drainage network under the railway line to the Eastern Channel. An overland flow path along the alignment of the railway line operates during larger events. In the 1% AEP the local roads become inundated by the overland flows with water depths greater than 0.5m in sections of Campbell and May streets.*

As it relates to the post-development site and flood mitigation strategies implemented, the following summary is provided (page 22):

> *During the design development, the hydraulic model identified areas of high afflux and was used to investigate possible solutions. The design development was an ongoing process which relied on an iterative approach between the multidisciplinary teams. The flood modelling was used to guide the MX road design and drainage design to deliver an acceptable flood outcome. The following mitigation measures were considered and incorporated in the final design.*
>
> - *Longitudinal flood relief culvert along Euston Road*
> - *The use of Elsholz kerbs within the median along Euston road.*
> - *Change in section of Euston road from a two-way cross-fall to a one-way cross-fall which would cause a reduction in flow moving in a southerly direction down Euston road*
> - *Non-return valves to new pipe outfalls where required*
> - *Drainage channel north of fire water complex to maintain an existing flow path from a small industrial estate*
> - *Flood relief culverts under Burrows Road*
> - *New road drainage pit and pipe network in the areas of the local road adjustments sized for an acceptable flood outcome*
> - *4000m3 of underground flood storage at Campbell Street to improve surface flooding and to maintain acceptable discharge flows to the Eastern Channel.*
>
> *Water levels generated from the flood report were used to set levels which provide PMF flood immunity for the New M5 carriageways, tunnel portals and the St Peters Motorway Operations Complexes. Mitigation measures adopted at the St Peters Interchange to provide PMF immunity include, a wall around the Norwest of the portal, a bund to the south of the portal, a concrete channel around the Fire Water Complex and grading of the northern ramps from the tunnel portal to Campbell Road*

The flood impacts from the project are limited to increased afflux on roads, parkland and small areas of properties immediately adjacent to the road upgrades. The 1% AEP flood impacts from the 2020 assessment are shown in **Figure 2-7**. An afflux will occur on Canal Road, Burrows Road and Campbell Road, as well as minor impacts on Princes Highway during a 1% AEP event.

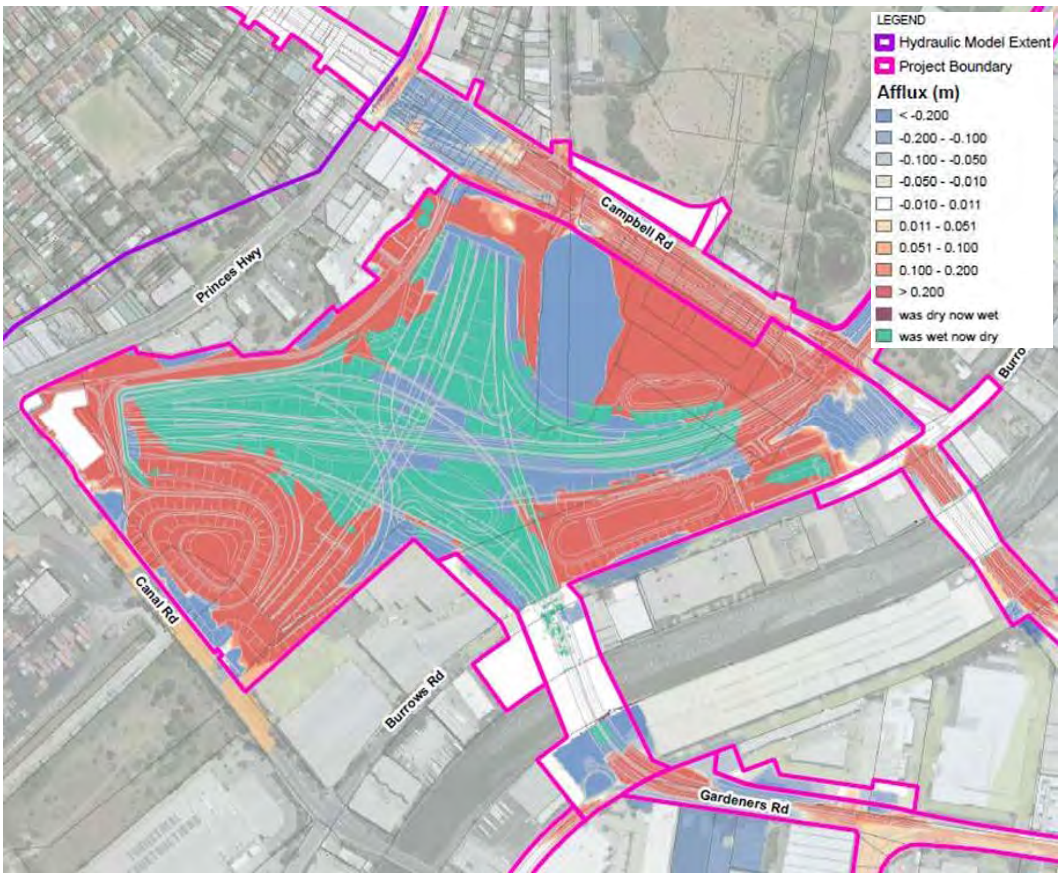

Figure 2-7 Proposed Flood Impacts in 1% AEP Event for Westconnex St Peter's Interchange (Source: Weastconnex JV, 2020)

2.5.2 Sydney Gateway Project

The Sydney Gateway is an approved transport project that is nearing completion and expected to be delivered in 2024. The project will provide a high-capacity connection from Sydney Airport and Port Botany to the new Westconnex St Peters Interchange once completed. The following details relating to the project have been sourced from the Sydney Gateway Stages 1 & 3 Hydrology and Flooding Assessment report (*Sydney Gateway JV*, 2021):

- *"Sydney Gateway comprises three stages:*
    - *Stage 1 - International Terminal and Qantas Drive connection - a new high capacity road connection, linking the Sydney motorway network at St Peters Interchange with Sydney Airport's International Terminal and Qantas Drive*
    - *Stage 2 - Botany Rail Line Duplication - the duplication of three kilometres of freight rail to Port Botany - this stage is being delivered separately by the Australian Rail Track Corporation (ARTC)*
    - *Stage 3 - Domestic Terminals access - an arterial road connection and flyover to Sydney Airport's Domestic Terminals. This includes improvements to existing roads, to relieve congestion and improve connectivity to Sydney Airport Domestic Terminals and towards Port Botany.*
- *Stage 1 comprises a road connection linking the following infrastructure / facilities:*
    - *New M5 and M4-M5 Link via St Peters Interchange at Canal Road*
    - *Sydney Airport International Terminal (T1) via a new link through the former Tempe Tip to the existing Airport Drive*
    - *Qantas Drive via a bridge over Alexandra Canal and Botany Rail Line, tying in with Stage 3 works.*
- *Sydney Gateway Stage 3 comprises arterial road network improvements to relieve congestion and improve connectivity to Sydney Airport Domestic Terminals 2 and 3 (T2/T3), including:*
    - *The widening of Qantas Drive from the interface with Stage 1 to the O'Riordan Street, Joyce Drive, Sir Reginald Ansett Drive intersection*
    - *Providing a grade separated, elevated viaduct access to T2/T3 from Qantas Drive to Sir Reginald Ansett Drive, allowing for the uninterrupted free flow from the Sydney Gateway Stage 1 to the T1/T2 Domestic terminals*
    - *Realignment of the surrounding affected road network including:*
        - *The intersection between Seventh Street, Qantas Drive and Robey Street*
        - *The intersection between Qantas Drive, Sir Reginald Ansett Drive, Joyce Drive and O'Riordan Street*
        - *The intersection of Sir Reginald Ansett Drive and Ross Smith Avenue*
        - *Changes to the vehicle underpass on Shiers Avenue leading to the taxi carparking facility on Seventh Street."*

According to the Infrastructure Pipeline website, "*Stage Two is the Port Botany Rail Duplication, which is being separately delivered by the Australian Rail Track Corporation*" (*Infrastructure Partnerships Australia*, 2021).

Figure 2-8 shows five active sites, at the time of drafting this interim report, including St Peters Interchange, Tempe, Mascot, Domestic Terminal and International Terminal. This figure was sourced from the *Sydney Gateway Project* website (NSW Government) in 2023.

Among the five active sites, only Tempe site and St Peters Interchange site are located within the Study Area. The proposed interaction of St Peters Interchange (and Sydney Gateway project in the form of the proposed elevated crossing of Canal Road is discussed in **Section 2.5.1**. The main developments (shown in **Figure 2-9**) within the Tempe site include:

> Excavation in Tempe Lands: The Sydney Gateway road will pass through Tempe Lands;

> More open space and new recreation facilities at Tempe Lands: The Sydney Gateway Project proposed to potentially provide open space within the project area to the community in Tempe after construction of Sydney Gateway is complete. Potential uses of this space could include sporting courts, amenities, walking

trails, parking and off leash dog exercise area, subject to a further Plan of Management. Cycleway Journey along and over the Alexandra Canal.

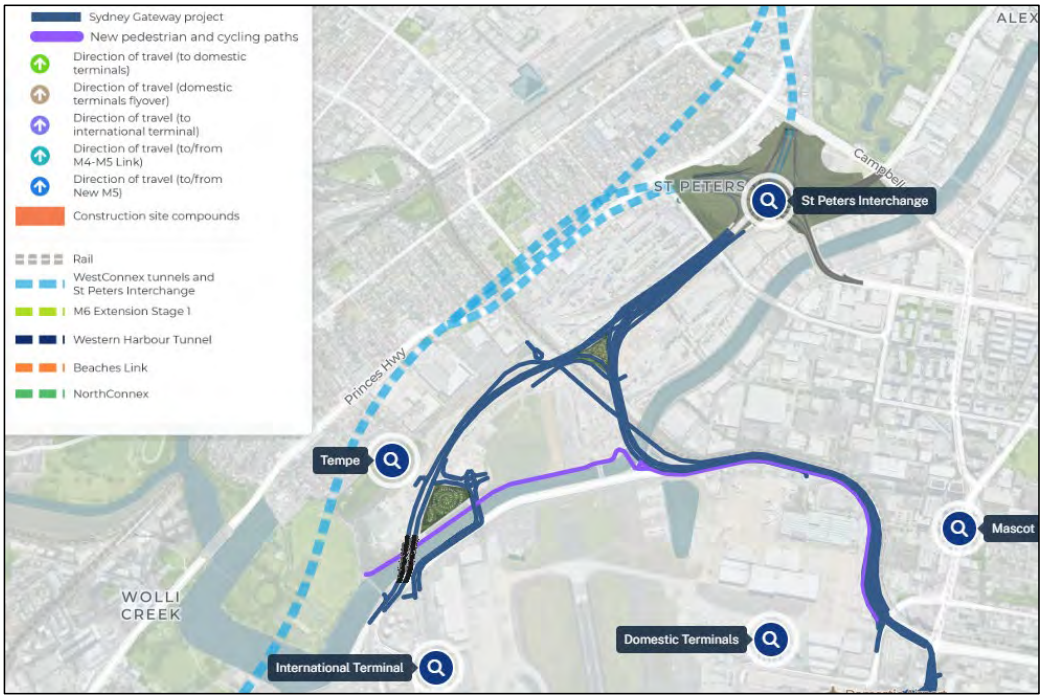

Figure 2-8 Concept Layout for the Proposed Sydney Gateway Project (NSW Government, 2023)



Figure 2-9 Concept layout for active site at Tempe (NSW Government, 2023)

It is noted that a flood study report was prepared during the Environmental Impact Statement (EIS) stage of the Sydney Gateway project (Lyall & Associates, 2019). This study included the development of a range of flood / stormwater mitigation measures in the central portion of the project near the Port Botany Rail Line crossing.

Subsequently, the *Sydney Gateway Stages 1 & 3 Hydrology and Flooding Assessment report* (Sydney Gateway JV, 2021) was released which confirmed details of proposed drainage networks. The proposed drainage network for the central portion of the Sydney Gateway project are shown in **Figure 2-10**. It shows a significant upgrade in the existing drainage network in this area.



Figure 2-10 Proposed Post-Gateway Drainage Network Near Rail Line (Source: Sydney Gateway JV, 2021)

Figure 2-11 and **Figure 2-12** shows water level impacts of the Gateway project for the study area in the 1% AEP and PMF events respectively.

In the 1% AEP flood, the maximum impacts in the FRMS&P study area are between 0.01 - 0.02m, in the PMF event the impacts are more significant with increases greater than 0.2 metres in the central portion of the study area adjacent to Port Botany Rail Line to Burrows Road to the north. The impacts are generally considered negligible as the 1% AEP impacts are very minor at less than 0.02m, though the PMF impacts may significantly alter flood risk or flood hazard in this extreme event.



Figure 2-11 1% AEP Water Level Event Impacts of the Sydney Gateway Project within the Study Area (Sydney Gateway JV, 2021)



Figure 2-12 PMF Water Level Impacts of the Sydney Gateway Project within the Study Area (Sydney Gateway JV, 2021)

3 Review of Available Data

3.1 Alexandra Canal Flood Study

The Alexandra Canal Flood Study was completed in 2017 on behalf of Inner West Council formerly Marrickville Council by WMAwater. The Flood Study defined flood behaviour in the catchment for the 50%, 20%, 10%, 2% and 1% Annual Exceedance Probability (AEP) design storms, and the Probable Maximum Flood (PMF). The 2017 Flood Study modelling forms the basis for this Flood Risk Management Study. Further details on the hydrological and hydraulic modelling approaches are discussed below.

3.1.1 Flood Study Approach

A hydrological model was built in DRAINS to create flow boundary conditions for input in the hydraulic (TUFLOW) model by using design rainfall patterns specified in AR&R 1987 to produce runoff hydrographs. Since there were no streamflow records available in the area, independent calibration for the hydrological model was not possible.

The model included 143 sub-catchments with an average size of 1.5 ha for a total Study Area of 2.20 km^2. A small catchment size was utilised such that overland flow behaviour is generally defined by the hydraulic model as part of a joint modelling approach which was verified against previous studies and alternative methods.

Impervious surface area within was determined based on the proportion of sub-catchment area allocated to a number of land use categories, with each category having an estimated impervious percentage based on aerial observation of a representative area. Rainfall losses were modelled using the initial & continuing loss method – an initial loss of 1.0 mm was adopted and a continuing loss of 5.0 mm.

Comparison with a DRAINS model of the nearby Rose Bay Catchment from a previous study was undertaken to verify the hydrological model. Specific yield (peak discharge divided by upstream catchment area) comparison was undertaken and the Alexandra Canal catchment model was found to have comparable yields.

The availability of high-quality LIDAR data meant that the Study Area was suitable for 2D hydraulic modelling to assess flood behaviour, with the TUFLOW package being adopted in this case. The hydraulic model uses the runoff hydrographs from the hydrology model as boundary conditions in order to provide estimates of flood depths, velocities and hazard within the Study Area. The model was used to define flood behaviour for the 50%, 20%, 10%, 2% and 1% AEP flood events and the Probable Maximum Flood (PMF).

The TUFLOW model boundary is shown in **Figure 2-1**. The TUFLOW model boundary has extended beyond the study area to allow for any complex flood behaviour around the fringes of the catchment to be accounted for. The TUFLOW model had a total area of 3.2 km^2, being approximately bounded at four corners by the rail crossing over the Cooks River, the Giovanni Brunetti Bridge (Marsh St / Airport Dr), the Gardeners Road Bridge, and the Princes Highway / May St intersection. The area includes downstream portions of Bayside Council, such as Cahill Park at the eastern bank of the Cooks River and portions of Sydney Kingsford Smith Airport south of Alexandra Canal, as it was expanded to incorporate water level conditions in the two open channels at the southern boundary of the site.

A grid with 2 m by 2 m cell size was adopted in order to provide sufficient detail for roads and overland flow paths. The grid sampled terrain from a 1 m by 1 m DEM generated from LIDAR data recorded in 2013 (see **Section 3.2** for further discussion). For inflows, local runoff hydrographs were extracted from the DRAINS model and applied to the 2D domain of the TUFLOW model at the downstream end of the sub-catchments.

Downstream boundary conditions for the open channel water levels where determined by determining design storm flood levels for Alexandra Canal from previous flood studies. As is common for coincident flooding for localised catchments and larger mainstream waterways is for tailwater conditions to represent more frequent flood events. A summary of the adopted tailwater conditions for Alexandra Canal is included in **Table 3-1**.

Roughness coefficients within the Flood Study model for different flow paths were adopted based on site inspection and correspondence to similar floodplain environments, and consistency with AR&R 2016 revision guidelines. Buildings and other structures were incorporated into the model as flow path obstructions, with reduced building footprints included in the model to allow for flow between buildings in the model. Bridges were modelled as 1D features within open channels. All pipes equal to or smaller than 300mm in diameter were assumed to be fully blocked and not included in the Flood Study model. The catchment drainage system defined in the model included 225 pipes, 259 pits / nodes, and 288 open channel segments.

Table 3-1 Tailwater Conditions Adopted in the Alexandra Canal Flood Study Model (WMAwater, 2017)

Design Storm AEP	Local Catchment Rainfall Storm AEP	Tailwater Condition
50%	50%	HHWS Ocean Level 1.25m AHD
20%	20%	HHWS Ocean Level 1.25m AHD
10%	10%	HHWS Ocean Level 1.25m AHD
5%	5%	HHWS Ocean Level 1.25m AHD
2%	2%	5% AEP Ocean Level 1.4m AHD
1% (Enveloped)	5%	1% AEP Ocean Level 1.45m AHD
	1%	5% AEP Ocean Level 1.4m AHD
PMF	PMF	1% AEP Ocean Level 1.45m AHD

The joint hydrologic / hydraulic model was calibrated based on the 25th April 2015 event by comparing flood affectation at various locations. The model was found to effectively replicate some degree of flood affectation at those locations when compared to council data. Verification of design storm model results was undertaken through comparison to previous studies.

Sensitivity analyses were conducted for the 1% AEP and 5% AEP models based on hydrologic routing lag, Manning's roughness values, pipe blockage, and climate change both rainfall increase (10%, 20%, and 30%) and sea level rise (0.4m and 0.9m).

Design storm result analysis and mapping included peak depths, levels and velocities. The analysis also included a pipe capacity assessment. In addition, the 20% AEP, 5% AEP, 1% AEP and PMF events also had provisional hydraulic hazard, hydraulic categorisation (floodway, flood storage, and flood fringe) and the 1% AEP and PMF events also had flood emergency response classifications.

A provisional Flood Planning Area (FPA) and Flood Control Lot tagging was conducted for the Study Area. The report also briefly summarised the relevant flood development controls for the Study Area.

Four flooding hotspots were identified in the Flood Study which were:

- Hotspot 1 – Holbeach Avenue, Bay Street and Old Street, Tempe;
- Hotspot 2 – Canal Road and Burrows Road, Tempe;
- Hotspot 3 – Princes Highway, Barwon Park Road and Crown Street, St Peters; and
- Hotspot 4 – Princes Highway, Talbot Street and Bellevue Street, Sydenham.

Refer to **Section 7.5** for a map of the hotspot locations.

3.1.2 Flood Study Data Provided

As part of project inception, Inner West Council provided Stantec with the following data related to the Alexandra Canal Flood Study (WMAwater, 2017):

- DRAINS hydrology models and associated input files for all calibration, sensitivity, and design storm runs. Included in these model inputs is GIS versions of drainage sub-catchments;
- TUFLOW hydraulic models and associated input files for all calibration, sensitivity, and design storm runs. Included within this is GIS such as roughness layers, building polygons, modelled pit and pipe data, model topography, and other relevant model inputs;
- PDF versions of the final report;
- GIS versions of all peak model results for calibration and design storms runs including depth, velocity, water level, provisional hazard, hydraulic categorisation, pipe capacity and others;
- Flood control lots database and GIS layer and the FPA in a GIS layer.

This data provided by Council formed the basis of the review of the Flood Study.

3.2 Survey Information

The Flood Study model (WMAwater, 2017) was constructed utilising the following available data:

- LIDAR data collected in 2013 and obtained from the Land and Property Information (LPI) division of the NSW Government Department of Finance, Services and Innovation. Open water and vegetation also tend to affect the accuracy of LIDAR data. A 1 m x 1 m Digital Elevation Model (DEM) was constructed from the LIDAR to form the basis of the TUFLOW model.
- Ground and floor level survey at select locations from the previous Alexandra Canal Catchment Drainage Study (Lucas Consulting Engineers, 1998), used to verify the LIDAR data and was found to have an average elevation difference of 0.04 m.
- Tempe Wetlands remediation and earthworks construction drawings by Stantec in 2004 – appended to the LIDAR DEM as the high presence of water and vegetation at the wetlands made LIDAR less accurate.
- In addition to these Flood Study model terrains, Stantec sourced several other LiDAR and DEM datasets for this study. Review of the following LiDAR sources has been conducted (refer to **Section 3.6.2**):
- LiDAR points provided by Council from an unknown source and date covering part of the Study Area;
- The ELVIS - Elevation and Depth - Foundation Spatial Data website was accessed with two datasets available from the website. The files appear to have been recorded on the following dates:
  - 2013-04-10 – 1m x 1m ASC grid data set in 2km x 2km with an accuracy of 0.3m (95% Confidence Interval) vertical and 0.8m (95% Confidence Interval) horizontal in GDA94 and MGAz56; and
  - 2020-05-10 - 1m x 1m TIFF data set in 2km x 2km with an accuracy of 0.3m (95% Confidence Interval) vertical and 0.8m (95% Confidence Interval) horizontal in GDA2020 and MGAz56.

3.3 GIS Data

As part of project inception, Inner West Council provided Stantec with the following GIS data for the study:

- Local Environment Plan (LEP) land use zone mapping and Acid Sulfate Soil (ASS) layer;
- LGA Boundary layer;
- LiDAR data from an unknown source and date covering part of the Study Area;
- Stormwater pit and pipe network;
- State Environmental Planning Policy (SEPP) 2016 Coastal Management layer; and
- Aerial imagery from an unknown source and date.

Aside from these GIS layers provided by Council during the early stages of the project, various other publicly available GIS layers were sourced by Stantec for this study including high quality aerial imagery from NearMap (2021) recorded at various periods for the Study Area and its surrounds. This aided in not only providing details about the current site, but also the historical site at the time of the Flood Study. Another example is the various flora and fauna and heritage GIS databases described in **Section 2**.

3.4 Site Inspection

Site inspections of the Study Area were conducted by Stantec representatives on 14 May 2021. In total, 23 different sites within the Study Area were visited, all in areas identified as flood affected based on Flood Study outcomes. The location of the sites visited is shown in **Figure 3-1**. The site visits provided the opportunity to review the following:

- Review flood hotspots identified in the Flood Study (WMAwater, 2017), and the flood study model results compared to the observed topography and layout of the site;
- Review of site layouts and the elevations of floor levels for buildings in the vicinity of flooded areas to help inform the development of a floor level survey scope;
- Noting of the current development of the Study Area with some large-scale changes in the area recorded such as the St Peters Interchange site, regrading of the sports field at Tempe Recreation Reserve, and the ongoing development on Princes Highway near Campbell Street; and
- Initial review of opportunities and constraints for potential future flood mitigation options.

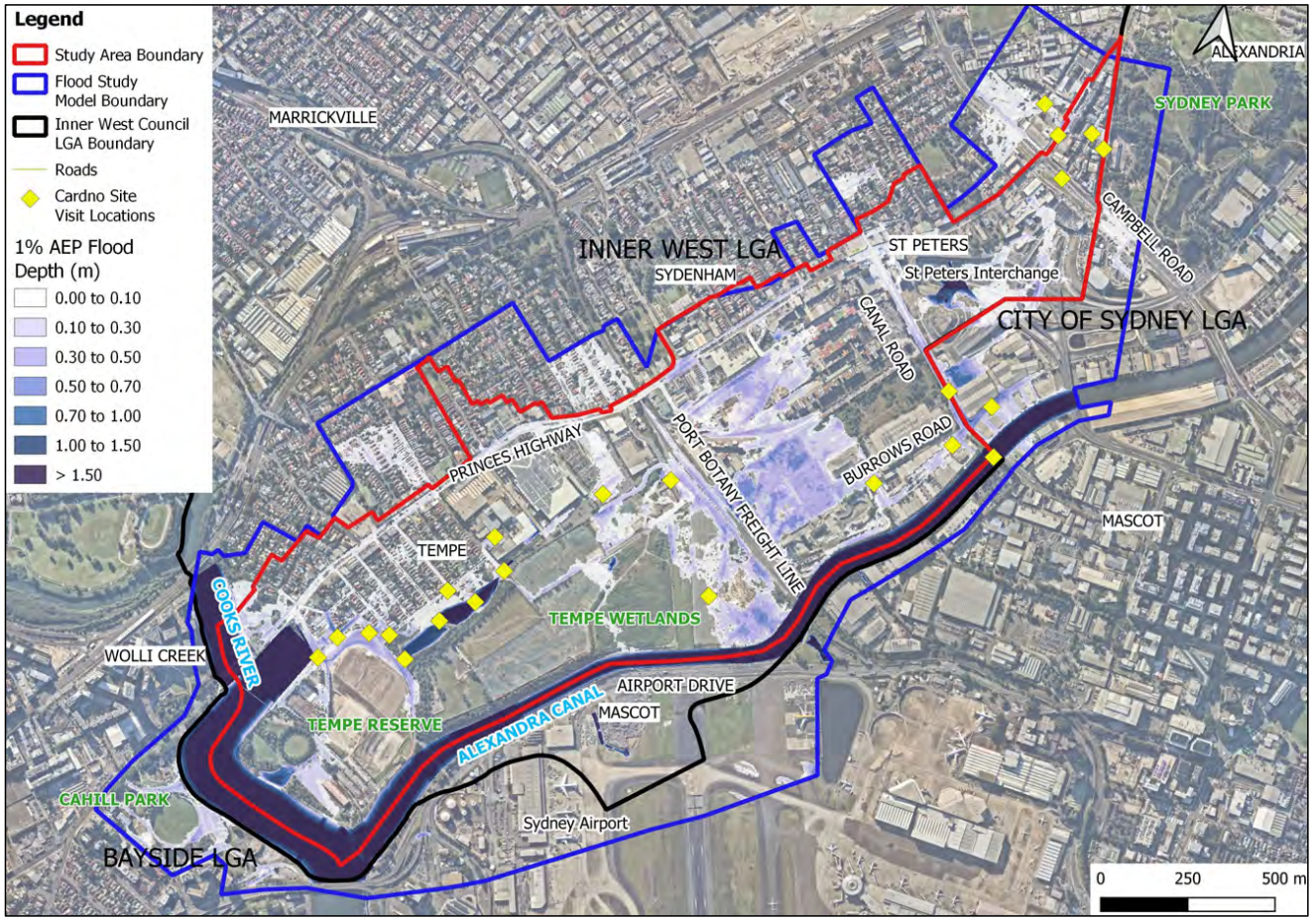

Figure 3-1 Site Locations for Alexandra Canal Study Area Visited by Stantec on 14 May 2021, with Underlay of Peak 1% AEP Depth Results from the Flood Study (WMAwater, 2017). This should be Figure 3-1.

3.5 Floor Level Survey

Floor level survey was prepared for the Alexandra Canal catchment as part of this Study. In total, 36 floor levels were surveyed. For flood affected buildings that did not have surveyed levels from the survey, floor levels were estimated as discussed further in **Section 6.2.3**.

3.6 Flood Study Model Review and Update

Since the completion of the Alexandra Canal Flood Study in 2017, several developments have occurred in both floodplain management guidance and standards and in the Study Area itself. These changes have the potential to impact the suitability of the Flood Study model in accurately representing the Study Area and its flood behaviour. Therefore, in order to confirm these potential impacts of these changes, a model review process has been conducted accounting for these changes in updated 1% AEP and 5% AEP models. The following model updates were included in this review process:

- Adoption of the AR&R 2019 design rainfall method as opposed to the AR&R 1987 method adopted in the Flood Study model;
- Updates to the model topography to reflect development and changes in the Study Area post-2013; and,
- Updates to the model building polygons to reflect development and changes in the Study Area post-2013.
- These updates are detailed further in the following sections with model outcomes from this review discussed in **Section 3.6.5**.

3.6.1 AR&R 2019 Design Rainfall Update

3.6.1.1 Background

An important change has occurred in the development of flood estimation in Australia, with the release of Australian Rainfall and Runoff 2016 (AR&R 2016). On 25 November 2016, Geosciences Australia announced that:

> *The AR&R 2016 Guidelines have now been officially finalised, providing engineers and consultants with the guidance and datasets necessary to produce more accurate and consistent flood studies and mapping across Australia, now and into the future.*

Following this, the AR&R 2019 update was released which included minor updates to AR&R 2016 without changes to the edition. There are specific changes to the methodology for estimation of flood behaviour compared to the AR&R 1987 methodology that was adopted in the Alexandra Canal Flood Study (WMAwater, 2017). These include:

- Rainfall – the Bureau of Meteorology (BoM) has re-analysed all the Intensity-Frequency-Duration (IFD) parameters across Australia, incorporating 30 further years of data and many more rainfall stations. The method of derivation has also changed, meaning the previously used IFD coefficients have been updated. It is also noted that the standard reporting for storm duration has been reduced;
- Design Storms – AR&R 2019 recommends the utilisation of a suite of design rainfall temporal patterns, with ten patterns for each Annual Exceedance Probability (AEP) and duration of event;
- Storm Loss Rates – AR&R 2019 recommends the use of initial and continuing loss rates for design storms, and is no longer recommending the use of runoff coefficients for hydrological modelling. The loss rates provided are also for the entire storm, as opposed to the burst losses adopted in AR&R 1987; and
- Storm Loss Rates – AR&R 2019 provides for the use of three types of area when assessing loss rates - directly connected impervious areas, indirectly connected impervious areas and pervious areas. The document also provides guidance as to the calculation of these areas.

3.6.1.2 Design Rainfall Update

In AR&R 1987, there was a single temporal pattern defined for each storm burst duration of interest. This limited the number of runs required to identify the critical storm burst duration within a catchment. In AR&R 2019, ten temporal patterns are provided for each storm burst duration.

As part of this model review, all ten temporal patterns were run for each storm burst duration and the median peak flow was determined at each location of interest. It is noted that this requires a ten-fold increase in hydrological assessments to identify the critical storm burst duration, which may vary depending on location within the catchment. Furthermore, no single temporal pattern will give the median peak flow and that rather the temporal pattern (which gives the peak flow closest to, but higher than, the median flow) has been adopted for assessment purposes.

As part of this model review, the DRAINS model from the Alexandra Canal Flood Study was updated to AR&R 2019 rainfall for the 1% AEP (1 in 100 year), and 5% AEP (1 in 20 year) events. For both design events all ten temporal patterns were prepared for the 30, 45, 60, and 90 minute and 2 hour storms. Compared to the AR&R 1987 critical duration of 60 minute, these modelled durations provided sufficient scope to encompass any potential shift in critical duration as part of the AR&R 2019 update.

3.6.1.3 Review of Rainfall Loss Approach

AR&R 2019 recommends the use of the initial / continuing loss approach, whereas the Flood Study model used Horton Loss model which is the default loss model for DRAINS with ILSAX hydrology. Stantec conducted a review of the adopted Horton losses from the Flood Study compared to an equivalent initial / continuing loss approach as recommended in AR&R 2019.

The equivalent initial / continuing losses suitable for the Study Area were concluded to be:

- 1% AEP – initial loss 6.4 mm and continuing loss 0.7mm / hour;
- 5% AEP - initial loss 8.5 mm and continuing loss 0.7mm / hour.

The losses were adopted using the Antecedent Moisture Condition (AMC) of 3.0 as adopted in the Flood Study model. In addition, a sensitivity check to an AMC of 3.5 was conducted. The outcomes of the total loss comparison showed for both AMC 3.0 and 3.5 total losses are similar for the shorter durations such as the 15 and 20 minute events. However, as the burst duration increases the Horton Losses becomes higher than that estimated by the Initial-Continuing loss model.

Nevertheless, the comparison shows that the choice of loss model is unlikely to make a significant difference to model results as the critical duration was assumed to be relatively short, the catchments are highly impervious so rainfall losses have less affect, and the rainfall excess is much higher than the losses for the 5% & 1% AEP events.

Therefore, the Horton loss curves from the Flood Study model were retained within the review model.

3.6.1.4 Review of Other Model Assumptions

Stantec also conducted a high-level review of other Flood Study model components. It was found that the model set-up was generally appropriate including surface roughness, impervious percentage, and pit and pipe modelling. For time of concentration calculation, the Kinematic Wave equation was adopted which is not typically utilised for large, piped catchments, however as calculated travel times are in the appropriate range, this was not considered a concern.

3.6.2 Topography Review and Update

Since the Flood Study model was completed, the catchment has undergone a substantial amount of change and development. As covered in **Section 3.2**, the Flood Study model terrain was based on LiDAR data recorded in 2013, sourced from the ELVIS website from 10 April 2013. A review was undertaken to assess the adequacy of the model terrain by comparing to newer LiDAR data collected May 10, 2020 sourced from the ELVIS website (refer to **Section 3.2** for further details).

Comparing the Flood Study model terrain to the newer DEM showed that the terrain differences between 2013 and 2020 data are largely within +/- 0.2 metres outside of building footprints, with notable exceptions where significant development has occurred. A comparison of Flood Study model terrain and 2020 LiDAR data is included in **Figure 3-2**.

Generally across the entire Study Area, it was not clear the 2020 terrain provides better accuracy than the 2013 terrain. Therefore the Flood Study model terrain was thus retained in the updated Flood Study Model for Alexandra Canal Study Area, with exceptions for the specific sites discussed below.

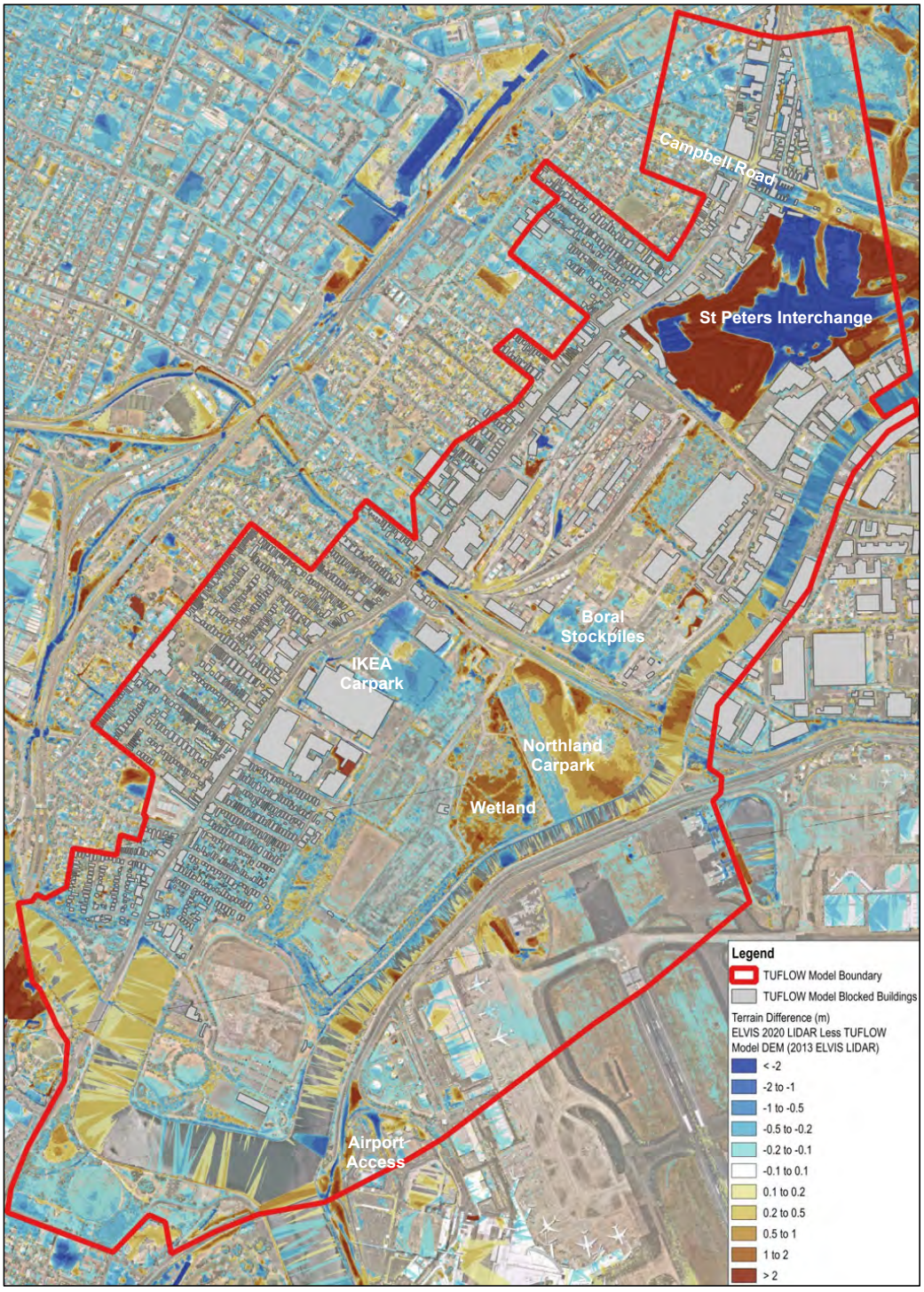

Figure 3-2 Terrain Differences - 2020 LiDAR Less 2013 LiDAR Used in the Alexandra Canal Flood Study with Labels of Key Sites

The sites with significant terrain differences outside of building footprints appear to be:

- The St Peters Interchange: The St Peters Interchange of Westconnex was transformed from undeveloped industrial area in 2013 to major road interchange site by 2020, with the majority of site alteration assumed to be at or near completion at the date of this report. This has resulted in the significant terrain changes from 2013 to 2020 LiDAR data, not only within the interchange site, but also along portions of Campbell Road north of the interchange that underwent road upgrades. Therefore, the terrain has been updated to include the 2020 LiDAR for the St Peters Interchange and adjoining Campbell Road reserve;
- Northland carpark: The Northland carpark was installed on the northern side of Alexandra Canal to provide additional parking for Sydney Airport. This included the construction of the Nigel Love Bridge over Alexandra Canal. This work commenced in 2015 and completed in 2016. Comparing the 2013 and 2020 terrains at this location, it appears the carpark has resulted in fill of between 0.5 – 2 metres above previous ground levels. There is also a triangular stockpile of material located adjacent to the carpark south of the rail corridor with fill depths from 2013 terrain of over 2 metres. Since the 2020 terrain appears to be a reasonable representation for the present-day Northlands Carpark, the updated Flood Study model was revised to include 2020 LiDAR for this area. Waterway opening details for the Nigel Love Bridge over Alexandra Canal were estimated based on Google Streetview images, and it was concluded that the soffit of the bridge was higher than peak flood levels, therefore no flood impacts from the bridge were anticipated. Therefore the bridge was not modelled in the updated model;
- The large heavily vegetated wetland to the west of Northlands Carpark also shows significant terrain differences between 2013 and 2020 (over 2 metre increases in some areas, with decreases of over 2 metres in other areas). As this land use has not changed over this time it is assumed that these terrain differences are resulting from changes in vegetation levels over this time and that the terrain has not actually changed in this wetland area, therefore 2013 LiDAR has been retained;
- International airport access road ramps: On the east side of Alexandra Canal, upgrades have been made to the access roads and ramps to the International Airport since 2013. As this area is on the downstream boundary of the model, outside of the LGA, and near the confluence with Cooks River it is not expected that any terrain changes in this area would materially alter the modelling outcomes or any consideration of potential flood mitigation options. Therefore, the Flood Study model terrain was retained at this location;
- IKEA / Decathlon carpark: The east side of the IKEA carpark shows significant reductions in levels from 2013 to 2020 terrain. This could be attributed to the works on the carpark area from 2017 to 2018 relating to the construction of the Decathlon building. The 2020 terrain appears to be a reasonable representation for present-day IKEA / Decathlon carpark, therefore the updated Flood Study was revised to include 2020 LiDAR for this area;
- The Boral Concrete site has two large areas for material stockpiling located north-east of Northland carpark. The 2020 terrain shows stockpile surfaces of these areas up to 2 metres lower than in 2013. It is assumed that the volumes of stockpiled materials for these areas is constantly fluctuating, however it has been assumed that 2020 terrain, with its lower levels is closer to the permanent site elevation. Therefore the 2020 LiDAR has replaced the model terrain for the stockpile portions of the Boral site; and
- There are some narrow sections of significant differences along the perimeters of the rail corridor. With no knowledge of any major recent works along this corridor, these differences are also presumably due to slight spatial misalignments. The Flood Study model terrain was retained at this location.

3.6.3 Model Building Polygon Review and Update

The Alexandra Canal Flood Study model assumed full blockage of building footprints by removing building polygons from the 2D terrain of the model. Generally, this approach is considered appropriate. A review was conducted of building footprints from the Flood Study TUFLOW model and more recent 2020 Geoscape building footprints provided by DCCEW, offering a detailed and more up-to-date dataset. Review of the building polygons layer showed that in most instances the polygons align with buildings shown in the aerials, but there were particular instances where this is not the case. There are presumably two reasons for building polygons not matching building locations in latest available aerials:

- The base data used in the model building polygon layer did not include some areas; and
- There has been development since the Flood Study with new or removed buildings in the area.

Instances of potential new buildings and extended buildings in Alexandra Canal were reviewed using latest available aerial imagery compared to historical aerials from the time of the Flood Study, if a building was found to have been newly constructed then this polygon was added to the updated model.

Examples of changes to the building polygon layer include:

- The addition of the Decathlon building to the model which was not yet constructed at the time of the Flood Study; and
- Conversely, there are some building footprints along Campbell Road, north of the St Peters Interchange that have been removed as part of those works. Therefore, these polygons were removed from the model to reflect this site change.

3.6.4 Drainage of Major Developments

In addition to the known terrain and building layer alterations that were accounted for in the updated model, as discussed in the previous two sections, the impacts on site drainage for significant current and future development was also considered. There are two notable large-scale projects underway in the Study Area as summarised previously in **Section 2.5**, which were accounted for in the updated model through:

- St Peters Interchange site was modelled through updated terrain to account for post-construction conditions. The assumption was that stormwater drainage was suitably designed to discharge to Alexandra Canal therefore site inflows for the model were discharged directly to Alexandra Canal in the updated model.
- Sydney Gateway project was not accounted for in the updated model set-up. At the time of model set-up there was no publicly available information for the project. The assumption was that appropriate design for the project would take place such that no significant impacts compared to pre-construction conditions would occur, and therefore pre-construction conditions were maintained in the updated model. As shown in the water level impact results for the Sydney Gateway project in **Section 2.5.2**, sourced from a report that was made publicly available subsequent to the updated model set-up, the 1% AEP impacts of the project are at most 0.01 – 0.02m, confirming this assumption.

3.6.5 Model Review Results

The model updates discussed in the above sections were incorporated into a review model for the 1% AEP and 5% AEP events, with the outcomes of this modelling summarised in the following sub-sections.

3.6.5.1 Critical Duration

For both the 1% AEP and 5% AEP events, all ten temporal patterns were prepared for the 30, 45, 60, and 90 minute and 2 hour storms. Of the ten temporal patterns for each duration, the median pattern was selected for each duration, and then these duration median results were combined to create the peak flood results. The critical durations for the 1% AEP and 5% AEP from the updated modelling is shown in **Figure 3-3** and **Figure 3-4** respectively.

The critical duration for the majority of overland flow areas of the Study Area is the 30 minute storm, with some section of 60 minute, 90 minute and 2 hour being critical. Compared to the Flood Study AR&R 1987 critical duration of 60 minute, the shorter critical duration for AR&R 2019 is in keeping with Stantec's past experience on updates to AR&R 2019 where the critical duration has been found to almost always shorten.

3.6.5.2 Peak Water Level Differences

A comparison of peak water level differences for the updated AR&R 2019 model compared to the Flood Study AR&R1987 model for the 1% AEP and 5% AEP from the updated modelling is shown in **Figure 3-5 and Figure 3-6** respectively.

The results show that throughout the Study Area, the proposed revision to AR&R 2019 has resulted in reductions in peak water level results for both the 1% AEP and 5% AEP events. These reductions in peak water level results are in keeping with Stantec's past experience on updates to AR&R 2019 across NSW, where the severity of peak flooding was almost always reduced as a result of AR&R 2019 updates.

Water level reductions from the Flood Study results are not significantly different, typically anywhere from -0.01 metres to -0.2 metres for both the 1% AEP and 5% AEP events. There are some areas of more significant differences such as in the Tempe wetland basins, however these more significant differences are typically quite isolated.

The terrain and building polygon changes do result in some minor areas of water level increases such as near Northland carpark where the change in terrain has caused reduced flooding on the north-west side of the carpark but on the canal side of the carpark water levels are slightly higher.

The removal of inflows into the St Peters Interchange has removed flood affectation of this site as it has been assumed the drainage for this site will discharge stormwater directly into Alexandra Canal. The changes in Campbell Road with the removal of building polygons and change of terrain from the road upgrade altering flow behaviour as expected.

Updated model results also suggest that site changes post-2013 do not have a significant impact on flood behaviour within the Study Area.

In conclusion, the model updates that have been assessed appear to have a relatively minor impact on flood behaviour for the majority of the Study Area. In accordance with Stantec's experience on other AR&R 2019 updates, the peak water level results for the majority of the Study Area are minor reductions (0.01 – 0.2 metres). In this instance, in light of these updated results, the AR&R 1987 Flood Study model may be a slightly conservative estimate of design flooding in the Study Area, however not a significant difference from more up-to-date modelling approaches. .

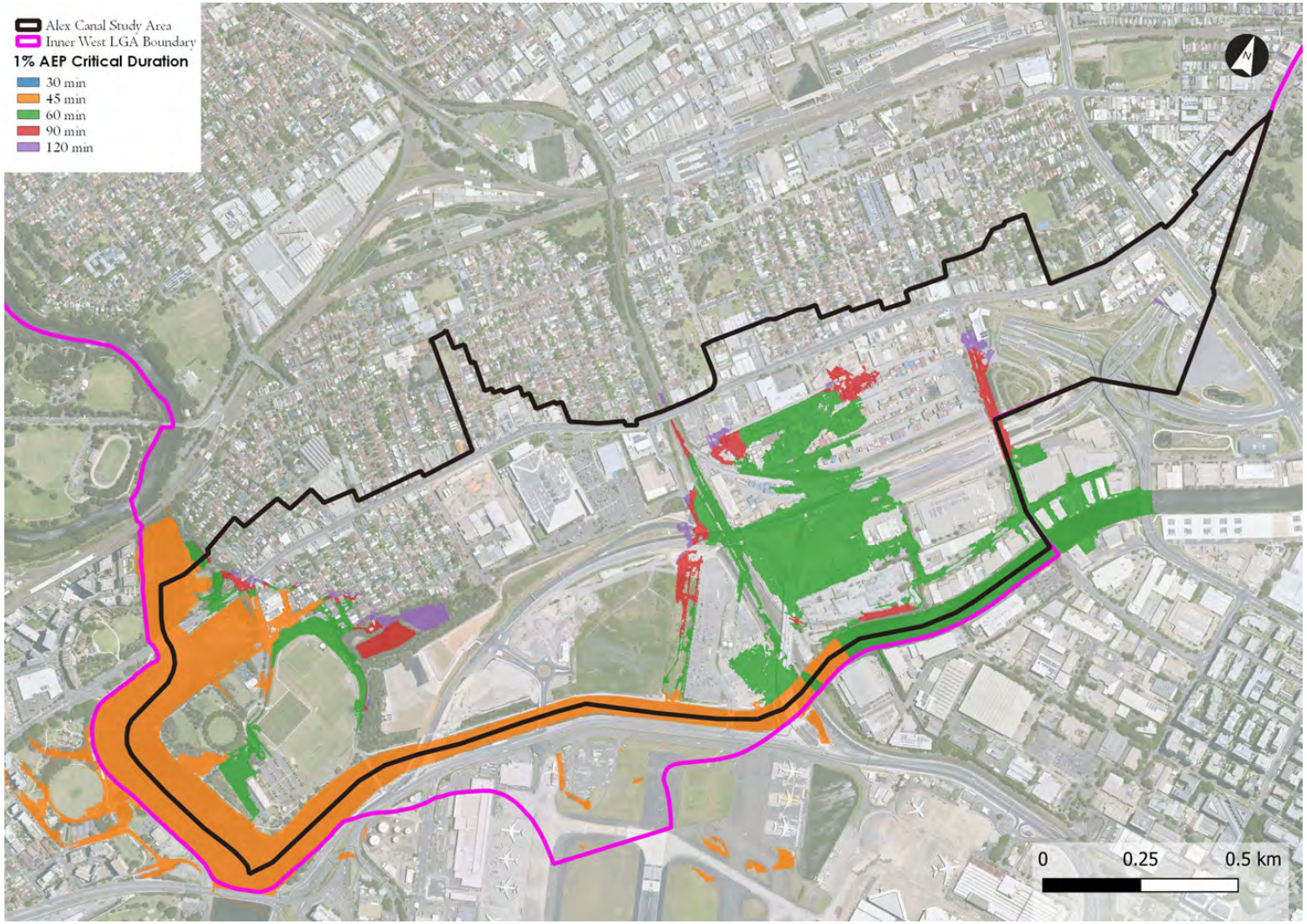

Figure 3-3 1% AEP Critical Duration Storms for Updated Model for Alexandra Canal Study Area Based on AR&R 2019 Design Rainfall Updates

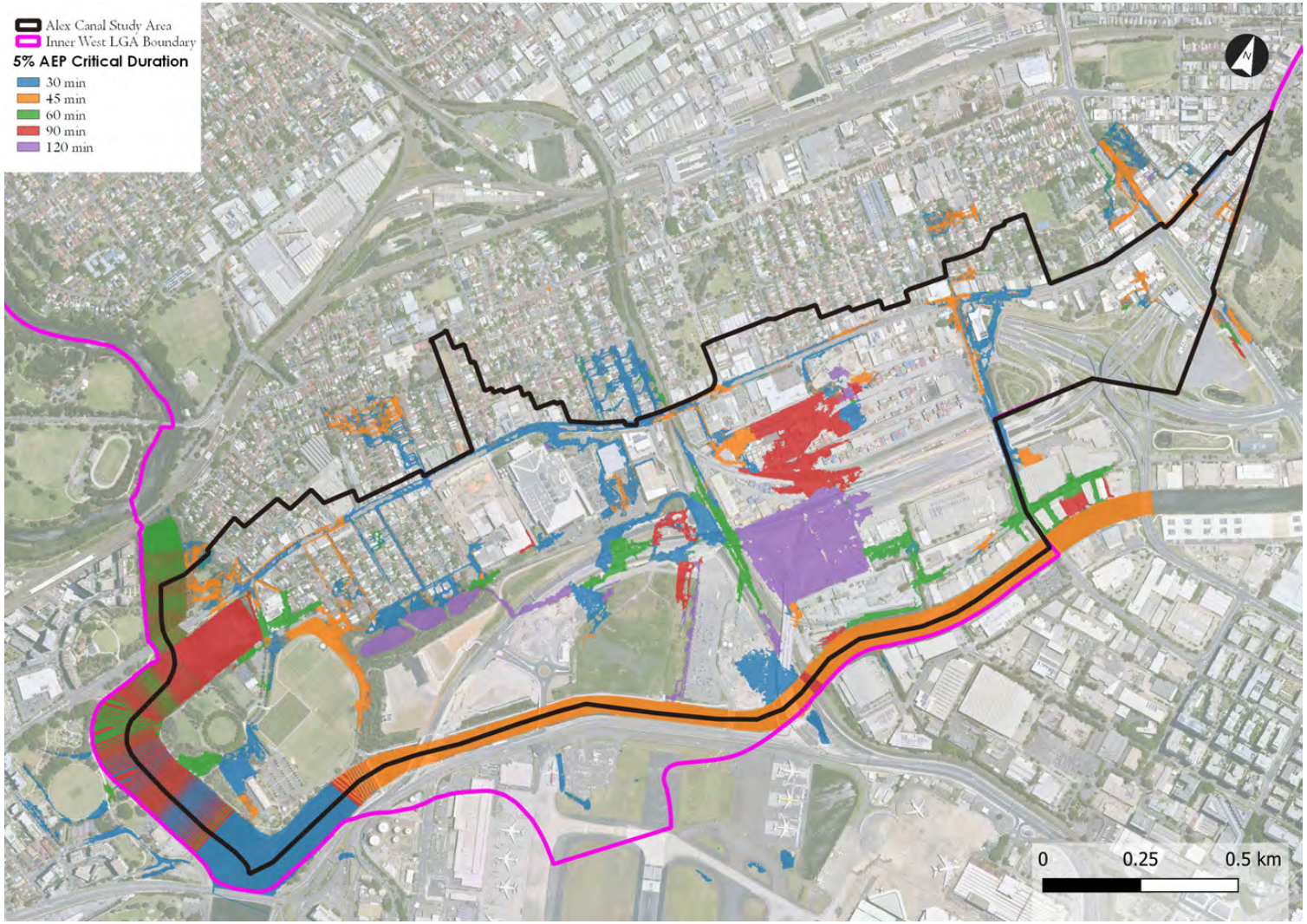

Figure 3-4 5% AEP Critical Duration Storms for Updated Model for Alexandra Canal Study Area Based on AR&R 2019 Design Rainfall Updates

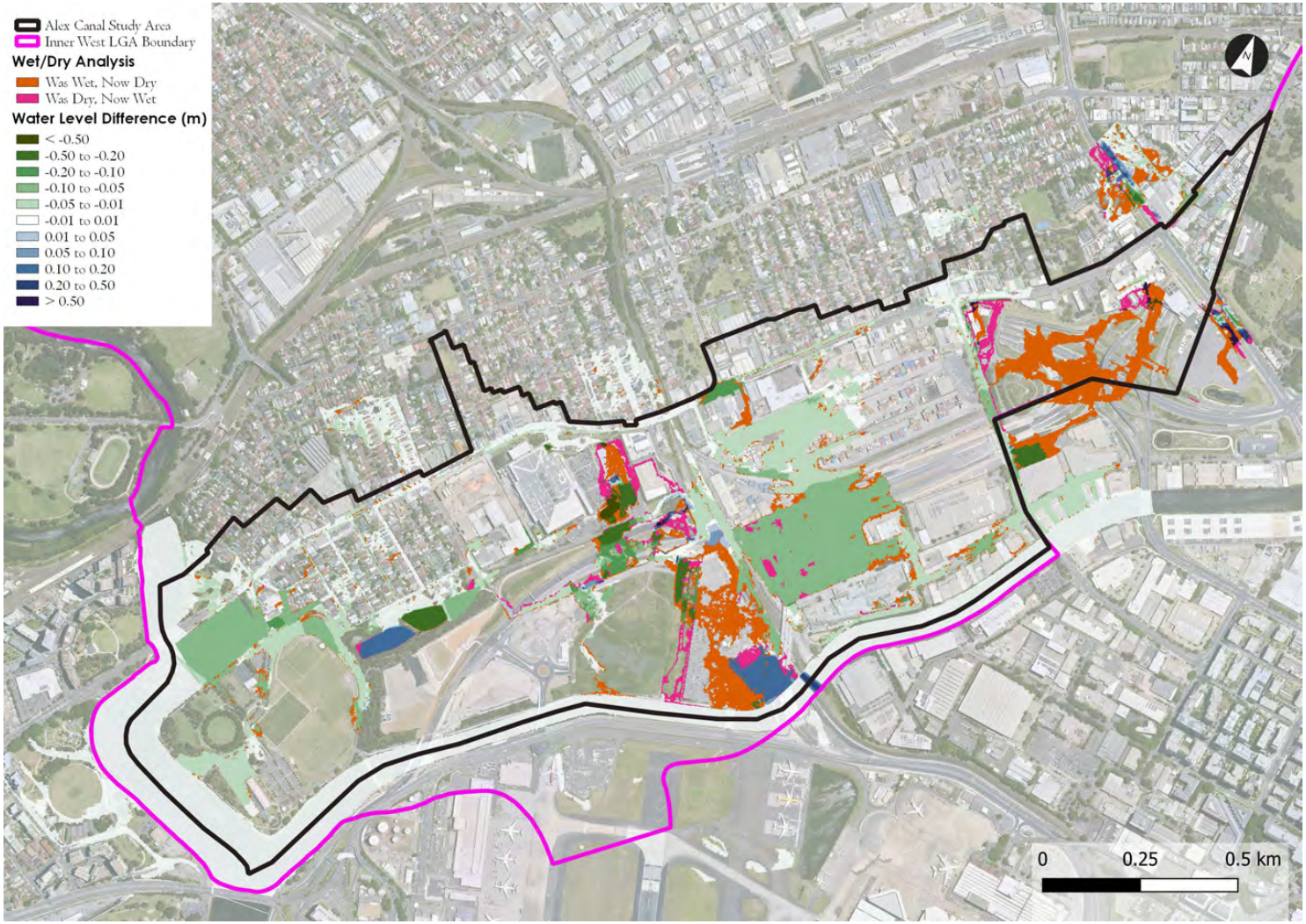

Figure 3-5 1% AEP Peak Water Level Differences – Updated AR&R 2019 Model Less Flood Study AR&R 1987

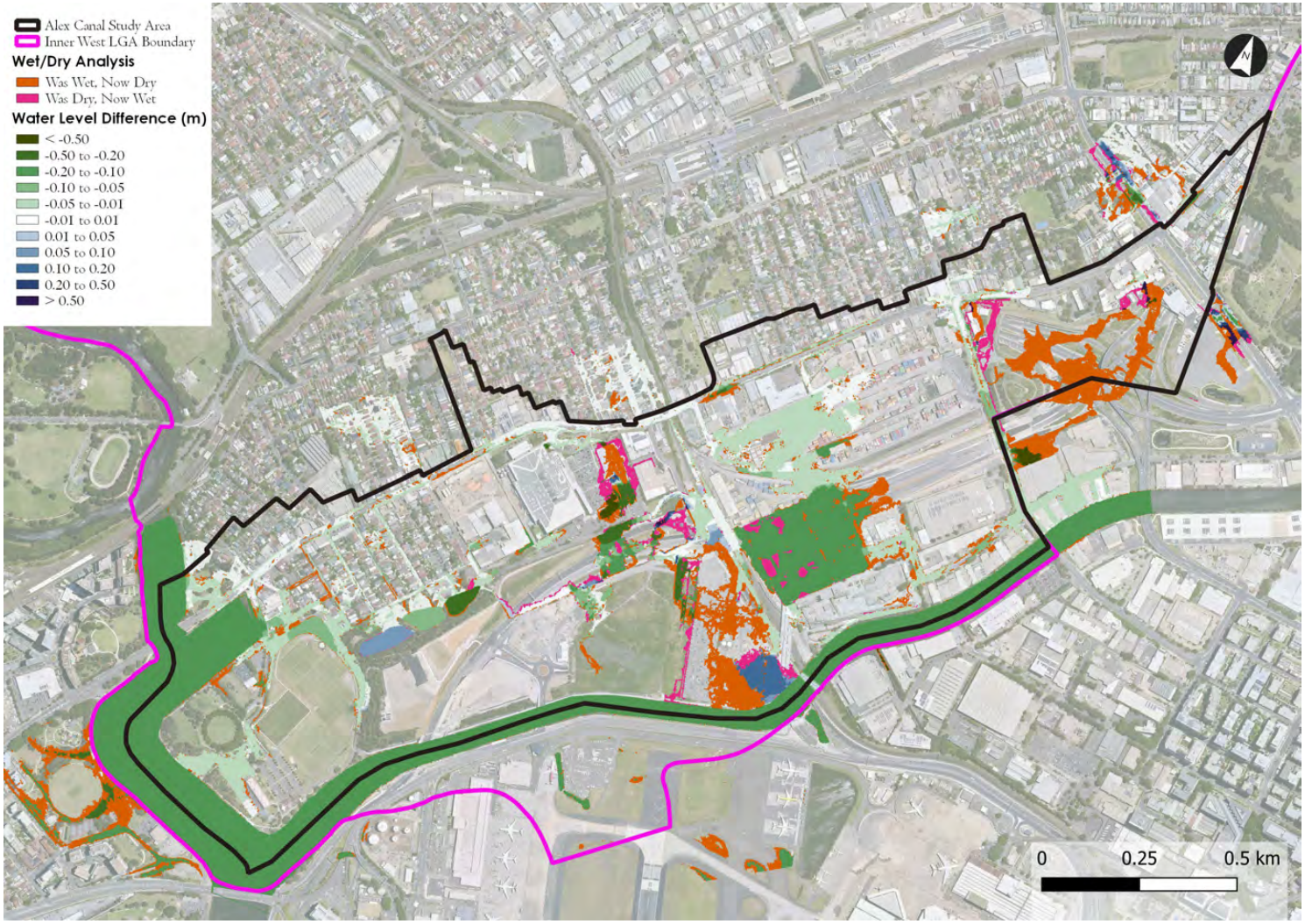

Figure 3-6 5% AEP Peak Water Level Differences – Updated AR&R 2019 Model Less Flood Study AR&R 1987

4 Consultation

4.1 Consultation Process

Consultation with the community and stakeholders is an important component in the development of a Flood Risk Management Study and Plan. Consultation provides an opportunity to collect feedback and observations from the community on problem areas and potential floodplain management measures. It also provides a mechanism to inform the community about the current study and flood risk within the Study Area and seeks to improve their awareness and readiness for dealing with flooding.

The consultation strategy has been divided into three key sections:

- Consultation in FRMS&P development: This occurred during the initial stages of the project (**Section 1.4**) and involved both informing the community and stakeholders of the project and gathering information on existing flooding issues and suggestions for flood risk management options.
- Review of possible flood management options with key stakeholder groups including Council Engineers, Council Planners, NSW SES, NSW DCCEW and community representatives within Council's Flood Risk Management Advisory Committee.
- Public exhibition of Draft FRMS&P: This occurred in the final stage of the project, with comments sought from the community and stakeholders on the Draft FRMS&P report with this input reviewed and incorporated into the final FRMS&P.

The strategy has been developed in accordance with the IAP2 Quality Assurance Standard and the Inner West Council Community Participation Plan.

4.2 Consultation Plan and Engagement Techniques

A consultation plan was developed in the preliminary stages of this project involving the development of several engagement techniques to achieve the objectives of the two stages of the consultation process. Details of the plan are provided below in **Table 4-1**.

Table 4-1 Consultation Plan

Task	Description	Expected Outcome
Press Release	Stantec will draft a press release for Council's consideration and publication.	> Public awareness of the study. > Assist in engagement with the community through the newsletter/questionnaire, workshops and public exhibition. > Assist in the public acceptance of the study outcomes and implications for development and food risk management in the future.
Stakeholder Consultation – Council	Relevant Council staff attended the inception meeting to discuss various input to the study and the proposed study approach. Key stakeholders will be consulted in an option development workshop to receive feedback on the preliminary options list.	> All available information is utilised in the preparation of the flood study. > Modelling incorporates the high risk areas. > Council objectives are achieved by the study.
Stakeholder Consultation – Flood Advisory Committee	Stantec will attend and present at four stakeholder meetings (which may include Flood Advisory Committee as deemed suitable) throughout the study.	> Update FRAC on the FRMS&P process. > Provide an opportunity for input from the FRAC on the mitigation options.
Stakeholder Consultation – Agencies	Stantec will contact relevant agency stakeholders (e.g. NSW SES, TfNSW) via letter and follow up email and/or phone.	> Inform the agencies of the study. > Obtain relevant information. > Provide an opportunity for input from the relevant agencies.
Community Newsletter and Questionnaire	Stantec will draft a newsletter and questionnaire for Council's consideration. Once finalised Council will print and distribute to	> Inform the community about the study and provide background information. > Identify community concerns and awareness

Task	Description	Expected Outcome
	target properties within the catchment. Responses will be via a reply-paid envelope. The brochure and survey will also be made available online by Council.	> Gather information from the community on potential flood mitigation options. > Develop and maintain community confidence in the study results.
Website	Council will host a dedicated "Your Say" website for the project. The website will be utilised for media release, online newsletter and questionnaire providing residents with an opportunity to locate the area of flooding on a GIS based system and upload an associated photos/videos they may wish to share.	> Collaborative community engagement process. > Provide community opportunities to provide input/feedback. > Provide key information to the community.
Community Workshops	Stantec will prepare materials for and present at 2 community workshops. One workshops will be undertaken during Stage 2 of the study to get community feedback on the preliminary flood options, the other during Public Exhibition (see below).	> Provide the community with an opportunity to comment on flood mitigation options and an understanding of the outcomes of the Draft Study and Plan.
Public Exhibition Period	Stantec to draft a press release for Council's consideration and publication.	> Inform the community of the draft Study and Plan and invite submissions. > Inform the community of the workshop.
	Council will arrange for the public exhibition of the Draft Flood Risk Management Study and Plan. One community workshop will be undertaken during the public exhibition to present the outcomes of the study and receive feedback from the community.	> Provide an opportunity for the community to review and provide comment on the Draft Study and Plan.

4.3 Council Engagement

Given Inner West Council's role in commissioning this FRMS&P, it is important that Stantec maintain constant engagement with Council's project manager throughout the project. Furthermore, NSW Department of Climate Change, Energy and Water (DCCEW) have maintained an active role in project supervision throughout the project. Council engagement has been maintained through the following:

> An online project inception meeting was held on 12 January 2021 with Council and Stantec representatives in attendance. The inception meeting signified the commencement of the project and provided an opportunity for Council to outline the objectives and expectations for the study, and to provide initial guidance and direction.

> Meetings occurred as required between 2021 and 2022 as the project reached critical milestones and review points, however there were delays associated with COVID and the 2022 Flood Response.

> Fortnightly online project update meetings have been conducted since the project recommenced model changes and option analysis in January 2023 with Council, DCCEW and Stantec's project manager in attendance as well as other Stantec staff as needed. The update meetings have provided an opportunity for Stantec to update Council on the ongoing status of the project, and to ask Council for any clarifications or queries that arise during the project.

> Ongoing weekly option development and review workshops with Stantec and Council's technical working groups were held from August through to October. The list of attendees included Council's project managers and NSW DCCEW representatives for the project), as well as relevant stakeholders from technical teams in Council. The goal of the meetings was to seek feedback on the preliminary list of options and refine and identify a set of detailed options for assessment.

> Workshops were held on 13 and 27 July 2023 with Stantec, DCCEW, SES, City of Sydney Council and Council strategic, engineering and planning representatives to present an overview of the FRMS&P and the initial preliminary flood mitigation options.

- Additional weekly workshops were held with Council's project team and NSW DCCEW representatives during option development and modelling to review option outcomes and refinement of options. This allowed the options to be developed in light of Council and DCCEW preferences and advice.

4.4 Flood Risk Management Committee

One of the primary mechanisms by which the study team engaged in consultation with key stakeholders and the community is via the Inner West City Flood Risk Management Advisory Committee (FMAC) convened by Council. The Committee includes membership by the following individuals:

Local community representatives,

Local business representatives,

Staff from Inner West Council who have involvement in the study including coordinators , managers, strategic planners, and engineers .

SES representatives,

Floodplain Engineer from NSW DCCEW.

The first FRAC meeting for the project was held mid-2022 to discuss the progress of the project and to present the outcomes of the Stage 1 report.

Further meetings were undertaken throughout 2023 to review, seek input, and shortlist proposed flood mitigation and management options for detailed assessment and costings.

The Draft FRMS&P was presented to the Committee for feedback and support for community exhibition in early 2024 . The meeting provided an opportunity for the FRM Committee members to ask questions about the FRMS&P. During the meeting the committee endorsed this report to go on public exhibition.

Next FRM Committee meeting will present outcomes of the public exhibition, the comments received from the community and how these were applied to the Final FRMS&P report. This meeting is planned for 24 July 2024 prior to potential Council endorsement and adoption of the final study.

4.5 Initial Consultation

The initial consultation period was held from 7 March 2023 to 6 April 2023. The initial consultation period for this project was run jointly with the Whites Creek and Johnstons Creek FRMS&P. During this period the following materials were made available to the community:

- A dedicated community engagement page for the catchment on Council's Your Say website was posted for the project. The text for the Your Say page has been included in **Appendix A**.
- Press release information for the study was posted to Council's social media and to Council's newsletter.
- Introductory letters were mailed to all owners and occupants of flood affected properties in the study area, which involved mail out to approximately 2,700 properties. The resident letter template provided an introduction to the study, and a link to the Your Say page for further information and to complete the online survey. The letter text is included in **Appendix A**.
- A resident online survey / questionnaire was hosted by Council through an online portal, with links to the online survey provided on the project's Your Say page. The survey text is included in **Appendix A**.

Three in-person information sessions were hosted by Council and attended by Stantec flood engineers and Council representatives. Notification of the in-person sessions was posted on the Your Say page and in the introductory letter (for the first session). The details for the three sessions were:

- St Peters Town Hall, 39 Unwins Road, St Peters on 15 March 2023 from 12.00 – 3.00pm
- St Peters Town Hall, 39 Unwins Road, St Peters on 15 March 2023 from 5.00 – 8.00pm
- Marrickville Pavilion, 313 Marrickville Road, Marrickville on 20 March 2023 from 12.00 – 3.00pm

4.5.1 Consultation Response Outcomes

With respect to Your Say outcomes from the initial consultation, there were 473 views of the project page, initiated by 414 unique visitors. The total viewing time of project information was approximately 2 hours. No community members shared their experiences of flooding via the online survey. One person contributed to the interactive map. The adopted Flood Study was downloaded 20 times.

The contribution to the interactive map was a submission noting that stormwater backs up at high tide and floods Bay Street regularly, confirming the modelled flood affectation of this area.

Across the initial consultation period there was 1 recorded response through email responses submitted to Council. In addition, there were 3 community attendees relevant to the Alexandra Canal study area to the three in-person information.

- The email response sender was interested in reviewing and in providing feedback to what Council is proposing. In response, Council replied that the Alexandra Canal Flood Study has been adopted in 2017, providing a link to the study report. Council also advised the resident that Council and its consultant are currently seeking community comments on local experience of flooding and desired measures for reduction or management, and asked the resident to provide comments via the Your Say page on Council's website or to contact Council directly via telephone, email or letter.
- The 3 in-person attendees were residents, one of the 3 attendees was a resident from outside of the study area and asked questions about the flood modelling project. The other two attendees raised matters related to the study area, including one from Tempe East and one from Tempe as their area had been identified as a hotspot and mitigation options considered.

4.6 Public Exhibition Period

The public exhibition period is an important stage of any regional Flood Study or FRMS&P as it provides the community and stakeholders the opportunity to provide comment and feedback on the draft outcomes of the study prior to finalisation.

The public exhibition period for this study was conducted from 4 June to 12 July 2024, a period of 5 weeks. The public exhibition period for this project was run jointly with the Whites Creek and Johnstons Creek FRMS&P During this period the following materials were made available to the community:

- An updated Your Say page was posted for the project, with links to the draft FRMS&P report including appendices, background information for the study, frequently asked questions, an interactive map showing 1% AEP flood extents and sub-catchment boundaries, a study timeline, details of in-person sessions and a feedback submission section for any comments.
- Notification letters were mailed to all owners and occupants of flood affected properties in the study area (including the 1 in 100 Annual Exceedance Probability (AEP) flood extent and the Probable Maximum Flood (PMF) extent), which involved an extensive mail out. The letter notified of the draft report completion, and provided a link to the Your Say page for further information and details of the four in-person sessions.
- Four in-person information sessions were hosted by Council and attended by Stantec flood engineers and Council representatives. The details for the four sessions were (set-ups for both sessions shown in **Figure 4-1**):
  - Thursday 13 June 2024, 5-8pm, Marrickville SES, 17 Railway Road, Sydenham
  - Thursday 20 June 2024, 5-8pm, Marrickville SES, 17 Railway Road, Sydenham
  - Monday 24 June 2024, 1:30-4:30pm, The Pavilion, Marrickville Library
  - Tuesday 2 July 2024, 1:30-4:30pm, The Pavilion, Marrickville Library.

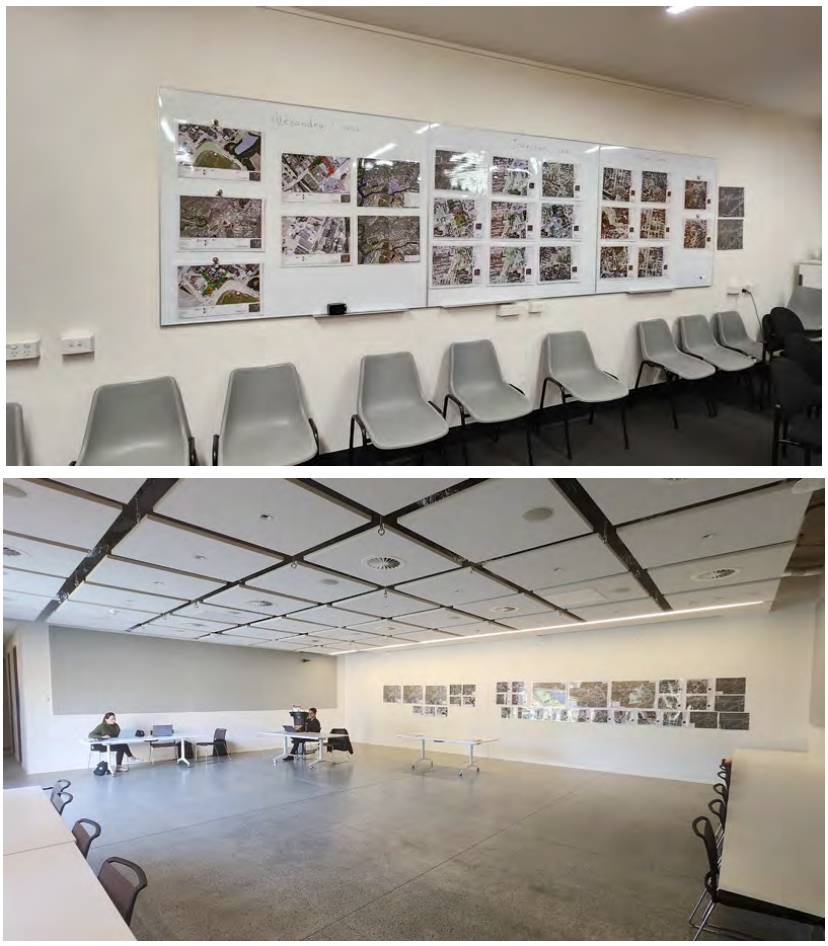

Figure 4-1 Public Exhibition In-Person Setups for Marrickville SES (Above) and The Pavilion, Marrickville Library (Below)

Public exhibition materials remained on display for SES representatives and volunteers in between the two Marrickville SES sessions (from 13 to 20 June 2024) as shown in **Figure 4-2**, including copies of the report, images of the mitigation options and mapping overview.

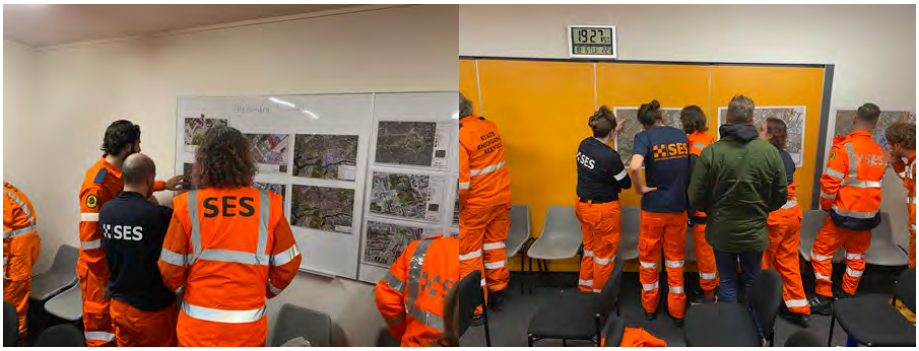

Figure 4-2 Public Exhibition In-Person Setup on display at Marrickville SES from 13 to 20 June 2024

4.6.2 Public Exhibition Response Outcomes

Across the public exhibition period there were 23 recorded responses across both Alexandra Canal FRMSP and Whites Creek and Johnstons Creek FRMSP through one of four response methods:

- Phone calls to Council by 4 different respondents in relation to the public exhibition of the study
- Your Say comment uploads (3 participants) and Your Say questionnaire responses (1 participant) by 4 total participants
- Email responses submitted to Council by 4 respondents
- 11 in-person attendees at the information sessions. These attendees consisted of 1 at the first session, 2 at the second, 7 at the third, and 1 at the fourth session.

Across all response methods, 1 comment (Your Say upload) related to Alexandra Canal FRMSP. All the other responses were related to Whites Creek and Johnstons Creek catchment areas.

Although this represents a total of 23 engagements, it should be noted a number of households made several engagements for some households, most commonly residents attending in-person sessions often completed another form of response such as a Your Say written response or email.

With respect to Your Say outcomes from the public exhibition period, there were a total of 708 visits across both Alexandra Canal FRMSP and Whites Creek and Johnstons Creek FRMSP project pages. 249 of these visits were for Alexandra Canal FRMSP without any downloads of the report.

During the public exhibition period, Council provided stakeholders with the draft final FRMSP report. As part of this engagement, one comment was received from Sydney Water regarding the number of overfloor flooded buildings reported. A clarifying response was provided to Council via an email, to be passed onto Sydney Water.

4.6.3 Summary of Public Comments

All concerns received across the various forms related to the following:

- Localised stormwater issues not within the scope of flood risk, i.e. maintenance or drainage issues to be addressed by means of temporary solutions prior to the implementation of mitigation options or otherwise captured under Council's capital works
- General enquiries either outside of the catchment subject areas or requesting information about the FRSMP and the proposed mitigation options
- The only response related to Alexandra Canal FRMSP via upload to Your Say, generally supporting the measures outlined in the report. The response highlights the 2017 Cooks River Flood Study and recommends an overall LGA wide list of prioritised projects for residents. It is understood that Council is considering consolidation of a list of the flood risk management options across the LGA to present to FRMAC.

5 Flood Planning Review

5.1 Flood Affected Properties

A review of flood affected properties has been considered for the study area with a review of changes considered compared to the previous Flood Study property tagging.

The updated property list adopted the original Flood Study model results in creating flood extents. These flood extents apply the flood extent trimming of 0.15 metres depth. This more effectively removes minor sheet flows and shallow overland flows. A comparison of 1% AEP flood extents with and without the 0.15m depths filter is shown in **Figure 5-1**. The comparison shows that the untrimmed flood extents are significantly more widespread than the extents trimmed to 0.15 metre depth, showing there is significant areas of shallow sheet flow modelled in the TUFLOW model.

The number of flood affected properties for five design events are summarised in **Table 5-1**. Two forms of property tagging analysis have been considered:

> Any flood affectation of the property

> Flood extent covers at least 10% of the property area,

A review of the number of properties affected between the "10% affectation" and the "any affectation" scenarios, and the relative flood hazard affecting these properties, it was considered that the 10% affectation scenario sufficiently addressed the flood risk, requiring no updates to the flood affected lot tagging currently adopted by Council.

Table 5-1 Flood Affected Property Numbers for Private and Developed Properties (Excluding Parkland Sites) for All Design Flood Events for Base Case Flood Extents

Property Tagging	Base Case Flood Affected Property				
	20% AEP	5% AEP	2% AEP	1% AEP	PMF
Flood Affected	134	167	180	188	303
>10% Area Affectation	36	42	51	56	147
				Total Properties in Catchment	1023

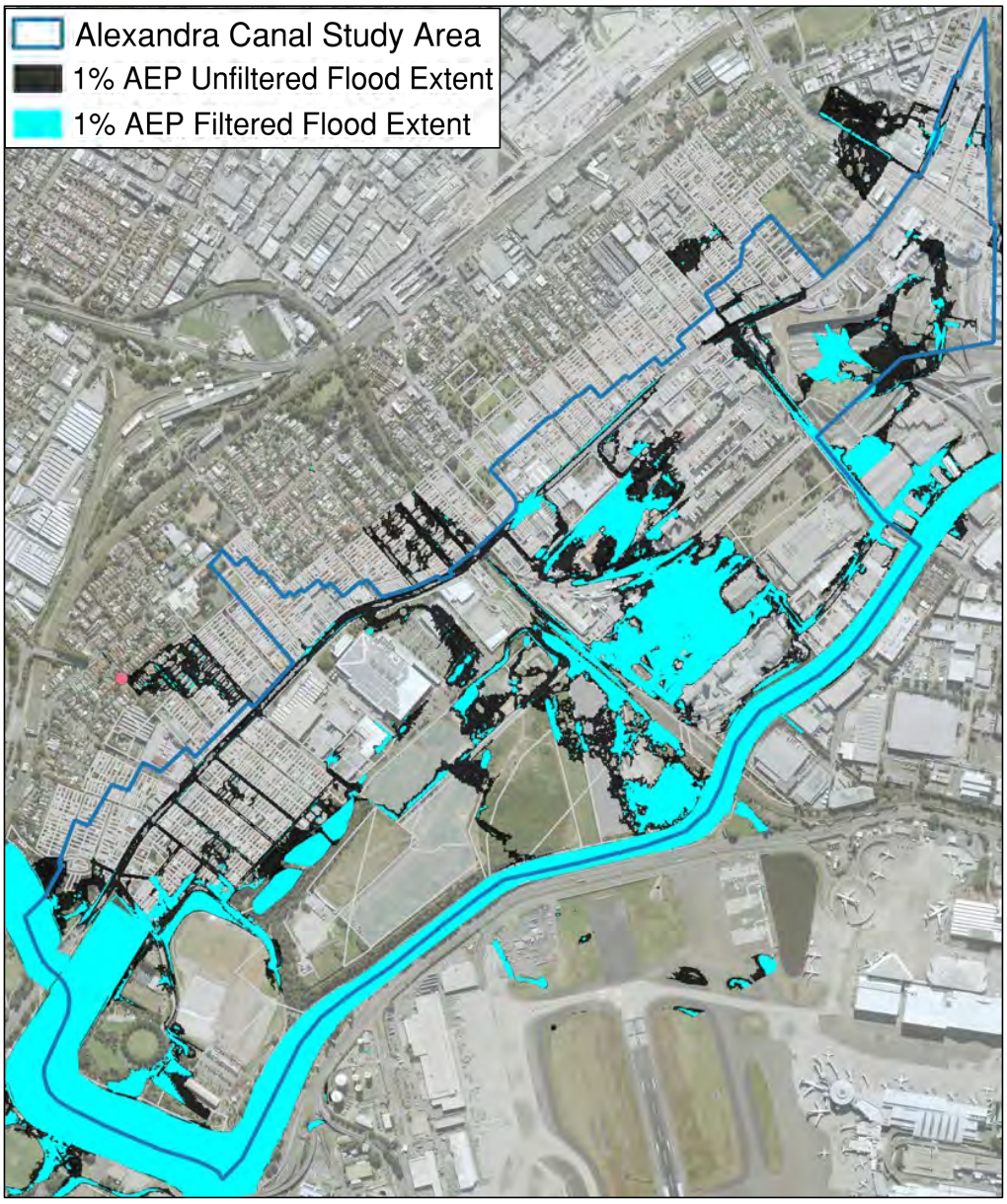

Figure 5-1 Comparison of 1% AEP Flood Extents with and without 0.15m Depth Filter Applied

5.2 Relative Flood Risk for Development Types

The relative vulnerability of development types and their users to flooding should be considered in decision-making as it can influence risk to the community. Vulnerability to flooding can vary between development types and their typical users.

The 2023 FRM Manual guideline for Flood Impact and Risk Assessment (Flood Risk Management Guide FU01) in Table 6 provides a useful resource in providing a high-level summary of flood risk for different development types of users, buildings and their contents for the same flood exposure. The summaries from this guideline for development types relevant to this Study Area have been included in **Table 5-2**.

Table 5-2 Relative Flood Risk & Vulnerability of Land Uses for the Same Flood Exposure (Source: NSW DCCEW, FRM Guide FB01)

Type of Use	Relative Risk Compared to Low Density Residential			Comment
	Users	Buildings	Contents	
Low Density Residential	Base	Base	Base	This is used as a baseline for considering relative impacts in other land uses
Medium/high density	Higher	Lower	Lower	Due to the higher density more people are involved but the buildings may be more structurally resistant to flooding. Contents may be less exposed to flooding as they may be over multiple levels
Emergency response management facility	Lower	Lower	Lower	Lower density of development and people
Aged care facility	Higher	Lower	Higher	Users on average more vulnerable in evacuation. Building may be structurally stronger. Potential for high value medical equipment
School	Higher	Lower	Lower	Users on average more vulnerable in evacuation. However, evacuation arrangements likely to be in place. Buildings and contents generally lower value
Correctional facility	Higher	Lower	Lower	May have challenges in the relocation of users therefore continued operation preferable. This relies on accessibility for staff and utility services. Buildings and contents expected to be generally of lower vulnerability
Commercial	Higher	Lower	Varies	Employees may be able to be trained to assist in response to flooding. Higher density of customers, who are likely to be unfamiliar with location or flood issue and therefore more vulnerable. Buildings expected to be generally of lower vulnerability. Contents varies substantially depending on the specific business
Industrial	Lower	Lower	Varies	Employees may be able to be trained to assist in response to flooding, customer density low, but they are likely to be unfamiliar with location or flood issue. Buildings expected to be generally of lower vulnerability. Contents varies substantially depending on the specific business
Hazardous/ offensive industry	Lower	Lower	Higher	Employees may be able to be trained to assist in response to flooding, customer density low, but they are likely to be unfamiliar with location or flood issue. Buildings expected to be generally of lower vulnerability. However, the impacts of hazardous or offensive materials could be significant and need to be considered. This may require management measures such as avoidance of flood-affected areas or effective containment of hazardous or offensive materials to limit impacts on the community or environment
Recreation	Lower	Lower	Lower	Occupied less and may be weather influenced but could be higher density of people when in use. Users often unfamiliar with flooding in the location. Buildings and contents expected to be generally of lower vulnerability or value

It is noted this guidance is a generalisation for development types, and the flood risk of any development will depend on site specifics and details of the development , not just these broad vulnerability assessments However, this provides a useful resource in understanding the relevant flood risk of different land uses. It should be consulted in the review of current land uses and future development potential in the following sections.

5.3 Future Development Potential in Flood Affected Land

5.3.1 Proposed Future Development Sites

In the preliminary stages of the project, Council reviewed submitted planning proposals within the study area and only one pre-planning proposal has been lodged on 14/12/2021 for 71-75 & 85 Crown Street and 116 Princes Highway St Peters (PPP 2021 0009). This is a pre-planning proposal and Council do not know whether they will receive a planning proposal for this site and whether it will be supported. This site location has been shown in **Figure 5-2**. As this planning proposal is located outside of the 1% AEP or PMF extents the flood risk of the site is negligible, and its consideration is not relevant to this study.

5.3.2 Future Planning Proposal Requirements

In mid-2021, NSW DCCEW released a new Flood Prone Land Policy Update. Included within this policy is a draft set of standard flood-related clauses for Local Environment Plans (LEPs) to assist local Councils. In addition, the update package included a local planning directive outlining flooding requirements in consideration of planning proposals.

A summary of the key requirements of the local planning direction for planning proposals and their relevance to the future development potential of Alexandra Canal Catchment is included in **Table 5-3**.

To assist in the discussion of planning proposal requirements related to floodway and high hazard areas, these two maps for the 1% AEP have been overlaid on current land use zoning as shown in **Figure 5-3** and **Figure 5-4** respectively.

The outcomes from **Table 5-3** suggest that development and particularly potential intensification should be prioritised in the flood free portions of the study area where possible. However, the high-level review suggests there is still redevelopment potential within parts of the floodplain.

The guide on flood risk of development types summarised in **Section 5.2**, should be reviewed as a general guide when assessing potential future changes in land use in the floodplain.

Table 5-3 Planning Proposal Requirements and Relevance to Alexandra Canal Catchment

Planning Proposal Requirement	Relevance to Alexandra Canal Catchment
A planning proposal must not rezone land within the flood planning area from Recreation, Rural, Special Purpose or Environmental Protection Zones to a Residential, Business, Industrial or Special Purpose Zones.	Based on this requirement there is limited development potential for the flood affected portions of sites that are currently zoned as recreation or special purpose including parts of Tempe Recreation Reserve and Tempe Lands as well as any zoned Council park sites.
A planning proposal must not contain provisions that apply to the flood planning area which:	
▪ permit development in floodway areas,	Assumed to be the 1% AEP floodway. As shown **Figure 5-3** the floodway extents in the study area are relatively well confined within Alexandra Canal, Cooks River, existing road corridors, and in other small, isolated areas. Therefore, this requirement should not significantly impact many potential redevelopment sites in the study area. Floodway areas also extend to the industrial areas along Princes Highway between Smith Street and Swamp Road and to a smaller extent some residential areas, such as on Bay Street between Quarry Street and Cook Street, as well as Hart Street between Princes Highway and South Street. Development potential for these areas may be limited by this requirement.
▪ permit development that will result in significant flood impacts to other properties,	This requirement would need to be assessed through flood impact assessments on a site-by-site basis with detailed assessment of proposed development plans
▪ permit development for the purposes of residential accommodation in high hazard areas,	Assumed to be the 1% AEP high hazard. As shown in **Figure 5-4** the high hazard extents in the study area are relatively well confined within Alexandra Canal, Cooks River, existing lakes/ponds in Tempe lands, and in other small, isolated areas. Therefore, this requirement should not significantly impact many potential redevelopment sites in the study area.

Planning Proposal Requirement	Relevance to Alexandra Canal Catchment
	An exception to these areas is the high hazard identified at St Peters Interchange. The flood model has not incorporated potential changes to the flooding behaviour in this area introduced by the ongoing construction of the St Peters Interchange.
▪ permit a significant increase in the development and/or dwelling density of that land,	This requirement will need to be considered in potential intensification of development in the floodplain. It is possible that intensification in flood affected areas may be feasible if flood risk is suitably addressed. However potential intensification should be prioritised in flood free portions of the study area.
▪ permit development for the purpose of centre-based childcare facilities, hostels, boarding houses, group homes, hospitals, residential care facilities, respite day care centres and seniors housing in areas where the occupants of the development cannot effectively evacuate,	These vulnerable development types should not be proposed within the 1% AEP floodplain where possible. As discussed further in **Section 7.3.2**, there are a number of these existing vulnerable developments within the floodplain, the alteration of these sites to improve flood risk should be considered.
▪ are likely to result in a significantly increased requirement for government spending on emergency management services, flood mitigation and emergency response measures, which can include but are not limited to the provision of road infrastructure, flood mitigation infrastructure and utilities, or	Further review of flood emergency management concerns for the study area is included in **Section 7**. Development potential in identified flood emergency hotspots should be avoided based on this requirement. That is unless a potential redevelopment could justifiably be shown to reduce the emergency response burden for an existing site.
▪ permit hazardous industries or hazardous storage establishments where hazardous materials cannot be effectively contained during the occurrence of a flood event.	This is a particular concern for areas in this catchment where the current general industrial zoning in flood affected areas may allow future developments to pose a risk of uncontained hazardous materials. The industrial areas along Princes Highway between Smith Street and Swamp Road are currently predominantly industrial retail outlets.
A planning proposal must not contain provisions that apply to areas between the flood planning area and probable maximum flood to which Special Flood Considerations apply which include items listed above.	Similar to the above response, vulnerable developments should not be prioritised within PMF affected lands where possible. This also relates to critical infrastructure types for flood emergencies (refer to **Section 7.3**).
For the purposes of preparing a planning proposal, the flood planning area must be consistent with the principles of the FRM Manual 2023 or as otherwise determined by a Flood Risk Management Study or Plan adopted by the relevant council.	The flood planning level should be maintained at the 1% AEP plus 0.5 metre freeboard as in the Inner West LEP and is recommended in the current Flood Prone Land Policy Update. There is no clear evidence that flood behaviour in the study area would justify an alternative FPL.

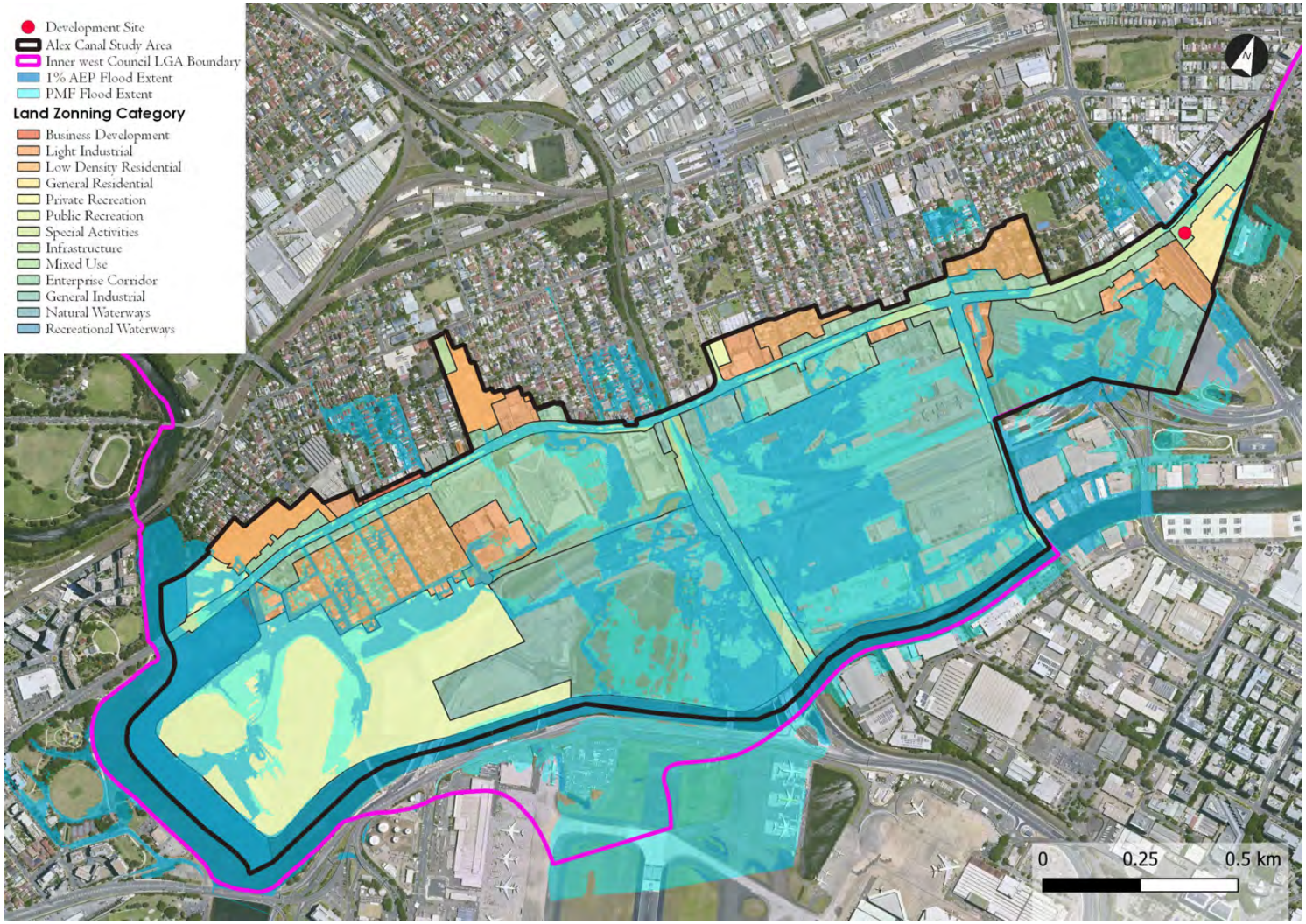

Figure 5-2 Current Land Use Zoning with 1% AEP and PMF Extents

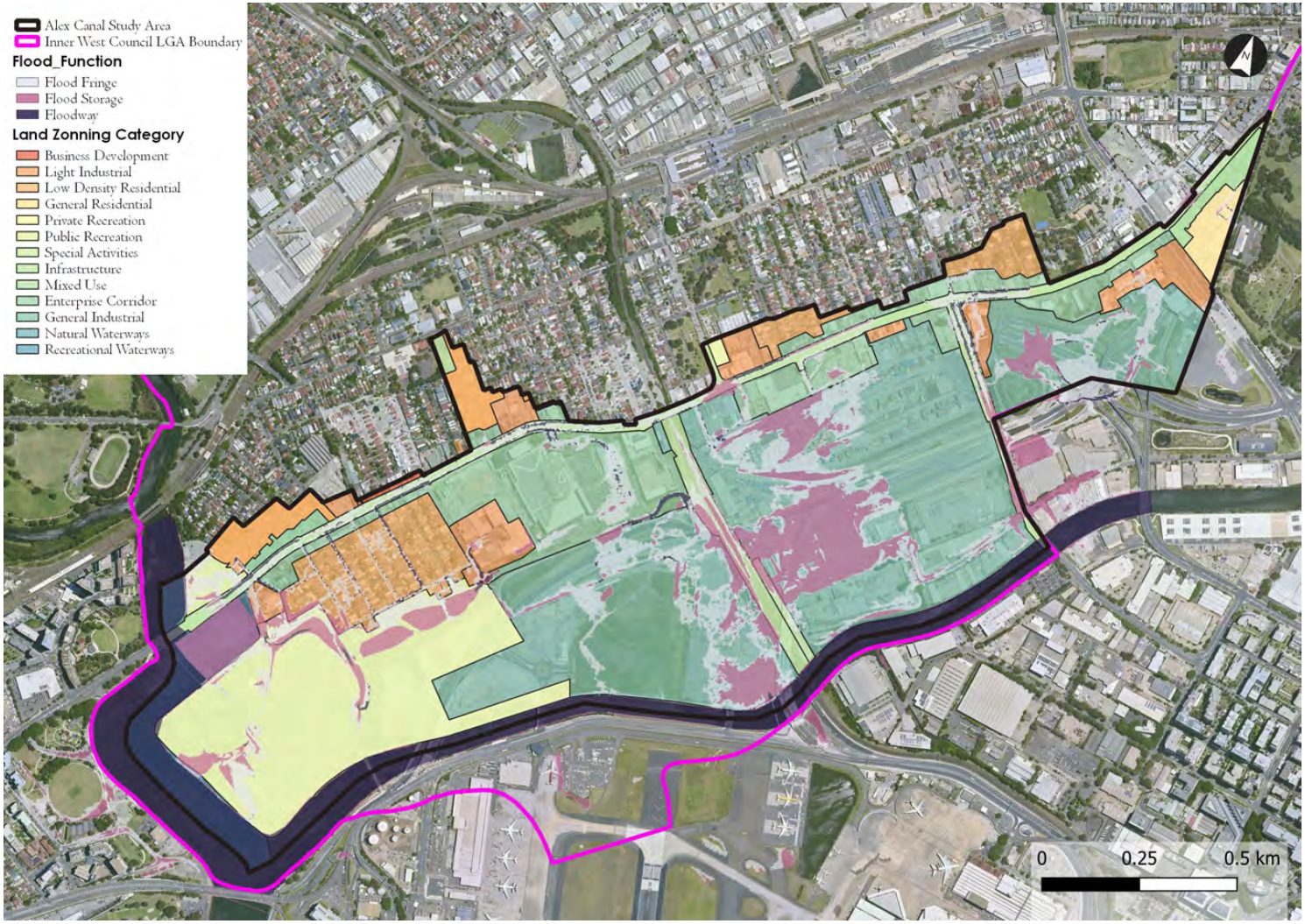

Figure 5-3 1% AEP Flood Function with Floodway on Current Land Use Zoning

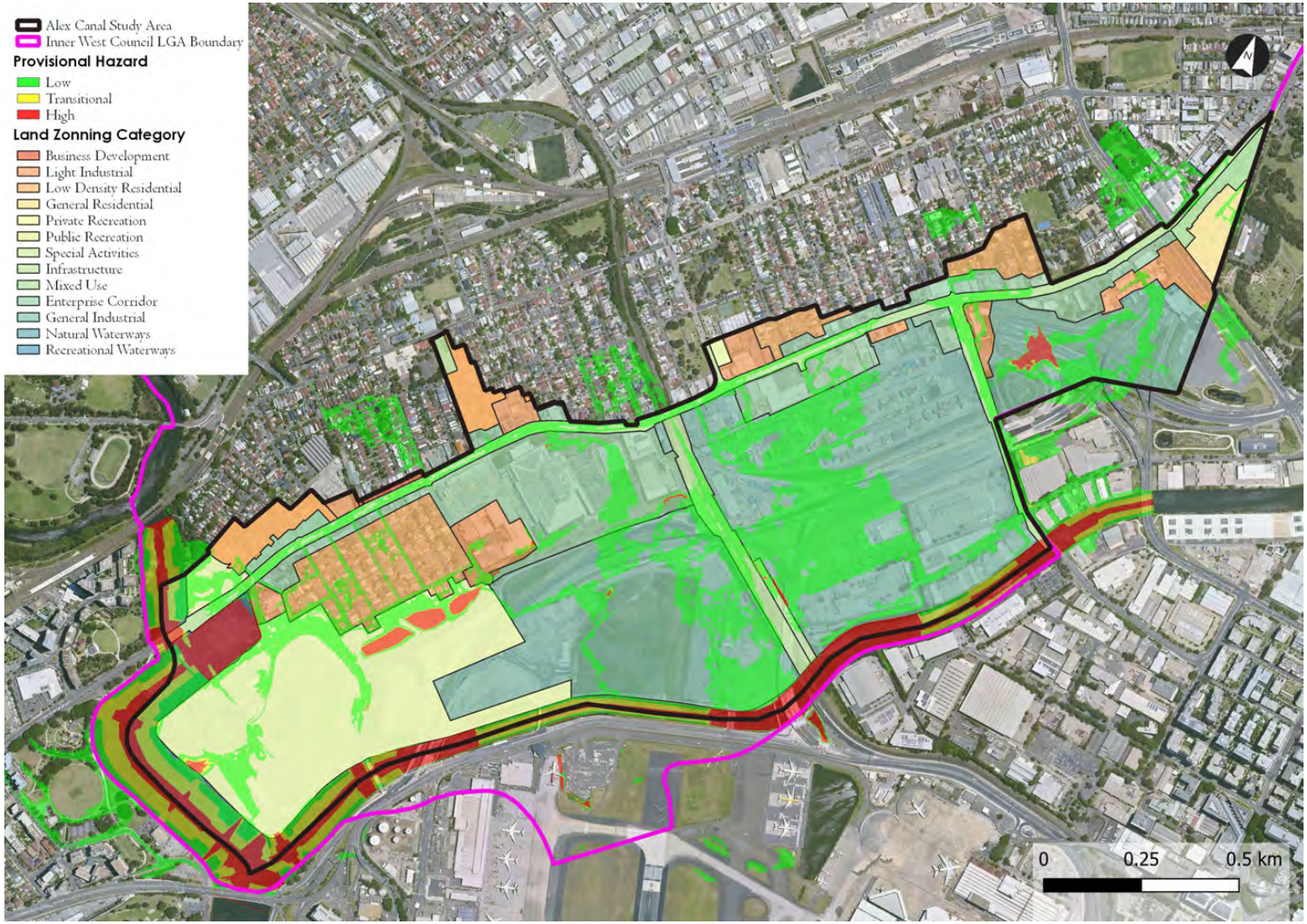

Figure 5-4 1% AEP Provisional Hazard with High Hazard on Current Land Use Zoning

5.4 Flood Related Development Controls

The Alexander Canal Catchment is located in the Inner West LGA where development is controlled through the Local Environment Plans (LEP) and Development Control Plan (DCP). The following sub-sections summarise the flood-related development controls for these documents and provide recommendations.

5.4.1 Local Environment Plan

The Alexandra Canal catchment lies within the Inner West LGA, therefore the relevant document is the Inner West Local Environmental Plan 2022.

As noted in previous sections, in mid-2021, NSW DCCEW released a new Flood Prone Land Policy Update. Included within this policy is a draft set of standard flood-related clauses for Local Environment Plans (LEPs) to assist local Councils. The 2021 package establishes two different categories, and two associated standard Local Environment Plan (LEP) clauses where flood-related development controls may be applied / considered. These are:

- Flood Planning Areas (FPAs): The 'flood planning' LEP clause is mandatory and the LEPs of all Councils in NSW were amended on 14 July 2021,
- Special Flood Considerations (SFCs): The 'special flood consideration' LEP clause is optional, and Councils decide whether to adopt this clause or not. If Councils choose to adopt the optional standard instrument SFC provision, it must be adopted without variation but subject to any relevant direction in the standard instrument (cl 4(2), SI order).

5.4.1.1 Mandatory LEP Clause - Flood Planning Area

Clause 5.21 outlines the requirements for developments in the FPA which is all land under Flood Planning Level (FPL), which in accordance with the FRM Manual 2023 is typically defined by the 1% AEP (1 in 100 AEP) event with a 0.5 metre freeboard. Councils are permitted to propose alternate FPLs, however they are required to demonstrate and document the merits of any decision based on a risk management approach. The land this clause applies to is essentially unchanged from the previous standard LEP clause.

The main updates to the mandatory standard flood related clause include:

- Several new objectives have been added to the updated text including a reference to cumulative impacts, enabling safe and appropriate uses of land, and enabling safe evacuation from the land,
- The requirements for development consent have been updated with reference to:
  - Compatibility to flood function (floodway, flood storage and flood fringe),
  - No offsite flood impacts and the impact of the development on projected changes to flood behaviour (accounting for climate change),
  - There is a reference to safe occupation and efficient evacuation of people and not to exceed the capacity of existing evacuation routes for the surrounding area. Similarly, also stated in the clause is whether the development incorporates measures to minimise the risk to life and ensure the safe evacuation of people in the event of a flood,
  - The intended design and scale of buildings resulting from the development, and the potential to modify, relocate or remove buildings resulting from development if the surrounding area is impacted by flooding.

Review of the draft Inner West LEP shows that the wording of the flood planning section 6.3 reflects this updated wording as is mandatory.

5.4.1.2 Optional LEP Clause – Special Flood Considerations

A new optional flood clause 5.22 has been added to the update called the 'Special Flood Considerations' (SFC) clause. The clause applies to all land between FPA and the PMF, an area that was not covered within the previous standard LEP clause. The types of development this optional clause would apply to includes vulnerable developments and critical infrastructure. In relation to the Special Flood Considerations (SFC) Clause 5.22, as stated within the guideline document:

> *….this is an optional provision of the Standard Instrument and Councils have the discretion whether to adopt the clause in a LEP in their LGA, provided they have appropriate information and justification to support the flood related development controls. Studies under the FRM process, as well as emergency management planning processes and relevant strategies and plans developed by NSW Government may provide information and support justification for the adoption of the clause.*

Inner West Council has adopted the optional LEP clause 5.22 for land between the FPA and the PMF. Therefore, both LEP clauses 5.21 and 5.22 for the FPA and the PMF will be applicable.

5.4.2 Current Development Control Plan

The Alexandra Canal Catchment lies within the former Marrickville Council LGA, therefore the relevant document was the Marrickville DCP 2011. This review relates to the Marrickville DCP 2011, Part 2.22 - Flood Management.

Section 2.22.2 – Land Affected complements Clause 6.3 (Flood planning) (currently Clause 5.21) of Inner West Local Environmental Plan 2022 (Inner West LEP 2022). It applies to:

- land identified on the DCP 2011 Flood Planning Area Map (**Figure 5-5**). Flood planning area include:
  - Flood planning area (Cooks River) that land likely to be affected by the 1% AEP flood, factoring in a rise in sea level of 400mm to the year 2050, (plus 500mm freeboard) of the Cooks River; and
  - Flood planning area (Overland Flow) that identifies land (in accordance with Council's Flood Tagging Policy) likely to be affected by the 1% AEP flood associated with various locations affected by local overland flooding.
- land identified as being flood liable land on the DCP 2011 Flood Liable Land Map (**Figure 5-6**). Flood liable land identifies land within a flood planning area, and land likely to be affected by the probable maximum flood (PMF) of the Cooks River. This means that the map identifies some land as being within the Cooks River PMF area, but not within the Cooks River 100-year flood (plus 500mm freeboard) area.

It should be mentioned that he Marrickville DCP 2011 incorporates twelve amendments. Amendment No. 7 relates to amendments to Part 2.22 – Flood Management, to incorporate an updated Flood Planning Area Map and an updated Flood Liable Land Map, came into force on 6 July 2018.

Flood classifications have been applied to parts of the Flood Planning Area (Cooks River). The flood classifications are:

- Low hazard: Should it be necessary, people and their possessions could be evacuated by truck. Able bodied adults would have little difficulty wading out of the area.
- High hazard: Possible danger to life, evacuation by truck difficult, potential for structural damage, and social disruption and financial losses could be high. The identified areas, and their flood classifications, are:
  - Riverside Crescent/Tennyson Street area (Marrickville and Dulwich Hill): Low hazard to high hazard.
  - Illawarra Road/Wharf Street area (Marrickville): Low hazard to high hazard.
  - Carrington Road area (Marrickville): Low hazard.
  - Bay Street area (Tempe): Low hazard to high hazard.

Flood management controls apply as follows:

- For land in a flood planning area, the controls apply to all development that requires development consent.
- For land that is flood liable land, but that is not in a flood planning area (land within the Cooks River PMF), the controls also apply to caravan parks, childcare centres, correctional centres, emergency services facilities, hospitals, residential accommodation (except for attached dwellings, dwelling houses, secondary dwellings and semi-detached dwellings), and tourist and visitor accommodation.

The development controls for the former Marrickville LGA (the DCP 2011) are derived from a development nature approach. The procedure to determine what controls apply to proposed development involves:

> Section 2.22.5 of the DCP identifies the category of the development which are grouped into the following:
  - New residential development
  - Residential development – minor additions
  - Non-habitable additions or alterations
  - New non-residential development
  - Non-residential development – additions
  - Change of use of existing buildings
  - Subdivision
  - Filling of land within the Flood Planning Area
  - Land uses on flood liable land identified on the DCP 2011 Flood Liable Land Map
  - Garages, carports, open car parks and basement garages.

There are twenty-nine development controls. **Table 5-1** indicates which flood management control applies to which type of development. Flood management controls are provided in **Appendix B.**

Table 5-1 Development Relevant Flood Management Controls

Development	Flood Management Control
General (applicable to all types of development)	C1, C2, C3, C4
New residential development	C5, C6, C7
Residential development – minor additions	C8, C9, C10
Non-habitable additions or alterations	C11, C12
New non-residential development	C13, C14
Non-residential development – additions	C15, C16
Change of use of existing buildings	C17, C18
Subdivision	C19, C20
Filling of land within the Flood Planning Area	C21
Land uses on flood liable land identified on the DCP 2011 Flood Liable Land Map	C22, C23, C24
Garages, carports, open car parks and basement garages	C25, C26, C27, C28, C29

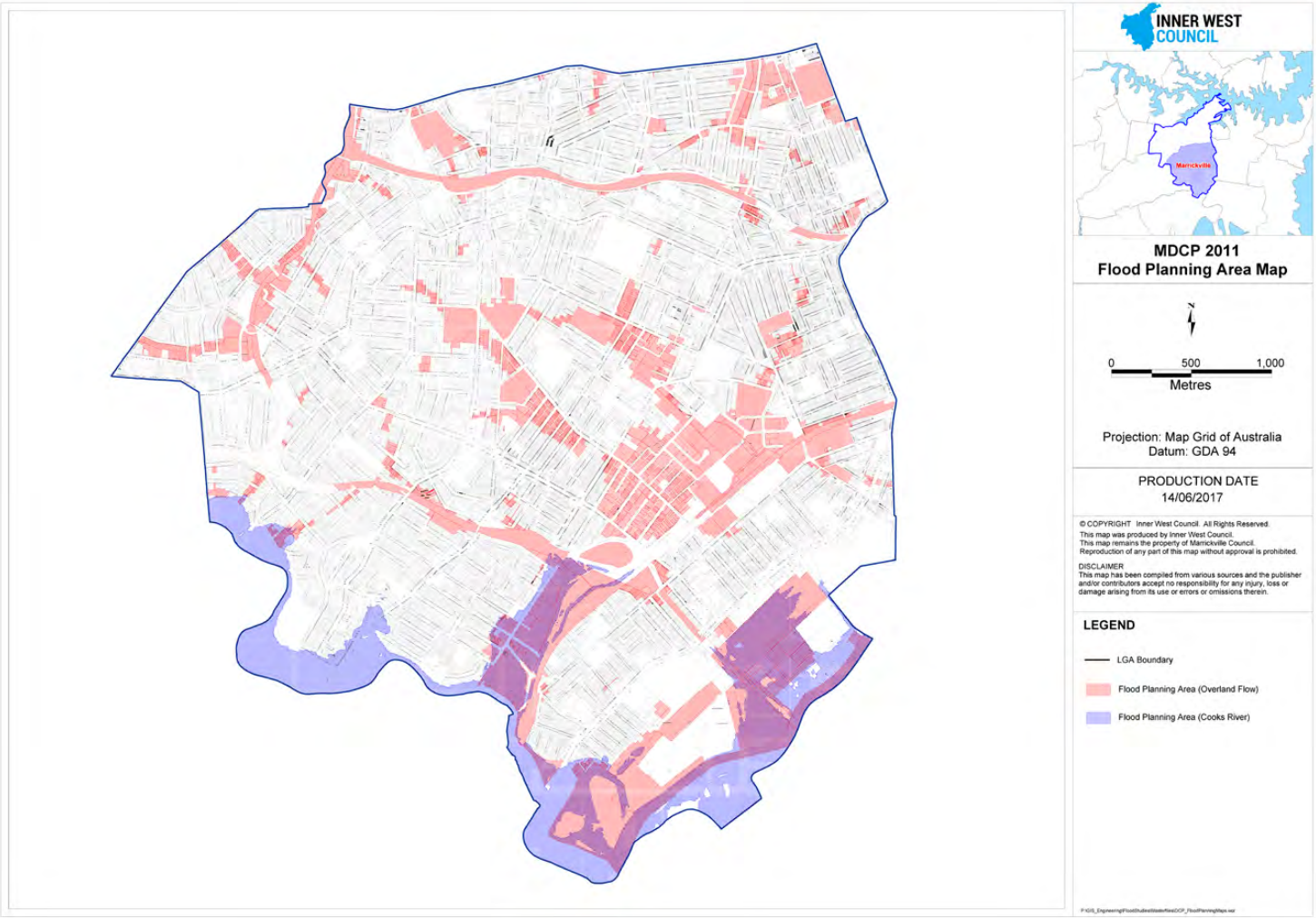

Figure 5-5 The Formerly Marrickville DCP 2011 Flood Planning Area Map

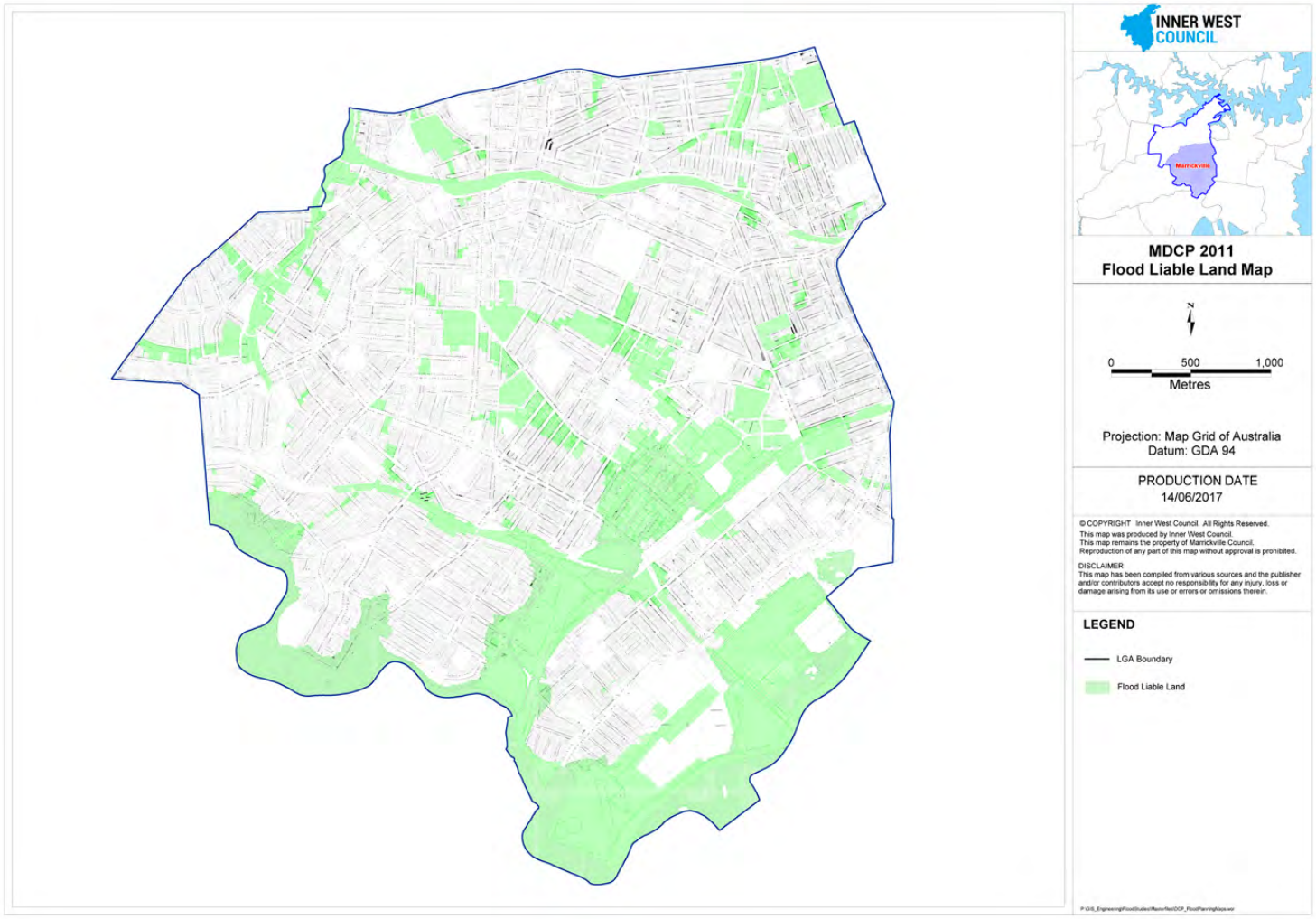

Figure 5-6 The Formerly Marrickville DCP 2011 Flood Liable Land Map

5.4.3 Flood Impact and Risk Assessment Requirements

More recent guidance for applicant flood impact assessments is included within the 2022 FRM Manual guideline for Flood Impact and Risk Assessment (Flood Risk Management Guide FU01). The guideline provides details on the preparation of both simple and detailed Flood Impact and Risk Assessment (FIRA) for developments. The recommended preparation of a FIRA for developments should consider (as outlined in Section 3 of the FU01 guide):

- Proposed development: The proposed development needs to be shown with the necessary detail.
- Existing and developed model scenarios: The consent authority will need to ensure that flood modelling and/or analysis is sufficient to identify and assess the existing flood conditions and to determine post developed flood impacts and risks. Assessment needs to consider the key details of the final proposal, including development type and density (changing runoff characteristics), infrastructure, proposed modification to waterways or floodplain landform or vegetation.
- Impacts to be addressed: The consideration of development impacts is recommended to extend beyond flood level impacts only, with the table of impacts recommended to consider provided in **Table 5-4** below.

Table 5-4 Typical considerations when assessing impacts due to development (Source: NSW DCCEW, FU01 Guide)

Key considerations	Reasons for considering
Flood level change	• May increase inundation and damage to existing development • May inundate additional existing development • May create new or larger floodways or flowpaths • May isolate new areas
Change in duration of flooding	• May increase damage • May increase duration of isolation
Velocity change	• May increase scour potential and/or damage to buildings
Change in warning and evacuation time	• May decrease available warning time and time available for evacuation
Change in frequency of inundation	• Properties may become flood affected in more frequent events • Access may be cut more frequently • Areas may be isolated more frequently
Flood function categorisation change	• May change categorisation (e.g. flood storage to floodway) and change impacts on flooding on existing development
Hazard categorisation change	• May reduce safety to vehicles, people or buildings

- Managing residual flood risk: In many situations there will be opportunities to limit the increase in risk due to development, however, available options will vary depending on the stage and scale of the development being considered. Typical risk considerations include the risks to people, property and infrastructure, including the ability of the occupants to respond in an emergency. Residual risks will remain after management measures and development controls have been applied. A list of measures available to minimise the increase in flood risk to large and small-scale development are in **Table 5-5**.

Table 5-5 Typical measures to minimise impacts due to development (Source: NSW DCCEW, FU01 Guide)

Multi-lot, large-scale development	Individual, small-scale development
Include strategic management considerations and measures: • avoid floodways and flowpaths • avoid other highly flood constrained areas • provide management measures to manage risks to existing development • consider compatibility of land uses/ development types with the flood constraints on the land • determine and apply controls required to manage risk to the development and its users • consider emergency response issues and options and provide management measures consistent with advice from emergency services	Generally: • avoid floodways and flowpaths • avoid other highly flood constrained areas • apply controls to manage the risk to the development and its users: • management and design measures • structural considerations • floor level controls

The guide notes that documentation should ensure the intent of the approval is clear and maintained for the life of the approved development. This may include the need for conditions that consider:

> Limiting impacts and risks posed to the development and future occupants to ensure these have been appropriately managed. Consent conditions are to incorporate the key requirements to ensure these aspects are addressed. This may include the need to apply flood related controls such as those that nominate minimum fill or floor levels, structural considerations, management measures, address site egress, ensure the safety of occupants during flooding, and restrict unapproved modification to key elements of the development as approved in the consent.

> Management measures required to be considered in a staged manner as necessary to manage risks to the existing community.

> Inclusion of all design reports and drawings in the consent to ensure these are consistent with key parameters used in post development modelling and analysis that formed the basis of the FIRA.

> Modification of key design features of the development that may alter flood behaviour. This may require an additional approval with supporting modelling and/or reporting to ensure impacts of post developed flood risks are either in accordance with the original approval or are within the tolerable levels as defined by the consent authority.

> How risks and impacts of the development change with future climatic conditions.

> Any other specific requirements for consideration by the proponent to manage flood risk.

5.4.4 Conclusion of Review of Development Controls

Upon review of the flood-related development controls within the formerly Marrickville DCP 2011, the following general comments are noted:

- Compared to the requirements for planning proposals outlined within the 2021 Flood Prone Land Policy Update (refer to **Section 5.3.2**), the current development controls are generally in agreement with one exception:
  - The controls do not permit (only) filling of floodways or high flood hazard areas. Regarding the policy requirement for no residential accommodation in high hazard areas, there is a relevant control for new residential development enforcing flood free access must be provided where practicable.
  - The controls require filling of land within the Flood Planning Area (Control C21)
    - not increase flood levels by more than 10mm,
    - not increase downstream velocities by more than 10%,
    - not redistribute flows by more than 15%,
    - the potential for cumulative effects of possible filling proposals in that area is minimal,
    - the development potential of surrounding properties is not adversely affected by the filling proposal,
    - not increase the flood liability of buildings on surrounding properties, and
    - no local drainage flow/runoff problems.
    - This is similar to requirements within the policy.
  - Requirements for storage of goods and hazardous materials are consistent.
  - Emergency management requirements are similar, though the controls are more prescriptive outlining refuge and evacuation requirements more specifically which is beneficial to aid applicants.
  - There is not a control that does not permit vulnerable and critical developments below the PMF level, similar to the requirements of the policy relating to these types of developments. Consideration should be given to amending the DCP to specifically address flood risk in vulnerable and critical developments,
- Compared to the requirements for FIRA from the 2022 FRM Manual Guide FU01. Generally, the current development controls are in agreement with the proposed requirements in the guide with some exceptions:
  - The current controls do not require consideration of climate change in assessments.
  - The current controls do not specifically require a consideration of residual risk of proposed developments to confirm if flood risk is lower than existing based on proposed risk management measures for developments.
- The development matrix approach offers a simple platform to be able to apply development controls specific to development types.

Ultimately, the current controls are generally fit for purpose, some alterations to the current development controls should be considered to bring it in accordance with recent guidance both within the 2021 Flood Prone Land Policy Update and the 2022 FRM Manual Guide FU01. This may include the following key changes from the bullet points above:

- setting controls to allow no new residential accommodation in high hazard flood areas
- setting controls to reduce flood hazard and associated risk to existing residential accommodation in high hazard areas,
- setting controls that consider the higher flood risk of vulnerable and critical developments below the PMF level, and
- consideration of climate change in assessments.

6 Economic Impact of Flooding

The economic impact of flooding can be defined by what is commonly referred to as flood damages. Flood damages are generally categorised as either tangible (direct and indirect) or intangible damage types, these types are summarised in **Table 6-1**.

Table 6-1 Types of Flood Damages

Type	Description
Direct	Building contents (internal)
	Structural damage (building repair)
	External items (vehicles, contents of sheds, etc.)
Indirect	Building contents (internal)
	Structural damage (building repair)
	External items (vehicles, contents of sheds, etc.)
Intangible	Social (increased levels of insecurity, depression, stress)
	Inconvenience (general difficulties in post-flood stage)

The direct damage costs, as indicated in **Table 6-1**, are just one component of the entire cost of a flood event. There are also indirect costs. Together, direct, and indirect costs are referred to as tangible costs. In addition to tangible costs, there are intangible costs such as social distress. The flood damage values discussed in this report are the tangible damages and do not include an assessment of the intangible costs which are difficult to calculate in economic terms.

The purpose of a flood damage assessment is to support decision-making on FRM options. It provides the basis for understanding the scale of benefits or disbenefits FRM measures may have on flood damages to the community. The damage assessment is not intended to be a precise estimate of damage at a given location. Rather, it is intended to provide a reasonable understanding of the relative scale of damage across the study area (focusing on aspects that will be materially changed by FRM measures) and how this may be altered with the implementation of FRM measures.

6.2 Input Data

6.2.1 Building Footprints

The primary flood damage calculation relates to building damages, being structural, contents, relocation, and clean-up costs. Therefore, building damages have been calculated for each individual building footprint, based on the building footprint layer provided by NSW DCCEW.

Commonly in the past flood damages were calculated on a per property basis rather than a per building basis. The adopted damage per building calculation provides a more accurate determinant of flood affectation due to the following reasons:

- Properties may have multiple buildings in the one property therefore damages can be calculated per building and added together,
- Flood model results can be considered only within the building footprints to provide a more accurate localised picture of flood affectation. On a property basis, flooding far removed from building footprints may misrepresent flood affectation near the building where the majority of flood damages are caused.

Therefore, the bulk of flood damages calculation has been conducted based on NSW DCCEW building footprints data. This includes external (garden) damage which has been considered on a per building basis from ground levels.

6.2.2 Building Types

The adopted damages approach allows for unique classification of flood damages based on the type of building that were able to be determined for each building across the study area. Building types were derived for each building footprint based on building type provided in the NSW DCCEW footprint layer and confirmed through site visit observations, and Google Streetview observations. For example, all 1% AEP flood affected residential

classed properties were inspected from site visit photos or Google Streetview to confirm if they were single or double storey. The building types were classified as follows:

> Residential building types:
  - Single storey:
  - Double storey,
  - Multi-unit,
  - Townhouse.
> Non-residential building types:
  - Low to medium being restaurants, cafes, offices, surgeries, retail outlets, service stations, hardware stores,
  - Default average,
  - Medium to high being chemists, electrical goods, bottle shops, electronics.
> Public buildings:
  - School
  - Hospital
  - Other

Note that all secondary buildings such as garden sheds and garages in residential properties were excluded from damages calculations. In total, when removing secondary buildings there were a total of 909 buildings assessed in the flood damages calculation across the catchment.

The number of dwellings per building footprint were also estimated based on aerial images, site visit observations and Google Streetview. In addition, residential properties were grouped by size with small being less than 135 m^2, medium being between 135 – 200 m^2, default being between 200 – 230 m^2 and large being 230 m^2 or greater.

6.2.3 Floor Levels

Floor levels for all building footprints have been adopted in the damages calculation through one of two methods:

- Based on floor levels survey for the building for surveyed buildings in the study area. The floor level survey data is summarised in **Section 3.5**.
- For non-surveyed buildings, the following floor level estimation process was applied:
  - The average ground level for the building footprint was calculated using the TUFLOW model terrain.
  - Using Google Streetview, an approximate floor height above ground levels was estimated. This floor height was typically 0.15 metres for slab-on-ground type construction, 0.3 metres for normal construction and 0.6 metres for higher suspended floor type buildings.
  - The estimated floor level was calculated from average ground floor of the building footprint plus the approximate floor height above ground.

6.2.4 Hydraulic Model Results

To inform the flood damages calculation, a range of base case model results were assessed for all five design flood events, 20%, 5%, 2% and 1% AEP and PMF events. The results were applied as max values across the building footprints:

- Maximum water levels for footprints were determined for each design event,
- Maximum depth results for footprints were determined for each design event, and,
- Maximum H1-H6 hazard category within the footprint were determined for each design event.

In addition, to inform external (garden) damage calculation, the maximum flood depth for properties were calculated for each design event.

6.3 Flood Damages Methodology

Flood damages can be assessed by a number of methods including the use of computer programs such as FLDamage or ANUFLOOD, or via more generic methods using spreadsheets. For the purposes of this project, the recently released 2023 Flood Damages Tool (DT01) prepared by NSW DCCEW as part of the FRM Manual 2023 has been adopted for calculation of building damages, with external damages calculated using in-house spreadsheet analysis as summarised in the following sub-sections.

6.3.1 New Flood Damages Tool

This flood damages analysis has been based on the Flood Damages Tool (DT01) prepared by NSW DCCEW as part of the FRM Manual 2023. The damages tool is supported by Section 3 of the Flood Risk Management Measures - Flood Risk Management Guide MM01 which provides background and guidance on the use of the tool.

The methodology outlined within the damages tool is an improved and more detailed calculations than previous damages tools. The damages tool DT01 provides the following advantages over past damages tools provided by the NSW Government:

- It provides not only residential damages for single and double storey houses similar to past tools, but it also provides damages curves for commercial and public infrastructure buildings and specific public buildings,
- The methodology also allows for calculation of risk to life projected costs based on the H1-H6 hazard categorisation of the building,
- It allows for damages estimation based on building footprint areas providing additional detail in analysis.

Therefore the DT01 damages tool was ultimately considered suitable for adoption in this study.

6.3.2 Calculation Parameters

The damages tool DT01 curves are derived for late 2019, and as part of this Study were updated to represent late 2022 dollars (only quarter 1 2023 inflation data available at the time of this report).

General recommendations in the damages tool and guideline are to adjust values in residential damage curves by Consumer Price Index (CPI). The most recent data for CPI from the Australian Bureau of Statistics at the time of the assessment was for March 2023. Therefore, all ordinates in the residential flood damage curves were updated to March 2023 dollars (CPI 132.7) from December 2023 dollars (CPI 130.9).

Consequently, all ordinates on the damage curves were increased by 1.38% compared to the curves presented in the flood damages tool DT01.

6.3.3 Damage Curves for Overfloor Flooding Depths

Residential and non-residential flood damages are generally assessed based on assessments of structural damage, damage to contents, external damage, relocation costs and clean-up costs. In limited cases, the additional damage costs related to structural integrity due to building failure may also warrant consideration. The adopted flood damages curves for residential single and double storey buildings for the various building sizes are shown in **Figure 6-2** and **Figure 6-2** respectively.

Further details about the formulation of the residential damage curves adopted in the flood damages tool DT01 are included in Section 3.1 of Flood Risk Management Guide MM01.

Non-residential flood damage curves including commercial / industrial and public buildings are shown in **Figure 6-3**. Further details about the formulation of the non-residential damage curves adopted in the flood damages tool DT01 are included in Section 3.2 of Flood Risk Management Guide MM01.

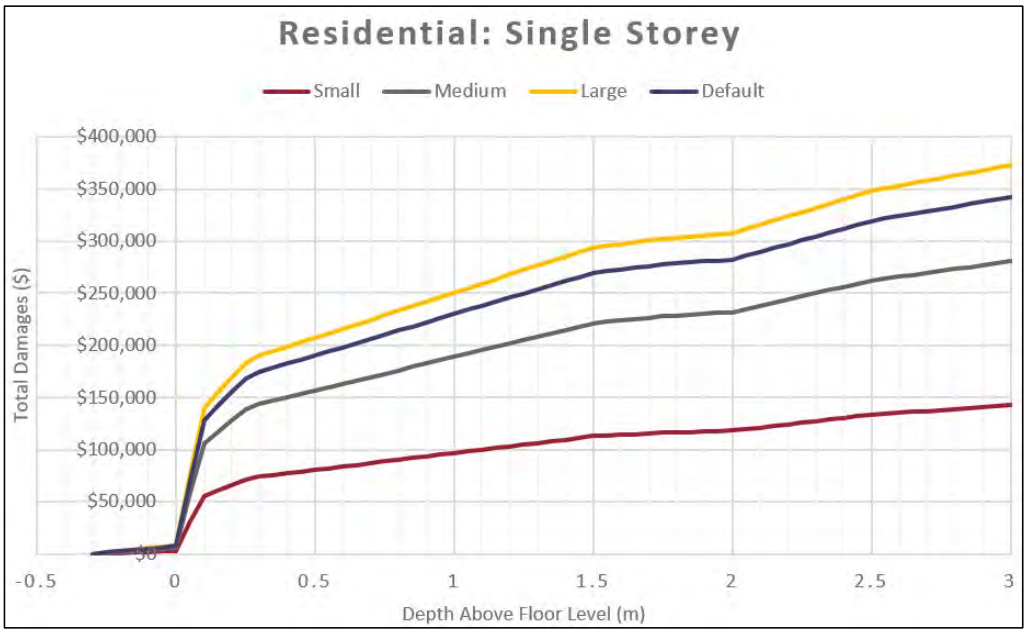

Figure 6-2 Adopted Damage Curves for Residential Single Storey (Source: DT01 Damages Tool)

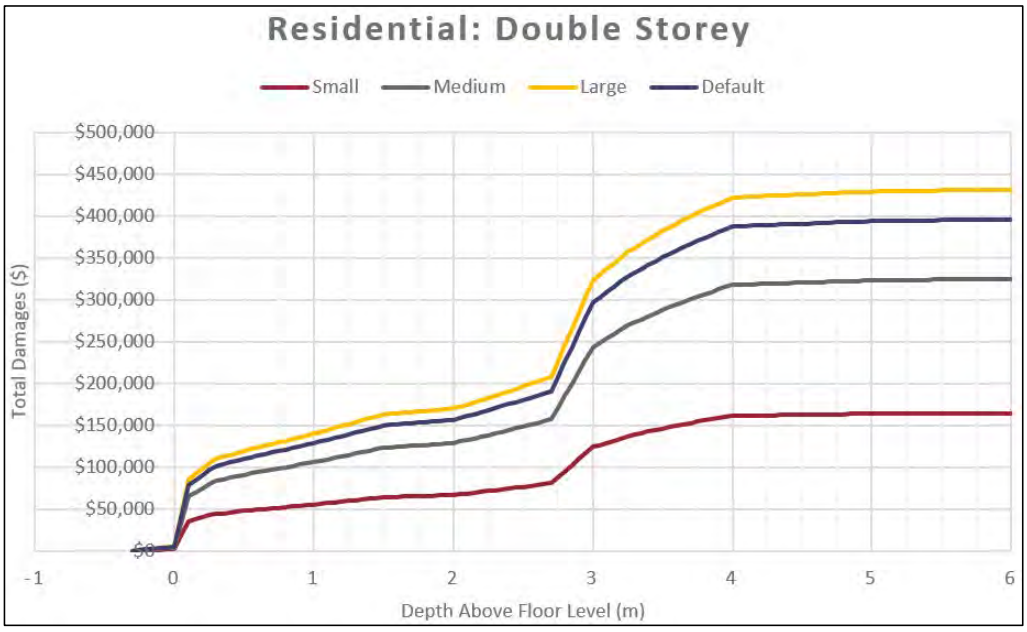

Figure 6-3 Adopted Damage Curves for Residential Double Storey (Source: DT01 Damages Tool)

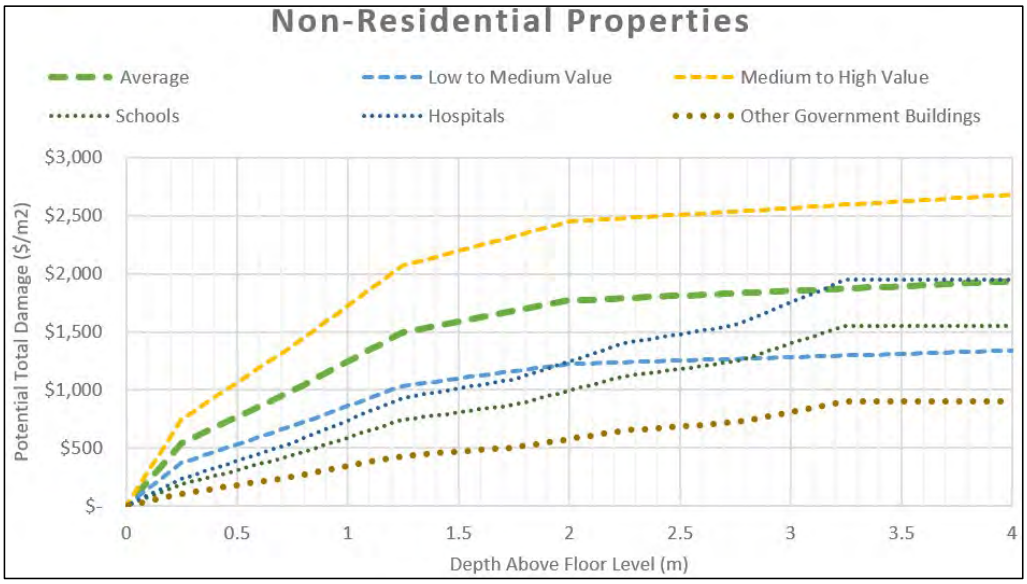

Figure 6-4 Adopted Damage Curves for Commercial Properties (Source: DT01 Damages Tool)

6.3.4 External Damages Calculation

A fixed external damage of $17,234 in 2023 dollars ($17,000 in 2022 dollars) is to be used for each dwelling site and for each site that contains multi-unit dwellings. This is used when flood depths above the ground level adjacent to the building are at least 0.3 metres or are above the habitable floor level of the house.

The trigger for these external damages has been based on average ground levels around the buildings, if the depth results exceed the threshold of the 0.3 metres, then the fixed damage rate has been applied to each property. The basis for external damage calculation has been based on the building footprint layer, and not based on a property layer. Therefore no external damage has been applied to properties without a building.

6.3.5 Adopted Input Parameters

The flood damages tool DT01 provides numerous input parameters to tailor the flood damages analysis. The tool and associated guide provide advice with respect to default values. The input parameters for this flood damages assessment are as follows:

- Actual to potential ratio = 0.9 (default)
- Regional uplift factor = 1.00 (default for Sydney region)
- Infrastructure damages uplift = 10% of residential damages (default)
- Damages downscale for townhouses and units = 30% (default)
- Internal / contents rate = $550 / m^2 (default)
- Residential clean-up costs = $4,500 / property (default)
- Non-residential indirect costs = 30% of direct actual damages, clean-up costs and loss of trading (default),

With respect to risk to life damages calculations, the equations adopted within the flood damages tool DT01 are summarised in **Figure 6-4**.

$$Injuries = 2 \cdot N_z \times \frac{HR \cdot AV}{100} \cdot PV$$

$$Fatalities = 2 \cdot N(I) \times \frac{HR}{100}$$

$$Hazard\ Rating\ [HR] = d \times (v + 0.5)$$

Where,

N_z	Population living in the floodplain
HR	Hazard Rating (Table 12-6)
AV	Area Vulnerability (Table 12-7)
PV	People Vulnerability = {% residents suffering any long-term illness, % aged 75+}
N(I)	Number of injuries
d	Depth of flooding (m)
v	Velocity of floodwaters (m/s)

Figure 6-5 Flood Risk to Life Damages Calculations (Source: NSW DCCEW, 2022)

The adopted flood risk to life parameters are as follows:

The adopted flood risk to life parameters are as follows:

- Estimated cost per fatality = $5,300,000 (default taken from the Office of Best Practice Regulation (Australian Government)
- Estimated cost per injury = $52,962 (default taken from the Office of Best Practice Regulation (Australian Government)
- N(z) average people per household = 2.1 (default from ABS)
- Speed of onset = 3 (rate of rise is less than 1 hour)
- Primary nature of area = 2 (detached residential dwellings)
- Flood Warning Factor = 3 (calculated from P1, P2 and P3)
- Area Vulnerability (AV) = 8
- People Vulnerability = 36% (default)

6.4 Flood Damages Outcomes

6.4.1 Total Damages

The total damages have been calculated for all design events, 20%, 5%, 2%, and 1% AEP and the PMF event. The results are tabulated in **Table 6-2** show that the damages total for Alexandra Canal catchment. The tabulated results also show the building and external damages.

As it relates to contributions from building and external damages, the external component makes up only a fraction (4.7 – 21.2%) of the total damages, with the vast majority being building related damages including structural, risk to life, contents, relocation etc.

The total damage values and number of affected properties / buildings, and average depth of flooding for the 20%, 5%, 2%, and 1% AEP events are shown in **Table 6-2**.

Table 6-2 Existing Total Damages Summary for Design Flood Events

Event	Damage Type	Total Damages	Number of Overfloor / Overground Flooded	Avg. Overfloor/ Overground Depth (m)
20% AEP	Building	**$8,321,540**	**50**	**0.14**
	External	**$530,800**	**80**	**0.33**
	Total	**$8,852,340**		

Event	Damage Type	Total Damages	Number of Overfloor / Overground Flooded	Avg. Overfloor/ Overground Depth (m)
5% AEP	Building	**$12,230,663**	**63**	**0.16**
	External	**$725,111**	**95**	**0.35**
	Total	**$12,955,774**		
2% AEP	Building	**$13,442,777**	**65**	**0.16**
	External	**$725,111**	**103**	**0.35**
	Total	**$14,167,888**		
1% AEP	Building	**$15,224,527**	**74**	**0.17**
	External	**$876,768**	**121**	**0.34**
	Total	**$16,101,295**		
PMF	Building	**$97,017,217**	**187**	**0.32**
	External	**$1,900,454**	**261**	**0.51**
	Total	**$98,917,671**		

6.4.2 Average Annual Damage

Average Annual Damage (AAD) is calculated using a probability approach based on the flood damages calculated for each design event. These damage curves attempt to define the damage experienced on a property for varying depths of flooding. The total damage for a design event is determined by adding all the individual property damages for that event. AAD attempts to quantify the flood damage that a floodplain would receive on average during a single year. It does this using a probability approach.

While the PMF event has a theoretical probability of 0% of occurring, to inform the calculation of AAD a representative probability of 0.0000001 (or 0.00001%) has been adopted for the PMF event (equivalent to a 10,000,000 year ARI event). This is based on guidance from AR&R Book 8 – Estimation of Very Rare to Extreme Events which notes this as the equivalent recurrence event for catchment less than 100 km^2. Through this method, the PMF accounts for extremely rare flood events in the AAD calculation.

For the most frequent event, the 20% AEP event, a lower bound flood damages estimate is required for the next most frequent event. In the DT01 tool it has been assumed that the total damages in the 100% AEP event will be $0 creating the lower bound of the AAD curve as per the default set-up of the tool.

The AAD calculation for the Alexandra Canal catchment is summarised in **Table 6-3**.

Table 6-3 Average Annual Damage Summary for Design Flood Event Contributions

AEP	Probability	Total Damages	AAD Contribution	AAD Contribution %
20%	0.20	$8,852,340	**$3,558,226**	56%
5%	0.05	$12,955,774	**$1,642,015**	26%
2%	0.02	$14,167,888	**$406,855**	6%
1%	0.01	$16,101,295	**$151,625**	2%
PMF	0.0000001	$98,917,671	**$574,520**	9%
		Total AAD	**$6,333,241**	

The total AAD for the Alexandra Canal is over $6.3 million. Nearly half (56%) of this AAD is a result of the most frequent 20% AEP event, with the next most frequent event, the 5% AEP contributing 26% of the AAD. The less frequent events, the 2% and 1% AEP and PMF provide between 2 – 6% of AAD contribution. Though these events result in far higher flood damage totals, particularly the PMF event, their relatively low likelihood means they contribute less to the AAD.

Therefore, as it relates to damages and AAD, structural flood risk management options that reduce flood damages for the most frequent 20% AEP event are expected to provide the biggest benefits to AAD reductions.

7 Flood Emergency Response Review

When determining the flood risk to life, the flood hazard for an area does not directly imply the danger posed to people in the floodplain. This is due to the capacity for people to respond and react to flooding, ensuring they do not enter floodwaters. This concept is referred to as flood emergency response. To help minimise the flood risk to occupants, it is important that there are provisions for flood emergency response.

The primary strategy for the NSW State Emergency Service is horizontal evacuation of people to an area outside of the effects of flooding that has adequate facilities to maintain the safety of the community. However, during flash floods this may not be possible due to the short warning times.

The emergency response provisions for Inner West Council are outlined in the Inner West Local Emergency Management Plan (EMPLAN) and overseen by the Local Emergency Management Committee. Under the provisions of the EMPLAN, NSW SES are appointed as the lead agency for response to Flooding Emergencies. The NSW SES, in conjunction with the Inner West LEMC is responsible for the preparation and management of the Inner West Council Flood Emergency Sub Plan. These documents are intended to provide information to residents and other authorities relating to identified evacuation centres, evacuation procedures, as well as actions and responsibilities in the event of flooding. A review of these available documents is included in **Section 7.1**. There is also a review of available flood emergency response advice in flash flooding situations in **Section 7.2**.

In addition, a review of the flood emergency response potential for the Alexandra Canal catchment summarised below including key emergency management locations (**Section 7.3**), current and possible flood warning systems (**Section 7.6**), evacuation timeline review (**Section 7.4**), potential for shelter-in-place refuge (**Section 7.7**), and a summary of flood emergency response hotspots (**Section 7.5**).

7.1 Emergency Flood Management Documentation

Emergency Flood Management in NSW is managed by the NSW SES at three levels of scale, at a state-wide level, at a regional level, and a local level. Each subsequent level provides additional local detail in emergency management.

The Inner West catchment is located within the Sydney Metropolitan Emergency Management Region. This region encompasses 8 Local Government Areas of Sydney bounded by Woollahra, Waverley and Randwick to the east and Sutherland Shire to the southwest. The relevant local area with respect to SES emergency planning is the Inner West Local Government Area (LGA).

7.1.1 Local Flood Plan

In December 2021 the SES released Volume I the Inner West Flood Emergency Sub Plan covering operations for flooding within the Inner West Council LGA. Volume I of the plan outlines emergency management arrangements for prevention, preparation, response and initial recovery for flooding in the Inner West LGA.

The local strategies for flood emergency response outlined within Volume I were divided into the four stages of emergency management, prevention / mitigation, preparation, response, and recovery operations. In response to strategies a range of recommended actions are nominated for SES to achieve these strategies. The total number of strategies is 32 and 136 actions, spread across the four stages of emergency management as follows:

- Prevention / mitigation – 2 strategies and 4 actions.
- Preparation – 6 strategies and 22 actions.
- Response – 23 strategies and 105 actions.
- Recovery – 1 strategy and 5 actions.

7.1.2 Local EMPLAN

Inner West Council has established a Local Emergency Management Committee to carry out emergency management as the responsible authority for the Inner West local government area. This committee is responsible for an all-agencies comprehensive approach to emergency planning to prepare the community for disasters. Committee members include Emergency Services and agencies with functional responsibilities.

Inner West Emergency Management Plan has recently been published by NSW SES.

7.1.3 Regional and State Documents

The relevant regional and state emergency management documents are as follows:

- Sydney Metropolitan Region Emergency Management Plan – January 2022
- NSW State Flood Plan – December 2021
- NSW State Emergency Management Plan – December 2018.

The various documents provide more useful information in relation to the roles and responsibilities of various stakeholders in both general emergencies (EMPLANs) and specifically for flood emergencies (Flood Plans).

7.2 Guidance on Emergency Response in Flash Flooding

7.2.1 AFAC Guideline for Emergency Response in Flash Flood Events

In April 2018, the Australasian Fire and Emergency Service Authorities Council (AFAC) released the *Guideline on Emergency Planning and Response to Protect Life in Flash Flood Events*. This guideline for flash flood events provides a useful insight into the position of the national emergency services authorities' council, of which NSW SES is a member. The guideline reflects a consensus on best practice for managing flash flooding, focussing on risk to life. The AFAC define flash flooding as:

> *Flash flooding can be defined as flooding that occurs within six hours or less of the flood-producing rainfall within the affected catchment. This may result in isolation of individuals and communities as time to warn and respond to flash flooding is limited.*
>
> *Flash flood environments are characterised by the rapid onset of flooding from when rainfall begins (often within tens of minutes to a few hours) and by rapid rates of rise and by high flow velocity. The duration of flash flooding is often relatively short by comparison to riverine floods.*

The discussion of flood timing for the Alexandra Canal study area (**Section 7.4.2**) shows the entire floodplain is flash flooding based on the above definition, making this guideline relevant to the catchment. The exception is the lower portions of the study area where tidal conditions from Alexandra Canal or Cooks River may result in riverbank overtopping.

7.2.2 Guidance on Flood Emergency Response Potential in Flash Flood Environments

Effective evacuation typically requires lead times of longer than just a couple of hours and this creates a dilemma for flash flood emergency managers. The following excerpt from the AFAC guideline outlines the dilemma as it relates to the suitability of evacuation and shelter-in-place potential in flash flood environments:

> *Because of the rapid onset of flash flooding and associated high velocity floodwaters, up to 75% of flash flood deaths occur while people are outside buildings attempting to leave or return, and directly exposed to floodwater.*
>
> *This suggests that if evacuation has not occurred prior to the arrival of floodwater, taking refuge inside a building may generally be safer than trying to escape by entering the floodwater. However, some deaths – 25% of the total – occur among people trapped inside buildings. Details are not well documented, and these deaths could be the result of the building filling with flood water to a depth occupants cannot survive or because those trapped inside are swept away when the building fails. Other causes of death could be serious injury or an emergency medical condition while access to emergency assistance is compromised. Fires might also break out in buildings surrounded by floodwater, in which case occupants might not be able to evacuate as they would usually do.*
>
> *For these reasons, remaining in buildings likely to be affected by flash flooding is not low risk and should never be a default strategy for pre-incident planning or incident action planning, even if the buildings are considered likely to withstand the impact of flash flooding. Where the available warning time and resources permit, evacuation should be the primary response strategy.*

This conclusion is similar to advice provided by NSW SES representatives for past studies within Sydney:

> *The NSW SES considers evacuation as the primary response strategy during flooding to protect the at-risk community. This strategy relies on the principles for evacuation that include:*
>
> - *Evacuation completed in sufficient time before the onset of a flood is the safest emergency management strategy.*

- *The primary method of evacuation should be by vehicle where feasible with pedestrian evacuation as a backup option.*
- *Evacuation must not require people to drive or walk through flood water.*
- *The best vehicular evacuation routes are vehicular escape routes that rise steadily and lead away from the flood.*
- *For existing communities, a strategy of having occupants shelter in place may be acceptable, where the decision to evacuate is left too late, as long as the buildings they inhabit are out of the floodwater or are structurally sound.*
- *Emergency management strategies must consider expected human behaviour and the expected range of severity of hazards*
- *Sheltering in place should only be a strategy where the risk if staying is lower than the risk of evacuating.*

The SES's position, continues to be that isolation is dangerous from the moment it commences and the longer the isolation continues, the more opportunity there is for an emergency to develop.

Additionally, secondary emergencies such as fires and medical emergencies may occur in buildings isolated by floodwater. During flooding it is likely there will be a reduced capacity for relevant emergency service agencies to respond. Even relatively brief periods of isolation, in the order of a few hours, can lead to personal medical emergencies.

While the preferred method of emergency response throughout NSW is for evacuation to be assisted and directed by the SES, there are certain emergency situations where there is limited time available to prepare and facilitate a staged evacuation as preferred. One such example is flash flooding where the rate of rise of floodwaters is extremely fast and the ability for SES to co-ordinate a regional evacuation strategy is not possible.

7.2.3 Guidance for New Developments in Flash Flood Environments

Given the life risk posed by flash flooding and the inherent limitations on how it can be managed, the AFAC guideline recommends new development areas:

- *be designed within the limits of existing flash flood forecast capability,*
- *facilitate rapid and safe evacuation from flash flood prone locations,*
- *account for the likelihood that some people might become trapped inside buildings, and*
- *involve a thorough understanding of how people will behave in a flash flood event and their risks*.

This conclusion is similar to advice provided by NSW SES staff for this study for new developments:

- *No increase to the existing risk to life and evacuation or reduces the current continuing or residual risk to life.*
- *Where evacuation cannot be accomplished and 'shelter in place' is proposed, then development that will increase the risk to life of future occupants and increase reliance on emergency services should not be permitted. Development strategies relying on deliberate isolation or sheltering in buildings surrounded by flood water are not equivalent, in risk management terms, to evacuation.*

Self-evacuation of the community should be achievable in a manner which is consistent with the NSW SES's principles for evacuation.

It should be made very clear that in relation to the strategy of sheltering in place the SES has done some work with several councils which have flash flood risk over large urban areas. In this existing flash flood context, and only in that context, it has been recognised that causing residents to attempt to evacuate at the time flash flooding is occurring, could be a serious risk to life. Only in areas where urban redevelopment cannot be prevented under existing planning policy, it has therefore been proposed that the DCP (that applies) for any new or redeveloped dwelling will require an internal refuge area above the level of the PMF (Opper and Toniato, 2008).

7.3 Emergency Management Locations

7.3.1 Emergency Services Locations

Emergency services locations are considered critical during flooding if the infrastructure is relied upon for emergency management on a regional scale or pose a significant hazard to surrounding areas. Therefore, these types of emergency services have been mapped at a regional scale around the Alexandra Canal Catchment as shown in **Figure 7-1**. This map has also been included in **Appendix C**.

The following emergency services have been mapped in the region around the Alexandra catchment:

- Hospitals,
- Ambulance stations,
- Fire stations,
- Police stations, and
- NSW SES facilities.

Within the study area there is NSW SES Marrickville Unit located in Alexandra Canal catchment, and also Marrickville Police Station, NSW ambulance at Farr Street, Pel-Air NSW Air Ambulance, Mascot Police Station and Mascot Fire Station are the emergency stations in closest proximity to the catchment area of Alexandra Canal. The NSW SES Marrickville Unit is flood free in all events up to and including the PMF, However it faces difficulties in access to Alexandra Canal catchment area due to the presence of flood affected roads in its vicinity.

Also shown in **Figure 7-1** with the emergency service locations is the 1% AEP and PMF flood extents, not only for entire Alexandra Canal catchment, but also in close proximity to the study area.

Relative to other overland flooding affected catchments, there are relatively flood free access roads within the Alexandra Canal study area. Central to this is Princes Highway which bisects the study area running south to north. As this regional road generally aligns with a ridgeline and is located in the upper areas of the catchment it is mostly flood free even in a PMF event. However there are several sections with 1% AEP and PMF ponding within the Princes Highway corridor which would impede evacuation in the event of flooding.

Though it was not possible to show the flood extents outside the study area, it is assumed that access to emergency services would be restricted for areas outside the study area. Review of emergency management summary for the Marrickville Valley FRMS&P (Stantec, 2017) located to the west of this study area shows that flood free evacuation routes in that direction are limited. Similarly for the Johnstons and Whites Creek FRMS&P (Stantec, ongoing) covering Newtown to the north, evacuation routes in that direction are mostly flood affected as well. To the south and east, evacuation routes are limited due to Cooks River and Alexandra Canal respectively, with evacuation over these waterbodies during extreme flooding not considered appropriate.

The nearest hospitals would be Marrickville Hospital to the north and Alexandria Specialist Day Hospital to the east. It is assumed that there would be no flood free access to these hospitals in the event of a regional flash flooding event from any part of the study area.

7.3.2 Vulnerable Developments

Vulnerable development relates to the increased risk of loss of life to vulnerable people including children, the elderly and disabled in most of these land use types. These demographics have a significantly greater risk to life when exposed to flood hazard. In addition, there is increased risk to life resulting from periods of isolation from medical emergency services due to pre-existing health conditions. Mobility of the related demographics is also compromised which will impede the effectiveness of both emergency response types. Included in these development types are:

- Schools, Preschools, and Childcare centres,
- Aged care facilities and retirement villages,
- Detention Centres – due to the limited mobility of the detained, these sites make flood evacuation much more difficult, and
- Hotels – the lack of local knowledge of hotel guests, coupled with the number of guests needing to be managed by hotel staff mean these are higher risk sites.

These categories of vulnerable developments match those presented in the 2021 Flood Prone Land Policy Update. Further discussion of the relative vulnerability of development types is in **Section 5.2**.

These sites have been mapped for the Study Area in **Figure 7-2**, which is also included in **Appendix C**.

The mapping shows that most vulnerable developments are suitably located in flood free land, with some of these developments partially affected by flooding, with only some locations significantly flood affected. Due to the permissibility of childcare centres, preschools and retirement communities in various land use zonings, the location of vulnerable developments will change over time. This mapping should be reviewed and updated by Council in the future to have a continued understanding of flood risk vulnerable developments.

7.3.3 Current Emergency Management Procedures for Vulnerable Developments

The NSW SES within the Inner West LGA Local Flood Plan provide the following specific actions within Section 5.8.3 and 5.9.2 as it relates to evacuation of vulnerable developments:

- Health Services Functional Area will coordinate the evacuation of hospitals, health centres and aged care facilities (including nursing homes) in consultation with the NSW SES and Welfare Services.
- School administration offices (Government and Private) will coordinate the evacuation of schools in consultation with the NSW SES and Welfare Services, if not already closed.
- Welfare Services Functional Area will manage evacuation centres for affected residents and travellers in accordance with the Welfare Services Functional Area Supporting Plan.
- Schools Administration (Government and Private) will manage the safety of students directly affected by flooding and will work with the NSW SES in the temporary closure of schools and will coordinate with NSW SES Transport and Welfare Services in the management of school evacuees.

As discussed further in **Section 7.2**, the flash flooding nature of the Study Area will make it difficult for SES to coordinate the evacuation of these vulnerable sites within the time available from the onset of rainfall. It is therefore recommended that individual flood response plans are developed for both existing and future vulnerable developments that are flood affected within the study area.

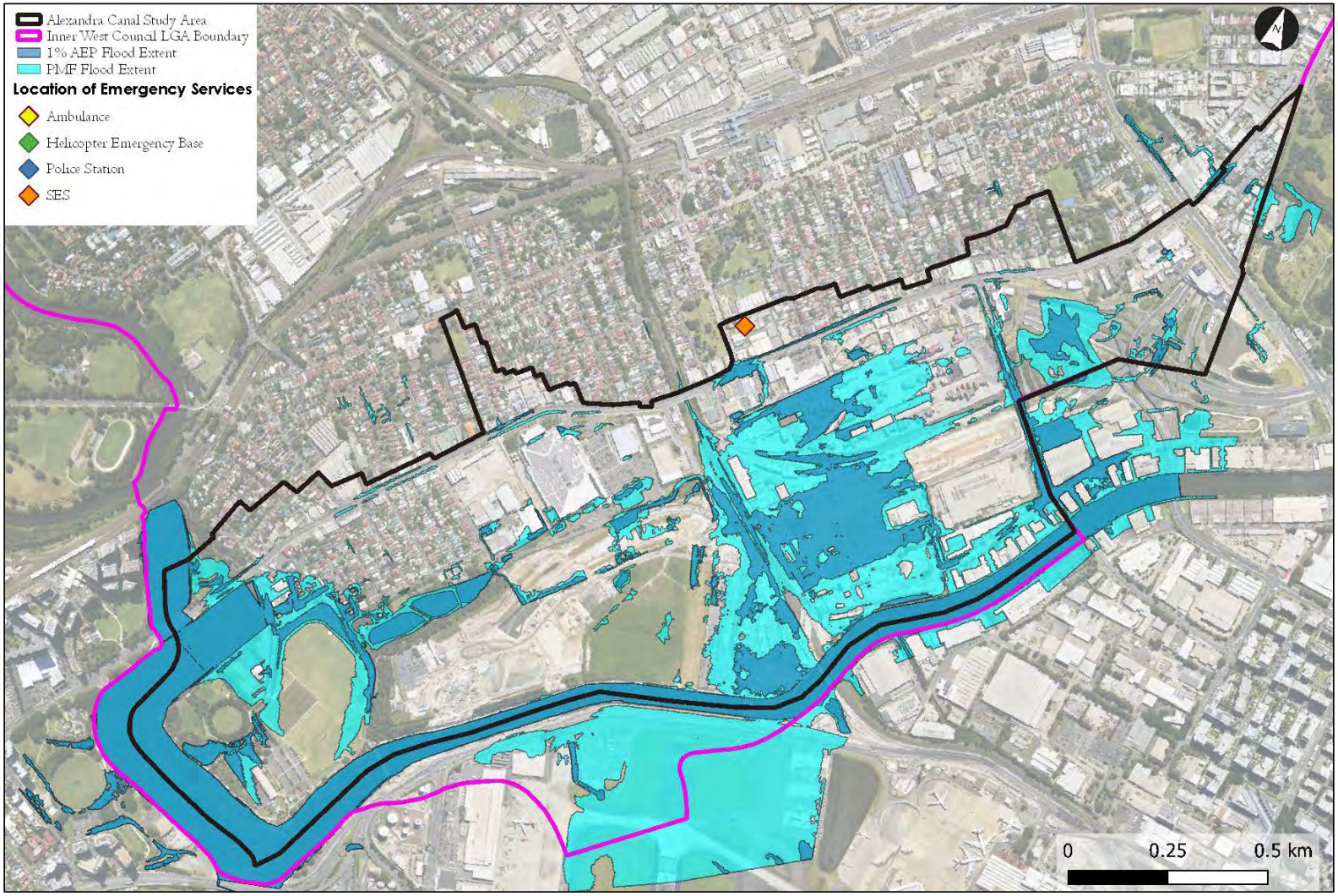

Figure 7-1 Location of Emergency Services in the Region with Inner West LGA 1% AEP and PMF Extents

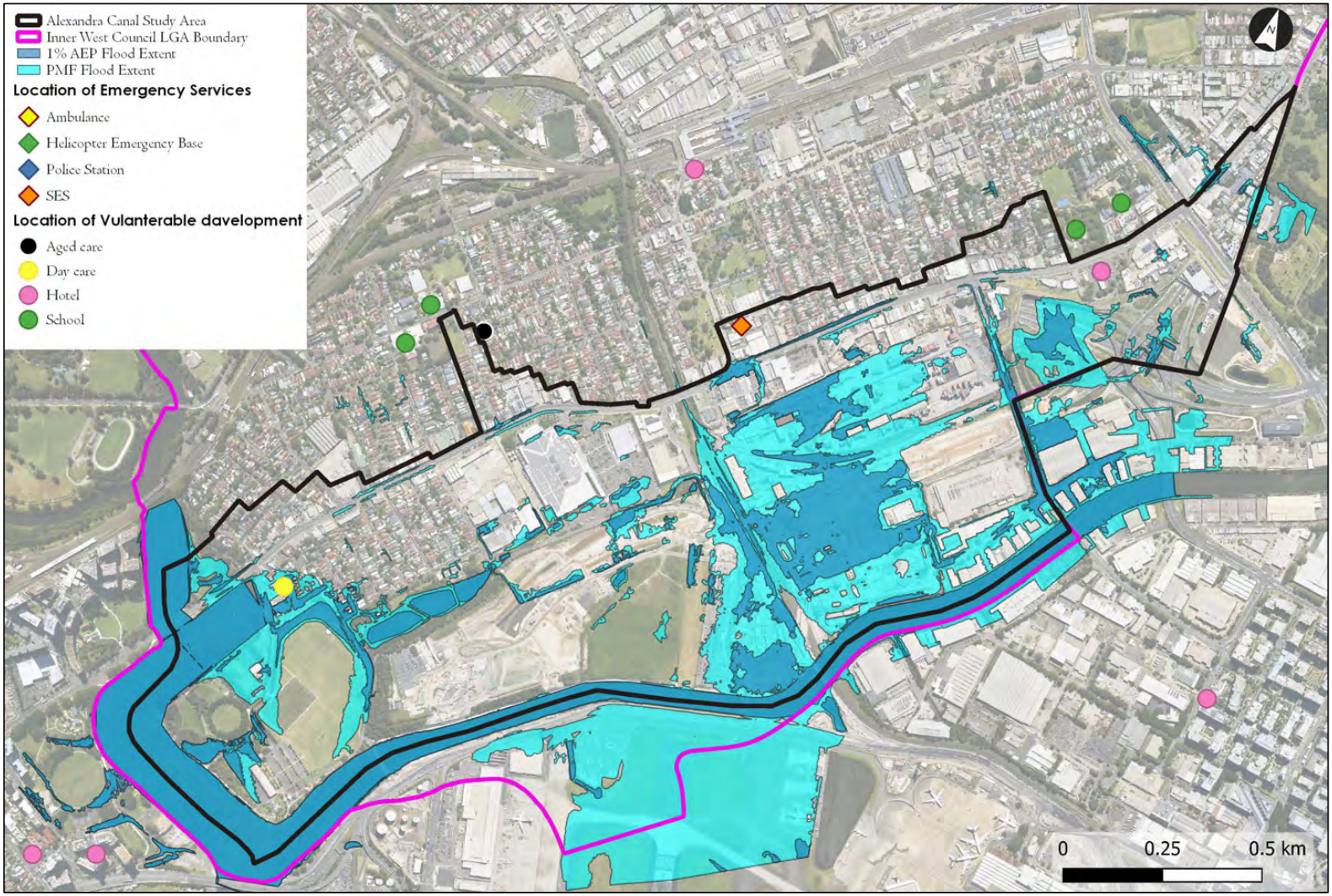

Figure 7-2 Location of Vulnerable Developments and Emergency Services within the Study Area with 1% AEP and PMF Extents

7.4 Evacuation Timeline

7.4.1 Background

The NSW SES Timeline Evacuation Model has been the de facto standard for evacuation calculations in NSW since it was first developed for evacuation planning in the Hawkesbury Nepean Valley. Though the guideline has not yet been released, the paper Technical Guideline for SES Timeline Evacuation Model was prepared by Molino S. et al in 2013 briefing the industry on the application of the guideline.

The timeline assessment of evacuation potential relates to the regional evacuation of floodplains through doorknocking by SES volunteers through to the evacuation of all occupants for the region.

At the centre of the timeline methodology is the following concept:

Surplus Time = Time Available – Time Required

If surplus time is positive then evacuation of all occupants is feasible, while a negative value implies evacuation of all occupants is not likely to be able to be achieved. The determination of the two times, 'Time Available', and 'Time Required' is summarised in the following sections.

7.4.2 Flood Water Levels and Timing

A review of flood timing for the Alexandra Canal catchment has been conducted based on the model results for the 20%, 5%, 2%, and 1% AEP and PMF events at one location. All have a rainfall duration of 1 hour. The flood timing inspection point, shown in **Figure 7-3**, is located on Bay Street which is a low-lying residential area. This selected location generally matches the identified emergency hotspots discussed in **Section 7.5**.

The water level time series results for the inspection point location is shown in **Figure 7-4**.

7.4.3 Rate of Rise

With regards to rate of rise for the PMF event, the Bay Street site begin flooding 10 minutes after the onset of rainfall, with up to 1.2 metres (check the range) of flooding depth within an hour of the onset of rainfall.

For the 1% AEP and smaller design events the rate of rise is slightly slower with flooding not commencing until 30 minutes after the onset of rainfall for the inspection point.

7.4.4 Duration of Flooding

With regards to flooding duration for the PMF event, the model simulation period was set at only 3 hours for the model. These short simulation times allow for the peak of flooding to occur, and as shown in **Figure 7-4**, also allow the falling limb of the PMF flood. For Bay Street (Tempe) the majority of the local overland flooding is expected to be finished within 3 hours of the onset of rainfall.

It is noted that Bay Street presents a unique situation, as it is low lying and has access to Cooks River through stormwater pit and pipe network. The model results in **Figure 7-4**7.4.4 show that longer duration flooding occurs at this location after the overland flooding has passed due to backwaters from Cooks River downstream. Locations such as Bay Street and foreshore areas of Alexandra Canal may be exposed to longer duration flooding from backwaters of Alexandra Canal and Cooks River.

For the 1% AEP and smaller events, the duration of flooding is expected to be less than the PMF, a shown in **Figure 7-4** these events have durations of flooding of less than 1 hour at Bay Street.

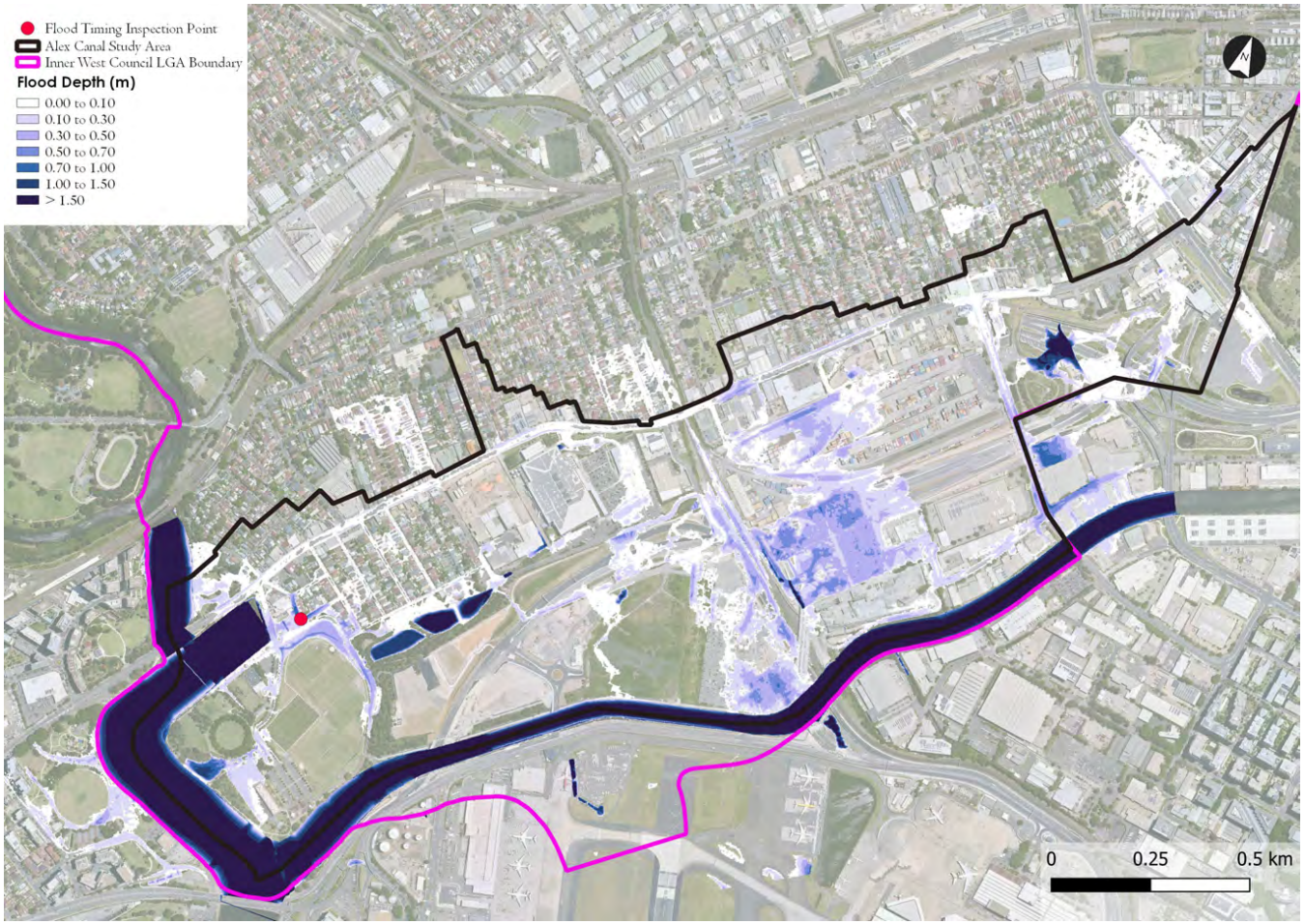

Figure 7-3 Flood Timing Inspection Point (Shown as Yellow Point) with 1% AEP Peak Depth Results

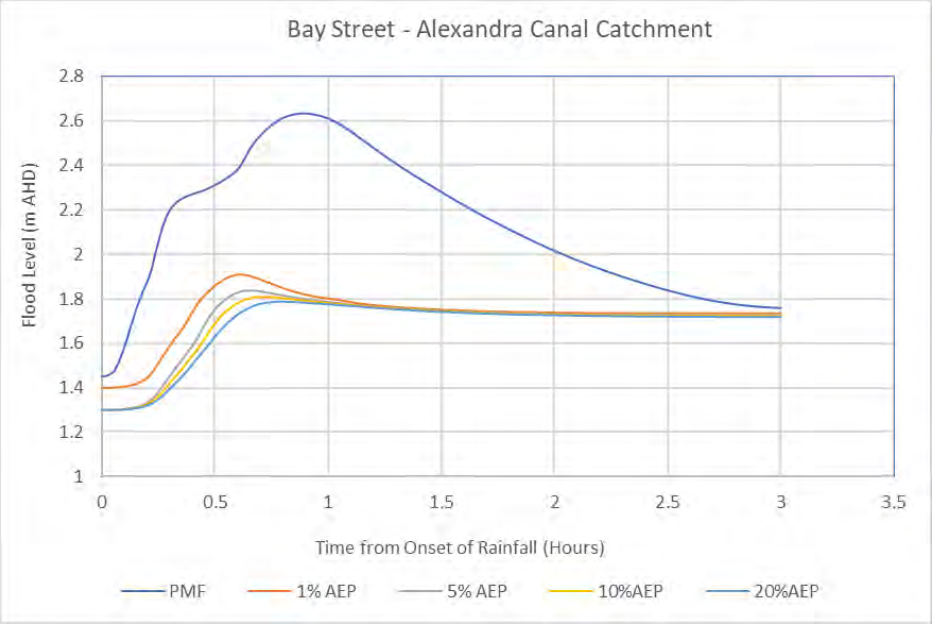

Figure 7-4 Flood Level Time Series Results for Alexandra Catchment Location

7.4.5 Time Available

The 'Time Available' is dependent on rate of rise of waters, meaning it varies for each evacuation scenario. From the flood timing assessment included above, the rate of rise is extreme for the Alexandra Canal Catchment with significant flooding occurring:

- Between 10 – 15 minutes (0.1 – 0.25 hours) from the onset of rainfall for the PMF event,
- Between 20 – 30 minutes (0.2 – 0.5 hours) from the onset of rainfall for the 1% AEP and smaller events.

Therefore, there is very little time available from the onset of storm burst rainfall for evacuation to occur. In addition, the volume of rainfall occurring is extreme in both a 1% AEP and PMF storm. It is unlikely that evacuating during the early stages of a design storm burst rainfall event will be safe as both vehicle safety and pedestrian safety is compromised under such heavy rainfall.

As a result, the only form of flood evacuation trigger for the Study Area that will provide sufficient available time to facilitate evacuation is flood forecasting methods as observed rainfall or flooding means that the opportunity to evacuate low-lying areas has already passed.

7.4.6 Time Required for SES Assisted Evacuation

The SES evacuation timeline model uses the following equation to calculate 'Time Required' to evacuate residents by doorknocking by SES volunteers:

Time Required = Warning Acceptance Factor (WAF) + Warning Lag Time (WLT) + Travel Time (TT) + Travel Safety Factor (TSF)

Where the following values are recommended:

- Warning Acceptance Factor = 1 hour – accounts for the delay between occupants receiving the evacuation warning and acting upon it.
- Warning Lag Time = 1 hour – an allowance for the time taken by occupants to prepare for evacuation such as packing their belongings etc.
- Travel Time = Variable – the number of hours taken for the evacuation of all vehicles based on road capacity. NSW SES recommend a road lane capacity of 600 vehicles per hour.

- Travel Safety Factor = Variable – added to travel time to account for any delays along the evacuation route for example resulting from accidents.

Note that time required is calculated from the time that SES are on site and ready to begin doorknocking. Before this time there is an additional phase of mobilisation of SES staff which is the time taken to coordinate and travel to residences to commence doorknocking. There is no data available on mobilisation time for local SES services. For the purposes of this analysis, it is assumed that it will take half an hour to coordinate SES staff and mobilise them to the flood affected areas.

Based on the above contributors, the overall time required for evacuation of the Alexandra Canal Catchment is a minimum of 2.5 hours (2 hours for WAF and WLT and 0.5 hours for mobilisation). It should be noted that this is a low bound estimate, as various factors such as Travel Time, and Travel Safety Factor have been disregarded. This means that in relation to SES doorknocked evacuation for the Study Area, evacuation needs to be triggered at least 2.5 hours prior to a storm burst rainfall event occurring.

While the Bureau of Meteorology (BoM) provide various flood forecasting tools, it is assumed there are no forecasting tools currently available that can provide the requisite confidence to trigger an evacuation based on flood forecasting 2.5 hours in the future.

Therefore it is concluded that SES doorknocked evacuation is not a reliable emergency response in the Alexandra Canal Catchment. While SES assisted evacuation may be suitable for more long duration rainfall events, for the critical storm burst rainfall events which result in flash flooding this approach is not appropriate.

7.5 Emergency Management Hotspots

As part of initial consultation for this project, NSW SES representatives requested emergency management mapping for hotspot areas in the Study Area. These emergency management maps have been provided in **Appendix C**.

The maps include flood information for the 20% and 1% AEP and PMF events to provide the requested information for the full range of design events. The maps provide the following information to assist SES:

- H1-H6 hazard mapping for the three selected design flood events to show areas of vehicular, pedestrian and building instability,
- Estimated overfloor flooding depth in metres for the three selected design flood events to provide an indication of flood risk sites,
- Indicative evacuation routes to flood free land. A distinction has been made between evacuation routes suitable for vehicles which are preferred and pedestrian only evacuation routes, and,

In total, three emergency management hotspot areas have been identified as shown in **Figure 7-5**. This figure is also replicated in **Appendix C**.

Potential flood risk management options, particularly emergency management focused options, should prioritise these three hotspot areas:

- Hotspot 1 – Areas including Bay Street, Old Street and up to Smith Street in Tempe.
- Hotspot 2 – Industrial areas on Swamp Road in St Peters.
- Hotspot 3 – Section of Princes Highway in St Peters between Princes Highway and Barwon Park Road.
- Hotspot 4 – Princes Highway, Talbot Street and Bellevue Street, Sydenham.

Within these hotspot areas, pockets of low flood island properties have been identified to support SES operations. These are the higher risk areas with limited evacuation potential due to flooding of access roads in accordance with the principles of the Flood Emergency Classification of Communities (FERCC) (outlined in Part C of Flood Risk Management Guide EM01), A distinction has been made for low flood islands in industrial land uses where the risk to life may be different than residential land uses

As noted within AIDR guideline 7.2 that outlines requirements for FERCC there is the following note:

> *The guideline supports decision making at a precinct or community scale, and for rivers and creeks where flow paths can readily be defined. It is not intended for application in local overland flooding at a smaller scale, or to individual structures.*

While the type of flooding in this study area would be defined as overland flooding, the FERCC mapping of specific hotspot areas does help to identify the properties that will have complications with flood emergency response.

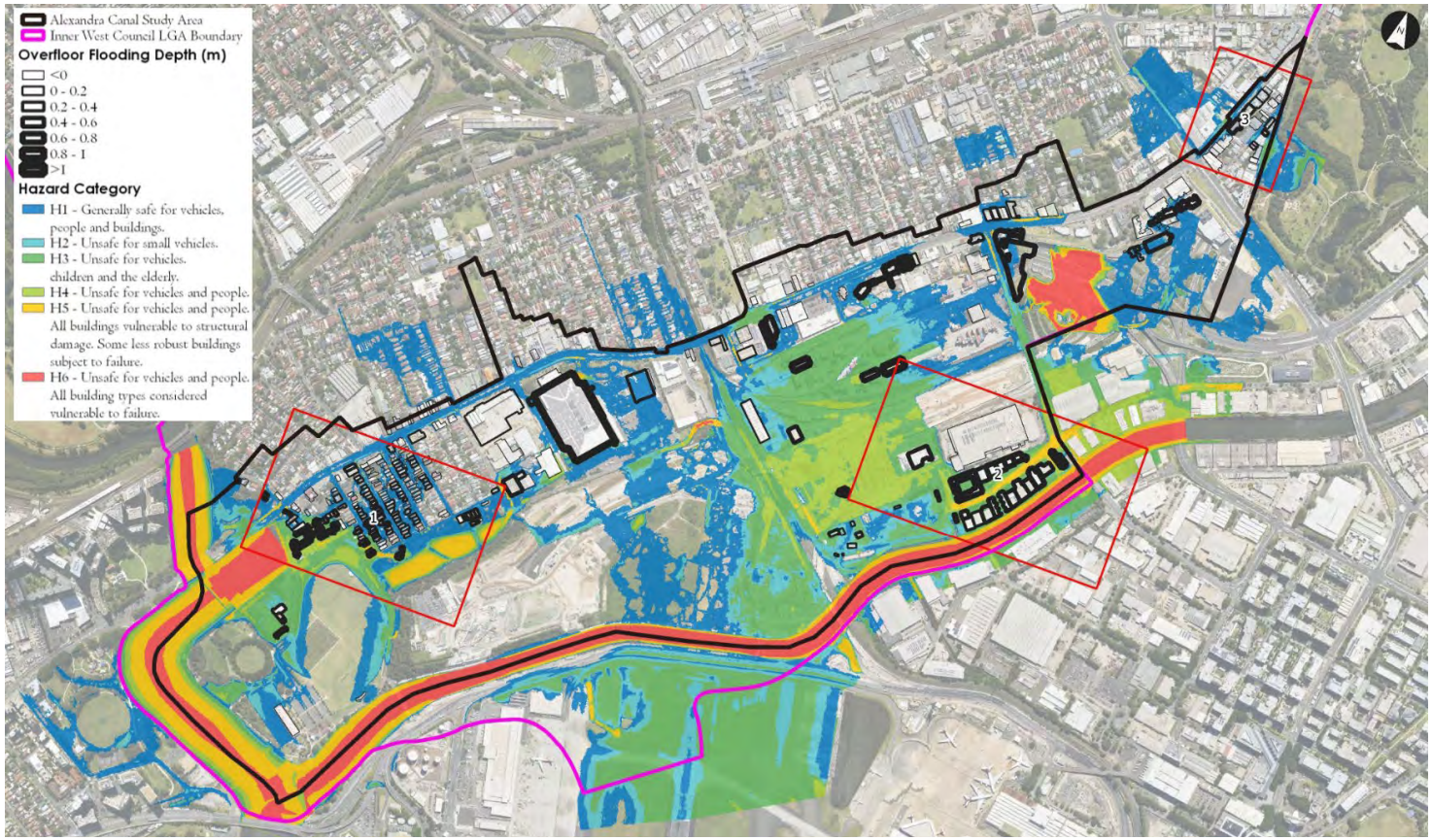

Figure 7-5 Emergency Management Hotspots with PMF H1-H6 Hazard and PMF Overfloor Flooding Depths

7.6 Flood Warning Systems

There are two components to a flood warning system:

- Monitoring of weather and flood conditions to decide when emergency response is required,
- Disseminating this information to residents so that evacuation may commence.

These two components of both current and potential flood warning systems are discussed in the following sub-sections.

7.6.1 Current Flood Warning System

The Inner West LGA Flood Emergency Sub Plan (SES, 2021) under Section 5.4 discusses the range of monitoring and alerts currently adopted by the NSW SES in the local area:

- The BoM issues public weather and flood warning products before and during a flood. These may include:
  - Severe Thunderstorm Warnings with reference to heavy rainfall
  - Regional Severe Thunderstorm Warnings with reference to heavy rainfall
  - Detailed Severe Thunderstorm Warnings (for Sydney/Newcastle/ Wollongong) with reference to heavy rainfall,
  - Severe Weather Warnings with reference to heavy rainfall and/or storm surge,
  - Flood Watches, and
  - Flood Warnings.

In a flash flooding environment, these services can provide pre-emptive warnings of potential flood-causing rainfall, however they are considered less viable for ongoing updates and warnings during a flood event and monitoring of these resources during an event is not considered appropriate.. Further discussion of the reasons for this are included in **Section 7.6.2**.

In addition to these resources that are monitored by the NSW SES, the Flood Plan also notes how these warnings are then disseminated to the community, with the SES providing alerts and flood information through:

- Mobile and fixed public address systems and sirens.
- Two-way radio.
- Emergency Alert (SMS and voice message alerting system).
- Telecommunications (including Auto dial systems).
- Facsimile.
- Standard Emergency Warning Signal.
- Doorknocking.
- Variable message signs.
- Community notices in identified hubs.
- Distribution through established community liaison networks, partnerships and relationships, and
- NSW SES social media and website.
- NSW SES may seek support from agencies and local Council to share the SES social media messages.
- Road closure information will be provided to the community through Transport for NSW ‘Live Traffic’ website: www.livetraffic.com or ‘Transport InfoLine’: 131 500. Also, VMS messaging on roadways may also be used to advise motorists.

Several of these options will provide a useful means of almost instantaneously distributing flood warnings to the community. However, some of these means such as doorknocking and social media posts and community notices are unlikely to have the near instantaneous response needed from the community in flash flooding situations.

7.6.2 Discussion of Flood Warning Systems in Flash Flooding Environments

A summary of the considerations for flood warning systems in flash flooding is contained in the below excerpt from the AFAC guideline for flash flooding:

> *Successful evacuation strategies require a warning system that delivers enough lead time to accommodate the operational decisions, the mobilisation of the necessary resources, the warning and the movement of people at risk.*
>
> *Where pre-incident planning identifies existing warning lead times as being non-existent, too short or based on too much uncertainty, improvements to warning systems within existing hydro-meteorological capability should be a priority.*
>
> *Weather forecasting and flash flood prediction is undergoing continual improvement. This is the result of many factors, including better science and the influence of technology. The advent of faster and more 'accurate' weather and hydrological modelling and enhanced real-time observation systems such as Doppler radar are examples of such advances.*
>
> *However, although forecast 'accuracy' is improving for 24 to 72-hour periods, the near-to-real-time period of one to six hours, the period most relevant to flash flood environments, remains a significant forecasting challenge.*
>
> *Effective evacuation typically requires lead times of longer than just a couple of hours and this creates a dilemma for flash flood emergency managers. Due to the nature of flash flood catchments, flash flood warning systems based on detection of rainfall or water level generally yield short lead times (often as short as 30 minutes) and as a result provide limited prospects for using such systems to trigger planned and effective evacuation.*
>
> *Warning systems based on weather forecast can yield longer lead times but provide only a qualitative assessment of the potential for flash flooding over a broad geographical area. A forecast-based warning also inherently provides less certainty in either the location or rainfall volume from which to derive the expected depth and timing of flash flooding. This makes it difficult to provide timely and accurate advice to at-risk communities about flash flooding, regarding advice about who needs to evacuate and when to evacuate.*
>
> *Initiating evacuation of large numbers of people from areas prone to flash flooding based on these uncertain triggers may be theoretically defensible in a purely risk avoidance context but it is likely to be viewed as socially and economically unsustainable. Frequent evacuations in which no flooding occurs, which statistically will be the outcome of forecast-based warning and evacuation, could also lead to a situation where warnings are eventually ignored by the community.*
>
> *These considerations call for flash flood emergency managers to engage with flash flood prone communities, both to discuss and agree on appropriate triggers for agency-led evacuation, and to educate the community on appropriate behaviour in the event of flash flooding occurring with no or very little warning (including messages about the dangers of late evacuation, and strategies such as moving from unsuitable to suitable buildings).*

Within the Inner West, the constraint in deploying an effective flooding warning system is the time available to obtain and process actual rainfall and runoff data to provide an accurate prediction of flood behaviour in a timely manner to residents. Current technologies do not currently provide sufficient time to record and model potential rainfalls and the resulting impact to in time for sufficient community warning. However, this is an area of advancing technology, and improvements may be possible within a medium timeline.

Consequently, a flood warning system is not recommended as an immediate action for this catchment; however, advancements in technology should continue to be monitored for potential medium to long term implementation in the emergency management hotspots discussed in **Section 7.5**.

7.7 Shelter-in-Place Potential

NSW DPE following consultation with NSW SES have released the Draft Shelter-in-Place Guidelines in December 2022. The principles outlined in the guideline for shelter-in-place reflect those included in **Section 7.2**. Essentially that evacuation is the primary response strategy, however in flash flooding areas where evacuation is not possible, shelter-in-place is an alternative, and a last resort for brownfield and greenfield developments.

The guideline provides a list of requirements for potential shelter-in-place. Some requirements relate to development specific considerations such as access to utilities and power during shelter, a minimum flood

space area for shelter, and the storage of food, first aid and other resources. However, there are some requirements that relate to the flood affectation of the area, specifically relating to:

- Stability of shelter-in-place structure,
- The duration of flooding of the refuge area, and,
- The feasibility of flood free refuge area.

The potential for shelter-in-place to be implemented for the study area based on these three factors is investigated in the following sections.

The advantage of shelter-in-place is that residents do not require as long to respond for this type of emergency response to be appropriate. As opposed to evacuation where people possibly need to travel a significant distance to reach flood free land, for shelter-in-place people are likely only going to need to access a mezzanine level or first floor within the same building. Thus, the response is more readily available for flash flooding environments and can offer residents a refuge even at night when people are likely to be asleep and not able to respond to evacuation warnings.

As noted within Emergency Management Principle 4 of the 2023 FRM Guide EM01, shelter-in-place should consider the following additional risks for this emergency response type:

- *Isolation – There is no known safe period of isolation in a flood, the longer the period of isolation the greater the risk to occupants who are isolated.*
- *Secondary risks – This includes fire and medical emergencies that can impact on the safety of people isolated by floodwater. The potential risk to occupants needs to be considered and managed.*
- *Consideration of human behaviour – The behaviour of individuals such as choosing not to remain isolated from their family or social network in a building on a floor above the PMF for an extended flood duration, or attempting to return to a building during a flood, needs to be considered when adopting EM strategy.*

7.7.1 Structural Stability

The collapse of a shelter-in-place refuge would result in almost certain loss of life and is not acceptable under any flood event. To determine the likelihood of this occurring the structural stability of shelter-in-place refuges in the event of flooding needs to be assessed.

Hazard categories H5 and H6 both involve structural instability with lower hazard groups H1-H4 being generally considered in a stable range for structures. Mapping of H1-H6 hazard for the 20% and 1% AEP and PMF events for the emergency hotspots is included in **Appendix C**.

The results show that H6 areas where as guided by the hazard definitions building stability is compromised are generally confined to road reserve, backyards and dedicated waterways and channels.

The extent of H5 areas are where standard buildings may be unstable but buildings designed for flood affectation may be stable based on hazard definitions. The H5 extents are more widespread than H6 but in most locations are not within existing building footprints. At these locations any prospective shelter-in-place refuges would need to be specially engineered to withstand flood forces in the PMF event.

7.7.2 Duration of Flooding

The duration of inundation (the time for which the location is submerged) is guided by the water level time series for the Study Area discussed in **Section 7.4.2**. The analysis shows that the duration of flooding for the Study Area is short with most locations flood free less than 3 hours after the onset of rainfall for the PMF event. For more frequent flood events the duration of flooding is a little longer.

As the maximum duration of flooding is expected to be sub-daily for the majority of the floodplain the flood risk to life associated with any prospective shelter-in-place isolation is expected to be manageable through provision of supplies / services to the refuges. However it should be noted from the AFAC guidelines:

> *However, safety of isolation is subjective, and there is no evidence-based method for determining the tolerable duration of isolation that might result from floods. This is to state that the question of what is a safe period of isolation is not resolved.*

Further discussion of duration of isolation is provided within Principle 4 of the 2023 FRM Guide EM01, which notes secondary risks including fire and medical emergencies can impact on the safety of people isolated by floodwater, and consideration of human behaviour in flooding isolation conditions.

7.7.3 Flood Free Refuge

Flood hazard exposure is the main risk to life related to flooding. Therefore, if shelter-in-place is implemented where occupants will remain on site for the duration of the flooding event, it is essential that refuge not expose them to any direct flood hazard, i.e. that the refuge is flood free. As a result, flood refuge should have floor levels located above the PMF water levels.

PMF peak depths throughout the Alexandra Canal study area are relatively shallow compared to riverine or mainstream floodplains. In the upper catchment where overland flow typically occurs and fringe areas of the floodplain PMF depths can be less than 0.5 metres, and even lower than the Flood Planning Level (1% AEP plus 500mm freeboard). In these locations it is not onerous at all to require for shelter-in-place refuge above the PMF level.

In some sections of the floodplain, PMF peak depths may be more significant. For these locations, shelter-in-place refuges become more onerous to construct as they will likely require a mezzanine level or a first floor to be constructed. However, such elevated levels are possibly advantageous to future industrial developments in the area assuming that they can be allowed for within height restrictions for the area.

Sections 7.7.1 to 7.7.3 indicate that the SIP (shelter-in-place) and planned vertical refuge in the flood impacted areas of the Alexandra Canal study area may not possible due to intensity and duration of flooding, though it may be feasible for large portions of the study area. There will be a need for the development of local level resilience at highly impacted properties to address and manage flooding risks. This would include an elevated platform (say 2m) at a flood impacted property based on available space, which could be used by residents to take refuge during flooding events. This will negate the requirements from the SES to mobilise resources and investments. The flood impacted property owners should be incentivised to build such elevated platforms.

7.8 Potential Improvements to Flood Emergency Response

Based on the detailed review of flood emergency response provisions for the Alexandra Canal Catchment, it is unlikely that SES doorknocked evacuation will be able to effectively evacuate residents prior to flooding. From this review, a number of potential measures have been identified that could improve flood emergency response potential for the study area:

- Improved flood awareness.
- Self-managed evacuation,

These points are discussed further in the following sections.

The potential for early warning systems to reduce the Warning Lag Time is discussed in **Section 7.6**. As noted in this section, current technology does not provide a suitable resource at this time, however newer technologies may provide for rapid modelling and predictions in the mid-term.

Another consideration to improve the emergency timeline is to reduce the Travel Time by utilising a shelter-in-place strategy where evacuation cannot be readily achieved. The suitability of this approach discussed further in **Section 7.7**. As noted in this section, where structural stability, duration of flooding and flood free refuge are feasible, this may be a potential alternative.

It is important to note that all of these potential alternatives are less preferential to SES assisted evacuation, which as per NSW SES and NSW DCCEW guidance is the primary and preferred form of flood emergency response.

These review outcomes have been considered and form the basis of the assessment of Emergency Management (EM) options as discussed in **Section 8.5**.

7.8.1 Self-Managed Evacuation

Where SES assisted evacuation is not an option, self-managed evacuation is a potential alternative. This describes where people make their own decision to evacuate earlier and move to alternate accommodation, using their own transport. These plans would typically be prepared using information available from Council and with support of the local SES unit, using SES templates such as Flood Safe. Self-managed evacuation has a number of advantages:

- People can be evacuated far quicker than SES assisted evacuation as various factors in the evacuation timeline are reduced or removed completely such as accounting for time for SES to mobilise, and doorknocking time.
- Self-managed evacuation reduces the strain on SES resources as part of the floodplain will be evacuated without needing to be doorknocked or otherwise prompted. Also less coordination is required on the part of SES as the scale of the evacuation exercise is lessened by some people being self-reliant.

However, self-managed evacuation can also pose a risk if not conducted in an appropriate way. Residents could place themselves at higher risk for example if they evacuate to a location which is even more flood affected, drive through flood waters, or could increase traffic congestion if the wrong route is selected.

A way for Council to encourage and confirm the adequacy of any self-managed evacuation is through flood emergency response development controls. This could be through implementing requirements for new developments to develop flood emergency response plans particularly large-scale development such as medium and high density residential. Another alternative to improve self-managed evacuation could be requiring site-specific flood warning systems, however these systems typically rely on observed flooding. NSW SES in their advice for this project noted “self-evacuation of the community should be achievable”.

7.8.2 Improved Flood Awareness

For the SES evacuation timeline model, two factors are typically expected to take one hour each in order for residents to evacuate, Warning Acceptance Factor and Warning Lag Time. These two factors both contribute to the poor outcome for the Alexandra Canal Catchment evacuation timeline, however both can feasibly be significantly reduced through improved flood awareness:

- Warning Acceptance Factor, accounts for the delay between occupants receiving the evacuation warning and acting upon it. If people are aware of the flood risk of the area that they live in, then it is reasonable to expect that they will acknowledge the seriousness of any flood warning, and perhaps begin evacuating immediately instead of one hour after receiving the warning.
- Warning Lag Time, an allowance for the time taken by occupants to prepare for evacuation such as packing their belongings etc. If residents are aware of the flash flooding nature of the catchment they are in, then they will know that they have very limited time to respond before flooding commences, leaving the majority of their belongings behind to ensure they evacuate as soon as possible for their own safety.

Based on the above considerations a comprehensive flood awareness program for the Study Area, educating residents of the seriousness of the flood risk and the flash flooding nature of the catchment could improve the evacuation timeline. Currently the processes of residents in evacuation are expected to take on average 2 hours, however this could potentially be reduced to 15 minutes if residents were suitably aware of flood risk in the area.

The crucial safety message to **not enter floodwaters** is relevant to all community members as flash flooding due to overland flow in heavy rainfall events (also referred to as stormwater flooding) is recognised as a high risk to all road users driving on flooded roads across the LGA.

8 Flood Risk Management Options

8.1 Background

8.1.1 Managing Flood Risk

Risk is a combination of the consequences of flooding and the likelihood of these consequences occurring. Flood risk to the community is not static. It can be influenced by Flood Risk Management (FRM) measures, climate change, and future development. It is important to understand these risks and how they may change over time so that this can be considered in management.

Considering flood behaviour with existing measures in place provides a basis for understanding the residual risk to the community with existing conditions, how risks may change into the future, and making informed management decisions. Flood risk can be categorised as existing, future or residual risk as follows:

- Existing Flood Risk – existing buildings and development on flood prone land. Such buildings and developments by virtue of their presence and location are exposed to an 'existing' risk of flooding,
- Future Flood Risk – buildings and developments that may be built on flood prone land in the future. Such buildings and developments would be exposed to a flood risk when they are built, and
- Residual Flood Risk – buildings and development that would be at risk following the implementation of FRM measures. Unless a FRM measure is designed to the PMF, it may be exceeded by a sufficiently large event at some time in the future, meaning in most instances there is still a residual flood risk.

The alternate approaches to managing risk are outlined in **Table 8-1**. The hierarchy of preferred risk approaches is from top to bottom in the approaches listed in the table. This hierarchy is also referenced within Section 3 of the Flood Risk Management Guide FB01.

Table 8-1 Flood Risk Management Alternatives (Source: SCARM, 2000)

Alternative	Examples
Preventing / Avoiding Risk	Appropriate development within the flood extent, setting suitable planning levels.
Reducing likelihood of risk	Measures to reduce flood risk such as drainage augmentation, levees, and detention.
Reducing consequences of risk	Development controls to ensure structures are built to withstand flooding.
Transferring risk	Via insurance – may be applicable in some areas depending on insurer.
Financing risk	Natural disaster funding.
Accepting Risk	Accepting the risk of flooding as a consequence of having the structure where it is.

The relevant emergency response provisions for Inner West Council are established in the Local EMPLAN by the Local Emergency Management Committee (LEMC). The EMPLAN details the combat agency for each hazard and is an all hazards all agencies approach. It refers to sub plans for hazard specific emergency management arrangements and planning. The flood emergency management arrangements that are outlined in the local flood plan (sub plan) expand on the roles and responsibilities of all local stakeholders including LEMC, and the NSW SES local volunteer unit as the combat agency for flooding, this is relevant once the SES stands up an Incident Management Team (activated) by a weather alert by the Bureau of Meteorology.

On all relevant public websites, members of the community within the PMF floodplain are encouraged to know their risk in relation to their local river level gauge. The AWS flood warnings that are issued provide clear statements for actions through Hazard Watch including for residents to stay informed of messaging based on Bureau warnings and reported flood water levels.

The crucial safety message to **not enter floodwaters** is relevant to all community members as flash flooding due to overland flow in heavy rainfall events (also referred to as stormwater flooding) is recognised as a high risk to all road users driving on flooded roads across the LGA. A valuable output of the FRM process to NSW SES flood intelligence is the mapping and tabulation of inundated roads by elevation and depth of flooding at various design storm events (Refer to **Section 8.4.3**).

8.1.2 Options Development Process

As stated within the FRM Guide MM01 the assessment of FRM options should consider:

- Their practicality and feasibility, including the timeframe within which they may be implemented.
- The social, economic, and environmental costs, benefits and disbenefits of FRM measures.
- The upfront, ongoing and complementary work and lifecycle costs involved in implementation.
- Input from the community and the acceptability of measures to the community.
- Consistency with industry guidance and government direction, policy and guidance.

The assessment of FRM options should consider people in the community, the economy, social and cultural aspects, services to the community and the natural environment. Relating to the development of FRM options, the FRM Guide MM01 recommends the following stages within a FRMS&P:

- Option identification and preliminary option assessment and optimization – The identification of an inclusive range of FRM options to address local or broad FRM issues for the existing community and new development. Having identified the FRM issues to address and an inclusive range of FRM options worthy of consideration, the viability of these options needs to be tested to determine if they warrant more detailed assessment. This process is summarised within the following sections.
- Detailed option assessment – Detailed assessment and subsequent optimization of FRM options and packages of options needs to consider their costs, benefits and disbenefits in managing risk. The detailed assessment includes flood modelling of options, damages assessment of option benefits, preliminary costing and a Multi-Criteria Assessment (MCA) that considers a broad range of factors quantitatively or qualitatively.
- Recommendation in FRM studies and decision-making in FRM plans.

8.2 Flood Risk Management Measures

FRM measures (interchangeably referred to as FRM options in this report) which are available for the management of flood risk can be categorised according to the way in which the risk is managed. There are five broad categories outlined within Table 29 of the FRM Guide MM01:

- Flood information - Flood information is essential to understanding flooding. Therefore the continued sourcing of flood information for the study area is considered a stand-alone FRM measure that indirectly influences future flood risk through informing decision-making.
- Flood modification measures – Flood modification measures are options aimed at preventing / avoiding or reducing the likelihood of flood risks. These options reduce the risk through modification of the flood behaviour in the catchment.
- Property modification measures – Property modification measures are focused on preventing / avoiding and reducing consequences of flood risks. Rather than necessarily modify the flood behaviour, these options aim to modify properties (both existing and future) so that there is a reduction in flood risk.
- Emergency response modification measures – Emergency response modification measures aim to reduce the consequences of flood risks. These measures generally aim to modify the behaviour of people during a flood event.
- Environment enhancement – Measures that look to prevent / avoid and reduce consequences of flood risk while also enhance environmental outcomes. Examples include catchment management measures, waterway modification measures, and Water Sensitive Urban Design (WSUD).

8.3 List of Preliminary Flood Modification Options

Opportunities for potential flood modification options were identified by incorporating the following:

- Observations made during the site visit,
- Comments received by the general public during initial consultation, and by project stakeholders including DCCEW, SES, City of Sydney Council and Council strategic, engineering and planning representatives during several workshops, and the FRM Committee. Comment was sought from all of these stakeholders during option identification and development.
- Assessment of the existing terrain, drainage information and 1% AEP and PMF flood hazards provided by Council.

A preliminary and exhaustive list of potential modification options for flood mitigation was developed, with a total of 15 flood modification (structural) options identified within the Alexandra Canal study area. Mapping of the comprehensive list of options are included within **Appendix D**. The flood modification options have been grouped into the following categories:

- Drainage Upgrade,
- Channel Upgrade,
- Bridge Upgrade,
- Detention Basin,
- Road Regrading,
- Drainage Maintenance.

The number of possible flood modification options and option types that were considered for each sub-catchment are summarised in **Table 8-2**. A total of 11, 2 and 2 potential options have been proposed to address hotspots 1, 2 and 3 respectively.

Table 8-2 Number of Flood Modification Options by Type

Catchment	Drainage Upgrade	Drainage Maintenance	Channel Upgrade	Detention Basin	Road Regrading	Total
Alexandra Canal	6	1	1	1	6	**15**

These options have been outlined in the following **Figure 8-1**, **Figure 8-2** and **Figure 8-3**.

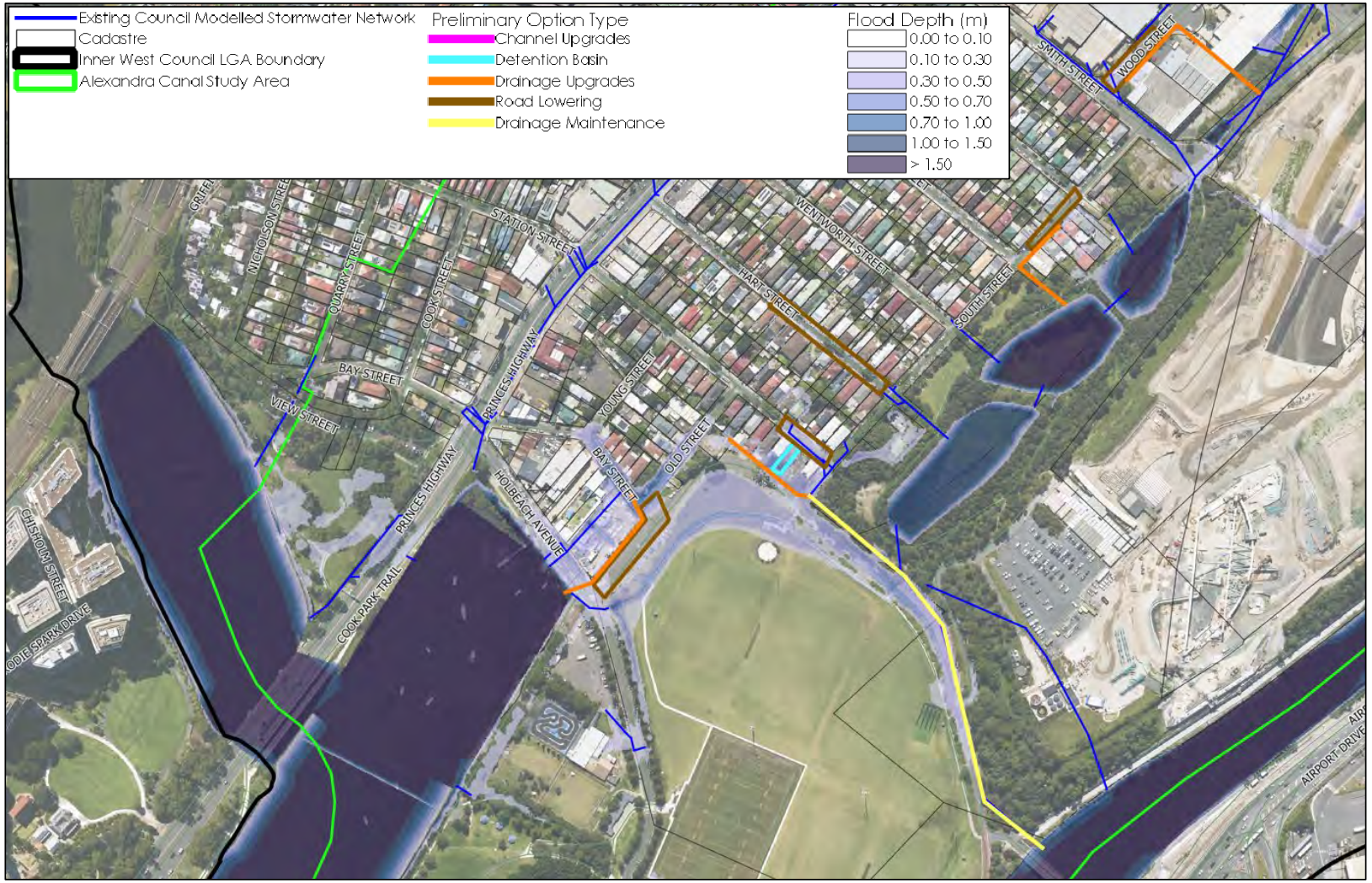

Figure 8-1 Alexandra Canal Hotspot 1 Preliminary Mitigation Options with 1% AEP Existing Peak Depth Results

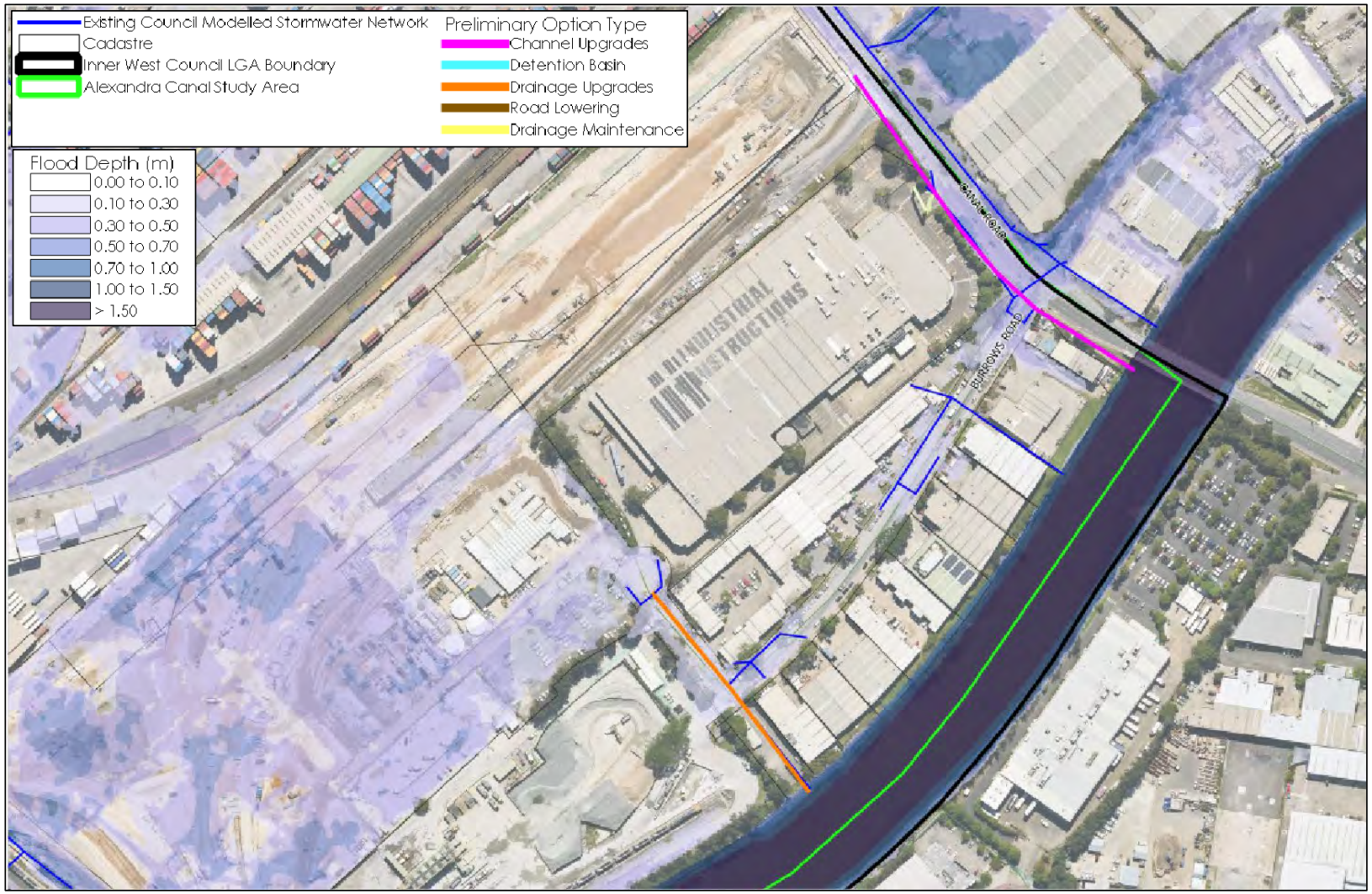

Figure 8-2 Alexandra Canal Hotspot 2 Preliminary Mitigation Options with 1% AEP Existing Peak Depth Results



Figure 8-3 Alexandra Canal Hotspot 3 Preliminary Mitigation Options with 1% AEP Existing Peak Depth Results

8.4 Preliminary Flood Modification Options

8.4.1 Initial Preliminary Flood Modification Options

The comprehensive list of possible flood modification options and option types that were considered are summarised in **Table 8-3.**

Table 8-3 Comprehensive List of Flood Modification Options

Location	Type	Hotspot*	Description
Bay Street, Tempe	Drainage Upgrade	1	Improve drainage capacity to better convey water ponding at the corner of Bay Street and Old Street.
Station Street, Tempe	Drainage Upgrade	1	Improve drainage capacity between South Street and Bay Street to better convey water away from residential properties towards the adjacent parklands.
South Street, Tempe	Drainage Upgrade	1	Improve drainage capacity adjacent Fanning Street to better convey water away from residential properties towards the adjacent parklands.
Wood Street, Tempe	Drainage Upgrade	1	Improve drainage capacity on Wood Street to better convey water towards nearby easements.
Bay Street, Tempe	Road Regrading	1	Regrade the existing road to better convey water ponding at the corner of Bay Street and Old Street.
Station Street, Tempe	Road Regrading	1	Regrade the existing road to better convey water towards nearby ponds/lakes.
Hart Street, Tempe	Road Regrading	1	Regrade the existing road to better convey water towards nearby ponds/lakes.
South Street, Tempe	Road Regrading	1	Regrade the existing road to better convey water towards nearby ponds/lakes.
Wood Street, Tempe	Road Regrading	1	Regrade the existing road to better convey water towards nearby ponds/lakes.
Station Street, Tempe	Drainage Maintenance	1	Carry out routine ongoing maintenance of existing drainage to sustain adequate drainage capacity.
Station Street, Tempe	Detention Basin	1	Construction of a detention basin to reduce flooding of downstream residential properties on South Street.
Burrows Road, St Peters	Drainage Upgrade	2	Improve drainage capacity on Burrows Road to better convey water towards Alexandra Canal.
Canal Road, St Peters	Channel Upgrade	2	Improve the existing channel to better convey water on Canal Road towards Alexandra Canal.
Princes Highway, St Peters	Road Regrading	3	Regrade the existing road to prevent water ponding and affecting properties between Princes Highway and Crown Street.
Barwon Park Road, St Peters	Drainage Upgrade	3	Improve drainage capacity on Barwon Park Road to better convey water towards nearby parklands and ponds/lakes.

Refer to **Section 7.5 for further details of the hotspot locations.*

8.4.2 Selection of Initial Preliminary Flood Modification Options

An initial high-level assessment was carried out for each option relative to other options based on the following qualitative criteria: potential benefits, technical feasibility and costs.

Benefits were assessed based on the expected or potential effects on flood affected areas. The zoning type, number of properties as well as road type/usage were considered. Benefits were categorised as negligible, very low, low, medium and high.

Technical feasibility and cost were assessed based on the specific requirements of each option such as earthworks, roadworks, potential property impacts, length of pipe upgrades, etc. Feasibility and costs were categorised as very low, low, medium and high.

Upon Council review, workshops were held with project stakeholders including DCCEW, SES, City of Sydney Council and Council strategic, engineering and planning representatives during several workshops, and the FRM Committee. The outcome of these discussions was to determine which of these preliminary options are to be adopted for further assessment.

Out of 15 total options, 5 were recommended to be progressed to modelling. Four were proposed Flood Modification (FM) options, while one was the Property Modification (PM) option for increased drainage maintenance. The selected preliminary options are in **Table 8-4**. The flood modification options not selected for detailed assessment, including a brief reason, have been summarised in **Table 8-5**.

Table 8-4 List of Modelled Flood Risk Management Options

Option ID/ Location	Type	Number of Modelling Iterations	Continued to Detailed Assessment (Y/N)
AC4 – Station Street, Tempe	Drainage Upgrade	5	Yes
AC6 – Bay Street, Tempe	Drainage Upgrade	6	Yes
AC11 – Princes Highway, St Peters	Drainage Upgrade	3	Yes
AC14 – Talbot Street, Sydenham	Drainage Upgrade	6	Yes
PM6 – Targeted Stomwater Maintenance	Drainage Maintenance	1	Yes

Table 8-5 Options Not Progressed to Detailed Assessment

Location	Type	Hotspot*	Description
South Street, Tempe	Drainage Upgrade	1	Relatively low technical feasibility/high cost. Scale of works required not suitable for extent of flooding at this location.
Wood Street, Tempe	Drainage Upgrade	1	Relatively low technical feasibility/high cost. Scale of works required not suitable for extent of flooding at this location.
Bay Street, Tempe	Road Regrading	1	Relatively low technical feasibility/high cost. Scale of works required to divert runoff from Bay Street around properties to bay not considered feasible.
Station Street, Tempe	Road Regrading	1	Relatively low technical feasibility/high cost. Scale of works required to divert runoff from Station Street around residential properties to South Street not considered feasible.
Hart Street, Tempe	Road Regrading	1	Relatively low technical feasibility/high cost. Scale of works required to divert runoff from Hart Street around residential properties to South Street not considered feasible.
South Street, Tempe	Road Regrading	1	Relatively low technical feasibility/high cost. Scale of works required to divert runoff from South Street around residential properties not considered feasible.
Wood Street, Tempe	Road Regrading	1	Relatively low technical feasibility/high cost. Scale of works required to divert runoff from Wood Street around commercial properties to Smith Street not considered feasible.
Station Street, Tempe	Drainage Maintenance	1	Included in PM6 for assessment on a catchment-wide scale, therefore specific assessment at this previously blocked location not necessary.

Location	Type	Hotspot*	Description
Station Street, Tempe	Detention Basin	1	Relatively low technical feasibility/high cost. Bugler playground opportunities not deemed feasible for detention basin given limited volumes and potential utilities, and loss of public space.
Burrows Road, St Peters	Drainage Upgrade	2	Relatively low technical feasibility/high cost. This cul de sac services few commercial / industrial properties, and there are flooding issues all along Canal Road so removing this flooding will not provide flood free access.
Canal Road, St Peters	Channel Upgrade	2	Relatively low technical feasibility/high cost. Significant scale of works on TfNSW road and there are flooding issues all along Canal Road so removing this flooding will not provide flood free access.
Princes Highway, St Peters	Road Regrading	3	Relatively low technical feasibility/high cost. Significant scale of works on TfNSW road with works not suitable for potential flood benefits.
Barwon Park Road, St Peters	Drainage Upgrade	3	Relatively low technical feasibility/high cost. Scale of works required not suitable for extent of flooding at this location.

8.4.3 Modelling of Preliminary Flood Modification Options

The 4 flood modification options that were selected for preliminary assessment were developed and modelled with the following methodology:

- 5 design events were considered: 20% AEP, 5% AEP (DSHHWS), 2% AEP, 1% AEP and PMF.
- The PM6 model scenario involved the unblocking off all pipes from the model. The assumption in this model approach is that improved maintenance would potentially remove blockage of pits and pipes, as a theoretical best-case scenario.
- PM6 was used as a base case for the FM options. Details on the PM6 scenario are in **Section 8.5**. The justification for adopting the PM6 option as the base case for the FM options is the removal of blockage. The FM options rely on the effectiveness of the drainage network, therefore assuming an unblocked condition is considered a suitable basis for assessing potential benefits of any drainage upgrades.
- Each option had a unique model scenario established to account for the proposed option details.
  - Each option model was based off the base case.
  - Drainage upgrades were modelled with updates to the 1D network with duplication of pits and pipes, and creation of new pits and pipes. The details of the proposed network were based on review of existing conditions to develop feasible pipe / culvert dimensions, locations, inverts and pit sizes.
- Each option was then initially modelled for the 20% AEP design event, then selected for detailed assessment based on the 20% AEP flood level difference impacts and other opportunities for improvement identified from the model set up.
- Options that were selected for detailed assessment were then progressed to modelling of all 5 design events.

8.4.4 Development and Optimization of Preliminary Flood Modification Options

As per Section 2.2.4 of the FRM Guide MM01, optimization of options may be used to refine options to improve benefits and reduce costs or disbenefits. This process was conducted for the 4 preliminary flood modification measures developed for this study.

The option as proposed in discussions with Council and NSW DCCEW was initially modelled, and then depending on the outcomes of the initial modelling was often refined and altered to enhance option benefits. In some instances, this led to significant changes in option design through this optimization process.

Optimization not only occurred based on maximising flood benefits, but also in response to other factors that were accounted for in the preliminary option development including:

> Maximising the feasibility of the option. This included consideration of the following:
  - Subsurface utility locations, with proposed earthworks avoiding the vicinity of these utilities where possible.
  - Suitable scale of works justifiable based on the anticipated flood benefits, such as downstream pipe sizes and lengths.
  - Land ownership and avoiding works on private lands where possible.
> Considering the relative cost of the option based on the scale of works, this provides an indication of the economic feasibility of the option.
> Reducing flood affectation and flood risk on private properties, particularly residential properties wherever possible. In some instances this resulted in additional flood risk within publicly owned lands such as road reserves and public open spaces.
> Minimising disturbance of ecological communities and minimising tree removal. The types of vegetation on subject sites were guided by site visit observations and Google Streetview.
> Minimising adverse impacts on private properties or non-publicly owned lands. While some options would result in significant benefits for some properties, it was important they not adversely affect other properties.

For the 4 preliminary flood modification options, a summary of the option outcomes considering the above was provided to Council and NSW DCCEW for their review. These factors were assessed in determining the options to carry into detailed assessment, which is discussed further in the sections below.

8.5 Other Preliminary Options

Beyond the 4 flood modification options that were modelled and assessed, a further twelve non-structural preliminary options were considered:

- Six preliminary Property Modification (PM) measures including Voluntary House Raising (VHR), flood proofing, Voluntary Purchase (VP) and two derivatives (land swap and Council redevelopment) and targeted stormwater maintenance. The options are discussed further in **Table 8-6**.
- Six preliminary Emergency Management Modification (EM) measures including flood prediction and warning, review of Local Flood Planning and information transfer to NSW SES, community flood awareness and school education programs, flood markers and signage and flood data and debrief. The options are discussed further in **Table 8-7**. It is noted that comment on these preliminary options was sought from NSW SES representatives to determine their opinion on the proposed Emergency Management options given the relevance to their operations.

These options were developed based on guidance provided within the FRM Guide MM01, the 2023 FRM Manual and based on past experience with option development in other study areas.

In total, 4 EM options and 1 PM options were recommended/selected for detailed assessment.

Table 8-6 Preliminary Property Modification Options

Option ID	Option Name	Description	Recommendation for Detailed Option
PM1	Voluntary House Raising (VHR)	House raising is a measure designed to reduce the incidence of over-floor flooding of existing buildings through works where Council and NSW DCCEW make contributions to the funding the cost of the work. There are a range of factors that contribute to the feasibility of Voluntary House Raising. The scheme should involve raising residential properties above a minimum design level, assumed to be Council's flood planning level (FPL) meaning 1% AEP plus 0.5 metre freeboard. While house raising can reduce the occurrence of overfloor flooding, there are issues related to the practice, including: > The potential for damage to items on a property other than the raised dwelling are not reduced – such as gardens, sheds, garages, granny flats, decks etc.; > Unless a dwelling is raised above the level of the PMF, and proven to be stable in such a flood event, the potential for above floor flooding still exists – i.e. there will still be a residual risk; > Evacuation may be required during a flood event for a medical emergency or similar, even if no overfloor flooding occurs, and this evacuation is likely to be hampered by floodwaters surrounding a property; > Ensure new footings or piers can withstand flood-related forces; and > Potential conflict with height restrictions imposed for a specific zone or locality within the LGA. The Guidelines for voluntary house raising schemes: Floodplain Management Program (NSW DCCEW, 2020) sets out ineligibility criteria for house raising under the Voluntary House Raising (VHR) scheme. In addition, follow up discussions with NSW DCCEW representatives have provided further information as the potential eligibility of properties for a VHR scheme. The adopted eligibility criteria for this FRMS&P based on these resources is as follows: > Must be residential dwellings to be eligible for funding. Commercial and industrial, public buildings or secondary dwellings are not considered eligible. > Properties that would not achieve a positive benefit through damage reduction relative to cost (i.e. benefit-cost ratio less than 1). > The post-raised building must be stable and therefore not be in a high hazard area. As outlined in the guideline this is defined as areas with PMF hazard of H4 or less being eligible. > Building located in 1% AEP floodway areas are not considered eligible as they represent a significant flow obstruction. > Based on NSW DCCEW guidance, house construction of brick or masonry type are not feasible for raising due to the difficulty of raising floors for such structures. Therefore, only fibro or timber type constructed houses are considered eligible. > Funding is only available for properties where the buildings were approved and constructed prior to 1986, when the original Floodplain Development Manual was gazetted by the State Government. Properties built after this date should have been constructed in accordance with the principles in the manual. > Properties which are already benefiting substantially from other floodplain mitigation measures, such as houses already protected by a levee. There are negligible existing flood mitigation measures in the study area. It is assumed that this requirement does not relate to properties that may benefit from one of the FM options proposed within the FRMS&P as these are not currently implemented mitigation works.	No - Considering the overland flooding nature of the study area, and the limited impact this would provide, and the suitability of the existing housing construction, this option was not considered viable.

Option ID	Option Name	Description	Recommendation for Detailed Option
PM2	Voluntary Purchase (VP)	Voluntary purchase is the optional purchase of pre-selected properties funded jointly by Council and the State Government. It would free both residents and emergency services personnel from the hazard of future floods by removing the risk, and is achieved by the purchase of properties and the removal and demolition of buildings. Properties could be purchased by Council at an equitable price and only when voluntarily offered. Such areas would then need to be re-zoned under the LEP to a flood compatible use, such as recreation or parkland, or possibly redeveloped in a manner that is consistent with the flood hazard (see PM5 below). Voluntary House Purchase is funded by Council with assistance from the State Government. However, due to the relatively expensive nature of such a program, limited availability of Government and/or Council funding can be a major constraint to undertaking Voluntary House Purchases. Typically, only a small number of properties within a floodplain can be considered for Voluntary Purchase, however, more can be assisted if funding is available. The Guidelines for voluntary purchase schemes: Floodplain Management Program (NSW DCCEW, 2020) to assist in determining when and where voluntary purchase schemes may be suitable. The guideline recommends that voluntary purchase be considered where: > There are highly hazardous flood conditions from riverine or overland flooding and the principal objective is to remove people living in these properties and reduce the risk to life of residents and potential rescuers; > A property is located within a floodway and the removal of a building may be part of a floodway clearance program that aims to reduce significant impacts on flood behaviour elsewhere in the floodplain by enabling the floodway to more effectively perform its flow conveyance function; and/or > Purchase of a property enables other flood mitigation works (such as channel improvements or levee construction) to be implemented because the property will impede construction or may be adversely affected by the works with impacts not able to be offset. > Must be residential dwellings to be eligible for funding. Commercial and industrial, public buildings or secondary dwellings are not considered eligible; > Properties that would achieve a positive benefit through damage reduction relative to cost (i.e. benefit cost ratio less than 1).	No Considering the overland flooding nature of the study area, heritage of existing buildings, and likely community expectation, this option was not considered viable.
PM3	Flood Proofing	Flood proofing involves undertaking structural changes and other procedures in order to reduce or eliminate the risk to life and property, and thus the damage caused by flooding. Flood proofing of buildings can be undertaken through a combination of measures incorporated in the design, construction and alteration of individual buildings or structures subject to flooding. It is primarily suited to industrial or commercial properties. Examples of proofing measures include: > All structural elements below the FPL shall be constructed from flood compatible materials. > All structures must be designed and constructed to ensure structural integrity for immersion and impact of debris up to the 100 years ARI flood event. If the structure is to be relied upon for shelter-in-place evacuation, then structural integrity must be ensured up to the level of the PMF. > All electrical equipment, wiring, fuel lines or any other service pipes and connections must be waterproofed to the FPL. The NSW SES Flash Flood Tool Kit (SES, 2012) provides businesses with a template to create a flood-safe plan and to be prepared to implement flood proofing measures.	No Current DCP provisions should address future development. The number of overfloor flooded properties across the LGA would make this type of scheme not feasible.

Option ID	Option Name	Description	Recommendation for Detailed Option
PM4	Land Swap	An alternative to voluntary purchase is the consideration of a land swap program whereby Council swaps a parcel of land outside of the flood prone area, such as an existing park, for a parcel of flood prone land with the appropriate transfer of any existing facilities to the acquired site. After the land swap, Council would then arrange for demolition of the building and have the land re-zoned under the LEP to open space. Since a detailed floor level survey has not been undertaken and over floor flooding has been estimated based on a desktop assessment, it is recommended that Council undertake a detailed floor level survey to validate if properties identified for voluntary purchase are suitable for land swap.	No – Due to lack of available Council owned land, particularly land that is flood free, therefore land swap not feasible.
PM5	Council Redevelopment	This option also provides an alternative to the Voluntary Purchase scheme. While Council would still purchase the worst affected properties, it would redevelop these properties in a flood compatible manner and re-sell them with a break-even objective.	No - From high level review conducted no properties are immediately apparent for being suitable for a scheme of this type.
PM6	Targeted Stormwater Maintenance	Vegetated roadsides result in significant leaf and branch drop which build up over time and often results in drainage inlet pits blocking rapidly when runoff events occur. This can lead to concentrated and uncontrolled overland flows occurring downslope of these inlets thereby increasing surface flows through streets and private properties. It is recommended that regular street sweeping is undertaken to reduce the potential for the inlets to become blocked and subsequently reduce the frequency of uncontrolled overland flows on streets and through private properties. In addition to regular street sweeping which reduces the potential for inlet pits to become blocked, it is also recommended that stormwater pits in areas subject to flooding are cleaned on a more frequent basis. Suction machines can be used to remove silt and rubbish from the pits. A stormwater maintenance program is currently implemented by Council, with the above tasks routinely conducted. However additional maintenance works could possibly be implemented in the future. It is difficult to quantify the potential benefits that an increased maintenance schedule may have, as the effectiveness of maintenance is reliant on the relative timing of maintenance and flooding. If a flood occurs immediately after a maintenance and cleaning then the benefits in flood reduction may be strongly evident. If flooding occurs after a long period without cleaning then any potential benefits of maintenance would be diminished. Therefore any increase maintenance program should consider the frequency of cleaning and other works. Option PM6 is for the targeted increased maintenance of the stormwater network. Inner West Council, in accordance with its responsibility as owner of the majority of the drainage assets within the study area, has a significant maintenance schedule already in place for all of its stormwater assets. This includes timely responses to community requests or notes relating to any drainage blockage or damage. Option PM6 involves potential additional targeted maintenance of greater frequency than is currently applied at key locations. The potential benefits of the PM6 option for targeted stormwater maintenance would be assessed using modelling assuming no blockage of pipes. This is a best-case scenario, that in reality is unlikely to be achievable. Nevertheless, it does provide an indication of areas of potential benefits, even if the scale of benefits may exceed expected outcomes.	Yes Council currently undertakes maintenance of the stormwater network. The base case model assumes a 100% blockage factor that has been applied to all small diameter pipes. A targeted cleaning program would help reduce the risk of blockage impacting flooding in small diameter pipelines.

Table 8-7 Preliminary Emergency Management Modification Options

Option ID	Option Name	Description	NSW SES Comment	Recommendation for Detailed Option
EM1	Flood Prediction and Warning	The critical duration and response times for the study area floodplain limit the implementation of a flood warning system. The short duration flooding experienced in local systems is not well suited to flood warning systems. Severe weather warnings are likely to be the only assistance for these areas. While flood response times of less than an hour that have been modelled in this study area make any form of warning system seem impossible, there are several factors that may make a scheme worth further investigation: > Flood free land throughout the study area is typically not a long distance. Unlike riverine catchments where the evacuation routes can be kilometres long, as shown in the evacuation route mapping the distance to flood free land does not typically exceed several hundred metres. This means that land above the PMF level could be reached by pedestrians or vehicles in a matter of minutes based on travel time. > Due to the local nature of the flooding, there should be less traffic for evacuation routes as there is not a regional evacuation route that needs to service an entire community. The 2023 FRM Guide EM01 provides advice around the development of a Total Warning System for Flooding (TWSF). The components of a TWSF must be integrated for a system to operate effectively.	Agree that a flood warning system is not feasible. BoM warnings are useful indicators of potential flooding. The NSW SES has adopted the Australian Warning System (AWS) for Riverine Flooding and Tsunami and is planning on extending this to Storms - including Flash flooding	No A local flood warning system may not be feasible due to the flash flooding nature of the study areas. However, the short distance to flood free land means that any advanced warning may provide improved flood risk for the residents. Not progressed as a detailed option as currently not feasible to implement.
EM2	Review of Local Flood Planning and Information Transfer to NSW SES	Having a robust EM plan that can provide the basis for responding to various scales of flood threat and be altered to fit the particular circumstances of an event can assist with flood preparation, response and recovery. The review of local flood plans should also include: > A review of the current flood warning classifications (minor, moderate and major) for the location relative to the impacts on the community and any associated recommendations. > Clarification of the scale of impacts and the scale of the emergency response required in relation to key events and the associated flood timings so this can inform decisions and logistics. For example, for a levee protected community, having a plan in place on how to respond to floods that do not threaten the levee, threaten to result in minor overtopping of the levee, and for extreme floods that overwhelm the levee and town, can provide flexibility. > A review of other key information in the plan in light of the information in this study. The findings of this FRMS&P are an important source of catchment specific information for the NSW SES and Council. Details of flood risks at specific locations are important for planning of operational tasks and for the future review of the Flood Emergency Sub-Plan. The NSW SES have developed a Flood Risk Management Checklist to clearly establish the current expectations for data developed in the FRM process for the purposes of generating reliable flood intelligence to support flood emergency planning. This is a standard across the board and the checklist is	NSW SES is currently revising the way flood planning is addressed in the IW LGA. The current draft VOL 2 of the flood plan is currently on hold and focus is on Pre-Incident Plans (PIPs) for flood rescue hotspots. The planning teams in Marrickville and Ashfield Leichardt units are refining overview documents for hotspot Zones to supplement the PIPs	Yes Providing outcomes from the FRMS&P to NSW SES is essential.

Option ID	Option Name	Description	NSW SES Comment	Recommendation for Detailed Option
		normally adopted upon receiving a formal request via the agency referral process. The checklist relates to three categories; Flood Studies, FRMS&P, and Key Flood Risk Management Issues		
EM3	Community Flood Awareness	Flood awareness is an essential component of flood risk management for people residing in the floodplain, it is important to maintain an adequate level of flood awareness during the extended periods when flooding does not occur. A continuous awareness program is required to ensure new residents are informed, the level of awareness of long-term residents is maintained, and to cater for changing circumstances of flood behaviour and new developments. This option would focus on education of the entire LGA with the objective to educate residents that may be in the floodplain at the time of flooding or may attempt to enter floodwaters. There are a broad range of approaches that can be adopted, which all should be done in close consultation with NSW SES: > Develop FloodSafe Brochure and FloodSafe Toolkit > Develop a post-flood data collection strategy > Hold a FloodSafe launch event > Develop a flood information package for new residents. This option however would not necessitate SES involvement in a Council flood awareness program. It is understood that some flood awareness programs are currently adopted in the local area. Collaboration with SES would be advantageous, as the expectation would be that Council could develop a flood awareness program that provides support and supplements SES flood awareness schemes. The implementation of a flood awareness program may be important in supporting other EM options. For example, the development of a flood warning system (option EM1) would require strong flood awareness, and flood signage and markers (option EM5) would provide best benefits if accompanied with a flood awareness program.	NSW SES supports the development of a council flood awareness program, accompanied by measures outlined in EM5	Yes Recommended outcome of the FRMS&P. Support shown for this option during stakeholder workshop call.
EM4	School Education Program	The SES has developed a tailored program for school children in primary schools. The program, includes teacher's resources, newsletters, activities and games, is designed to deliver knowledge and awareness of floods to young children. SES personnel are also available to visit schools to talk about flooding and flood response. Further details of these programs are available on the SES StormSafe website. Education of parents / carers relating to the flood affectation of the school and the emergency response procedures in place to ensure the safety of their children could be provided directly or through children in the form of brochures etc. Particularly for the study area floodplain it should be reinforced to parents that as all schools have programs in place so they should never enter floodwaters in an attempt to reach their children at school.	NSW SES supports schools who have such programs in place. NSW SES obtains contact details from relevant school authorities.	Supported in Principle Not Recommended for Detailed Analysis Council can engage and advocate on this matter, however only SES and Department of Education can take action.

Option ID	Option Name	Description	NSW SES Comment	Recommendation for Detailed Option
EM5	Flood Markers and Signage	While the above public programs can be effective in improving the long-term awareness of flood risk, in the event of flooding these education programs can easily be forgotten. Therefore, flood warning signage can be an effective tool to remind or inform residents of the risks associated with entering floodwaters, and to also provide practical information in the event of flooding such as recommended evacuation routes. Appropriate flood warning signs should be posted at all locations of significant flooding. These signs may contain information on flooding issues or be depth gauges to inform residents of the flooding depth over roads and paths. Also, evacuation route mapping could be provided on these signs to assist residents. In addition, consultation could be conducted with Transport for NSW (TfNSW) to discuss potential flood signage for flood affected regional roads through the study area. Potential flood affected roads for signage and markers may include: > Princes Highway at several short flood affected ponding areas. This is a potential regional access route with a NSW SES operations centre located nearby. > Bay Street and Holbeach Ave in Tempe > Burrows Road and Canal Road in St Peters	NSW SES supports and encourages the adoption of this measure. Many of the roads affected are high traffic through roads and used by non-residents, so local awareness campaigns are not relevant to these road users. Our flood rescue operators also support these measures as they also indicate to responders the depth of water in the area.	Yes Recommended outcome of the FRMS&P. Support shown for this option during stakeholder workshop call.
EM6	Flood Data and Debrief	A flood event provides an ideal opportunity to capture information on the flood and learn from it. It helps understand the event, the consequences for the community, successes and limitations in current management practices and how the community recovered. Information can be captured in coordinated community surveys. This information should be collated, and a report produced to catalogue what has been captured and its availability and format. The data should be securely stored and made publicly available. The information can be used in both explaining this event to the community and in considering future flood risk, EM and land-use planning decisions within and potentially beyond this community. These tasks are currently part of Council's requirements for flooding response. It is also noted that post-flood funding is also available from NSW DCCEW.	NSW SES supports this measure and considers this information vital to refining flood planning and response alternatives.	Yes Recommended outcome of the FRMS&P. While Council already implements a program of post-flood data collection, continued emphasis of the need for such schemes is recommended. Post flood funding available from NSW DCCEW

9 Detailed Assessment of Options

9.1 Options for Detailed Assessment

A total of 9 options were selected for detailed assessment including hydraulic modelling of 5 design events (for 4 FM options and 1 PM option), damages assessment, cost estimation and Multi-Criteria Assessment (MCA). A summary of the 9 options is included in **Table 9-1**. It is noted that detailed options retained their preliminary option ID, therefore the ID numbering of the detailed option list is non-sequential.

Table 9-1 Description of Options for Detailed Assessment

Option Type	Option ID/Name	Modelled Option
Flood Modification (FM)	AC4 – Station Street, Tempe Drainage Upgrade	Yes
	AC6 – Bay Street, Tempe Drainage Upgrade	Yes
	AC11 – Princes Highway, St Peters Drainage Upgrade	Yes
	AC14 – Talbot Street, Sydenham Drainage Upgrade	Yes
Property Modification (PM)	PM6 – Targeted Stormwater Maintenance	Yes
Emergency Management Modification (EM)	EM2 – Review of Local Flood Planning and Information Transfer to NSW SES	No
	EM3 – Community Flood Awareness	No
	EM5 – Flood Markers and Signage	No
	EM6 – Flood Data and Debrief	No

A brief description of the proposed works for the 4 FM options proposed for adoption are summarised in **Table 9-2**. The layout of these FM options is also included in **Appendix E**.

Table 9-2 Description of FM Options for Detailed Assessment

Option ID	Description
AC4 – Station Street, Tempe Drainage Upgrade	Increased pipe diameters (Station St and Holbeach Ave 0.3m to 0.6m, Trunk drainage line to pond outlet changed from 0.75m to 1.2m). Two inlet pits on Station St converted to unlimited capacity, two pits on Holbeach Ave moved to the low point in properties. One-directional flow (CU) was added at downstream end of trunk drainage line and the outlet pipe extended to intersect with 1D channel as there was no interaction with 1D at the channel outlet in the base model.
AC6 – Bay Street, Tempe Drainage Upgrade	A new 1.2m pipe with unlimited pit capacity was added along the road corridor, modelled as one directional pipe to represent flap gate.
AC11 – Princes Highway, St Peters Drainage Upgrade	The existing pipe size was upgraded from 0.3m to 0.525m on Princes Highway.
AC14 – Talbot Street, Sydenham Drainage Upgrade	New drainage network with 0.9m pipes through Princes Hwy and Talbot St. Downstream pipe sizes not under private property increased from 0.9m to 1.2m and west side of Princes Hwy 0.525m to 0.9m. Two pits on west side of Princes Hwy changed to unlimited capacity and all pipes changed to one directional flow.



Figure 9-1 Location of 4 Detailed Flood Modification Options for Alexandra Canal

9.2 Hydraulic Modelling of Options

The hydraulic modelling of detailed flood modification options reflected the model approach adopted for the preliminary options summarised in **Section 8.4.3**. The 4 detailed flood modification options and one property modification option were modelled for five design flood events – the 20%, 5%, 2% and 1% AEP and PMF events.

The review of hydraulic model results for detailed options included water level difference plots for each option compared to existing conditions for all 5 design events. The extent and scale of water level reductions and complete removal of flooding informed flood risk improvement conclusions for each option. Flood impact maps for all five modelled options for all five design flood events are included in **Appendix E**.

9.3 Preliminary Costing

Preliminary cost estimates have been prepared for all FM options, which allow for an economic assessment via consideration of the cost of implementation and the associated reduction in flood damages. The process for capital cost estimation was as follows:

- Quantities for construction have been estimated from preliminary design for the 4 FM options as they were modelled in the TUFLOW model. This included cut and fill volumes, disturbance footprint areas, and pipe lengths and diameters.
- Unit rates were initially estimated by Stantec based on past project experience. These unit cost rates were reviewed by Council staff and revised in some instances to match current cost rates for the local area.
- Due to the high-level nature of the estimates, a 50% contingency has been applied to all estimates given uncertainty on eventual design refinement and quantities.

Ongoing maintenance costs of FM Options have been estimated based on expected site conditions post-construction. Typically, maintenance works assumed include pit and pipe cleaning, CCTV and mowing and maintenance of open space areas, with only minor expected costs associated. Due to uncertainty on future maintenance requirements and annual costs for Council, a 50% contingency has been applied to ongoing cost estimates as well.

Cost estimates for the Property Modification Option, PM6, the annual drainage maintenance budget for Inner West Council was scaled to the study area as an estimate of potential costs for increased maintenance based on the number of existing stormwater pipes. This amount was applied as both a capital cost and an ongoing maintenance cost for PM6.

For Emergency Management (EM) options, costs were estimated only on the basis of cost to implement, and were done for the purpose of comparison in the multi-criteria assessment. Ongoing costs for EM options were estimated based on expected work needed for each scheme.

Due to uncertainty of potential capital and ongoing costs for all PM and EM options, a 50% contingency has been applied to all, remaining consistent with the assessment of the FM options as well.

A summary of cost estimation outcomes for the 4 FM, 1 PM and 4 EM detailed options is included in **Table 9-3**. All capital and ongoing costs are excluding GST, and account for the 50% contingency.

Table 9-3 Cost Estimates for High-Level Quantitatively Assessed Options

Option	Capital Cost (excl. GST)	Ongoing Annual Cost (excl. GST) *
AC4 – Station Street, Tempe Drainage Upgrade	$1,053,643	$750
AC6 – Bay Street, Tempe Drainage Upgrade	$1,094,884	$1,800
AC11 – Princes Highway, St Peters Drainage Upgrade	$828,821	$-
AC14 – Talbot Street, Sydenham Drainage Upgrade	$1,947,232	$1,500
PM6 – Targeted stormwater maintenance	$142,610	$142,610
EM2 – Review of Local Flood Planning and Info Transfer to NSW SES	$22,500	$7,500
EM3 – Community Flood Awareness	$60,000	$45,000
EM5 – Flood Markers and Signage	$150,000	$7,500
EM6 – Flood Data and Debrief	$45,000	$15,000

9.4 Damages Assessment of Options

An assessment of flood damages of the study area for the existing condition was presented in **Section 6**. The 2023 DT01 damage tool provides both a base case tab and an option tab such that damage benefits can be assessed within the tool. The base case is used to compare the performance of modelled options, and through calculation of post-option damages based on hydraulic model results the potential flood damage benefits of each option. The details of all methodology and input data for the option condition damages assessment are unchanged from those summarised in **Section 6**.

The damage assessment for options focussed only on the extent of impacts of the options, not the entire study area, with the total damage benefits calculated from the difference between option and PM6 condition damage totals in these areas of impact.

The new 2023 damages tool optimised external damage calculations by directly assessing them, eliminating the necessity for a separate property layer in the process. The tool features a tab for the base case and an option tab for inputting options data, enhancing the ease of comparing modelled options' performance.

Notably, the total length of assessment utilised a 30-year timeframe, as opposed to the previously employed 50 years, with a discount rate of 5% being considered throughout the analysis in agreement with DT01 defaults.

For PM6, applying existing condition, all pits and pipes were unblocked, achieving the desired PM6 condition to assess the best possible outcomes of increased drainage maintenance. For the PM6 option, the existing case was adopted as the base case. For the four FM options, the PM6 condition assessment was used as the base case.

A summary of damage benefit outcomes for the five modelled design flood events (20%, 5%, 2%, and 1% AEP and PMF) for each of the 4 AC options is included in **Table 9-4**.

The Average Annual Damage (AAD) reduction for each of the 4 AC options has also been calculated in **Table 9-4**. The total combined AAD benefit of all 4 AC option is estimated to be nearly $200,000 per year.

Table 9-4 Reduction in Flood Damages and AAD Associated with each AC Option

Option ID	Total Damages Reduction					Average Annual Damage Reduction
	PMF	1% AEP	2% AEP	5% AEP	20% AEP	
AC4	$0	$0	$0	$0	$34,468	$18,957
AC6	$149,014	$85,014	$124,618	$136,045	$79,732	$60,183
AC11*	$0	$0	$0	$50,029	$0	$4,503
AC14	$30,390	$1,020,346	$1,043,809	$904,837	$0	$112,662
Total	**$180,304**	**$1,105,360**	**$1,168,427**	**$1,090,911**	**$114,200**	**$196,305**

*AC11 has potential flood damage benefits for buildings outside of the study area, therefore this damage benefit may be an underestimate.

9.5 Benefit-Cost Ratio

The economic evaluation of each option was performed by considering the reduction in the amount of flood damages incurred for the design events and then comparing this value with the cost of implementing the option.

Table 9-5 summarises the results of the economic assessment of each of the options. The indicator adopted to assess these measures on economic merit is the benefit-cost ratio (BCR), which is based on the net present worth (NPW) of the benefits (reduction in AAD, refer to **Section 9.4**) and the costs (of implementation, refer to **Section 9.3**). In the calculation of NPW, a 5% discount rate and an implementation period of 30 years have been adopted (default values in the 2023 DT01 Damage Tool).

The benefit-cost ratio provides an insight into how the damage savings from a measure relate to its cost of construction and maintenance.

- Where the benefit-cost ratio is greater than one (BCR >1) the economic benefits are greater than the cost of implementing the measure.
- Where the benefit-cost is less than one but greater than zero (0 < BCR < 1) there is still an economic benefit from implementing the measure, but the cost of implementing the measure is greater than the economic benefit.
- Where the benefit-cost is equal to zero (BCR = 0), there is no economic benefit from implementing the measure.

For all FM options it is possible to quantify, at least at a high-level both damage benefits and costs of implementation for each option, therefore a BCR is able to be calculated. For EM & PM options, the damage benefits are not easily quantifiable, though there would be some economic benefits of these options in the form of reduced risk to life and resultant reduction in flood damage for loss of life. Therefore in lieu of any damage benefit information, the economic analysis of these options has assumed that BCR is 1.0.

Table 9-5 Summary of Net Present Worth of Benefits and Costs and Resultant Benefit Cost Ratio

Option	NPW of AAD Reduction Benefits	NPW of Cost of Implementation of Option	Benefit Cost Ratio
AC4 – Station Street, Tempe Drainage Upgrade	$291,418	$1,065,173	0.27
AC6 – Bay Street, Tempe Drainage Upgrade	$925,163	$1,122,555	0.82
AC11 – Princes Highway, St Peters Drainage Upgrade**	$69,216	$828,821	0.08
AC14 – Talbot Street, Sydenham Drainage Upgrade	$1,731,887	$1,970,291	0.88
PM6 – Targeted stormwater maintenance		$2,334,873	1.0*
EM2 – Review of Local Flood Planning and Info Transfer to NSW SES		$137,794	1.0*
EM3 – Community Flood Awareness		$751,761	1.0*
EM5 – Flood Markers and Signage		$265,294	1.0*
EM6 – Flood Data and Debrief		$275,587	1.0*

*In lieu of benefit values for EM and PM options, due to flood risk reduction BCR value assumed to be 1.0

**AC11 has potential flood damage benefits for buildings outside of the study area, therefore this damage benefit may be an underestimate.

The BCR results show that of FM options, AC6 and AC14 both have BCR values slightly under 1.0, therefore the costs only slightly exceed the calculated benefits. For AC11, the potential benefits of this option for private property are on the west side of Princes Highway and therefore are not picked up in damages assessment. Therefore, it is likely that the BCR score for that option is an underestimate.

The PM6 option cannot be easily assessed as the potential benefits of targeted maintenance are difficult to quantify. A sensitivity modelling scenario has been adopted assuming no blockage of pipes as a result of maintenance. This is a best-case scenario, that in reality is unlikely to be achievable. Nevertheless, it does provide an indication of areas of potential benefits, even if the scale of benefits may exceed expected outcomes. Therefore, due to this uncertainty, the modelling outcomes in the form of damage benefits were not applied to the BCR outcome for this option PM6.

9.6 Multi-Criteria Assessment

To assist Council in identifying the FRM options that provide the most benefits for the community, all options need to be compared against each other based on factors relevant to the study area.

Evaluating what constitutes an appropriate strategy for floodplain management is a significant analytical and policy challenge. Such challenges have led to the exploration of alternative policy analysis tools, one being Multi Criteria Assessments (MCA). The goal of MCA is to attempt to directly incorporate multiple values held by community and stakeholders into the analysis of management alternatives while avoiding the reduction of those values into a standard monetary unit. In doing so, one can consider different FRM options in the context of economic criteria as well as other criteria such as social, or environmental aspects. Community and stakeholders can also assign explicit weights to those values to reflect their preferences and priorities. Therefore, MCA provides opportunities for the direct participation of community and stakeholders in the analysis.

An MCA approach has been used for the comparative assessment of all options identified using a similar approach to that recommended in 2023 FRM Guide MM01. This approach uses a subjective scoring system to assess the merits of each option. The principal value of such a system is that it allows comparisons to be made between alternatives using a common index. In addition, the MCA makes the assessment of alternatives “transparent” (i.e. all important factors are included in the analysis).

However, this approach does not provide an absolute “right” answer as to what should be included in the plan and what should be omitted. Rather, it provides a method by which Council, community and stakeholders can re-examine options and, if necessary, debate the relative scoring assigned.

Each option is given a score according to how well the option meets specific considerations. In order to keep the scoring system simple a framework has been developed for each criterion.

9.6.1 Development of Criteria

A balanced FRMS&P addresses existing, future and continuing risk to reduce residual risk to a level more acceptable to the community and in doing so generally involves assessing, deciding on and prioritising a range of FRM measures.

One way of considering the outcomes of an MCA of different options or packages of options is the establishment of an options assessment matrix that considers a range of criteria that can influence decision-making. The criteria used can vary with the flood situation and community. Some may not be relevant to the circumstances or the options being considered. In addition, different communities, decision-makers and groups may consider different criteria and specific elements to be more or less important. One way of addressing this variation is to weight the relative importance of these criteria so this can be factored into the assessment.

As per the recommendations of Section 2.2.5 of the FRM Guide MM01, the selection of criteria and weighting should be completed independent of scoring and actively involve the FRM committee and its technical working group (TWG).

There are a total of 11 MCA criteria adopted for this FRMS&P:

- 5 economic criteria – Benefit-cost ratio, risk to property, technical feasibility, implementation complexity, and adaptability/long-term performance
- 4 social criteria – Risk to life, emergency access and evacuation, social disruption and public open spaces, and community and stakeholder support
- 2 environment criteria – Flora and fauna impact and heritage impact.

The criteria weightings provided by Council are summarised in **Table 9-6**.

9.6.2 Criteria Scoring System

A scoring system was established for each criteria with scores ranging from +2 for options that represented a significant improvement on existing conditions for any given criteria, to -2 for options that represented a significant worsening of existing conditions. The scoring system for all 10 criteria are summarised in **Table 9-6**. It is noted that for two criteria (Benefit-Cost Ratio and Reduction in Risk to Property) scoring systems was based on quantifiable assessment outcomes, for all other criteria scoring was more subjective.

Table 9-6 Multi-Criteria Assessment – Scoring System Summary

Category	Criterion	Weighting	Description of Criterion Assessment	Score				
				-2	-1	0	1	2
Economic	Benefit-Cost Ratio	20%	The cost effectiveness of the scheme, i.e. the tangible return on investment	0 to 0.25	0.25 to 0.5	0.5 to 1.5	1.5 to 3.0	>3.0
	Reduction in Risk to Property	5%	Based on reduction in AAD, it establishes the tangible benefit of an option	Major increase in AAD (>$200,000)	Slight increase in AAD ($200k to $100k)	Negligible Improvement (less than $100k AAD impact)	Slight decrease in AAD ($200k to $100k)	Major decrease in AAD ($>200,000)
	Technical Feasibility	10%	Establishes the feasibility of options based on likely service constraints, environmental hazards, and programming contingencies such as land acquisition or agreements with external agencies	There are a number of significant factors that pose an impact on the feasibility of the project	There is a single significant factor or multiple smaller factors that pose a potential impact on the feasibility of the project	May or may not be feasible	Likely to be feasible with management of constraints	Very likely to be feasible with no significant restraint
	Implementation Complexity	5%	Ease of constructability within Council's standard Capital Works Planning	Construction timeframe greater than 1 year Project cannot be broken down into sequential components	Construction timeframe greater than	Key components can be completed in isolation within 12 months	Overall construction timeframe less than 12 months Minor components can be staged	Construction timeframe less than 6 months Major components can be staged
	Adaptability and long-term performance	10%	The impact the option will have both in terms of feasibility, benefits and cost over the life of the option, and adaptability to climate change conditions	Significantly diminished performance long-term or under climate change	Slightly diminished performance long-term or under climate change	Unchanged performance long-term or under climate change	Unchanged or improved performance long-term or under climate change with minor ongoing costs	Unchanged or improved performance long-term or under climate change with negligible ongoing costs
Social	Reduction in Risk to Life	15%	The impact on risk to life from the 20% AEP up to the PMF event	Widespread or significant localised increase in risk to life	Localised or slight increase in risk to life	Negligible change in risk to life	Localised or slight reduction of risk to life	Widespread or significant localised reduction of risk to life
	Emergency Access and Evacuation	10%	The impact on the ability to evacuate or for NSW SES or emergency services under extreme flood conditions	Widespread or significant localised impact on evacuation and emergency services	Localised or slight localised impact on evacuation and emergency services	Negligible impact on evacuation and emergency services	Localised or slight improvement for evacuation and emergency services	Widespread or significant localised improvement for evacuation and emergency services
	Social Disruption and Public Open Spaces	5%	The impact of the risk management option on social disruption and the use of public spaces	Significant increase in the frequency of flooding or limitation of the use of a public space or causes significant social disruption	Increase in the frequency of flooding or limitation of the use of a public space or causes social disruption	Negligible impact on public space or social disruption	Reduces the frequency of flooding or provides enhanced use of a public space or causes social benefit	Significantly reduces the frequency of flooding or enhanced use of a public space or causes significant social benefit
	Community and Stakeholder Support	10%	Support for the option based on FRM Committee meeting, stakeholder engagement and community consultation outcomes	Strong opposition to the option in multiple submissions	Slight opposition to the option	No response	Slight support to the option	Significant support to the option
Environment	Impact on Fauna/Flora	5%	Likely impacts on Threatened Ecological Communities and Threatened Species	High negative impact	Slight negative impact	Negligible impact	Some benefit	Considerable benefit
	Impact on Heritage	5%	Impact to Heritage items	Likely impact on State, National, or Aboriginal Heritage item	Likely impact or increased impact on a local heritage item	No impact	Reduces the impact of flooding to heritage item or heritage conservation area	Heritage item no longer flooded

9.6.3 Multi-Criteria Scoring Outcomes

The assignment of a score and brief discussion reasoning for the score for each criterion for the flood modification (FM), property modification (PM), and emergency management (EM) modification options is shown in its entirety in the matrices presented in **Appendix F**.

The unweighted scores of the MCA has a range from 20 to -20 based on 10 criteria each with a score of +2 to -2. The weighted final MCA scores using the criteria weighting (see **Table 9-6**) have a possible range of +2.0 to -2.0. The total weighted and unweighted MCA scores for each detailed option are summarised in **Table 9-7**. The options have been tabulated in order from highest to lowest weighted score.

Due to the relative weighting of the 11 criteria the weighted and unweighted scores for options were not ordered the same. For example PM6 and AC11 both have weighted scores of 0.45, however in terms of unweighted scores PM6 has a score of 9 compared to AC11 score of 4. This provides an insight into the significance of appropriate criteria weighting.

Table 9-7 MCA Outcomes for Weighted and Unweighted Scores for Detailed Options

Option ID	Option Type	Total Unweighted Score (from -20 to 20)	MCA Weighted Score	MCA Rank
EM2 – Review of Local Flood Planning and Info Transfer to NSW SES	Emergency Management (EM)	11	1.10	1
EM3 – Community Flood Awareness	Emergency Management (EM)	10	0.95	2
EM5 – Flood Markers and Signage	Emergency Management (EM)	10	0.95	2
Option AC6 – Bay Street, Tempe Drainage Upgrade	Flood Management (FM)	7	0.60	4
PM6 – Targeted Stormwater Maintenance	Property Modification (PM)	6	0.50	5
EM6 – Flood Data and Debrief	Emergency Management (EM)	5	0.45	6
Option AC11 - Princes Highway, St Peters Drainage Upgrade	Flood Management (FM)	4	0.45	6
Option AC14 - Talbot Street, Sydenham Drainage Upgrade	Flood Management (FM)	3	0.40	8
Option AC4 – Station Street, Tempe Drainage Upgrade	Flood Management (FM)	-3	-0.40	9

The highest scoring options were all emergency management modification options (EM) due to their relatively minor cost and ease of implementation. In the top half of ranked options, three of the four were EM options.

Option AC6 Bay Street drainage upgrade was the highest scoring FM option due to this being an area of noted frequent flooding (even during king tide events), its relative ease in terms of feasibility and complexity for relatively greater benefits compared to other FM options.

The lowest scoring options were AC14 Talbot Street drainage upgrade which was marginally lower due to its complexity, and AC4 Station Street drainage upgrade which was much lower due to low relative benefits and BCR.

10 Implementation Program

The Flood Risk Management options outlined in **Section 9** are recommended for implementation as an outcome of the Floodplain Risk Management Study. In order to achieve the implementation of relevant management actions, a plan of implementation has been developed as outlined in the following sections.

10.1 Steps to Implementation

The steps in progressing the flood risk management process from this point onwards are:

- Formal adoption of FRMS&P: Following public exhibition and FRM Committee approval, Council will formally adopt the final Flood Risk Management Study and Plan;
- Investigation and Design (I&D) stage – Most options will next require an Investigation and Design (I&D) phase to further refine the design and further confirm the feasibility of the option. An equivalent assessment is a 'Feasibility Study' or 'Scoping Study' for programs such as the Voluntary House Raising Scheme. These investigation and design assessments for individual projects should build on the assessment undertaken in the FRM plan. The potential steps of the I&D stage may include:
  - Prior to the I&D stage, grant funding applications for the I&D assessment may need to be submitted by Council when required.
  - Additional investigations may be required to inform feasibility assessment. For example, for Flood Modification options these may include geotechnical investigations, subsurface utility survey, or environmental impact reviews.
  - Concept design of the option.
  - Detailed design of the option.
  - Environmental approvals submissions such as a Review of Environmental Factors (REF) or Environmental Impact Statement (EIS).
  - Economic assessment of options (Level 1, Level 2 or Level 3 guided by the framework discussed in the next sub-section) potentially including further detailed damages benefit assessment, or cost estimation compared to the analyses conducted in this FRMS&P.
- Following I&D stage, if required, a grant funding application will need to be submitted to support the implementation / construction of the option.
- Implementation / construction of the flood risk management option.

10.2 Economic Assessment Framework for Options

Where external funding is required, the FRM economic assessment framework, as shown in **Figure 10-1**, provides the basis for further assessment of the FRM measures as part of the investigation and design phases of implementation.

The framework for the economic assessment of FRM measures from the FRM Guide MM01 is shown in **Figure 10-1**. It provides a summary of the economic assessment of FRM options following on from a FRMS&P into Investigation and Design (I&D) stage and into Implementation stage. This provides useful context into the different levels of detailed assessment required for FRM options once they proceed beyond the FRMS&P stage. There are four levels of economic assessment based on this framework:

- Level 1 assessments are the least detailed form of economic assessment. Level 1 assessments include preliminary costing, damages benefit estimation and an MCA including preliminary cost-benefit summary. These Level 1 assessments are applied at the FRMS&P phase for all FRM options, regardless of expected option cost. For FRM options with expected cost less than $1 million, a level 1 assessment is also appropriate at I&D and implementation stage as no grant approval is required. The Level 1 assessment in this FRMS&P for detailed options is summarised in **Section 9**.
- Level 2 assessments update the Level 1 economic analysis to include cost estimates from I&D stage. Consider whether additional damage assessment factors (not included but likely to influence the outcome) should be included to improve the Level 1 damage assessment, also consider sensitivity assessment to discount rate, and increases, and decreases in benefits and costs. Level 2 assessments relate to FRM options with expected value between $1-$5 million. Level 2 assessments require additional reporting incorporated in I&D reporting to support grant application for implementation.

- Level 3 assessments are similar to Level 2 with updating of Level 1 economic analysis to include cost estimates from I&D stage, but with potential to include more detailed techniques for monetary valuation. Use of more detailed assessment techniques for benefits assessment, for example, evacuation modelling may be appropriate to identify risk to life more readily. More detailed sensitivity analyses than Level 2 with a more detailed stand-alone report or appendix to the I&D report to support grant application. Level 3 assessments relate to FRM options with expected value between $5-$10 million.
- For FRM Options with expected value in excess of $10 million, the option must go through a NSW Treasury gateway review process with more detailed economic assessment and reporting required.

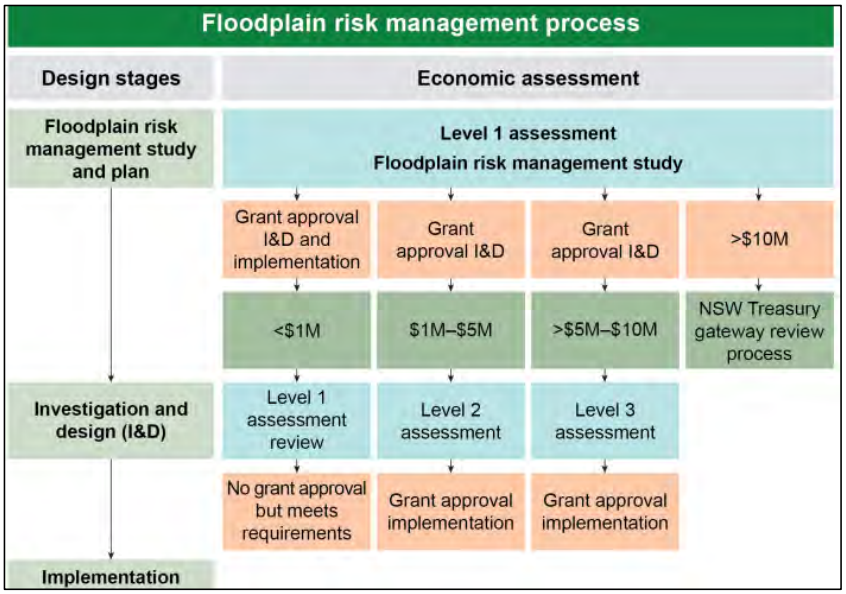

Figure 10-1 Detailed FRM Measure Economic Assessment Framework (Source: FRM Guide MM01)

The expected necessary economic assessment level of each option in this FRMS&P is summarised in the implementation program in **Table 10-1**. The economic assessments will need to be completed during Investigation and Design (I&D) stage for each option.

10.3 Funding Mechanisms for FRM Options

As stated in FRM Guide MM01, FRM plans may recommend a range of implementation measures that are funded through one of the following means:

a. Council funded: Can be implemented within council's own resources, such as updating land-use planning arrangements. Council should progress these measures within their own resources considering the priorities in the plan

b. Funded by Other Agencies: Are the agreed responsibility of, or require agreed input from external parties to implement. Examples include updating EM planning arrangements, or options located within the lands of other stakeholder agencies. Council should work with external parties to support implementation, considering the priorities in the plan.

c. Grant Funded: Will generally require external funding support, such as new or upgraded FRM works, including levees, basins, and flood warning systems. Council will need to apply for these grant funds.

The anticipated funding mechanism for each option adopted within this FRMS&P is summarised in the implementation program in **Table 10-1**. This is an assumed funding source, it is possible that funding sources other than those listed in **Table 10-1** may be considered for any given option at Council's discretion and with the agreement and support from any relevant funding agencies.

10.3.1 Grant Funding

The NSW Government's floodplain management grants support local Councils to manage flood risk. The funding for FRM option implementation from these grants has traditionally comes from two programs:

- NSW Floodplain Management Program, and
- Floodplain Risk Management Grants Scheme (jointly funded by the NSW DCCEW and the Commonwealth Government).

Applications for funding can be made by Council for the implementation of actions identified in a FRMS&P. The information provided in the applications for each management action is used to rank the priority for funding of all actions across NSW. The information presented in this FRMS&P can be used as a starting point to complete the relevant applications for funding.

Sufficient information should be provided in reports to facilitate funding applications for eligible projects under relevant funding programs. Information currently needed to support these applications relates to Council's commitment to FRM, how FRM measures were identified and assessed, community involvement in FRM plan development, and the FRM benefits of the project for the community.

10.4 Ranking and Prioritisation of Options

Based on review of the Multi-Criteria Assessment outcomes summarised in **Section 9.6.2**, the options have been ranked in order of preference. The MCA scores were combined to produce an options implementation preferences list as shown in **Table 10-1**. As shown in the rank column, this table was ordered based on ranking, from highest ranking to lowest ranking option.

In addition, a priority has been assigned to each of the options to inform the implementation strategy. The priority reflects the recommended urgency of the option from a reduction in flood risk perspective, it is possible that the order of implementation that Council adopts may differ from these priority assignments.

The grouping of options into the three priority categories was based on the distribution of MCA scoring, with categories set at points of clear delineation of scoring outcomes. There is an MCA score difference of 1.5 from the worst scoring high priority option and the best medium priority option, with a 0.05 score difference from medium to low. The three priority categories are:

- High – Four options were identified as high priority. Of the high priority options, three are Emergency Management (EM) and one is a Flood Modification (FM) – AC6 Bay Street Drainage Upgrade. The range of MCA scores for high priority options is 1.10 to 0.6 (ranks 1-4)
- Medium – Four options were identified as medium priority. Of the medium priority options, there is one Emergency Management (EM), two Flood Modification (FM) and one Property Modification (PM) options. The range of MCA scores for medium priority options is 0.45 to 0.4 (ranks 5-8); and
- Low – One option was identified as low priority. This option is a Flood Modification (FM) – AC4 Station Street Drainage Upgrade. This option had a MCA score of -0.40 (rank 9). This low score is a result of the only minor flood benefits this option produces.

10.5 Implementation Plan

The list of recommended management options has been transformed into an implementation plan provided in **Table 10-1**. It lists the following information relevant to the implementation of each adopted FRM option:

- Type and sub-catchment location of option and Multi-Criteria Assessment score;
- The priority for implementation (high, medium, or low) and rank as an outcome of the FRMS&P;
- An estimate of implementation costs including capital and ongoing costs per annum;
- Potential funding mechanism or organisation; and
- Required economic assessment level during I&D stage from framework in **Section 10.2**.

The flood risk management options identified in **Table 10-1** represent a capital cost of approximately $5.3M, with the flood modification options making up $4.9M of this cost. High priority options have combined capital costs of $1.3M.

It is noted that a specific timeframe for the implementation plan has not been explicitly identified. Experience with these types of plans has identified that the works are undertaken when and as funding becomes available, as well as when various opportunities might arise specifically for an option.

Table 10-1 Implementation Plan for Alexandra Catchment FRMS&P

Option ID	Option Type	MCA Weighted Score	Option Rank	Implementation Priority	Capital Costs (incl. GST)	Ongoing Costs (p.a incl. GST)	Economic Assessment Level for I&D
EM2 – Review of Local Flood Planning and Info Transfer to NSW SES	Emergency Management (EM)	1.10	1	High	$ 22,500	$7,500	Level 1 (FRMS&P)
EM3 – Community Flood Awareness	Emergency Management (EM)	0.95	2	High	$ 60,000	$ 45,000	Level 1 (FRMS&P)
EM5 – Flood Markers and Signage	Emergency Management (EM)	0.95	2	High	$ 150,000	$ 7,500	Level 1 (FRMS&P)
Option AC6 - Bay Street Drainage Upgrade	Flood Management (FM)	0.60	4	High	$ 1,094,884	$ 1,800	Level 2 (Detailed damages)
PM6 –AC Targeted Stormwater Maintenance	Property Modification (PM)	0.50	5	Medium	$ 142,610	$ 142,610	Level 1 (FRMS&P)
EM6 – Flood Data and Debrief	Emergency Management (EM)	0.45	6	Medium	$ 45,000	$ 15,000	Level 1 (FRMS&P)
Option AC11 - Princes Highway Drainage Upgrade	Flood Management (FM)	0.45	6	Medium	$ 828,821	$ -	Level 1 (FRMS&P)
Option AC14 - Talbot Street Drainage Upgrade	Flood Management (FM)	0.40	8	Medium	$ 1,947,232	$ 1,500	Level 2 (Detailed damages)
Option AC4 - Station Street Drainage Upgrade	Flood Management (FM)	-0.40	9	Low	$ 1,053,643	$ 750	Level 2 (Detailed damages)
				Total	**$5,344,690.00**	**$2,250.00**	

11 Conclusions

This Final Flood Risk Management Study and Plan (FRMS&P) report summarises the outcomes of the study undertaken for Inner West Council for Alexandra Canal Catchment. This includes initial data collection and review process, community consultation, review of the flood study models, existing risk assessments including economic impacts of flooding, flood emergency response review, and flood planning review. It includes a summary of the flood risk management option development process and preliminary option assessment to refine options for adoption. The report also documents the detailed option assessment including modelling, cost estimation, damage benefits assessment, and Multi-Criteria Assessment (MCA) and provides a prioritised list of final options. Finally, the report outlines an implementation program to assist Council in the future implementation of these final options.

The flood study model review process involved the updating of the Flood Study TUFLOW model to account for ARR2019 design rainfall (Flood Study adopted ARR87 rainfall), and updating for present-day terrain in the form of LiDAR. The review concluded that the impacts of the model updates were relatively minor therefore the Flood Study model was appropriate for retention as the base case model for this FRMS&P and the assessment of options.

The flood damages assessment, flood emergency response review and flood planning review all contribute to the understanding of existing flooding as it relates to economic impacts, risk to life, and future development respectively.

A preliminary assessment of flood modification options has also been conducted including flood modelling of Flood Modification (FM) options and consideration of Property Modification (PM) options and Emergency Management Modification (EM) options. In total 27 preliminary options were developed including 15 FM, 6 PM and 6 EM options. From these preliminary options, 9 options have been selected for detailed assessment including 4 FM options, 1 PM option, and 4 EM options.

The detailed option assessment to review the selected final 9 options through flood modelling to assess the impacts of the option, flood damages (both for FM and PM options only, not EM options), cost estimation and Multi-Criteria Assessment (MCA). The outcomes of the MCA have been applied to the implementation plan including a list of priority options with four high priority options, four medium priority options, and one low priority option. Of the high priority options, one is a Flood Modification (FM) – AC6 Bay Street Drainage Upgrade and three are Emergency Management (EM) modification options.

The Draft Final FRMS&P report was placed on public exhibition, to receive comments and feedback from the community on the draft outcomes of the study prior to finalisation. The public exhibition period was conducted for a five-week period in June and July 2024. Comments from the community were collated and reviewed and incorporated into the Final FRMS&P report.

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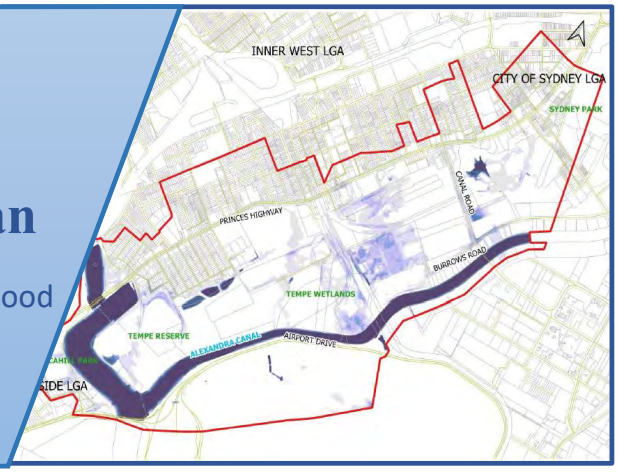
APPENDIX A

CONSULTATION MATERIALS

Stantec

Alexandra Canal
Flood Management Plan

Managing flood risk in your neighbourhood



Project updates

What we heard about your experiences of flooding?

1 June 2023

Between 7 March and 6 April 2023 we sought your feedback on the Alexandra Canal Flood Risk Management Study and Plan. The purpose of the engagement was to understand resident experiences of stormwater and flooding within the Alexandra Canal catchments and to identify preferences for flood management options.

Key points on the engagement methods and results:

- The Your Say Inner West project page was viewed 650 times
- Five people shared their experiences of flooding via the online survey and two contributed to the interactive map
- Seven people attended a drop-in session to ask questions and share their experiences
- The adopted Flood Study was downloaded 49 times

Feedback received during this engagement has been passed on to Council's consultant and will assist with developing flood mitigation options for these catchments. A detailed study will be prepared and placed on exhibition towards the end of 2023.

Community feedback dates

Tuesday 7 March - Thursday 6 April 2023

Council is exploring options for managing the impact of floods in the Alexandra Canal catchment.

In 2017 Council completed the Alexandra Canal Flood Study. This involved modelling flood behaviour using rainfall data and information from the community about past storm events. The study determined:

- Where flood water will run
- How the existing drainage system will cope.
- Which properties are affected?

The results from this investigation can be found in the completed Flood Study.

What happening now?

Council has engaged specialist flood consultants, Stantec, to prepare a Floodplain Risk Management Study and Plan (the Management Plan) for Alexandra Canal. This involves reviewing the Flood Study and identifying options for reducing flood risk in the catchment.

What does the management plan propose?

The primary objective of the flood Management Plan is to identify options to mitigate and manage flood risk. This will involve consideration of options that seek to:

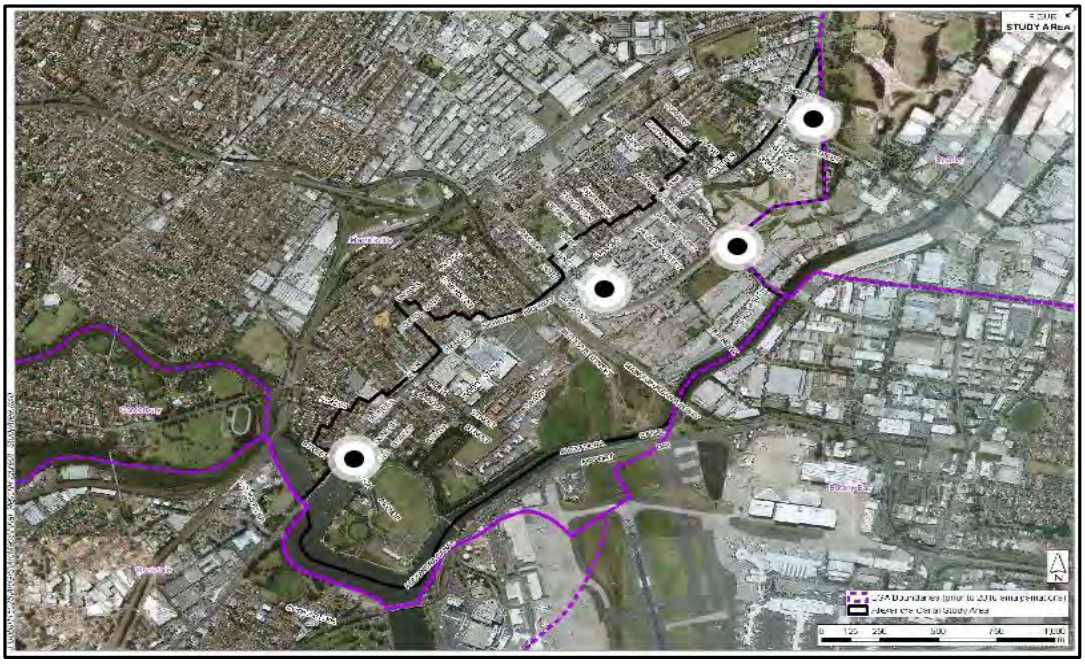
- Modify flood behaviour (e.g. levees, upgrade of stormwater systems)
- Mitigate the impact of flooding on existing properties (e.g. via floor raising)
- Control future development in the floodplain
- Guide emergency management when a flood occurs

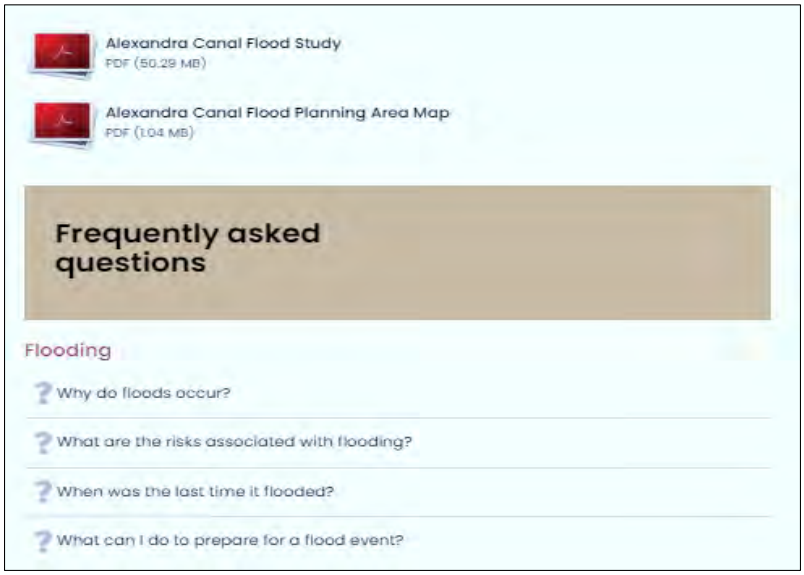
Future development on properties that are flood affected may be subject to development controls.

What can you influence?

We asked the community to share their recent experiences of flooding in the Alexandra Canal catchment to ensure the flood management plan reflects current areas of concern.

Community members could also let us know their preferences for flood management options in the catchment area.





What happens next?

The project team is using your feedback and other information to develop the final flood Management Plan. Everyone who provided feedback will be updated via email and on this project page when the Management Plan is available.

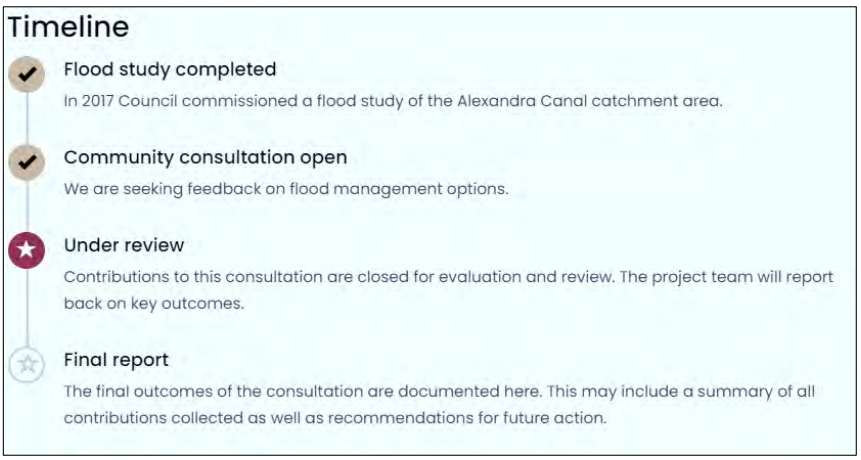
Contact us:

Have questions or want to learn more about the project? Contact us below:

Name Rafaah Georges

Phone 02 9392 5208

Email rafaah.georges@innerwest.nsw.gov.au



7 March 2023

Managing flood risk in your neighbourhood

Alexandra Canal

Council is preparing a plan to manage the impact of floods in the Alexandra Canal area. Management options can include upgrading stormwater systems, controls on future development and guiding emergency response plans.

Find out more and have your say

To learn more, share your experiences or to discuss your preference for flood management options.

- **Online** at yoursay.innerwest.nsw.gov.au
- **In person** at an information session:
  - Wednesday 15 March 2023, 12-3pm and 5-8pm at St Peters Town Hall - Main Hall
  - Monday 20 March 2023, 12-3pm at Marrickville Library - Pavilion Hall
- **Phone** Rafaah Georges on 02 9392 5208
- **Email** floodstudies@innerwest.nsw.gov.au
- **Write to** Rafaah Georges, Inner West Council, PO Box 14 Petersham 2049

The last date to provide feedback is **Thursday 6 April 2023.**

What happens next?

All feedback will be reviewed and inform further investigations of response strategies and possible drainage upgrades. The results will be collated into a Flood Risk Management Plan that will be presented to the community in late 2023.

What else is happening?

Surveyors will be in the neighbourhood during March and April, taking levels in the flood affected areas to help with assessing the merits of the flood management options. Stantec and North Western Surveyors will be undertaking this work on behalf of Council and will be carrying authorisation from Council.

Yours faithfully,

Ryann Midei
Director Infrastructure

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2-14 Fisher St PO Box 14, Petersham NSW 2040

Alexandra Canal Resident Online Survey/ Questionnaire

Question 1 **Is your property:**

- ☐ Owner occupier
- ☐ Rented - by yourself
- ☐ Rented - by others
- ☐ A business
- ☐ Other

Question 2 **Have you ever experienced flooding since living/working in the catchment area?**

- ☐ Yes, floodwater has entered my house/business
- ☐ Yes, floodwater has entered my yard
- ☐ Yes, the road was flooded and I couldn't drive my car
- ☐ Yes, the stormwater channel reached capacity and was overflowing
- ☐ Yes, other parts of my neighbourhood have flooded
- ☐ Yes, I saw water flowing out of street drains, pits or manholes
- ☐ No, I haven't experienced flooding

Question 3 **How did the flooding affect you/your business?**

- ☐ Parts of my house/business building were damaged
- ☐ The contents of my house/business were damaged
- ☐ My garden, yard, and/or surrounding property were damaged
- ☐ My car(s) were damaged
- ☐ I couldn't leave the house/business
- ☐ Family members/work mates couldn't leave/return to the house/business
- ☐ The flooding disrupted my daily routine
- ☐ The flooding didn't affect me
- ☐ Not applicable - I have not experienced flooding in the catchment area
- ☐ Other

Question 4 **Please upload any materials or photos to evidence the flooding you experienced.**

Question 5 **What do you believe to be the main cause of flooding in your area?**

- ☐ Stormwater channels reaching capacity and overflowing.
- ☐ Lack of capacity in the stormwater network (e.g., pits and pipes) causing drainage systems to surcharge and backflow.
- ☐ Rainfall runoff flowing to a channel or drain.
- ☐ Other

Question 6 **As a local resident who may have witnessed flooding/drainage problems, you may have your own ideas on how to reduce flood risks. Which of the following management options would you prefer? Select your 5 preferred options.**

- ☐ Stormwater harvesting such as rainwater tanks.
- ☐ Retarding or detention basins; these temporarily hold water and reduce peak flows.
- ☐ Culvert / bridge / increasing pipe size and/or capacity.
- ☐ Levee banks
- ☐ Environmental channel improvements
- ☐ Diversion of channels
- ☐ Planning and flood related development controls to ensure future development does not add to the existing flood risk.

- ☐ Voluntary raising of houses to reduce flood damages by raising floor levels above a design flood.
- ☐ Voluntary purchase of highly affected properties by Council and demolition of any buildings on the property
- ☐ Education of community, providing greater awareness of potential hazards
- ☐ Flood forecasting, flood warning, evacuation planning and emergency response such as early warning systems, improved local SES capabilities/ resources or improved radio and phone communications.

Question 7 **Please specify any other options you believe are suitable.**

Question 8 **Are you concerned about the uncertainty of future climates and the possible impacts on flooding in your area?**

- ☐ Yes
- ☐ No

Question 9 **Do you believe the climate is changing?**

- ☐ Yes, it will have significant effects
- ☐ Yes, but the effects won't be significant
- ☐ Not at all

Question 10 **Are you concerned about the impact of an uncertain climate on future flooding in the study areas?**

- ☐ Yes
- ☐ Somewhat
- ☐ No

Question 11 **Should Council be addressing the impacts of an uncertain future climate on flooding?**

- ☐ Yes
- ☐ No

Question 12 **Enter your email address here if you would like to receive a copy of your submission via email.**

Question 13 **Do you give permission for Cardno or Council to contact you to discuss the information you have provided us?**

- ☐ Yes
- ☐ No

APPENDIX

B

MARRICKVILLE DCP 2011 – FLOOD MANAGEMENT CONTROLS

Stantec

2.22

GENERIC PROVISIONS
FLOOD MANAGEMENT



Marrickville Development Control Plan 2011

MARRICKVILLE council



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Part 2 Generic Provisions

2.22 Flood Management

A flood is an overflow or accumulation of an expanse of water that submerges land. In the sense of flowing water, the word may also be applied to the inflow of the tide. Floods are a natural and inevitable event that communities must learn to live with while minimising risks to public health and safety, property and infrastructure.

This section recognises that there are some flooding risks that require development controls and guidelines in order to reduce or eliminate their impacts.

2.22.1 Objectives

O1 To maintain the existing flood regime and flow conveyance capacity.

O2 To enable the safe occupation of, and evacuation from, land to which flood management controls apply.

O3 To avoid significant adverse impacts upon flood behaviour.

O4 To avoid significant adverse effects on the environment that would cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of the river bank/watercourse.

O5 To limit uses to those compatible with flow conveyance function and flood hazard.

O6 To minimise risk to human life and damage to property.

2.22.2 Land affected

This section complements Clause 6.3 (Flood planning) of Inner West Local Environmental Plan 2022 (Inner West LEP 2022). It applies to land identified on the DCP 2011 Flood Planning Area Map in Appendix 1 and land identified as being flood liable land on the DCP 2011 Flood Liable Land Map in Appendix 2.

For the purposes of this Section of the DCP:

> Flood planning levels(FPLs) are the combinations of flood levels (derived from significant historical flood events or floods of specific annual exceedance probability (AEP) and freeboards selected for floodplain risk management purposes.
>
> The Standard Flood adopted by Council is the 1% AEP or the 1 in 100 year flood. The Standard Flood has been used to derive the Flood Planning Levels.

The land identified on the DCP 2011 Flood Liable Land Map and on the DCP 2011 Flood Planning Area Map is based on information available to Council when the Plans were prepared. As new information becomes available, the DCP 2011 Flood Planning Area Map and the DCP 2011 Flood Liable Land Map may change.

2.22.2.1 Flood planning area (Cooks River)

The Flood Planning Area (Cooks River) identifies land likely to be affected by the 1% AEP flood, factoring in a rise in sea level of 400mm to the year 2050, (plus 500mm freeboard) of the Cooks River.

PART 2: GENERIC PROVISIONS

2.22.2.2 Flood planning area (Overland Flow)

The Flood Planning Area (Overland Flow) identifies land (in accordance with Council's Flood Tagging Policy) likely to be affected by the 1% AEP flood associated with various locations affected by local overland flooding.

2.22.2.1 Flood planning level

The Flood Planning Level is the 1% AEP flood level plus freeboard. The applicable freeboard is 500mm unless an exception is described within a specific development control.

2.22.2.2 Flood liable land

Land identified on the DCP 2011 Flood Liable Map as flood liable land identifies land within a flood planning area, and land likely to be affected by the probable maximum flood (PMF) of the Cooks River. This means that the map identifies some land as being within the Cooks River PMF area, but not within the Cooks River 100-year flood (plus 500mm freeboard) area.

NB *The 1% AEP flood is a flood that has a one per cent probability of occurring or being exceeded in any year. The probable maximum flood (PMF) is calculated to be the maximum flood likely to occur. Freeboard refers to a factor of safety and is expressed as a height above the flood level. Freeboard tends to compensate for factors such as wave action and localised hydraulic effects.*

2.22.3 Development affected

Flood management controls apply as follows:

- For land in a flood planning area, the controls apply to all development that requires development consent.
- For land that is flood liable land, but that is not in a flood planning area (land within the Cooks River PMF), the controls also apply to caravan parks, child care centres, correctional centres, emergency services facilities, hospitals, residential accommodation (except for attached dwellings, dwelling houses, secondary dwellings and semi-detached dwellings), and tourist and visitor accommodation.

2.22.4 Cooks River flood classification areas

Flood classifications have been applied to parts of the Flood Planning Area (Cooks River). The flood classifications are:

- Low hazard: Should it be necessary, people and their possessions could be evacuated by truck. Able bodied adults would have little difficulty wading out of the area.
- High hazard: Possible danger to life, evacuation by truck difficult, potential for structural damage, and social disruption and financial losses could be high.

The identified areas, and their flood classifications, are:

1. Riverside Crescent/Tennyson Street area (Marrickville and Dulwich Hill): Low hazard to high hazard.
2. Illawarra Road/Wharf Street area (Marrickville): Low hazard to high hazard.
3. Carrington Road area (Marrickville): Low hazard.
4. Bay Street area (Tempe): Low hazard to high hazard.

2.22.5 Controls

General

C1 A *Flood Risk Management Report* must be submitted for applications that are on land identified on the Flood Planning Area Map in Appendix 1 and land identified as flood liable on the Flood Liable Land Map in Appendix 2.

The report must be informed by flood information relevant to the subject property and surrounds, including the 1% AEP flood level, Flood Planning Level, Probable Maximum Flood (PMF) level and the Flood Hazard Category, as obtained from Council.

The report is not required where the assessed value of the works is under $50,000 except where, in the opinion of Council, those works are likely to substantially increase the risk of flood to the subject or adjoining or nearby sites.

The report may be limited to a short report (Flood Risk Management Statement) for single residential dwellings, alterations and additions or change of use developments where the property is confirmed by Council as being subject only to low hazard flooding. The Flood Risk Management Statement must reference the source of flood information; specify the relevant flood information applicable to the site, then describe the proposed development and how it meets the relevant development controls.

If Council is concerned with the apparent loss of flood storage and/or flood or overland flow paths, and/or increase in flow velocities, and/or risk of life, on any type of development, the applicant may be requested to undertake further analysis in support of the proposal and detail it in a new/revised Flood Risk Management Report.

C2 The Flood Risk Management Report must address:

a. Description of the existing stormwater drainage system, including catchment definition.
b. Extent of the 1% AEP flood event in the vicinity of the development.
c. The Flood Hazard Category affecting the subject site and surrounds. Where the site is subject to the high hazard flooding category, the Probable Maximum Flood (PMF) extent must be shown.
d. Long and cross sections showing the Flood Planning Level(s) in relationship to the floor levels of all existing and proposed components of the development.
e. Recommendations on all precautions to minimise risk to personal safety of occupants and the risk of property damage for the total development to address the flood impacts on the site during a 1% AEP flood and PMF event. These precautions must include but not be limited to the following:
    i. Types of materials to be used to ensure the structural integrity of the development for immersion and impact of velocity and debris for the 1% AEP flood event and PMF (for high hazard);
    ii. Waterproofing methods, including electrical equipment, wiring, fuel lines or any other service pipes or connections;
    iii. A flood evacuation strategy (Flood Emergency Response Plan); and

iv. On site response plan to minimise flood damage, and provide adequate storage areas for hazardous materials and valuable goods above the flood level;

f. Details of any flood mitigation works that are proposed to protect the development.

g. Supporting calculations.

h. The architectural/engineering plans on which the assessment is based.

i. The date of inspection.

j. The professional qualifications and experience of the author(s).

C3 All applications for development must be accompanied by a survey plan including relevant levels to AHD (Australian Height Datum). Consideration must be given to whether structures or filling are likely to affect flood behaviour and whether consultation with other authorities is necessary.

C4 Compliance with flood management controls must be balanced by the need to comply with other controls in this DCP.

Controls for new residential development

C5 Floor levels (Flood Planning Levels) of habitable rooms must be a minimum of 500mm above the 1% AEP flood level at that location. For areas of minor overland flow (a depth of 300mm or less or overland flow of 2cum/sec or less) a lower freeboard of 300mm may be considered on its merits.

C6 Any portion of buildings below the Flood Planning Level) must be constructed from flood compatible materials (See Schedule 1).

C7 Flood free access must be provided where practicable.

Controls for residential development – minor additions

C8 Once-only additions with a habitable floor area of up to 30m^2 may be approved with floor levels below the 1% AEP flood level at that location if the applicant can demonstrate that no practical alternatives exist for constructing the extension above the 1% AEP flood level.

C9 Additions greater than 30m^2 will be considered against the requirements for new residential development (refer C5, C6, and C7).

C10 Any portion of buildings below the Flood Planning Level must be constructed from flood compatible materials.

Controls for non-habitable additions or alterations

C11 All flood sensitive equipment must be located above the Flood Planning Level at that location.

C12 Any portion of buildings below the Flood Planning Level must be built from flood compatible materials.

Controls for new non-residential development

C13 Floor levels (except for access-ways) must be at least 500mm above the 1% AEP flood level, or the buildings must be flood-proofed to at least 500mm above the 1% AEP flood level. For areas of minor overland flow (a depth of 300mm or less or overland flow of 2cum/sec or less) a lower freeboard of 300mm may be considered on its merits.

C14 Flood-free access must be provided where practicable.



Controls for non-residential development – additions

C15 Where the proposed development is for an addition to an existing building within the Flood Planning Area, the development may be approved with floor levels below the 1% AEP flood Level if the applicant can demonstrate that all practical measures will be taken to prevent or minimise the impact of flooding. In determining the required floor level, matters which will be considered include:

i. The nature of the proposed landuse;
ii. The frequency and depth of possible flooding;
iii. The potential for life and property loss;
iv. The suitability of the building for its proposed use; and
v. Whether the filling of the site or raising of the floor levels would render the development of the site impractical or uneconomical.

C16 Any portion of the proposed addition below the 1% AEP must be built from flood compatible materials.

Controls for change of use of existing buildings

C17 Development consent for change of use of an existing building with floor levels below the 1% AEP flood level will only be given where there is no foreseeable risk of pollution associated with the proposed use of the building in the event that 1% AEP flood event occurs.

C18 In determining whether to grant development consent for change of use of an existing building with floor levels below the1% AEP flood level, consideration will be given to whether the proposed development would result in increased flood risk for the property on which the building is located, or other land. In this regard, the following matters will be considered:

i. The nature of the proposed use and the manner in which it is proposed to be carried out within the building or on the land; and
ii. The foreseeable risk of pollution associated with the proposed use of the building/land in the event that the 1% AEP flood event occurs.

Controls for subdivision

C19 Development consent for the subdivision of flood liable land may depend on whether the land to which the proposed development relates is unsuitable for any development made likely by the subdivision, by reason of the land likely to be subject to flooding.

C20 Development consent for the subdivision of flood liable land may depend on whether the carrying out of the subdivision and any associated site works would:

i. Adversely impede the flow of flood water on the land or land in its vicinity;
ii. Imperil the safety of persons on that land or land in its vicinity in the event of the land being inundated with flood water; and
iii. Aggravate the consequences of flood water flowing on that land or land in its immediate vicinity with regard to erosion or siltation.

PART 2: GENERIC PROVISIONS

Controls for filling of land within the Flood Planning Area

C21 Development consent will not be granted to filling of flood ways or high flood hazard areas. Consideration will only be given to granting development consent to the filling of other flood liable land where:

i. Flood levels are not increased by more than 10mm by the proposed filling.
ii. Downstream velocities are not increased by more than 10% by the proposed filling.
iii. Proposed filling does not redistribute flows by more than 15%.
iv. The potential for cumulative effects of possible filling proposals in that area is minimal.
v. The development potential of surrounding properties is not adversely affected by the filling proposal.
vi. The flood liability of buildings on surrounding properties is not increased.
vii. The filling creates no local drainage flow/runoff problems.

NB *Where the proposal has the potential to increase flood levels, depths, velocities and/or the risk to life or property, through loss of flood storage and/or blockage/ redirection of overland flowpaths, the Flood Risk Management Report supporting the development application must include detailed flood analysis. Such analysis should address compliance with all relevant development controls and include survey cross-sections to provide representative topographic information. The proponent should approach Council to determine available Council flood studies for the area, with the analysis based on or calibrated against relevant studies. In some cases, flood model data can be obtained from Council, subject to application and payment of fees.*

Controls for land uses on flood liable land identified on the DCP 2011 Flood Liable Land Map

C22 A site emergency response flood plan must be prepared in case of a PMF flood.

C23 Adequate flood warning systems, signage and exits must be available to allow safe and orderly evacuation without increased reliance upon the State Emergency Service (SES) or other authorised emergency services personnel.

C24 Reliable access for pedestrians or vehicles must be provided from the building, commencing at a minimum level equal to the lowest habitable floor level to an area of refuge above the PMF.

Controls for garages, carports, open car parks and basement garages

C25 The floor level of new enclosed garages must be at or above the 1% AEP flood level plus 200mm. In extenuating circumstances, consideration may be given to a floor level at a lower level, being the highest practical level but no lower than 180mm below the 1% AEP flood level, where it can be demonstrated that providing the floor level at the Flood Planning Level is not practical within the constraints of compliance with Australian Standard AS/NZS 2890.1 Parking facilities as amended.

C26 The floor levels of open car park areas and carports must meet the same criteria as above for garages. In extreme circumstances, for single dwelling residential development, a floor level below the 1% AEP flood

level minus 180mm may be accepted for a single car space, subject to bollards being provided along the 'free' perimeter (excluding the vehicle entry on one side only) at 1.2m intervals and the floor level being raised as high as practical within the constraints of compliance with Australian Standard AS/NZS 2890.1 Parking facilities as amended.

C27 On properties with a low flood hazard classification, basement (below natural ground level) car parking must have all access and potential water entry points above the Flood Planning Level, and a clearly signposted flood free pedestrian evacuation route provided from the basement area separate to the vehicular access ramps. For basement car parking in properties affected by High Hazard flooding further considerations will apply.

C28 Basement garages must include:

a. Suitable pumps must be provided within the garage to allow for the drainage of stormwater should the basement garage become inundated during flooding.

b. Adequate flood warning systems, signage and exits must be available to allow safe and orderly evacuation without increased reliance upon the SES or other authorised emergency services personnel.

C29 For parking areas servicing more than two parking spaces, reliable access for pedestrians must be provided from all parking areas, to a safe haven which is above the PMF.

PART 2: GENERIC PROVISIONS

2.22.6 SCHEDULE 1 – Flood compatible materials

Building component	Flood compatible material
Flooring and sub-floor	• concrete slab-on-ground monolith
	• suspended reinforced concrete slab
Floor covering	• clay tiles
	• concrete, precast or in situ
	• concrete tiles
	• epoxy, formed-in-place
	• mastic flooring, formed-in-place
	• rubber sheets or tiles with chemicals-set-adhesive
	• silicone floors formed-in-place
	• vinyl sheets or tiles with chemical-set adhesive
	• ceramic tiles, fixed with mortar or chemical-set adhesive
	• asphalt tiles, fixed with water resistant adhesive
Wall structure	• solid brickwork, blockwork, reinforced, concrete or mass concrete
Roofing structure (for situations where the relevant flood level is above the ceiling)	• reinforced concrete construction • galvanised metal construction
Doors	• solid panel with water proof adhesives
	• flush door with marine ply filled with closed cell foam
	• painted metal construction
	• aluminium or galvanised steel frame
Wall and ceiling linings	• fibro-cement board
	• brick, face or glazed
	• clay tile glazed in waterproof mortar
	• concrete
	• concrete block
	• steel with waterproof applications
	• stone, natural solid or veneer, waterproof grout
	• glass blocks
	• glass
	• plastic sheeting or wall with waterproof adhesive
Insulation windows	• foam (closed cell types)
	• aluminium frame with stainless steel rollers or similar corrosion and water resistant material
Nails, bolts, hinges and fittings	• brass, nylon or stainless steel • removable pin hinges • hot dipped galvanised steel wire nails or similar

SCHEDULE 1: Flood compatible materials (cont.)

Electrical and mechanical equipment

For development constructed on land to which this section of the DCP applies, the electrical and mechanical materials, equipment and installation must conform to the following requirements:

Main power supply

Subject to the approval of the relevant authority the incoming main commercial power service equipment, including all metering equipment, must be located above the relevant flood level. Means must be available to easily disconnect the dwelling from the main power supply.

Wiring

All wiring, power outlets, switches, must be to the maximum extent possible, located above the maximum flood level. All electrical wiring installed below this level must be suitable for continuous underwater immersion and must contain no fibrous components. Each leakage circuit-breaker (core balance relays) must be installed. Only submersible type splices must be used below maximum flood level. All conduits located below the relevant designated flood level must be so installed that they will be self-draining if subjected to flooding.

Equipment

All equipment installed below or partially below the relevant flood level must be capable of disconnection by a single plug and socket assembly.

Reconnection

Should any electrical device and/or part of the wiring be flooded it must be thoroughly cleaned or replaced and checked by an approved electrical contractor before reconnection.

Heating and air conditioning systems

Where viable, heating and air conditioning systems should be installed in areas and spaces of the development above maximum flood level. When this is not feasible, every precaution must be taken to minimise the damage caused by submersion according to the following guidelines:

Fuel

Heating systems using gas or oil as fuel must have a manually operated valve located in the fuel supply line to enable fuel cut-off.

Installation

Heating equipment and fuel storage tanks must be mounted on and securely anchored to a foundation pad of sufficient mass to overcome buoyancy and prevent movement that could damage the fuel supply line. All storage tanks must be vented to an elevation of 600mm above the relevant flood level.

Ducting

All ductwork located below the relevant flood level must be provided with openings for drainage and cleaning. Self-draining may be achieved by constructing the ductwork on a suitable grade. Where ductwork must pass through a water-tight wall or floor below the relevant flood level, a closure assemble operated from above relevant flood level must protect the ductwork.

Appendix 1 - DCP 2011 Flood Planning Area Map

See the attached map.

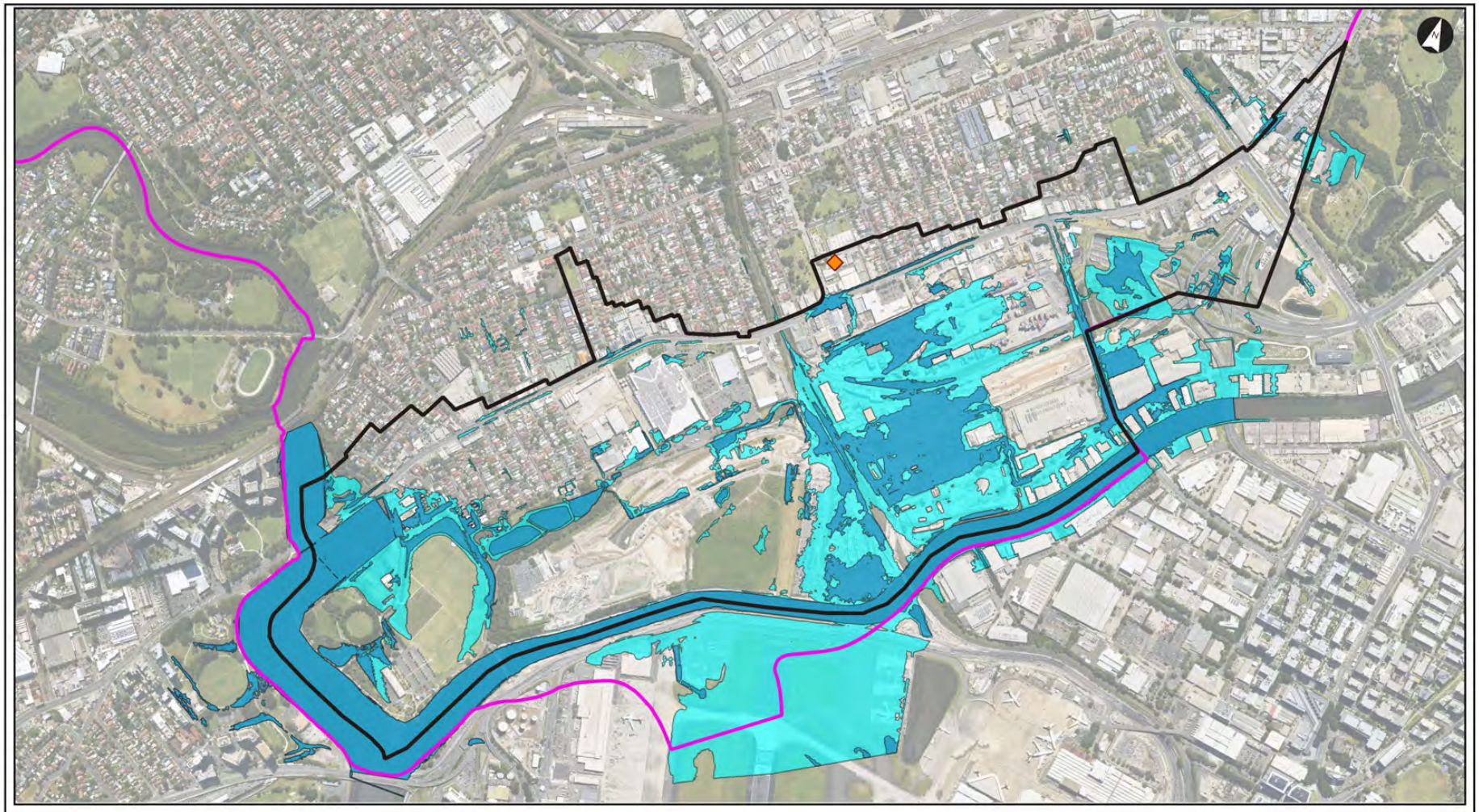
Appendix 2 - DCP 2011 Flood Liable Land Map

See the attached map.

APPENDIX C

EMERGENCY MANAGEMENT MAPS

Stantec



Emergency Services within the Study Area with 1% AEP and PMF Extent

Project: Alexandra Canal Flood Risk Management Study & Plan

Client: Inner West Council
Project Code: NW30095
Drawn By: Habba Rahimi, Checked By: Alireza Pouya
Date: (2023-06-26)
Figure No: 1

Stantec

Legend

- Alexandra Canal Study Area
- Inner West LGA Boundary
- 1% AEP Flood Extent
- PMF Flood Extent

Location of Emergency Services

- Ambulance
- Helicopter Emergency Base
- Police Station
- SES

Notes:
1. Map displayed in EPSG:28356

References:
1. Aerial Imagery [Metromap, March 2023]

DRAFT - Not For Construction

0 0.3 0.6 km

Scale at A3: 1:10000



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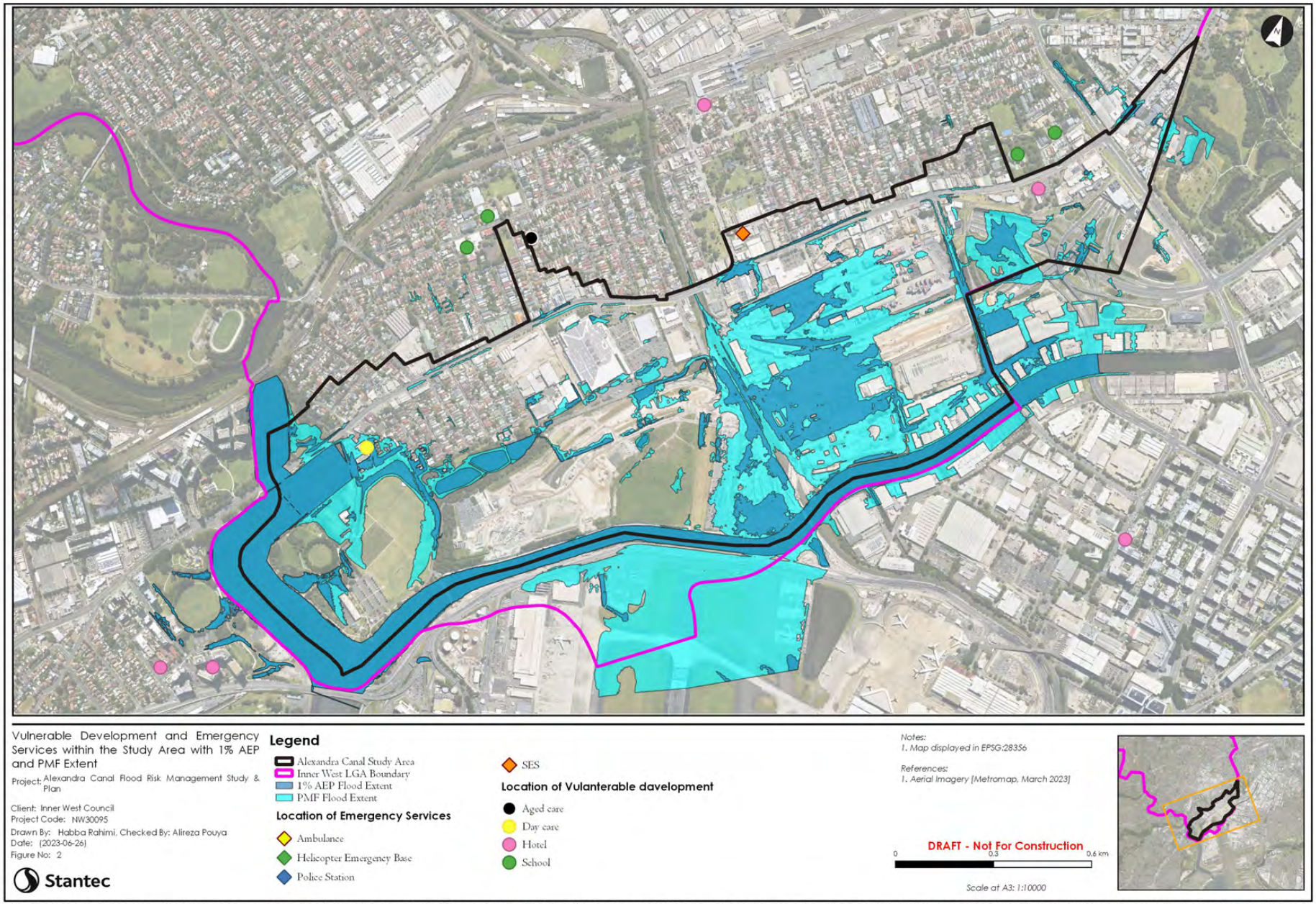

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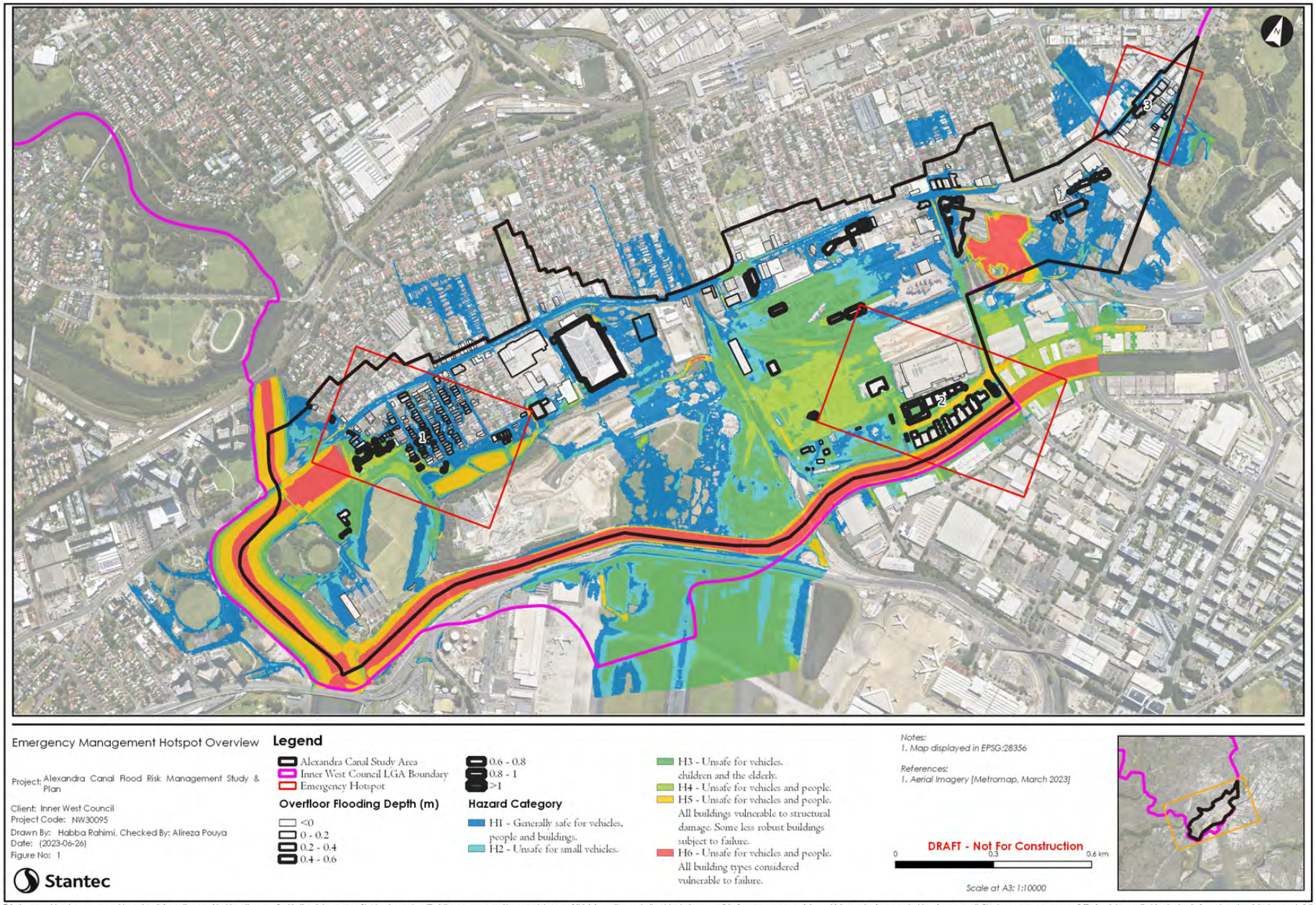

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Emergency Management

Hotspot 1 **20% AEP**

Project: Alexandra Canal Flood Risk Management Study and Plan

Client: Inner West Council
Project Code: NW30095
Drawn By: Habba Rahimi, Checked By: Alireza Pouya
Date: (2023-07-05)
Figure No: 1

Stantec

Legend

Alexandra Canal study Area

Overfloor Flooding Depth (m)

- <0
- 0 - 0.2
- 0.2 - 0.4
- 0.4 - 0.6

Evacuation Routes

- Vehicular
- Commercial Low Flood Island
- Low Flood Island

Hazard Category

- H1 - Generally safe for vehicles, people and buildings.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for vehicles, children and the elderly.
- H4 - Unsafe for vehicles and people.
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.

Notes:
1. Map displayed in EPSG:28356

References:
1. Aerial Imagery [MetroMap, 2023]

DRAFT - Not For Construction

0 0.09 0.18 km

Scale at A3: 1:19987

Key Map

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Emergency Management

Hotspot 1 **1% AEP**

Project: Alexandra Canal Flood Risk Management Study and Plan

Client: Inner West Council
Project Code: NW30095
Drawn By: Habba Rahimi. Checked By: Alireza Pouya
Date: (2023-07-05)
Figure No: 2

Stantec

Legend

Alexandra Canal study Area

Overfloor Flooding Depth (m)

- <0
- 0 - 0.2
- 0.2 - 0.4
- 0.4 - 0.6

Evacuation Routes

- Vehicular
- Commercial Low Flood Island
- Low Flood Island

Hazard Category

- H1 - Generally safe for vehicles, people and buildings.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for vehicles, children and the elderly.
- H4 - Unsafe for vehicles and people.
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.

Notes:
1. Map displayed in EPSG:28356

References:
1. Aerial Imagery [MetroMap, 2023]

DRAFT - Not For Construction

0 0.09 0.18 km

Scale at A3: 1:19987

This document has been prepared based on information provided by others as cited in the data sources. Stantec has not verified the accuracy and/or completeness of this information as shall not be help responsible for any errors or omissions which may be incorporated herein as a result. Stantec assumes no responsibility for data supplied in electronic format, and recipient accepts full responsibility for verifying the accuracy and completeness of the data.



Emergency Management

Hotspot 1 **PMF**

Project: Alexandra Canal Flood Risk Management Study and Plan

Client: Inner West Council
Project Code: NW30095
Drawn By: Habba Rahimi, Checked By: Alireza Pouya
Date: (2023-07-05)
Figure No: 3

Stantec

Legend

Alexandra Canal study Area

Overfloor Flooding Depth (m)

- <0
- 0 - 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- 0.8 - 1
- >1

Evacuation Routes

- Vehicular
- Commercial Low Flood Island
- Low Flood Island

Hazard Category

- H1 - Generally safe for vehicles, people and buildings.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for vehicles, children and the elderly.
- H4 - Unsafe for vehicles and people.
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.

Notes:
1. Map displayed in EPSG:28356

References:
1. Aerial Imagery [MetroMap, 2023]

DRAFT - Not For Construction

0 0.09 0.18 km

Scale at A3: 1:19987

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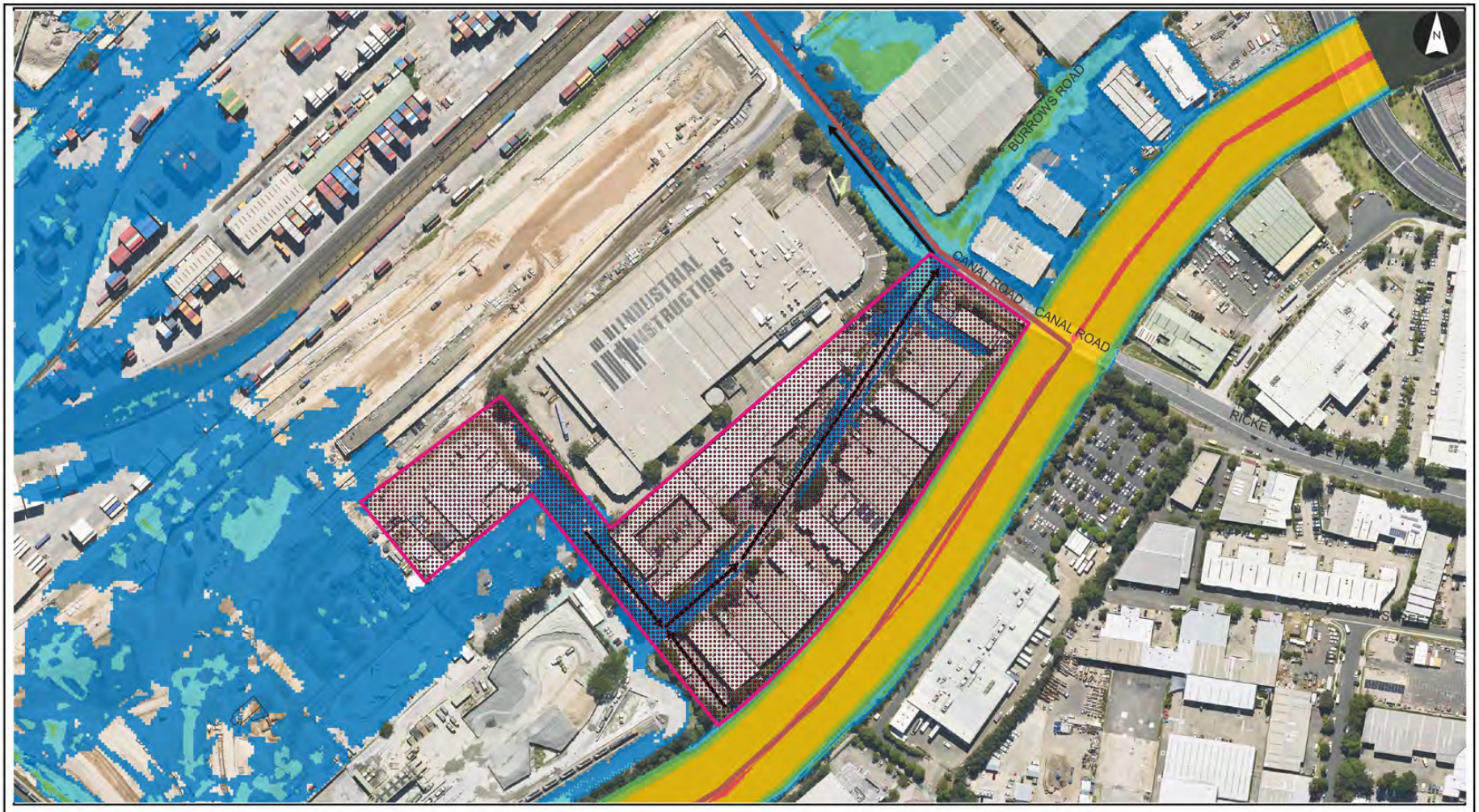

Emergency Management

Hotspot 2 **20% AEP**

Project: Alexandra Canal Flood Risk Management Study and Plan

Client: Inner West Council
Project Code: NW30095
Drawn By: Habba Rahimi, Checked By: Alireza Pouya
Date: (2023-07-05)
Figure No: 4

Stantec

Legend

Alexandra Canal study Area

Overfloor Flooding Depth (m)

<0

Evacuation Routes

Vehicular

Commercial Low Flood Island

Hazard Category

H1 - Generally safe for vehicles, people and buildings.

H2 - Unsafe for small vehicles.

H3 - Unsafe for vehicles, children and the elderly.

H4 - Unsafe for vehicles and people.

H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.

H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.

Notes:
1. Map displayed in EPSG:28356

References:
1. Aerial Imagery [MetroMap, 2023]

DRAFT - Not For Construction

0 0.09 0.18 km

Scale at A3: 1:19987



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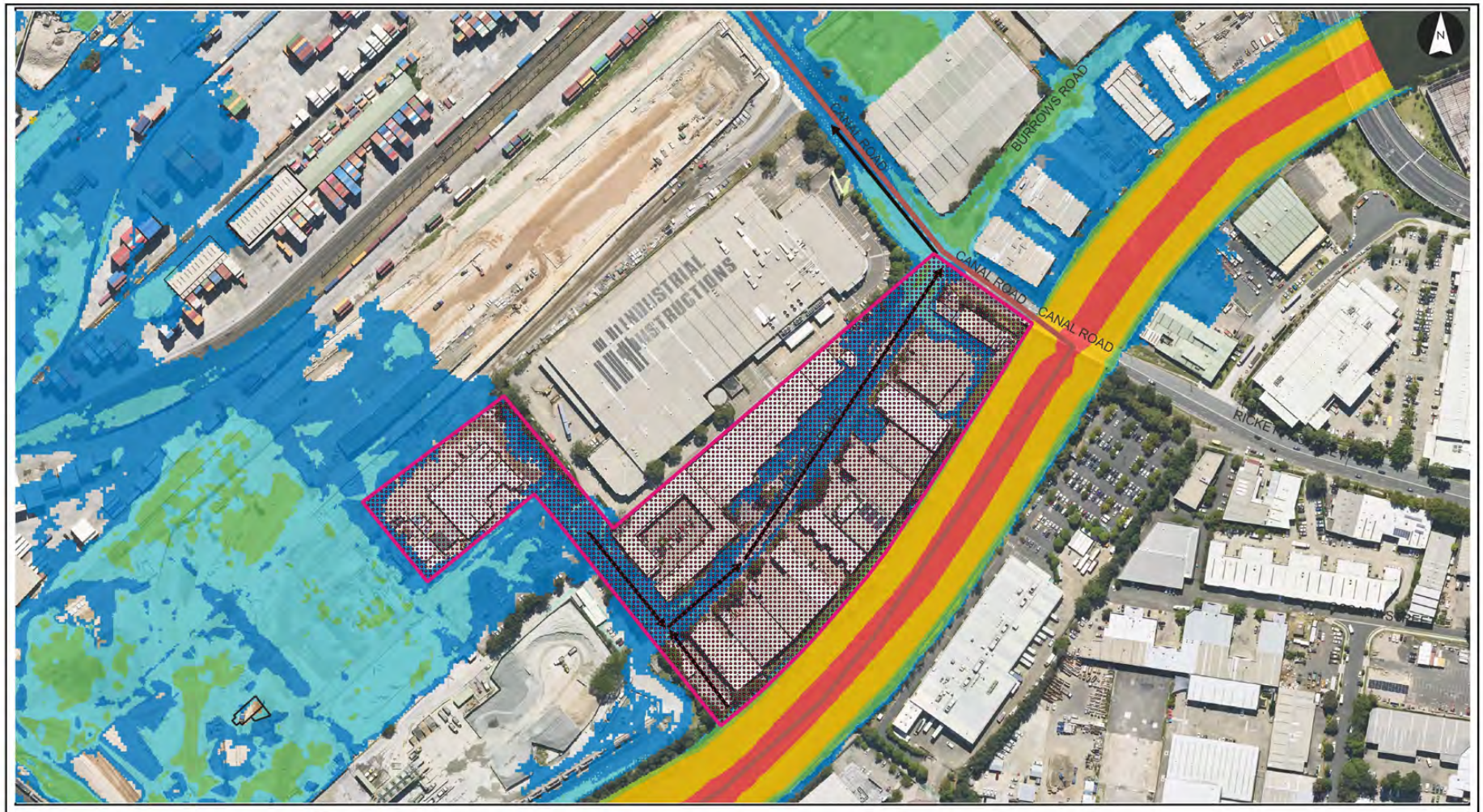

Emergency Management

Hotspot 2 **1% AEP**

Project: Alexandra Canal Flood Risk Management Study and Plan

Client: Inner West Council
Project Code: NW30095
Drawn By: Habba Rahimi, Checked By: Alireza Pouya
Date: (2023-07-05)
Figure No: 5

Stantec

Legend

- Alexandra Canal study Area

Overfloor Flooding Depth (m)

- <0
- 0 - 0.2

Evacuation Routes

- Vehicular
- Commercial Low Flood Island

Hazard Category

- H1 - Generally safe for vehicles, people and buildings.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for vehicles, children and the elderly.
- H4 - Unsafe for vehicles and people.
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.

Notes:
1. Map displayed in EPSG:28356

References:
1. Aerial Imagery [MetroMap, 2023]

DRAFT - Not For Construction

0 0.09 0.18 km

Scale at A3: 1:19987



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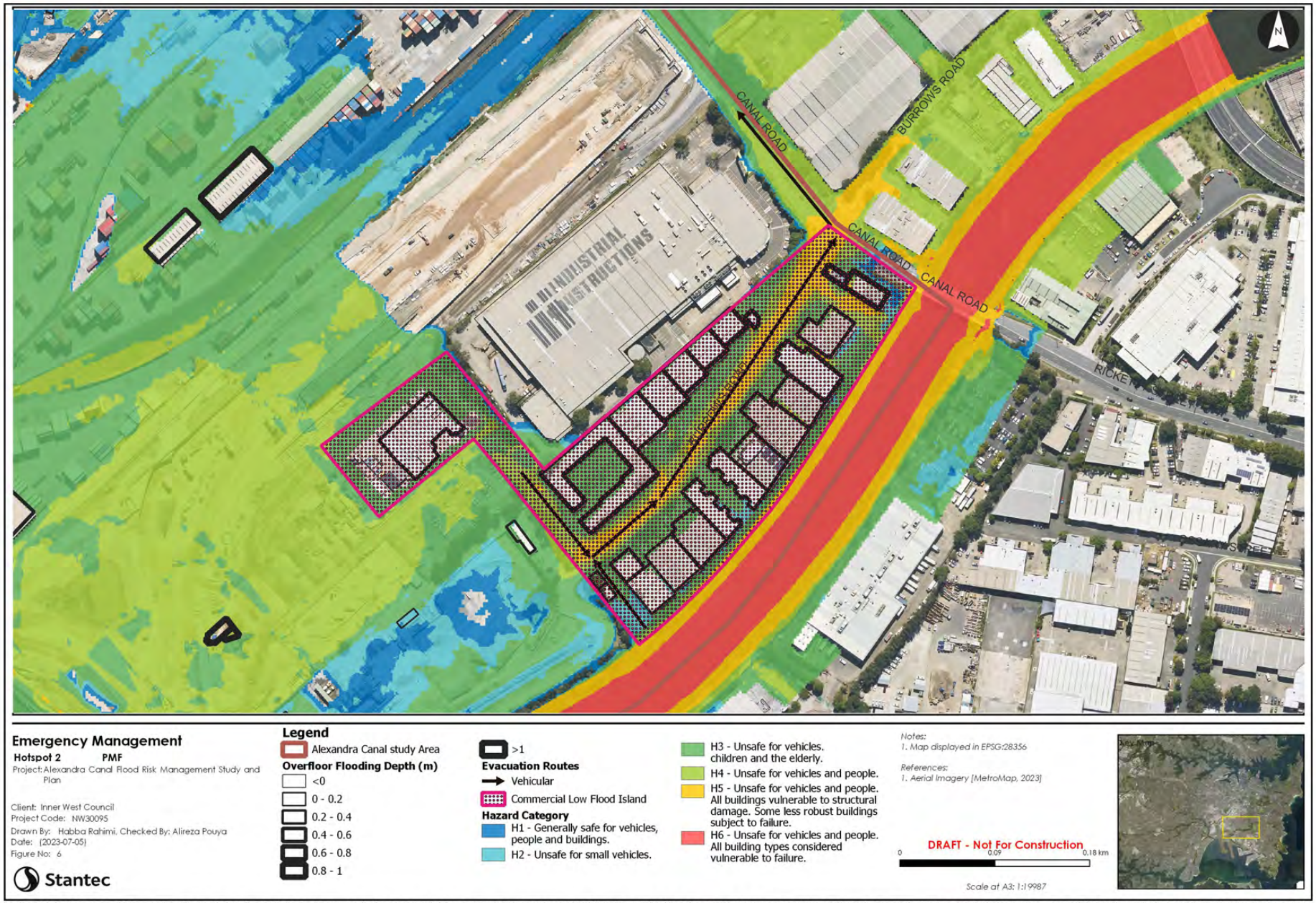

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APPLEBEE STREET
PRINCES HIGHWAY
SHORT STREET
BARWON PARK ROAD
CAMPBELL STREET
Emergency Management
Hotspot 3 20%AEP
Project: Alexandra Canal Flood Risk Management Study and Plan
Client: Inner West Council
Project Code: NW30095
Drawn By: Habba Rahimi Checked By: Alireza Pouya
Date: (2023-07-05)
Figure No: 7
Stantec
Legend
Alexandra Canal Study Area
Overfloor Flooding Depth (m)
<0
0 - 0.2
Evacuation Routes
Vehicular
Commercial Low Flood Island
Low Flood Island
Hazard Category
H1 - Generally safe for vehicles, people and buildings.
H2 - Unsafe for small vehicles.
H3 - Unsafe for vehicles, children and the elderly.
H4 - Unsafe for vehicles and people.
H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.
Notes:
1. Map displayed in EPSG:28356
References:
1. Aerial Imagery [MetroMap, 2023]
DRAFT - Not For Construction
0 0.02 0.04 km
Scale at A3: 1:29044
this document has been prepared based on information provided by others as cited in the data sources. Stantec has not verified the accuracy and/or completeness of this information as shall not be help responsible for any errors or omissions which may be incorporated herein as a result. Stantec assumes no responsibility for data supplied in electronic format, and recipient accepts full responsibility for verifying the accuracy and completeness of the data.



Emergency Management

Hotspot 3 **1% AEP**

Project: Alexandra Canal Flood Risk Management Study and Plan

Client: Inner West Council
Project Code: NW30095
Drawn By: Habba Rahimi Checked By: Alireza Pouya
Date: (2023-07-05)
Figure No: 8

Stantec

Legend

- Alexandra Canal Study Area

Overfloor Flooding Depth (m)

- <0
- 0 - 0.2
- 0.2 - 0.4

Evacuation Routes

- Vehicular
- Commercial Low Flood Island
- Low Flood Island

Hazard Category

- H1 - Generally safe for vehicles, people and buildings.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for vehicles, children and the elderly.
- H4 - Unsafe for vehicles and people.
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.

Notes:
1. Map displayed in EPSG:28356

References:
1. Aerial Imagery [MetroMap, 2023]

DRAFT - Not For Construction

0 0.02 0.04 km

Scale at A3: 1:29044

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APPENDIX D

PRELIMINARY FLOOD OPTIONS MAPS

Stantec



Preliminary Mitigation Options Hotspot 1

Project: Alexandra Canal Floodplain Risk Management Study and Plan

Client: Inner West Council
Project Code: NW30095
Drawn By: Anson Chang, Checked By: Alireza Pouya
Date: (2023-07-05)
Figure No: 1

Stantec

Legend

Existing Council Modelled Stormwater Network
Cadastre
Inner West Council LGA Boundary
Alexandra Canal Study Area

Preliminary Option Type
Channel Upgrades
Detention Basin
Drainage Upgrades
Flood Lowering
Drainage Maintenance

Flood Depth (m)
0.00 to 0.10
0.10 to 0.30
0.30 to 0.50
0.50 to 0.70
0.70 to 1.00
1.00 to 1.50
> 1.50

Notes:
1. Map displayed in EPSG:28356

References:
1. Aerial Imagery [Metromap, 2023]

DRAFT - Not For Construction

30 0 30 60 90 120 m

Scale at A3: 1:3200

Key Map

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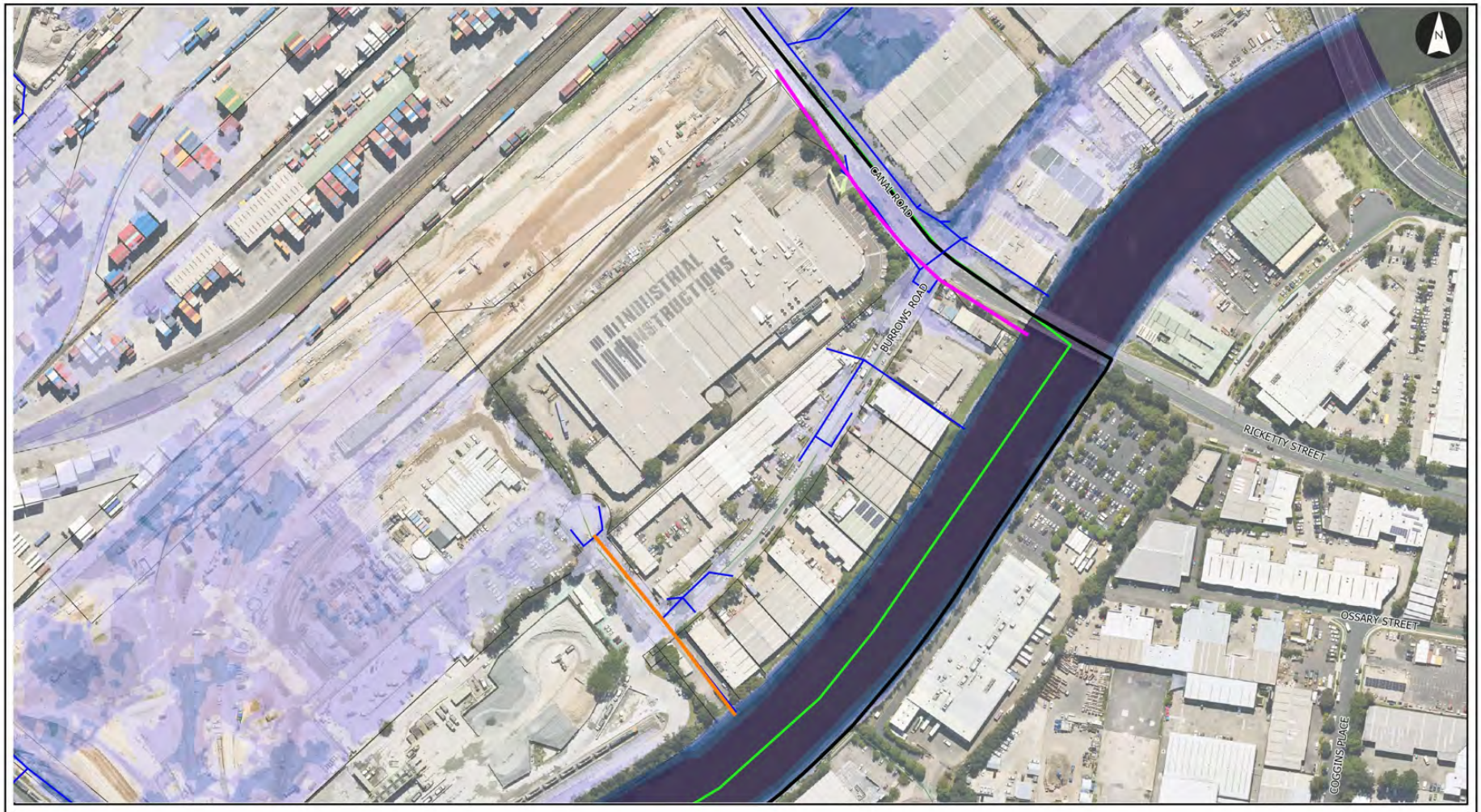

Preliminary Mitigation Options Hotspot 2

Project: Alexandra Canal Floodplain Risk Management Study and Plan

Client: Inner West Council
Project Code: NW30095
Drawn By: Anson Chang, Checked By: Alireza Pouya
Date: (2023-07-05)
Figure No: 2

Stantec

Legend

- Existing Council Modelled Stormwater Network
- Cadastre
- Inner West Council LGA Boundary
- Alexandra Canal Study Area

Preliminary Option Type
- Channel Upgrades
- Detention Basin
- Drainage Upgrades
- Road Lowering
- Drainage Maintenance

Flood Depth (m)
- 0.00 to 0.10
- 0.10 to 0.30
- 0.30 to 0.50
- 0.50 to 0.70
- 0.70 to 1.00
- 1.00 to 1.50
- > 1.50

Notes:
1. Map displayed in EPSG:28356

References:
1. Aerial Imagery [Metromap, 2023]

DRAFT - Not For Construction

30 0 30 60 90 120 m

Scale at A3: 1:2500



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Preliminary Mitigation Options
Hotspot 3
Project: Alexandra Canal Floodplain Risk Management Study and Plan

Client: Inner West Council
Project Code: NW30095
Drawn By: Anson C. Checked By: Alireza Pouya
Date: (2023-07-05)
Figure No: 3

Stantec

Legend
- Existing Council Modelled Stormwater Network
- Cadastre
- Inner West Council LGA Boundary
- Alexandria Canal Study Area

Preliminary Option Type
- Channel Upgrades
- Detention Basin
- Drainage Upgrades
- Road Lowering
- Drainage Maintenance

Flood Depth (m)
- 0.00 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- 0.50 to 0.70
- 0.70 to 1.00
- 1.00 to 1.50
- > 1.50

Notes:
1. Map displayed in EPSG:28356

References:
1. Aerial Imagery [Metromap, 2023]

DRAFT - Not For Construction

19 0 19 38 57 76 m

Scale at A3: 1:1600



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APPENDIX

E

DETAILED FLOOD OPTIONS MAPS

Stantec



Alexandra Canal Base Case - PM6 Overview

Legend

- Unblocked Pipes
- Blocked Pipes, Now Unblocked
- IWC LGA Boundary
- Study Area
- Cadastre

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Key Map



DRAFT - Not For Construction

180 0 180 360 540 720 m

Scale at A3: 1:15000

Project: Alexandra Canal FRMS&P

Client: Inner West Council
Project Code: 304600163
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 1

Stantec

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Alexandra Canal Base Case 20% AEP
PM6 Pit and Pipes Unblocked

Project: Alexandra Canal FRMS&P

Client: Inner West Council
Project Code: 304600163
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 2

Stantec

Legend

- Unblocked Pipes
- Blocked Pipes, Now Unblocked

Change in Flood Extents (Wet/Dry)
- Was Wet, Now Dry
- Was Dry, Now Wet

Water Level Difference (m)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50

- IWC LGA Boundary
- Study Area
- Cadastre

Notes:
1. Map displayed in EPSG:28356

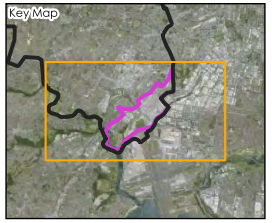
References:
1. Metro map

DRAFT - Not For Construction

180 0 180 360 540 720 m

Scale at A3: 1:15000

Key Map



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Alexandra Canal Base Case 5% AEP
PM6 Pit and Pipes Unblocked

Project: Alexandra Canal FRMS&P

Client: Inner West Council
Project Code: 304600163
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 3

Stantec

Legend

Unblocked Pipes
Blocked Pipes, Now Unblocked

Change in Flood Extents (Wet/Dry)
Was Wet, Now Dry
Was Dry, Now Wet

Water Level Difference (m)
< -0.50
-0.50 to -0.20
-0.20 to -0.10
-0.10 to -0.05
-0.05 to -0.01
-0.01 to 0.01
0.01 to 0.05
0.05 to 0.10
0.10 to 0.20
0.20 to 0.50
> 0.50

IWC LGA Boundary
Study Area
Cadastre

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

DRAFT - Not For Construction

180 0 180 360 540 720 m

Scale at A3: 1:15000

Key Map

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Alexandra Canal Base Case 2% AEP
PM6 Pit and Pipes Unblocked

Project: Alexandra Canal FRMS&P

Client: Inner West Council
Project Code: 304600163
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 4

Stantec

Legend

Unblocked Pipes
Blocked Pipes, Now Unblocked

Change in Flood Extents (Wet/Dry)
Was Wet, Now Dry
Was Dry, Now Wet

Water Level Difference (m)
< -0.50
-0.50 to -0.20
-0.20 to -0.10
-0.10 to -0.05
-0.05 to -0.01
-0.01 to 0.01
0.01 to 0.05
0.05 to 0.10
0.10 to 0.20
0.20 to 0.50
> 0.50

IWC LGA Boundary
Study Area
Cadastre

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

DRAFT - Not For Construction

180 0 180 360 540 720 m

Scale at A3: 1:15000

Key Map

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Alexandra Canal Base Case 1% AEP
PM6 Pit and Pipes Unblocked

Project: Alexandra Canal FRMS&P

Client: Inner West Council
Project Code: 304600163
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 5

Stantec

Legend

- Unblocked Pipes
- Blocked Pipes, Now Unblocked

Change in Flood Extents (Wet/Dry)
- Was Wet, Now Dry
- Was Dry, Now Wet

Water Level Difference (m)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50

- IWC LGA Boundary
- Study Area
- Cadastre

Notes:
1. Map displayed in EPSG:28356

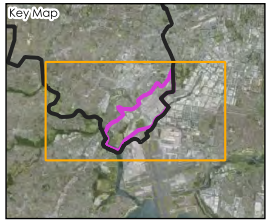
References:
1. Metro map

DRAFT - Not For Construction

180 0 180 360 540 720 m

Scale at A3: 1:15000

Key Map



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Alexandra Canal Base Case PMF
PM6 Pit and Pipes Unblocked

Legend

- Unblocked Pipes
- Blocked Pipes, Now Unblocked

Change in Flood Extents (Wet/Dry)
- Was Wet, Now Dry
- Was Dry, Now Wet

Water Level Difference (m)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50

- IWC LGA Boundary
- Study Area
- Cadastre

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Key Map

DRAFT - Not For Construction

180 0 180 360 540 720 m

Scale at A3: 1:15000

Project: Alexandra Canal FRMS&P
Client: Inner West Council
Project Code: 304600163
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 6

Stantec

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Alexandra Canal Option -
AC4 v6 Overview

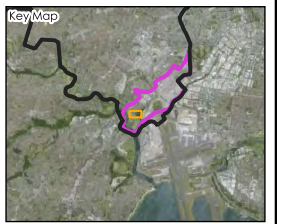
Legend

Proposed Drainage
Existing Pits and Pipes
IWC LGA Boundary
Study Area
Cadastre

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Key Map



DRAFT - Not For Construction

10 0 10 20 30 40 m

Scale at A3: 1:1000

Project: Alexandra Canal FRMS&P

Client: Inner West Council
Project Code: 304600163
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 7

Stantec

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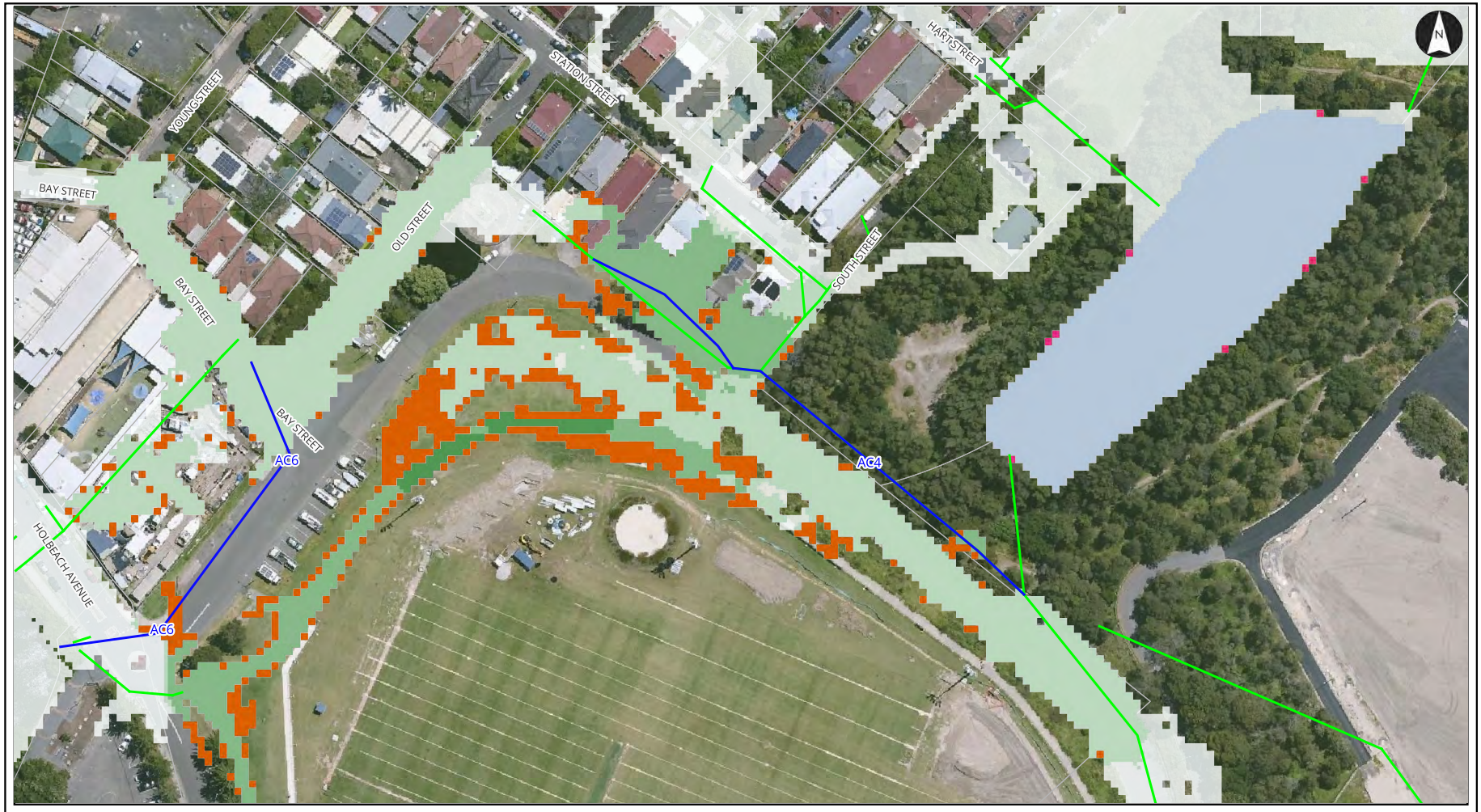


Alexandra Canal Option 20% AEP
AC4 v6 Station Street Drainage
Upgrade

Project: Alexandra Canal FRMS&P

Client: Inner West Council
Project Code: 304600163
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 8

Stantec

Legend

Proposed Drainage
Existing Pits and Pipes

Change in Flood Extents (Wet/Dry)
Was Wet, Now Dry
Was Dry, Now Wet

Water Level Difference (m)
< -0.50
-0.50 to -0.20
-0.20 to -0.10
-0.10 to -0.05
-0.05 to -0.01
-0.01 to 0.01
0.01 to 0.05
0.05 to 0.10
0.10 to 0.20
0.20 to 0.50
> 0.50

IWC LGA Boundary
Study Area
Cadastre

Notes:
1. Map displayed in EPSG:28356

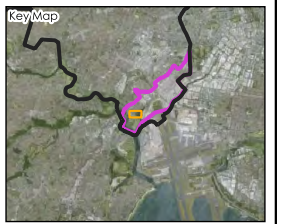
References:
1. Metro map

DRAFT - Not For Construction

10 0 10 20 30 40 m

Scale at A3: 1:1000

Key Map



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Alexandra Canal Option 5% AEP
AC4 v6 Station Street Drainage
Upgrade

Project: Alexandra Canal FRMS&P

Client: Inner West Council
Project Code: 304600163
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 9

Stantec

Legend

Proposed Drainage
Existing Pits and Pipes
Change in Flood Extents (Wet/Dry)
Was Wet, Now Dry
Was Dry, Now Wet

Water Level Difference (m)
< -0.50
-0.50 to -0.20
-0.20 to -0.10
-0.10 to -0.05
-0.05 to -0.01
-0.01 to 0.01
0.01 to 0.05
0.05 to 0.10
0.10 to 0.20
0.20 to 0.50
> 0.50

IWC LGA Boundary
Study Area
Cadastre

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

DRAFT - Not For Construction

10 0 10 20 30 40 m

Scale at A3: 1:1000

Key Map

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Alexandra Canal Option 2% AEP
AC4 v6 Station Street Drainage
Upgrade

Project: Alexandra Canal FRMS&P

Client: Inner West Council
Project Code: 304600163
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 10

Stantec

Legend

- Proposed Drainage
- Existing Pits and Pipes

Change in Flood Extents (Wet/Dry)
- Was Wet, Now Dry
- Was Dry, Now Wet

Water Level Difference (m)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50

- IWC LGA Boundary
- Study Area
- Cadastre

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Key Map



DRAFT - Not For Construction

10 0 10 20 30 40 m

Scale at A3: 1:1000

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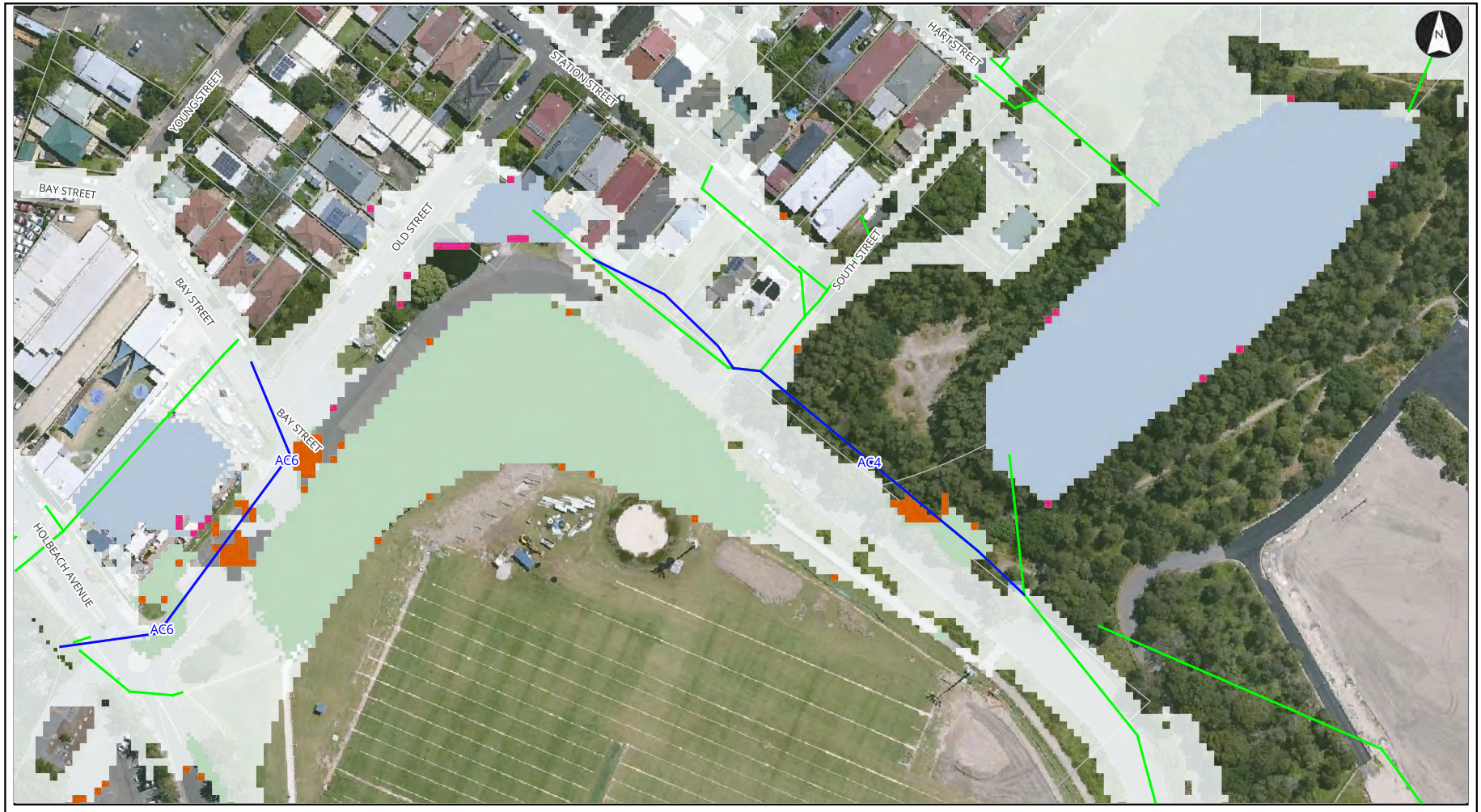

Alexandra Canal Option 1% AEP
AC4 v6 Station Street Drainage
Upgrade

Project: Alexandra Canal FRMS&P

Client: Inner West Council
Project Code: 304600163
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 11

Stantec

Legend

Proposed Drainage
Existing Pits and Pipes

Change in Flood Extents (Wet/Dry)
Was Wet, Now Dry
Was Dry, Now Wet

Water Level Difference (m)
< -0.50
-0.50 to -0.20
-0.20 to -0.10
-0.10 to -0.05
-0.05 to -0.01
-0.01 to 0.01
0.01 to 0.05
0.05 to 0.10
0.10 to 0.20
0.20 to 0.50
> 0.50

IWC LGA Boundary
Study Area
Cadastre

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Key Map

DRAFT - Not For Construction

10 0 10 20 30 40 m

Scale at A3: 1:1000

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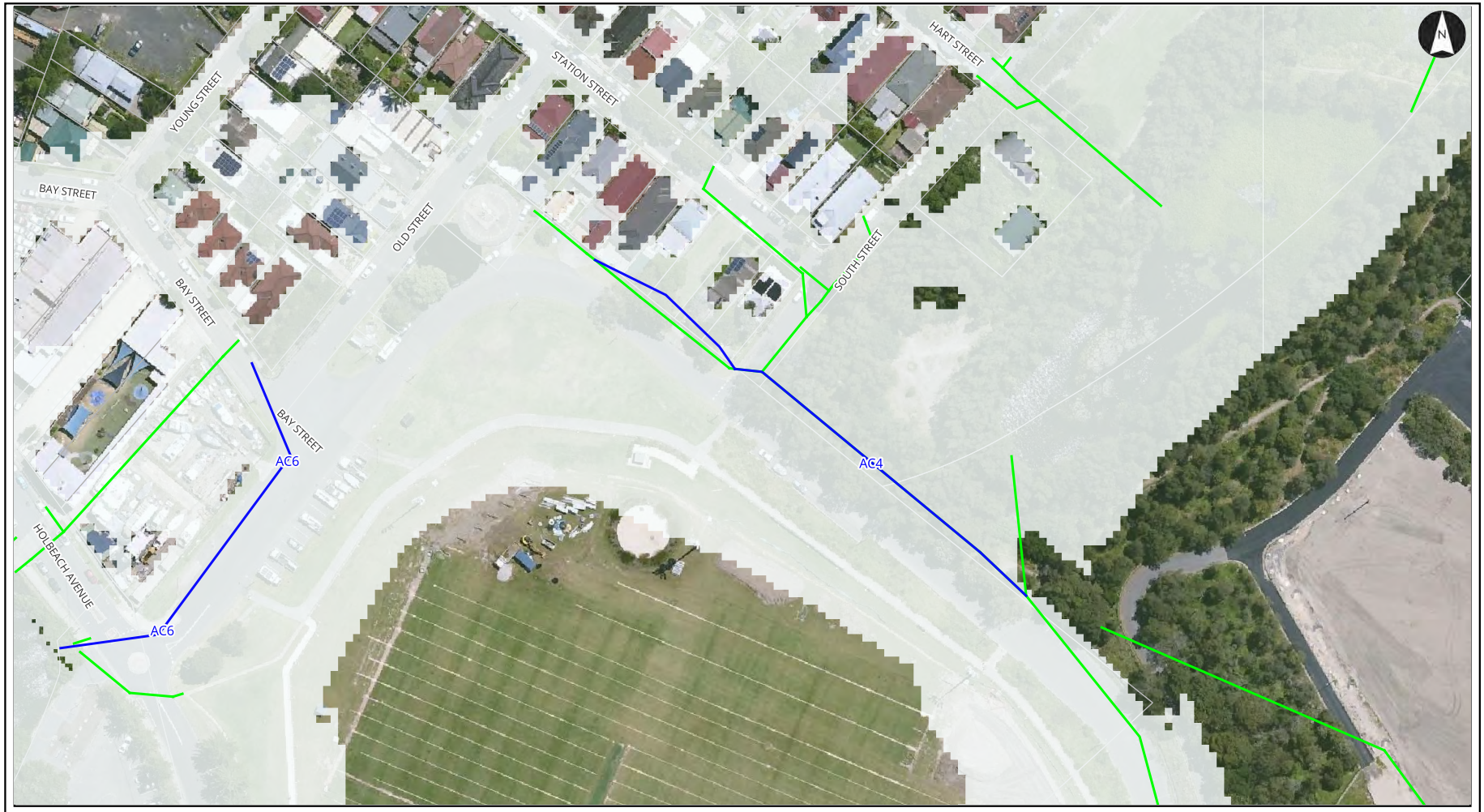

Alexandra Canal Option PMF
AC4 v6 Station Street Drainage Upgrade

Project: Alexandra Canal FRMS&P

Client: Inner West Council
Project Code: 304600163
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 12

Stantec

Legend

- Proposed Drainage
- Existing Pits and Pipes

Change in Flood Extents (Wet/Dry)
- Was Wet, Now Dry
- Was Dry, Now Wet

Water Level Difference (m)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50

- IWC LGA Boundary
- Study Area
- Cadastre

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

DRAFT - Not For Construction

10 0 10 20 30 40 m

Scale at A3: 1:1000



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Alexandra Canal Option -
AC6 v5 Overview

Legend

Proposed Drainage
Existing Pits and Pipes
IWC LGA Boundary
Study Area
Cadastre

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Key Map

Project: Alexandra Canal FRMS&P

Client: Inner West Council
Project Code: 304600163
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 13

Stantec

DRAFT - Not For Construction

10 0 10 20 30 40 m

Scale at A3: 1:850

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Alexandra Canal Option 20% AEP
AC6 v5 Bay Street Drainage Upgrade

Project: Alexandra Canal FRMS&P

Client: Inner West Council
Project Code: 304600163
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 14

Stantec

Legend

- Proposed Drainage
- Existing Pits and Pipes

Change in Flood Extents (Wet/Dry)
- Was Wet, Now Dry
- Was Dry, Now Wet

Water Level Difference (m)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50

- IWC LGA Boundary
- Study Area
- Cadastre

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

DRAFT - Not For Construction

10 0 10 20 30 40 m

Scale at A3: 1:850

Key Map

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Alexandra Canal Option 5% AEP
AC6 v5 Bay Street Drainage Upgrade

Project: Alexandra Canal FRMS&P

Client: Inner West Council
Project Code: 304600163
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 15

Stantec

Legend

- Proposed Drainage
- Existing Pits and Pipes

Change in Flood Extents (Wet/Dry)
- Was Wet, Now Dry
- Was Dry, Now Wet

Water Level Difference (m)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50

- IWC LGA Boundary
- Study Area
- Cadastre

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

DRAFT - Not For Construction

10 0 10 20 30 40 m

Scale at A3: 1:850

Key Map

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Alexandra Canal Option 2% AEP
AC6 v5 Bay Street Drainage Upgrade

Project: Alexandra Canal FRMS&P

Client: Inner West Council
Project Code: 304600163
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 16

Stantec

Legend

Proposed Drainage
Existing Pits and Pipes

Change in Flood Extents (Wet/Dry)
Was Wet, Now Dry
Was Dry, Now Wet

Water Level Difference (m)
< -0.50
-0.50 to -0.20
-0.20 to -0.10
-0.10 to -0.05
-0.05 to -0.01
-0.01 to 0.01
0.01 to 0.05
0.05 to 0.10
0.10 to 0.20
0.20 to 0.50
> 0.50

IWC LGA Boundary
Study Area
Cadastre

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

DRAFT - Not For Construction

10 0 10 20 30 40 m

Scale at A3: 1:850

Key Map

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Alexandra Canal Option 1% AEP
AC6 v5 Bay Street Drainage Upgrade

Project: Alexandra Canal FRMS&P

Client: Inner West Council
Project Code: 304600163
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 17

Stantec

Legend

Proposed Drainage
Existing Pits and Pipes

Change in Flood Extents (Wet/Dry)
Was Wet, Now Dry
Was Dry, Now Wet

Water Level Difference (m)
< -0.50
-0.50 to -0.20
-0.20 to -0.10
-0.10 to -0.05
-0.05 to -0.01
-0.01 to 0.01
0.01 to 0.05
0.05 to 0.10
0.10 to 0.20
0.20 to 0.50
> 0.50

IWC LGA Boundary
Study Area
Cadastre

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

DRAFT - Not For Construction

10 0 10 20 30 40 m

Scale at A3: 1:850

Key Map

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Alexandra Canal Option PMF
AC6 v5 Bay Street Drainage Upgrade

Project: Alexandra Canal FRMS&P

Client: Inner West Council
Project Code: 304600163
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 18

Stantec

Legend

Proposed Drainage
Existing Pits and Pipes

Change in Flood Extents (Wet/Dry)
Was Wet, Now Dry
Was Dry, Now Wet

Water Level Difference (m)
< -0.50
-0.50 to -0.20
-0.20 to -0.10
-0.10 to -0.05
-0.05 to -0.01
-0.01 to 0.01
0.01 to 0.05
0.05 to 0.10
0.10 to 0.20
0.20 to 0.50
> 0.50

IWC LGA Boundary
Study Area
Cadastre

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

DRAFT - Not For Construction

10 0 10 20 30 40 m

Scale at A3: 1:850

Key Map

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Alexandra Canal Option -
AC11 v3 Overview

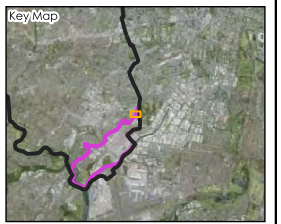
Legend

Proposed Drainage
Existing Pits and Pipes
IWC LGA Boundary
Study Area
Cadastre

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Key Map



DRAFT - Not For Construction

10 0 10 20 30 40 m

Scale at A3: 1:850

Project: Alexandra Canal FRMS&P

Client: Inner West Council
Project Code: 304600163
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 19

Stantec

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Alexandra Canal Option 20% AEP
AC11 v3 Princes Highway Drainage Upgrade

Project: Alexandra Canal FRMS&P

Client: Inner West Council
Project Code: 304600163
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 20

Stantec

Legend

- Proposed Drainage
- Existing Pits and Pipes

Change in Flood Extents (Wet/Dry)
- Was Wet, Now Dry
- Was Dry, Now Wet

Water Level Difference (m)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50

- IWC LGA Boundary
- Study Area
- Cadastre

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Key Map

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10 0 10 20 30 40 m

Scale at A3: 1:850

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Alexandra Canal Option 5% AEP
AC11 v3 Princes Highway Drainage Upgrade

Project: Alexandra Canal FRMS&P

Client: Inner West Council
Project Code: 304600163
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 21

Stantec

Legend

- Proposed Drainage
- Existing Pits and Pipes

Change in Flood Extents (Wet/Dry)
- Was Wet, Now Dry
- Was Dry, Now Wet

Water Level Difference (m)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50

- IWC LGA Boundary
- Study Area
- Cadastre

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Key Map

DRAFT - Not For Construction

10 0 10 20 30 40 m

Scale at A3: 1:850

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Alexandra Canal Option 2% AEP
AC11 v3 Princes Highway Drainage Upgrade

Project: Alexandra Canal FRMS&P

Client: Inner West Council
Project Code: 304600163
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 22

Stantec

Legend

- Proposed Drainage
- Existing Pits and Pipes

Change in Flood Extents (Wet/Dry)
- Was Wet, Now Dry
- Was Dry, Now Wet

Water Level Difference (m)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50

- IWC LGA Boundary
- Study Area
- Cadastre

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Key Map

DRAFT - Not For Construction

10 0 10 20 30 40 m

Scale at A3: 1:850

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Alexandra Canal Option 1% AEP
AC11 v3 Princes Highway Drainage Upgrade

Project: Alexandra Canal FRMS&P

Client: Inner West Council
Project Code: 304600163
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 23

Stantec

Legend

Proposed Drainage
Existing Pits and Pipes

Change in Flood Extents (Wet/Dry)
Was Wet, Now Dry
Was Dry, Now Wet

Water Level Difference (m)
< -0.50
-0.50 to -0.20
-0.20 to -0.10
-0.10 to -0.05
-0.05 to -0.01
-0.01 to 0.01
0.01 to 0.05
0.05 to 0.10
0.10 to 0.20
0.20 to 0.50
> 0.50

IWC LGA Boundary
Study Area
Cadastre

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Key Map

DRAFT - Not For Construction

10 0 10 20 30 40 m

Scale at A3: 1:850

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Alexandra Canal Option PMF
AC11 v3 Princes Highway Drainage Upgrade

Project: Alexandra Canal FRMS&P

Client: Inner West Council
Project Code: 304600163
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 24

Stantec

Legend

- Proposed Drainage
- Existing Pits and Pipes

Change in Flood Extents (Wet/Dry)
- Was Wet, Now Dry
- Was Dry, Now Wet

Water Level Difference (m)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50

- IWC LGA Boundary
- Study Area
- Cadastre

Notes:
1. Map displayed in EPSG:28356

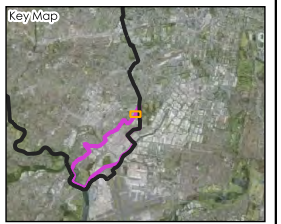
References:
1. Metro map

DRAFT - Not For Construction

10 0 10 20 30 40 m

Scale at A3: 1:850

Key Map



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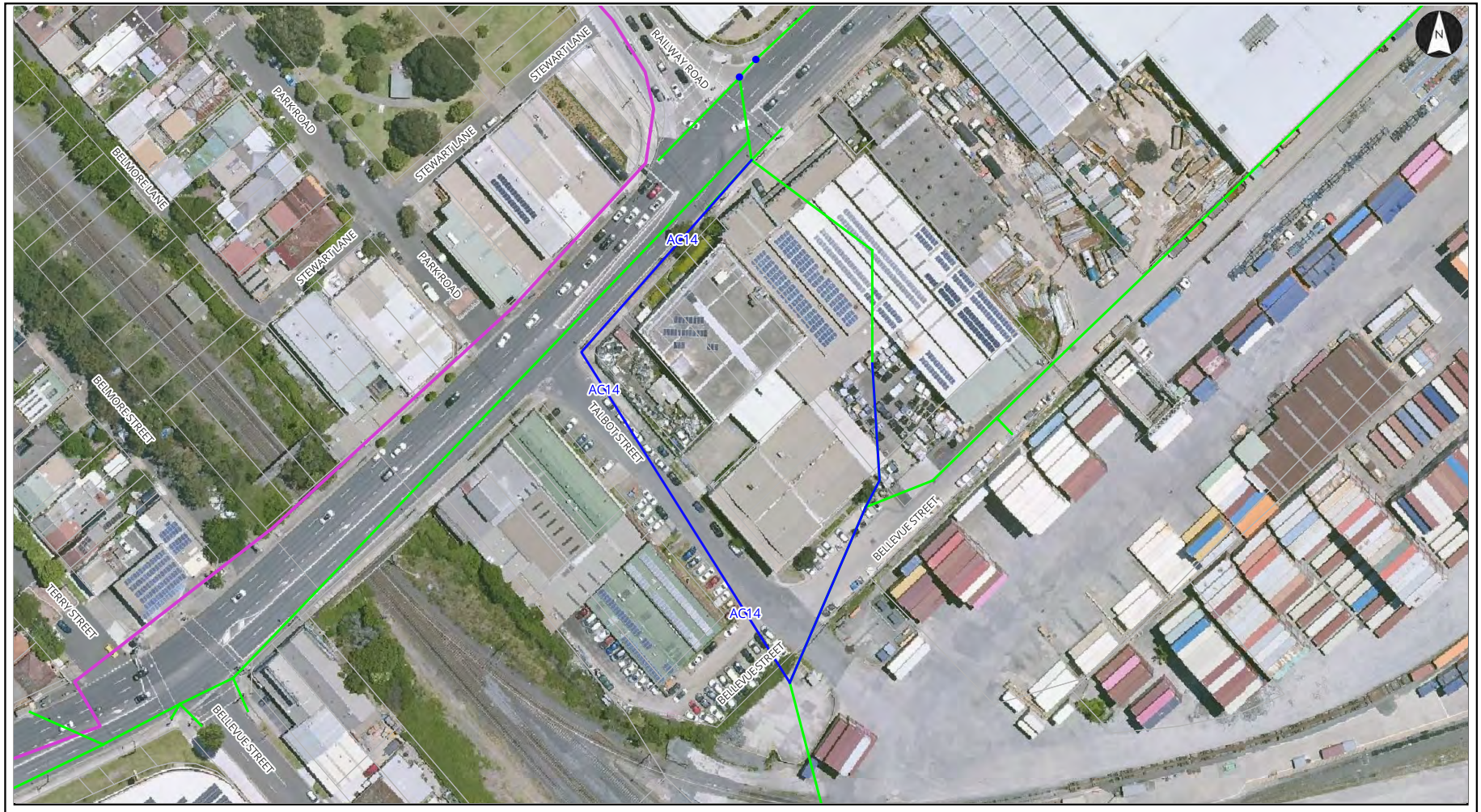

Alexandra Canal Option -
AC14 v6 Overview

Legend

Proposed Drainage
Existing Pits and Pipes
IWC LGA Boundary
Study Area
Cadastre

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Key Map

DRAFT - Not For Construction

10 0 10 20 30 40 m

Scale at A3: 1:1000

Project: Alexandra Canal FRMS&P

Client: Inner West Council
Project Code: 304600163
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 25

Stantec

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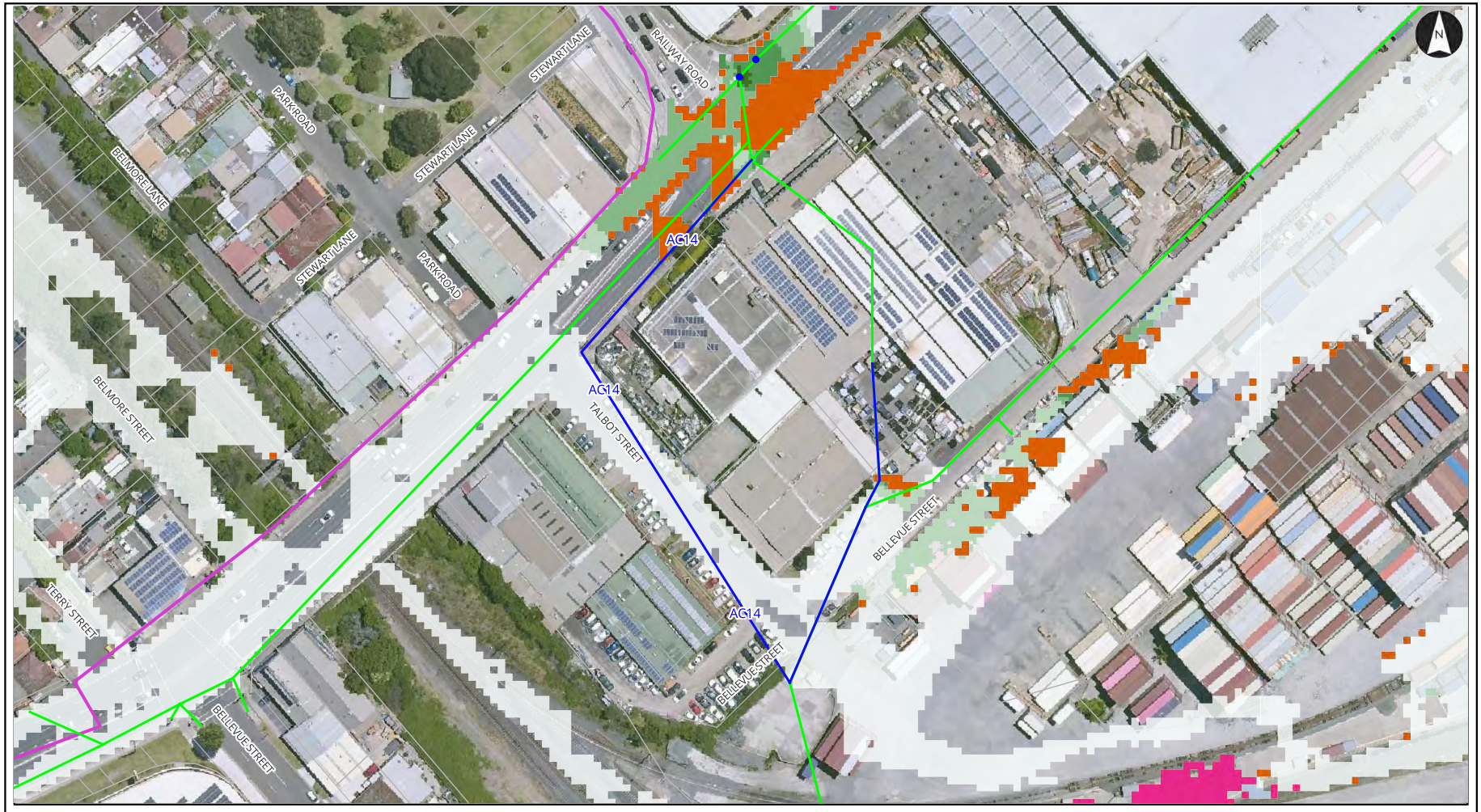

Alexandra Canal Option 20% AEP
AC14 v6 Talbot Street Drainage Upgrade

Project: Alexandra Canal FRMS&P

Client: Inner West Council
Project Code: 304600163
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 26

Stantec

Legend

- Proposed Drainage
- Existing Pits and Pipes

Change in Flood Extents (Wet/Dry)
- Was Wet, Now Dry
- Was Dry, Now Wet

Water Level Difference (m)
- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50

- IWC LGA Boundary
- Study Area
- Cadastre

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Key Map

DRAFT - Not For Construction

10 0 10 20 30 40 m

Scale at A3: 1:1000

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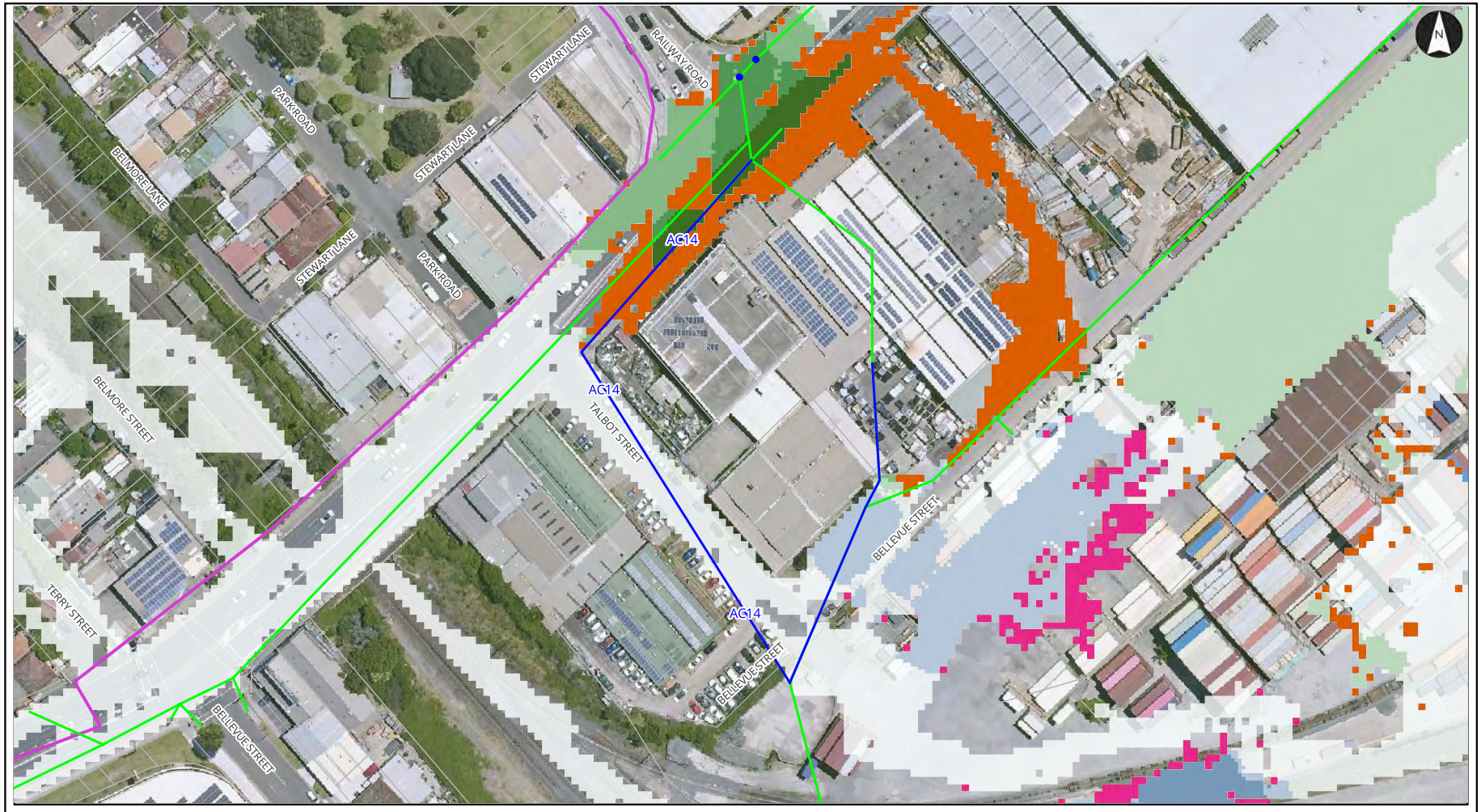

Alexandra Canal Option 5% AEP
AC14 v6 Talbot Street Drainage Upgrade

Project: Alexandra Canal FRMS&P

Client: Inner West Council
Project Code: 304600163
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 27

Stantec

Legend

Proposed Drainage
Existing Pits and Pipes

Change in Flood Extents (Wet/Dry)
Was Wet, Now Dry
Was Dry, Now Wet

Water Level Difference (m)
< -0.50
-0.50 to -0.20
-0.20 to -0.10
-0.10 to -0.05
-0.05 to -0.01
-0.01 to 0.01
0.01 to 0.05
0.05 to 0.10
0.10 to 0.20
0.20 to 0.50
> 0.50

IWC LGA Boundary
Study Area
Cadastre

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Key Map

DRAFT - Not For Construction

10 0 10 20 30 40 m

Scale at A3: 1:1000

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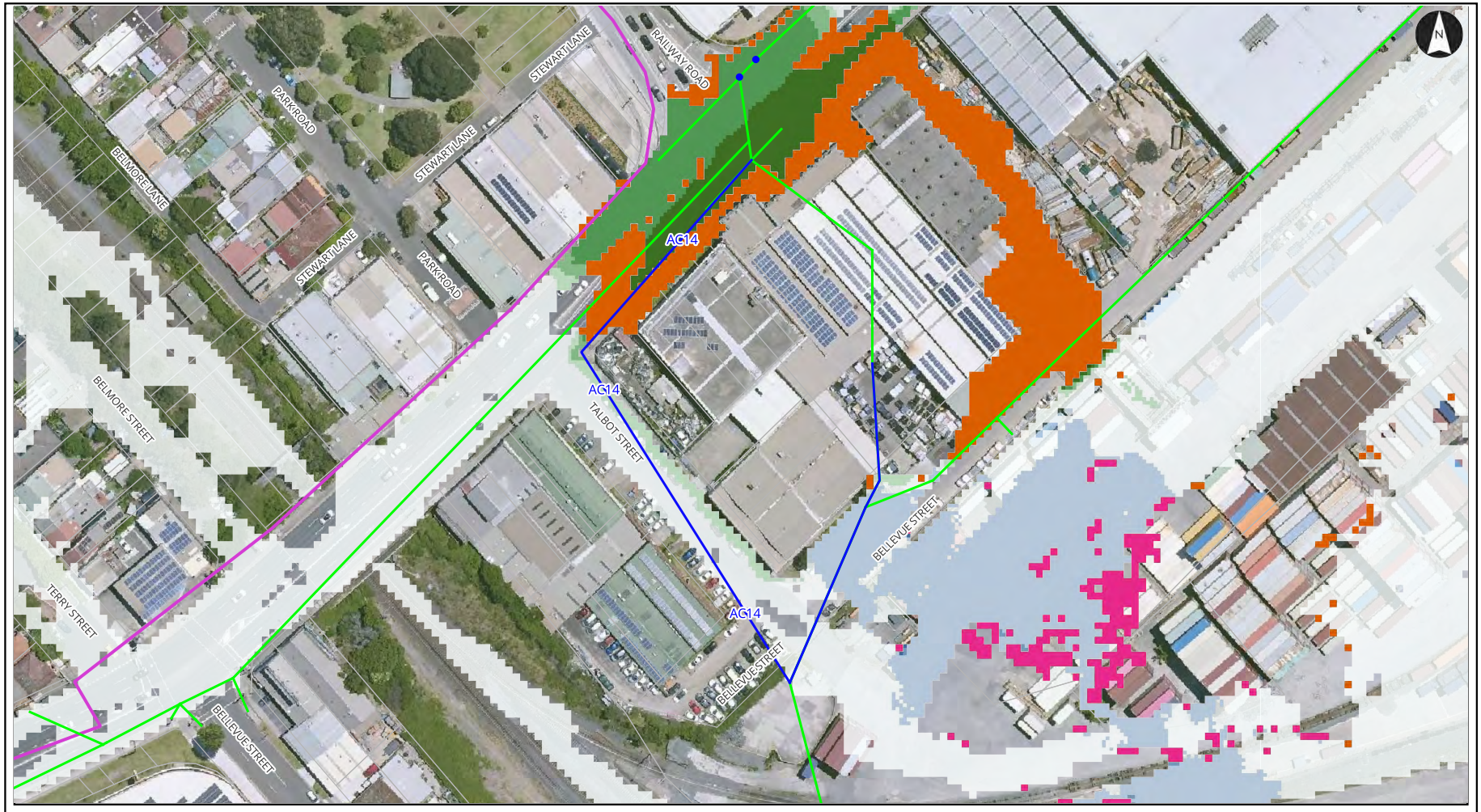

Alexandra Canal Option 2% AEP
AC14 v6 Talbot Street Drainage Upgrade

Project: Alexandra Canal FRMS&P

Client: Inner West Council
Project Code: 304600163
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 28

Stantec

Legend

Proposed Drainage
Existing Pits and Pipes

Change in Flood Extents (Wet/Dry)
Was Wet, Now Dry
Was Dry, Now Wet

Water Level Difference (m)
< -0.50
-0.50 to -0.20
-0.20 to -0.10
-0.10 to -0.05
-0.05 to -0.01
-0.01 to 0.01
0.01 to 0.05
0.05 to 0.10
0.10 to 0.20
0.20 to 0.50
> 0.50

IWC LGA Boundary
Study Area
Cadastre

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Key Map

DRAFT - Not For Construction

10 0 10 20 30 40 m

Scale at A3: 1:1000

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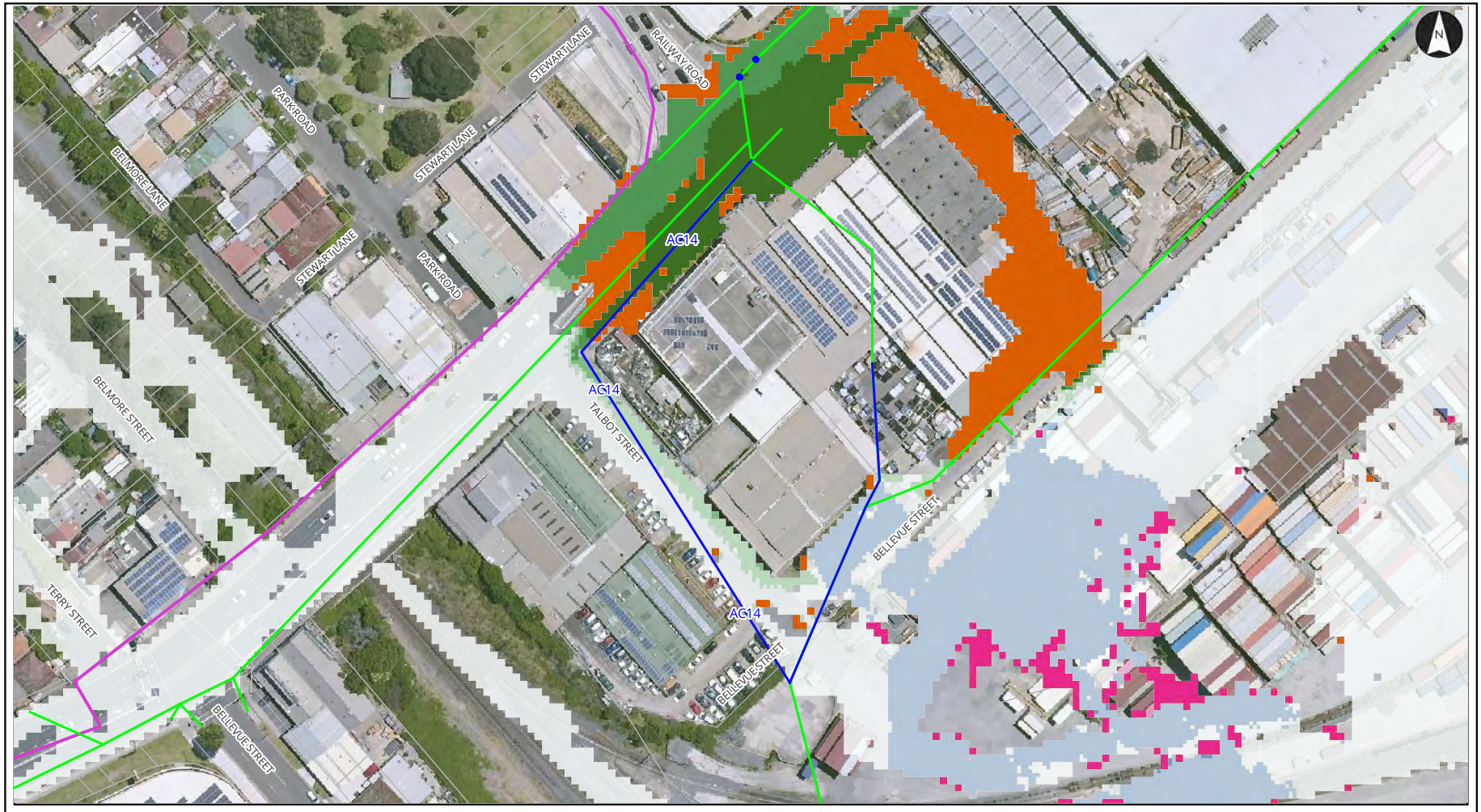

Alexandra Canal Option 1% AEP
AC14 v6 Talbot Street Drainage Upgrade

Project: Alexandra Canal FRMS&P

Client: Inner West Council
Project Code: 304600163
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 29

Stantec

Legend

Proposed Drainage
Existing Pits and Pipes

Change in Flood Extents (Wet/Dry)
Was Wet, Now Dry
Was Dry, Now Wet

Water Level Difference (m)
< -0.50
-0.50 to -0.20
-0.20 to -0.10
-0.10 to -0.05
-0.05 to -0.01
-0.01 to 0.01
0.01 to 0.05
0.05 to 0.10
0.10 to 0.20
0.20 to 0.50
> 0.50

IWC LGA Boundary
Study Area
Cadastre

Notes:
1. Map displayed in EPSG:28356

References:
1. Metro map

Key Map

DRAFT - Not For Construction

10 0 10 20 30 40 m

Scale at A3: 1:1000

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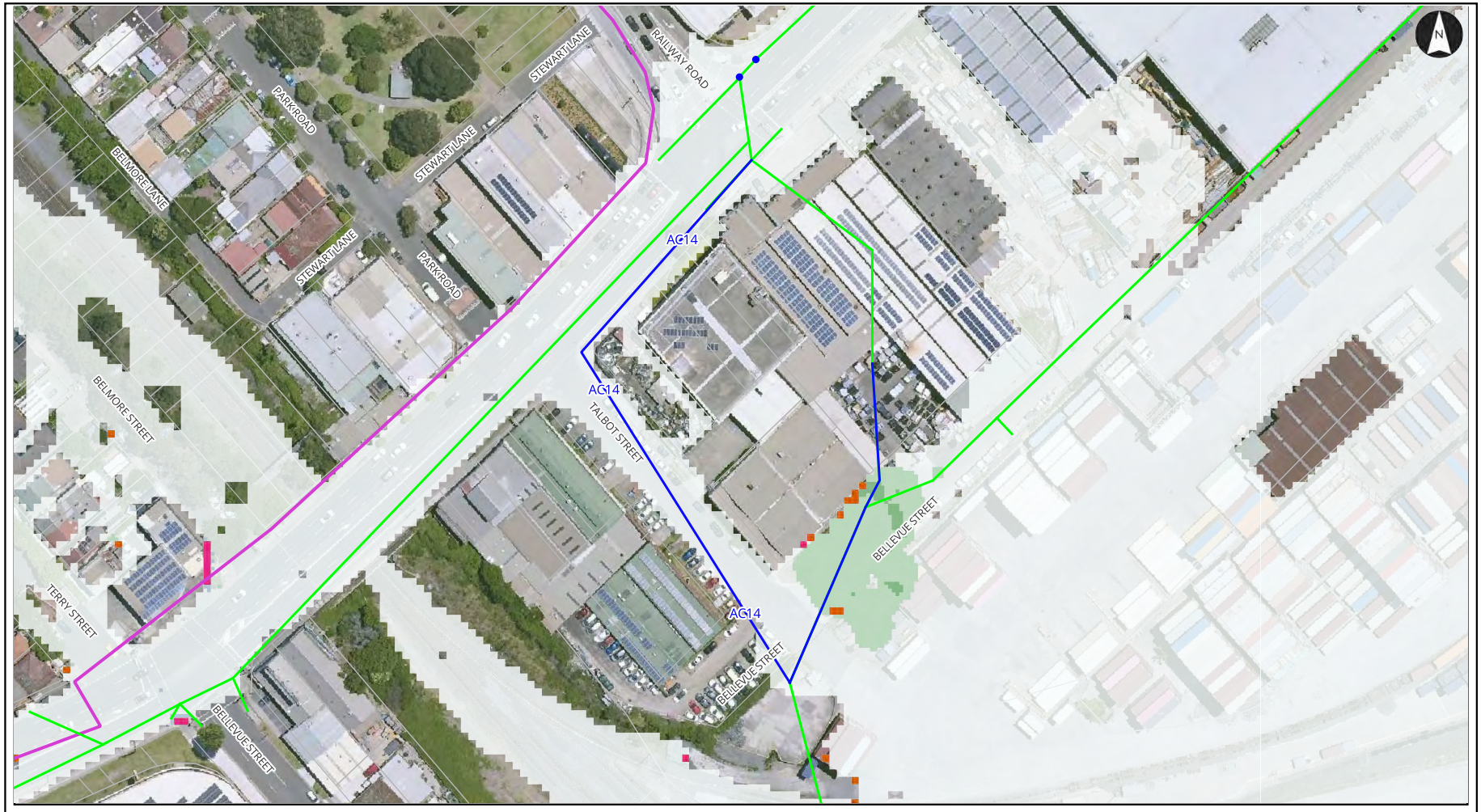

Alexandra Canal Option PMF
AC14 v6 Talbot Street Drainage Upgrade

Project: Alexandra Canal FRMS&P

Client: Inner West Council
Project Code: 304600163
Drawn By: AC, Checked By: MG
Date: (2023-12-22)
Figure No: 30

Stantec

Legend

Proposed Drainage
Existing Pits and Pipes

Change in Flood Extents (Wet/Dry)
Was Wet, Now Dry
Was Dry, Now Wet

Water Level Difference (m)
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-0.50 to -0.20
-0.20 to -0.10
-0.10 to -0.05
-0.05 to -0.01
-0.01 to 0.01
0.01 to 0.05
0.05 to 0.10
0.10 to 0.20
0.20 to 0.50
> 0.50

IWC LGA Boundary
Study Area
Cadastre

Notes:
1. Map displayed in EPSG:28356

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Key Map

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APPENDIX

F

MCA SCORING AND IMPLEMENTATION

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Table - Multi-Criteria Assessment – Scoring System

Category	Criterion	Weighting	Description of Criterion Assessment	Score				
				-2	-1	0	1	2
Economic	Benefit-Cost Ratio	20%	The cost effectiveness of the scheme, i.e. the tangible return on investment	0 to 0.25	0.25 to 0.5	0.5 to 1.5	1.5 to 3.0	>3.0
	Reduction in Risk to Property	5%	Based on reduction in AAD, it establishes the tangible benefit of an option	Major increase in AAD (>$200,000)	Slight increase in AAD ($200k to $100k)	Negligible Improvement (less than $100k AAD impact)	Slight decrease in AAD ($200k to $100k)	Major decrease in AAD ($>200,000)
	Technical Feasibility	10%	Establishes the feasibility of options based on likely service constraints, environmental hazards, and programming contingincies such as land acquisition or agreements with external agencies	There are a number of significant factors that pose an impact on the feasibility of the project	There is a single significant factor or multiple smaller factors that pose a potential impact on the feasibility of the project	May or may not be feasible	Likely to be feasible with management of constraints	Very likely to be feasible with no significant restraint
	Implementation Complexity	5%	Ease of constructability within Council's standard Capital Works Planning	Construction timeframe greater than 1 year Project can not be broken down into sequential components	Construction timeframe greater than	Key components can be completed in isolation within 12 months	Overall construction timeframe less than 12 months Minor components can be staged	Construction timeframe less than 6 months Major components can be staged
	Adaptability and long-term performance	10%	The impact the option will have both in terms of feasibility, benefits and cost over the life of the option, and adaptability to climate change conditions	Significantly diminished performance long-term or under climate change	Slightly diminished performance long-term or under climate change	Unchanged performance long-term or under climate change	Unchanged or improved performance long-term or under climate change with minor ongoing costs	Unchanged or improved performance long-term or under climate change with negligible ongoing costs
Social	Reduction in Risk to Life	15%	The impact on risk to life from the 20% AEP up to the PMF event	Widespread or significant localised increase in risk to life	Localised or slight increase in risk to life	Negligible change in risk to life	Localised or slight reduction of risk to life	Widespread or significant localised reduction of risk to life
	Emergency Access and Evacuation	10%	The impact on the ability to evacuate or for NSW SES or emergency services under extreme flood conditions	Widespread or significant localised impact on evacuation and emergency services	Localised or slight localised impact on evacuation and emergency services	Negligible impact on evacuation and emergency services	Localised or slight improvement for evacuation and emergency services	Widespread or significant localised improvement for evacuation and emergency services
	Social Disruption and Public Open Spaces	5%	The impact of the risk management option on social disruption and the use of public spaces	Signficiant increase in the frequency of flooding or limitation of the use of a public space or causes significant social disruption	Increase in the frequency of flooding or limitation of the use of a public space or causes social disruption	Negligible impact on public space or social disruption	Reduces the frequency of flooding or provides enhanced use of a public space or causes social benefit	Significantly reduces the frequency of flooding or enhanced use of a public space or causes significant social benefit
	Community and Stakeholder Support	10%	Support for the option based on FRM Committee meeting, stakeholder engagement and community consultation outcomes	Strong opposition to the option in multiple submissions	Slight opposition to the option	No response	Slight support to the option	Significant support to the option
Environment	Impact on Fauna/Flora	5%	Likely impacts on Threatened Ecological Communities and Threatened Species	High negative impact	Slight negative impact	Negligible impact	Some benefit	Considerable benefit
	Impact on Heritage	5%	Impact to Heritage items	Likely impact on State, National, or Aboriginal Heritage item	Likely impact or increased impact on a local heritage item	No impact	Reduces the impact of flooding to heritage item or heritage conservation area	Heritage item no longer flooded

Table - Multi Criteria Assessment Outcomes – Flood Modification Options - Alexandra Canal

Category	Criterion	Weighting	Description of Criterion Assessment	AC4 - Station St Drainage Upgrade		AC6 - Bay Street Drainage Upgrade		AC11 - Princes Highway Upgrade		AC14 - Talbot St Drainage Upgrade	
				Score	Comment	Score	Comment	Score	Comment	Score	Comment
Economic	Benefit-Cost Ratio	20%	The cost effectiveness of the scheme, i.e. the tangible return on investment	-1	BCR = 0.27	0	BCR = 0.82	0	BCR = 0.08, though damages on west side of Highway not accounted for	0	BCR = 0.88
	Reduction in Risk to Property	5%	Based on reduction in AAD, it establishes the tangible benefit of an option	0	AAD increase <$100k	0	AAD increase <$100k	1	AAD increase <$100k, though damages on west side of Highway not accounted for	1	AAD increase $100k-200k
	Technical Feasibility	10%	Establishes the feasibility of options based on likely service constraints, environmental hazards, and programming contingincies such as land acquisition or agreements with external agencies	-2	Two utility (Sydney Water and Telstra) services crossing proposed option, works in private properties, potential presence of acid sulfate soils	-1	Two utility (Sydney Water and Telstra) services crossing proposed option, potential presence of acid sulfate soils	-1	Three utility (Sydney Water, Uecomm and Telstra) services crossing proposed option, may be feasible depending on clearance between existing pipes and utilties or possible relocation. Highly constrained major highway corridor.	-1	Two utility (Sydney Water and Telstra) services crossing proposed option in multiple locations, long section of pipe, impacts to property access during works. Along major highway corridor.
	Implementation Complexity	5%	Ease of constructability within Council's standard Capital Works Planning	0	Estimated 12 months, easements in private properties	2	Construction timeframe less than 6 months, basic drainage installation in Council owned road corridor	-1	Construction timeframe greater than 12 months that can be staged - temporary lane closures, nightworks. Works in TfNSW corridor (Princes Highway) so would need to be collaboration with TfNSW	-2	Construction timeframe greater than 12 months that can be staged - temporary lane closures, nightworks. Works in TfNSW corridor (Princes Highway) so would need to be collaboration with TfNSW. Easements in private properties
	Adaptability and long-term performance	10%	The impact the option will have both in terms of feasibility, benefits and cost over the life of the option, and adaptability to climate change conditions	0	Climate change may increase frequency of flooding (considering a lifespan of 30-50 years), though this option will help to reduce that flooding severity	0	Slight impact from climate change (considering a lifespan of 30-50 years). Performance of flap gate and tidal flow will help to address sea level rise impacted by climate change	0	Climate change may increase frequency of flooding (considering a lifespan of 30-50 years), though this option will help to reduce that flooding severity	0	Climate change may increase frequency of flooding (considering a lifespan of 30-50 years), though this option will help to reduce that flooding severity
Social	Reduction in Risk to Life	15%	The impact on risk to life from the 20% AEP up to the PMF event	0	Only H1-H2 in existing conditions, minimal reduction in water level in local road corridor only	1	H3 in existing conditions, minimal reduction in water level in road corridor only	1	Only H1-H2 in existing conditions, minimal reduction in water level. Option is on Princes Highway (major evacuation route) in road corridor only	1	Minimal areas of H3 in existing conditions, minimal reduction in water level. Option is on Princes Highway (major evacuation route) in road corridor only
	Emergency Access and Evacuation	10%	The impact on the ability to evacuate or for NSW SES or emergency services under extreme flood conditions	0	Minimal reduction in water level in road corridor (very localised)	2	Some reduction in water level in local road corridor (very localised). Depth of approx 0.8m in the existing 1% event. Will assist with reduced flooding frequency	2	Minimal reduction in water level. Option is very localised on Princes Highway (major evacuation route) in road corridor	2	Some reduction in water level. Option is very localised on Princes Highway (major evacuation route) in road corridor
	Social Disruption and Public Open Spaces	5.0%	The impact of the risk management option on social disruption and the use of public spaces	1	Reduced flooding of sports fields and minor reduced flooding of local roads	2	Reduced nuisance flooding in road corridor	0	Reduced flooding on Princes Highway, social disruption due to roadworks on Princes Highway	0	Reduced flooding on Princes Highway, social disruption due to roadworks on Princes Highway
	Community and Stakeholder Support	10%	Support for the option based on FRM Committee meeting, stakeholder engagement and community consultation outcomes	0	No response from the community in relation to this option. Community member noted this trunk drainage line had collapsed years ago resulting in flooding, but did not request drainage capacity increase	2	During community consultation, suggestions for a proposed option to address Bay St flooding was received. SES indicated awareness of community complaints regarding flooding in this area	2	SES shared strong support for making the regional evacuation route (Princes Highway) flood free due to SES site located nearby	2	SES shared strong support for making the regional evacuation route (Princes Highway) flood free due to SES site located nearby
Environment	Impact on Fauna/Flora	5%	Likely impacts on Threatened Ecological Communities and Threatened Species	-1	Potential slight negative impacts (temporary) to nearby trees and wetland environment due to drainage works	-1	Negligible known impacts on fauna and flora. New pipe outlet may need to be designed to avoid existing estuarine vegetation	0	Negligible known impacts on fauna and flora	0	Negligible known impacts on fauna and flora
	Impact on Heritage	5%	Impact to Heritage items	0	No known impact to heritage items	0	No known impact to heritage items	0	No known impact to heritage items	0	No known impact to heritage items
			Total Score (from -22 to 22	**-3**		**7**		**4**		**3**	
			Total Weighted Score (from -2.00 to 2.00)	**-0.40**		**0.60**		**0.45**		**0.40**	

Table - Multi Criteria Assessment Outcomes – Property Modification and Emergency Management Options - All Sub-Catchments

Category	Criterion	Weighting	Description of Criterion Assessment	Property Modification (PM) Options		Emergency Management (EM) Options							
				PM6 - Stormwater System Maintenance		EM2 - Review of Local Flood Planning and Info to SES		EM3 - Community Flood Awareness		EM5 - Flood Markers and Signage		EM6 - Flood Data and Debrief	
				Score	Comment	Score	Comment	Score	Comment	Score	Comment	Score	Comment
Economic	Benefit-Cost Ratio	20%	The cost effectiveness of the scheme, i.e. the tangible return on investment	1	BCR = 2.36, though the efficacy of maintenance is dependent on timing, it is difficult to guarantee these benefits	0	BCR = 1.0	0	BCR = 1.0	0	BCR = 1.0	0	BCR = 1.0
	Reduction in Risk to Property	5%	Based on reduction in AAD, it establishes the tangible benefit of an option	1	AAD increase >$200k, though the efficacy of maintenance is dependent on timing, it is difficult to guarantee these benefits	0	Unknown impacts on flood damages, conservatively assumed to be negligible	0	Unknown impacts on flood damages, conservatively assumed to be negligible	0	Unknown impacts on flood damages, conservatively assumed to be negligible	0	Unknown impacts on flood damages, conservatively assumed to be negligible
	Technical Feasibility	10%	Establishes the feasibility of options based on likely service constraints, environmental hazards, and programming contingincies such as land acquisition or agreements with external agencies	2	Council would already have a maintenance schedule in place and can consider increasing frequency. However, should be noted that effectiveness of the maintenance schedule of stormwater system is dependent on timing of a rainfall event and may or may not have a significant impact	2	Straightforward to implement a local flood planning review and allow for sharing of information with NSW SES	1	Depending on the awareness program to be developed, could be some complications with regards to encouraging community engagement with such a program	2	Straightforward to implement and install flood markers and signage	1	Council should already have a flood data collection scheme. Would need to ensure the availability of Council staff to respond to and record flooding at any time
	Implementation Complexity	5%	Ease of constructability within Council's standard Capital Works Planning	2	Straightforward to increase maintenance schedule	2	Straightforward to implement a local flood planning review and allow for sharing of information with NSW SES	1	Depending on the awareness program to be developed, could be some complications with regards to encouraging community engagement with such a program	2	Straightforward to implement and install flood markers and signage	1	Council should already have a flood data collection scheme. Would need to ensure the availability of Council staff to respond to and record flooding at any time
	Adaptability and long-term performance	10%	The impact the option will have both in terms of feasibility, benefits and cost over the life of the option, and adaptability to climate change conditions	0	No impact of adaptibility of maintenance to climate change conditions	2	Minimal ongoing costs for review. Review can be revised to consider climate change impacts in the future	1	Ongoing costs to maintain the flood awareness program, however following initial engagement ongoing information should be more straightforward. Can be	2	Minimal ongoing costs for flood markers and signage. Signs can be altered to account for climate change if necessary, however unlikely to be needed	2	Ongoing costs will be variable based on flood event occurrence. Climate change should not significantly influence scheme
Social	Reduction in Risk to Life	15%	The impact on risk to life from the 20% AEP up to the PMF event	1	Increased frequency of stormwater system management may or may not have an effect depending on timing of a rainfall event. Slight benefits if a rainfall event occurs right after scheduled maintenance	2	Providing information to SES will assist them in their planning and consequently reduce risk to life	2	Expected reduction in risk to life through better responses of majority of residents	1	Expected reduction in risk to life through residents not attempting to enter floodwaters	0	Negligible direct impact on risk to life
	Emergency Access and Evacuation	10.0%	The impact on the ability to evacuate or for NSW SES or emergency services under extreme flood conditions	1	Increased frequency of stormwater system management may or may not have an effect depending on timing of a rainfall event. Slight benefits if a rainfall event occurs right after scheduled maintenance	2	Providing information to SES will assist them in their planning	2	A flood aware community will limit the number of instances of residents entering floodwaters	2	Will assist residents and the NSW SES identify depth of flooding for some crossings on evacuation routes	0	Negligible direct impact on emergency access and evacuation
	Social Disruption and Public Open Spaces	5.0%	The impact of the risk management option on social disruption and the use of public spaces	0	Near neglible social disruption of residences with more frequent maintenance, no impact on open space or increase in flooding.	0	No direct impact on social disruption or public open space	2	Improved community awareness seen as a social benefit	0	No direct impact on social disruption or public open space	0	No direct impact on social disruption or public open space
	Community and Stakeholder Support	10%	Support for the option based on FRM Committee meeting, stakeholder engagement and community consultation outcomes	1	Two responses received during community consultation requesting more frequent stormwater maintenance. Supported by Council engineers	1	NSW SES confirmed support for continued data provision in light of Flood Plan development	1	NSW SES supports the development of a Council led flood awareness program	1	NSW SES supports the development of this measure. Would require TfNSW agreement for signage on major TfNSW roads	1	NSW SES supports continued flood debrief and recording of information
Environment	Impact on Fauna/Flora	5%	Likely impacts on Threatened Ecological Communities and Threatened Species	0	Negligible impact	0	Negligible impact	0	Negligible impact	0	Negligible impact	0	Negligible impact
	Impact on Heritage	5%	Impact to Heritage items	0	Negligible impact	0	Negligible impact	0	Negligible impact	0	Negligible impact	0	Negligible impact
Total Score (from -22 to 22				**9**		**11**		**10**		**10**		**5**	
Total Weighted Score (from -2.00 to 2.00)				**0.90**		**1.10**		**0.95**		**0.95**		**0.45**	

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Suburb change for 2 Malthouse Way

Engagement Outcomes Report
2 May to 2 June 2024



Summary

From 2 May to 2 June 2024, owners and residents from 2 Malthouse Way were invited to provide feedback on realigning the suburb boundary which would change the suburb from Lewisham to Summer Hill.

During the engagement period 48 people visited the Your Say project page, 35 people completed the online survey and 7 people emailed through their thoughts.

100% of respondents supported the proposal.

Project background

Council was approached by 2 Malthouse Way Strata Committee to investigate a change of suburb from Lewisham to Summer Hill.

Promotion and engagement methods

Promotion method	Stakeholders engaged
Letters	**98** letters were sent to owners and residents of 2 Malthouse Way

Engagement method	Stakeholders engaged
Online survey	**35** surveys completed
Direct contact from residents	**7** emails from individuals

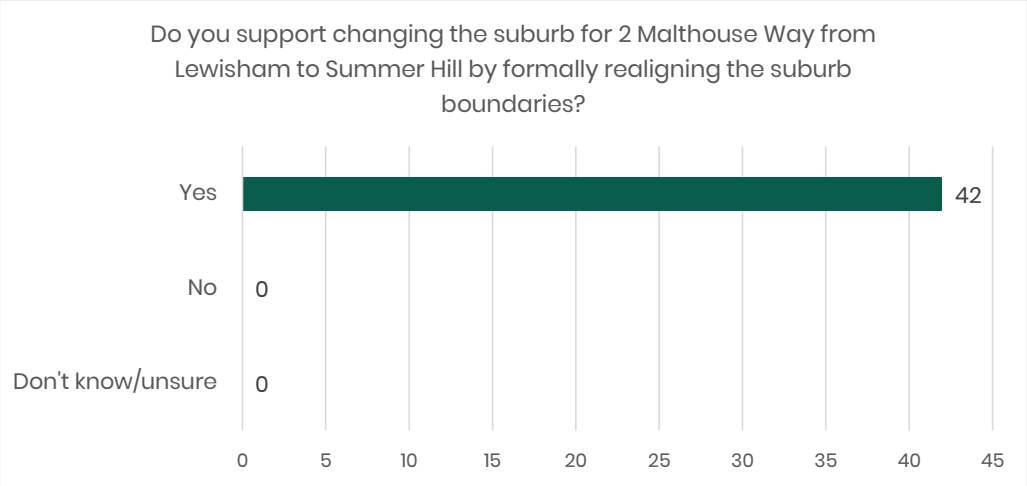
Who did we hear from?

During the online survey participants were asked to select their connection to 2 Malthouse Way.

Connection	Total respondents
I live at 2 Malthouse Way and rent the property	2
I live at 2 Malthouse Way and own the property	28
I live elsewhere but own a property at 2 Malthouse Way	3
Other	2

Summary of feedback

Everyone who provided feedback supported the proposal.



Support reason	Total respondents
Fix issues with postage, government agencies, utilities and locating the property.	14
Logical and makes sense	8
Consistency for the whole complex	8
Light Rail is a more distinct boundary	6

Next steps

Council will consider all feedback at its meeting on 13 August 2024 and decide whether to formally lodge the proposal with the NSW Geographic Names Board (GNB).

If the GNB approves the change, it will be notified in the NSW Government Gazette and Council will:

- Notify all properties affected
- Make any required changing to signposting, maps and rates information
- Notify Australia Post, Emergency Services, Utility and Telecommunication Services, Australia Electoral Commission and Valuer General's Office NSW.

Audit, Risk and Improvement Committee Terms of Reference

V7



IWC/2022/0222

Title	**Audit, Risk and Improvement Committee Terms of Reference**
Summary	The Terms of Reference set out the Audit Risk & Improvement Committee (ARIC)'s objectives, authority, composition and tenure, roles and responsibilities, reporting and administrative arrangements.
Document Type	Terms of Reference
Relevant Strategic Plan Objective	Strategic Direction 5: Progressive responsive and effective civic leadership.
Legislative Reference	*Local Government Act 1993*, section 428A
Related Council Documents	Model Code of Conduct
Version Control	See page 13

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1 Introduction

1.1 Inner West Council (Council) has established the Audit, Risk and Improvement Committee ('Committee' or 'ARIC') in compliance with section 428A of the *Local Government Act 1993*. These terms of reference set out the Committee's objectives, authority, composition and tenure, roles and responsibilities, reporting and administrative arrangements.

1.2 These terms of reference have effect from 1 July 2024.

2 Objective

2.1 The objective of Council's ARIC is to provide independent assurance to Council by monitoring, reviewing and providing advice about the Council's governance processes, compliance, risk management and control frameworks, external accountability obligations and overall performance.

3 Independence

3.1 The Committee is to be independent to ensure it has no real or perceived bias or conflicts of interest that may interfere with its ability to act independently and provide Council with robust, objective and unbiased advice and assurance.

3.2 The Committee is to provide an advisory and assurance role only and is to have no administrative function, delegated financial responsibility or any management functions of the Council. The Committee will provide independent advice to the Council that is informed by the Councils internal audit and risk management activities and information and advice provided by Council relevant external bodies and subject matter experts.

3.3 The Committee must at all times ensure it maintains a direct reporting line to and from the Council's internal audit function and act as a mechanism for internal audit to report to the governing body and general manager on matters affecting the performance of the internal audit function.

4 Authority

4.1 Council authorises the Committee, for the purposes of exercising its responsibilities, to:

- access any information it needs from Council;
- use any Council resources it needs;
- have direct and unrestricted access to the General Manager and senior management of the Council;

- Seek the General Manager's permission to meet with any other Council staff member or contractor;
- Discuss any matters with the external auditor or other external parties;
- Request the attendance of any employee at committee meetings, and
- Obtain external legal or other professional advice in line with Council's procurement policies (following budgetary consideration and consultation with the General Manager).

4.2 Information and documents pertaining to the committee, other than its Minutes, are confidential and are not to be made publicly available. The committee may only release Council information to external parties that are assisting the committee to fulfil its responsibilities with the approval of the General Manager, except where it is being provided to an external investigative or oversight agency for the purpose of informing that agency of a matter that may warrant its attention.

5 Composition and Tenure

5.1 The Committee will consist of an independent Chairperson and three independent members who have voting rights and one non-voting councillor/ board member, as required under the *Local Government (General) Regulation 2021*

5.2 The governing body is to appoint the Chairperson and members of the committee. Current committee members are published on the Council website.

5.3 All committee members must meet the independence and eligibility criteria prescribed under the Local Government (General) Regulation 2021. Members of IWC's ARIC may participate as members on a maximum of 5 NSW Local Government Audit, Risk and Improvement Committees and a maximum of 10 committees or board roles (including the maximum 5 NSW Local Government roles). This requirement applies for independent member appointments made from 1 July 2024. Participation in committees carries responsibilities which from a good governance perspective requires focus. Members' participation in committees and their capacity to perform the independent member role for Council is subject to disclosure and conflict considerations and is a factor considered annually as part of Committee assurance reporting and through Review arrangements.

5.4 Members will be appointed for up to a four-year term. Members can be reappointed for one further term, but the total period of continuous membership cannot exceed eight years. This includes any term as Chairperson of the committee. Members who have served an eight-year term (either as a member or as chairperson) must have a two-year break from serving on the committee

before being appointed again. To preserve the committee's knowledge of the Council, ideally, no more than one member should retire from the committee because of rotation in any one year.

5.5 The terms and conditions of each member's appointment to the committee are to be set out in a letter of appointment. New members will be thoroughly inducted to their role and receive relevant information and briefings on their appointment to assist them to meet their responsibilities.

5.6 Prior to approving the reappointment or extension of the chairperson's or an independent member's term, the governing body is to undertake an assessment of the chairperson's or committee member's performance. Reappointment of the Chairperson or a committee member is also to be subject to that person still meeting the independence and eligibility requirements prescribed under the Local Government (General) Regulation 2021.

5.7 Members of the committee must possess and maintain a broad range of skills, knowledge and experience relevant to the operations, governance and financial management of the Council, the environment in which the Council operates, and the contribution that the committee makes to the Council. At least one member of the committee must have accounting or related financial management experience with an understanding of accounting and auditing standards in a local government environment. All members should have sufficient understanding of the Council's financial reporting responsibilities to be able to contribute to the committee's consideration of the Council's annual financial statements.

6 Role

6.1 As required under section 428A of the Local Government Act 1993 (the Act), the role of the committee is to review and provide independent advice to the Council regarding the following aspects of the Council's operations:

- compliance
- risk management
- fraud control
- financial management
- governance
- implementation of the strategic plan, delivery program and strategies
- service reviews
- collection of performance measurement data by the Council, and
- internal audit

6.2 The committee must also provide information to the Council for the purpose of improving the Council's performance of its functions.

6.3 The committee's specific audit, risk and improvement responsibilities under section 428A of the Act are outlined in Schedule 1 to these terms of reference.

6.4 The committee will act as a forum for consideration of the Council's internal audit function and oversee its planning, monitoring and reporting to ensure it operates effectively.

6.5 The committee has no power to direct external audit or the way it is planned and undertaken but will act as a forum for the consideration of external audit findings.

6.6 The committee is directly responsible and accountable to the governing body for the exercise of its responsibilities. In carrying out its responsibilities, the committee must at all times recognise that primary responsibility for management of the Council rests with the governing body and the General Manager.

6.7 The responsibilities of the committee may be revised or expanded in consultation with, or as requested by, the governing body from time to time.

7 Responsibilities of members

Independent members

7.1 The Chairperson and members of the committee are expected to understand and observe the requirements of the Office of Local Government's Guidelines for risk management and internal audit for local government in NSW. Members are also expected to:

- make themselves available as required to attend and participate in meetings
- contribute the time needed to review and understand information provided to it
- apply good analytical skills, objectivity and judgement
- act in the best interests of the Council
- have the personal courage to raise and deal with tough issues, express opinions frankly, ask questions that go to the fundamental core of the issue and pursue independent lines of inquiry
- maintain effective working relationships with the Council
- have strong leadership qualities (chairperson)
- lead effective committee meetings (chairperson), and
- oversee the Council's internal audit function (chairperson).

Councillor members (if applicable)

7.2 To preserve the independence of the committee, the Councillor member of the committee is a non-voting member. Their role is to:

- relay to the committee any concerns the governing body may have regarding the Council and issues being considered by the committee
- provide insights into local issues and the strategic priorities of the Council that would add value to the committee's consideration of agenda items
- advise the governing body (as necessary) of the work of the committee and any issues arising from it, and
- assist the governing body to review the performance of the committee.

7.3 Issues or information the councillor member raises with or provides to the committee must relate to the matters listed in Schedule 1 and issues being considered by the committee.

7.4 The Councillor member of the committee must conduct themselves in a non-partisan and professional manner. The Councillor member of the committee must not engage in any conduct that seeks to politicise the activities of the committee or the internal audit function or that could be seen to do so.

7.5 If the Councillor member of the committee engages in such conduct or in any other conduct that may bring the committee and its work into disrepute, the Chairperson of the committee may recommend to the Council, that the Councillor member be removed from membership of the committee. Where the Council does not agree to the committee chairperson's recommendation, the Council must give reasons for its decision in writing to the chairperson.

Conduct

7.6 Independent committee members are required to comply with the Council's code of conduct.

7.7 Complaints alleging breaches of the Council's code of conduct by an independent committee member are to be dealt with in accordance with the Procedures for the Administration of the Model Code of Conduct for Local Councils in NSW. The General Manager must consult with the governing body before taking any disciplinary action against an independent committee member in response to a breach of the Council's code of conduct.

Conflicts of interest

7.8 Once a year, committee members must provide written declarations to the Council stating that they do not have any conflicts of interest that would preclude them from being members of the committee. Independent committee members are 'designated persons' for the purposes of the Council's code of conduct and must also complete and submit returns of their interests.

7.9 Committee members and observers must declare any pecuniary or non-pecuniary conflicts of interest they may have in a matter being considered at the meeting at the start of each meeting or as soon as they become aware of the

conflict of interest. Where a committee member or observer declares a pecuniary or a significant non-pecuniary conflict of interest, they must remove themselves from committee deliberations on the issue. Details of conflicts of interest declared at meetings must be appropriately minuted.

Standards

7.10 Committee members are to conduct their work in accordance with the International Standards for the Professional Practice of Internal Auditing issued by the Institute of Internal Auditors and the current Australian risk management standard, where applicable.

8 Work plans

8.1 The work of the committee is to be thoroughly planned and executed. The committee must develop a strategic work plan every four years to ensure that the matters listed in Schedule 1 are reviewed by the committee and considered by the internal audit function when developing their risk-based program of internal audits. The strategic work plan must be reviewed at least annually to ensure it remains appropriate.

8.2 The committee may, in consultation with the governing body, vary the strategic work plan at any time to address new or emerging risks. The governing body may also, by resolution, request the committee to approve a variation to the strategic work plan. Any decision to vary the strategic work plan must be made by the committee.

8.3 The committee must also develop an annual work plan to guide its work, and the work of the internal audit function over the forward year.

8.4 The committee may, in consultation with the governing body, vary the annual work plan to address new or emerging risks. The governing body may also, by resolution, request the committee to approve a variation to the annual work plan. Any decision to vary the annual work plan must be made by the committee.

8.5 When considering whether to vary the strategic or annual work plans, the committee must consider the impact of the variation on the internal audit function's existing workload and the completion of pre-existing priorities and activities identified under the work plan.

9 Assurance reporting

9.1 The committee must regularly report to the Council to ensure that it is kept informed of matters considered by the committee and any emerging issues that

may influence the strategic direction of the Council or the achievement of the Council's goals and objectives.

9.2 The committee will provide an update to the governing body and the General Manager of its activities and opinions after every committee meeting.

9.3 The committee will provide an annual assessment to the governing body and the General Manager on the committee's work and its opinion on how the Council is performing.

9.4 The committee will provide a comprehensive assessment every council term of the matters listed in Schedule 1 to the governing body and the General Manager.

9.5 The committee may at any time report to the governing body or the General Manager on any other matter it deems of sufficient importance to warrant their attention. The Mayor and the Chairperson of the committee may also meet at any time to discuss issues relating to the work of the committee.

9.6 Should the governing body require additional information, a request for the information may be made to the Chairperson by resolution. The Chairperson is only required to provide the information requested by the governing body where the Chairperson is satisfied that it is reasonably necessary for the governing body to receive the information for the purposes of performing its functions under the Local Government Act. Individual Councillors are not entitled to request or receive information from the committee.

10 Administrative arrangements

Meetings

10.1 The committee will meet at least 4 times per year, including a special meeting to review the Council's financial statements.

10.2 The committee can hold additional meetings when significant unexpected issues arise, or if the Chairperson is asked to hold an additional meeting by a committee member, the General Manager or the governing body.

10.3 Committee meetings can be held in person, by telephone or videoconference. Proxies are not permitted to attend meetings if a committee member cannot attend.

10.4 A quorum will consist of a majority of independent voting members. Where the vote is tied, the Chairperson has the casting vote.

10.5 The Chairperson of the committee will decide the agenda for each committee meeting. Each committee meeting is to be minuted to preserve a record of the issues considered and the actions and decisions taken by the committee.

10.6 The Mayor, General Manager and the Internal Audit Coordinators should attend committee meetings as non-voting observers. The external auditor (or their

representative) is to be invited to each committee meeting as an independent observer. The Chairperson can request the Council's Chief Financial Officer or equivalent, Senior Manager Governance and Risk, Directors, Senior Managers, any Councillors, any employee/contractor of the council and any subject matter expert to attend committee meetings. Where requested to attend a meeting, persons must attend the meeting where possible and provide any information requested. Observers have no voting rights and can be excluded from a meeting by the Chairperson at any time. Councillors are invited to attend as Observers.

10.7 The committee can hold closed meetings whenever it needs to discuss confidential or sensitive issues with only voting members of the committee present.

10.8 The committee must meet separately with the Internal Audit Coordinators and the Council's external auditor at least once each year.

Dispute resolution

10.9 Members of the committee and the Council's management should maintain an effective working relationship and seek to resolve any differences they may have in an amicable and professional way by discussion and negotiation.

10.10 In the event of a disagreement between the committee and the General Manager or other senior managers, the dispute is to be resolved by the governing body.

10.11 Unresolved disputes regarding compliance with statutory or other requirements are to be referred to the Departmental Chief Executive of the Office of Local Government in writing.

Secretariat

10.12 The General Manager will nominate a staff member to provide secretariat support to the committee.

10.13 The Secretariat will ensure the agenda for each meeting and supporting papers are circulated after approval from the Chairperson at least 1 week before the meeting and ensure that minutes of meetings are prepared and maintained.

10.14 Draft Minutes must be approved by the Chairperson and circulated within three weeks of the meeting to each member. These Draft Minutes will also be circulated to Councillors.

10.15 Out-of-session approval of draft Minutes: Draft Minutes may be approved by a circular resolution (whether hardcopy or electronically) of voting members of the ARIC and signed by the Chairperson (whether hardcopy or electronically).

10.16 In-session approval of Draft Minutes: If not approved out of session, the Draft Minutes are to be approved at the following ARIC and signed by the Chairperson (whether hardcopy or electronically).

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10.17 The Approved Minutes are to be subsequently reported to the next Council meeting and after being adopted by the Council, published to Council's website. Draft Minutes are not publicly available.

10.18 The Approved Minutes of a meeting may be amended to correct typographical or administrative errors, so long as the changes do not alter the substance of any decision made. Any such changes are to be endorsed by the Chairperson prior to their being made and reported to the next ARIC meeting.

11 Resignation and dismissal of members

11.1 Where the Chairperson or a committee member is unable to complete their term or does not intend to seek reappointment after the expiry of their term, they should give [agreed timeframe] notice to the Chairperson and the governing body prior to their resignation to allow the Council to ensure a smooth transition to a new Chairperson or committee member.

11.2 The governing body can, by resolution, terminate the appointment of the Chairperson or an independent committee member before the expiry of their term where that person has:

- breached the council's code of conduct
- performed unsatisfactorily or not to expectations
- declared, or is found to be in, a position of a conflict of interest which is unresolvable
- been declared bankrupt or found to be insolvent
- experienced an adverse change in business status
- been charged with a serious criminal offence
- been proven to be in serious breach of their obligations under any legislation, or
- experienced an adverse change in capacity or capability.

11.3 The position of a Councillor member on the committee can be terminated at any time by the governing body by resolution.

Review arrangements

11.4 At least once every council term, the governing body must review or arrange for an external review of the effectiveness of the committee.

11.5 These terms of reference must be reviewed annually by the committee and once each council term by the governing body. Any substantive changes are to be approved by the governing body.

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12 Further information

12.1 For further information on Council's ARIC contact the Senior Manager Governance and Risk on +61 2 9392 5589.

13 Administrative Changes

13.1 From time-to-time circumstances may change leading to the need for minor administrative changes to this document. Where an update does not materially alter this document, such a change may be made including branding, Council Officer titles or department changes and legislative name or title changes which are considered minor in nature and not required to be formally endorsed.

14 Version Control – Terms of Reference History

This policy will be formally reviewed every three years from the date of adoption and as required.

Governance use only:

Document	**Audit, Risk and Improvement Committee Terms of Reference**	***Uncontrolled Copy When Printed***	
Custodian	Senior Manager, Governance & Risk	Version #	Version 7
Adopted By	Council	ECM Document #	36770368
Next Review Date	30 June 2025		

Amended by	**Changes made**	**Date Adopted**
Governance & Risk	New IWC Charter created	31 Oct 2017
Governance & Risk	Changes to membership, appointment and quorum	24 April 2018
Governance & Risk	Significant updates to the entire document as part of the required review to align document to, as far as practicable, the new draft OLG guidelines Risk Mgmt. & Internal Audit for Local Councils in NSW	9 Aug 2022
Governance & Risk	Amendments to clause 8.6 *Secretariat* to enable ARIC to approve minutes out of session.	8 August 2023
Governance & Risk	Revised document and aligned to the OLG mandatory requirements – adopted by Council	9 April 2024
Governance & Risk	Amendments to clause 5.3	25 June 2024
Governance & Risk	Amendments to clause 5.1	3 September 2024

Schedule 1 Audit, Risk and Improvement Committee Responsibilities

Audit

Internal audit

- Provide overall strategic oversight of internal audit activities
- Act as a forum for communication between the governing body, General Manager, senior management, the internal audit function and external audit
- Coordinate, as far as is practicable, the work programs of internal audit and other assurance and review functions
- Review and advise the Council:
  - on whether the Council is providing the resources necessary to successfully deliver the internal audit function
  - if the Council is complying with internal audit requirements, including conformance with the International Professional Practices Framework
  - if the Council's internal audit charter is appropriate and whether the internal audit policies and procedures and audit/risk methodologies used by the Council are suitable
  - of the strategic four-year work plan and annual work plan of internal audits to be undertaken by the Council's internal audit function
  - if the Council's internal audit activities are effective, including the performance of the internal audit coordinator and the internal audit function
  - of the findings and recommendations of internal audits conducted, and corrective actions needed to address issues raised
  - of the implementation by the Council of these corrective actions
  - on the appointment of the internal audit coordinator and external providers, and
  - if the internal audit function is structured appropriately and has sufficient skills and expertise to meet its responsibilities

External audit

- Act as a forum for communication between the governing body, General Manager, senior management, the internal audit function and external audit
- Coordinate as far as is practicable, the work programs of internal audit and external audit
- Provide input and feedback on the financial statement and performance audit coverage proposed by external audit and provide feedback on the audit services provided

- Review all external plans and reports in respect of planned or completed audits and monitor Council's implementation of audit recommendations
- Provide advice to the governing body and/or General Manager on action taken on significant issues raised in relevant external audit reports and better practice guide

Risk

Risk management

Review and advise the Council:

- if the Council's has in place a current and appropriate risk management framework that is consistent with the Australian risk management standard
- whether the Council is providing the resources necessary to successfully implement its risk management framework
- whether the Council's risk management framework is adequate and effective for identifying and managing the risks the Council faces, including those associated with individual projects, programs and other activities
- if risk management is integrated across all levels of the Council and across all processes, operations, services, decision-making, functions and reporting
- of the adequacy of risk reports and documentation, for example, the Council's risk register and risk profile
- whether a sound approach has been followed in developing risk management plans for major projects or undertakings
- whether appropriate policies and procedures are in place for the management and exercise of delegations
- if the Council has taken steps to embed a culture which is committed to ethical and lawful behaviour
- if there is a positive risk culture within the Council and strong leadership that supports effective risk management
- of the adequacy of staff training and induction in risk management
- how the Council's risk management approach impacts on the Council's insurance arrangements
- of the effectiveness of the Council's management of its assets, and
- of the effectiveness of business continuity arrangements, including business continuity plans, disaster recovery plans and the periodic testing of these plans.

Internal controls

Review and advise the Council:

- whether the Council's approach to maintaining an effective internal audit framework, including over external parties such as contractors and advisors, is sound and effective

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- whether the Council has in place relevant policies and procedures and that these are periodically reviewed and updated
- whether appropriate policies and procedures are in place for the management and exercise of delegations
- whether staff are informed of their responsibilities and processes and procedures to implement controls are complied with
- if the Council's monitoring and review of controls is sufficient, and
- if internal and external audit recommendations to correct internal control weaknesses are implemented appropriately.

Compliance

Review and advise the Council of the adequacy and effectiveness of the Council's compliance framework, including:

- if the Council has appropriately considered legal and compliance risks as part of the Council's risk management framework
- how the Council manages its compliance with applicable laws, regulations, policies, procedures, codes, and contractual arrangements, and
- whether appropriate processes are in place to assess compliance.

Fraud and corruption

Review and advise the Council of the adequacy and effectiveness of the Council's fraud and corruption prevention framework and activities, including whether the Council has appropriate processes and systems in place to capture and effectively investigate fraud-related information.

Financial management

Review and advise the Council:

- if the Council is complying with accounting standards and external accountability requirements
- of the appropriateness of the Council's accounting policies and disclosures
- of the implications for the Council of the findings of external audits and performance audits and the Council's responses and implementation of recommendations
- whether the Council's financial statement preparation procedures and timelines are sound
- the accuracy of the Council's annual financial statements prior to external audit, including:
  - management compliance/representations
  - significant accounting and reporting issues
  - the methods used by the Council to account for significant or unusual transactions and areas of significant estimates or judgements
  - appropriate management signoff on the statements

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- if effective processes are in place to ensure financial information included in the Council's annual report is consistent with signed financial statements
- if the Council's financial management processes are adequate
- the adequacy of cash management policies and procedures
- if there are adequate controls over financial processes, for example:
  - appropriate authorisation and approval of payments and transactions
  - adequate segregation of duties
  - timely reconciliation of accounts and balances
  - review of unusual and high value purchases
- if policies and procedures for management review and consideration of the financial position and performance of the Council are adequate
- if the Council's grants and tied funding policies and procedures are sound.

Governance

Review and advise the Council regarding its governance framework, including the Council's:

- decision-making processes
- implementation of governance policies and procedures
- reporting lines and accountability
- assignment of key roles and responsibilities
- committee structure
- management oversight responsibilities
- human resources and performance management activities
- reporting and communication activities
- information and communications technology (ICT) governance, and
- management and governance of the use of data, information and knowledge

Improvement

Strategic planning

Review and advise the Council:

- of the adequacy and effectiveness of the Council's integrated, planning and reporting (IP&R) processes
- if appropriate reporting and monitoring mechanisms are in place to measure progress against objectives, and
- whether the Council is successfully implementing and achieving its IP&R objectives and strategies.

Service reviews and business improvement

- Act as a forum for communication and monitoring of any audits conducted by external bodies and the implementation of corrective actions (for example, NSW

government agencies, Commonwealth government agencies, insurance bodies)

- Review and advise the Council:
  - If the Council has robust systems to set objectives and goals to determine and deliver appropriate levels of service to the community and business performance
  - if appropriate reporting and monitoring mechanisms are in place to measure service delivery to the community and overall performance, and
  - how the Council can improve its service delivery and the Council's performance of its business and functions generally

Performance data and measurement

Review and advise the Council:

- if the Council has a robust system to determine appropriate performance indicators to measure the achievement of its strategic objectives
- if the performance indicators the Council uses are effective, and
- of the adequacy of performance data collection and reporting.

Guidelines for the Appointment and Oversight of General Managers

2022



NSW GOVERNMENT

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INTRODUCTION

The *Local Government Act 1993* (the Act) requires councils to appoint a person to be the council's general manager (section 334).

One of the prescribed functions of the governing body of a council is to determine the process for the appointment of the general manager and to monitor their performance (section 223).

These Guidelines have been developed to assist councillors when performing their functions under the Act relating to the appointment of general managers and overseeing their performance. They provide guidance on:

- the role of the general manager and the importance of a good working relationship between councillors and the general manager
- the recruitment process and the appointment of a general manager
- day to day oversight of and liaison with the general manager
- the performance review process
- separation, and
- renewal of the general manager's contract.

These Guidelines are issued under section 23A of the Act and must be taken into consideration by councils when exercising their functions in relation to the recruitment and oversight of general managers. They should be read in conjunction with the relevant provisions of the Act and the *Local Government (General) Regulation 2021* (the Regulation) and the standard contract of employment for general managers approved by the Departmental Chief Executive of the Office of Local Government under section 338 of the Act (the approved standard contract).

ROLE OF THE GENERAL MANAGER

Councillors comprise the governing body of a council and make decisions by passing resolutions. It is the general manager's role to implement the lawful decisions of the council and to carry out the functions conferred on them by the Act and Regulation and other legislation.

General managers also perform other functions delegated to them by the governing body.

The governing body monitors the implementation of its decisions through the general manager's reports to council meetings.

Key functions of the general manager

The Act confers certain functions on general managers of councils (section 335). Key aspects of the general manager's role are set out below:

Management of the council

The general manager is responsible for conducting the day-to-day management of the council in accordance with the strategic plans, programs, strategies and policies approved by the governing body of the council and implementing without undue delay, lawful decisions of the governing body.

Assisting the governing body to set the strategic direction

The general manager also plays a key role in assisting the governing body to develop the council's strategic direction. The general manager is responsible for guiding the preparation of the community strategic plan and the council's response to it via the delivery program and operational plans. The general manager is also responsible for implementing the delivery program and operational plans and reports to the governing body on their implementation. More information on this is available on the Office of Local Government's website.

Determining the organisation structure

The general manager is responsible for determining the organisation structure of the council (other than senior staff positions) following consultation with the governing body and in accordance with the budget approved by the governing body (section 332). The positions within the organisation structure of the council must be determined to give effect to the priorities set out in the council's strategic plans, including the community strategic plan and delivery program.

Appointment and direction of staff

The general manager is responsible for the appointment and direction of staff and their dismissal. The general manager must consult with the governing body before appointing or dismissing senior staff.

Supporting councillors

The general manager is also responsible for ensuring councillors are provided with the information and the advice they require to make informed decisions and to carry out their civic duties.

The general manager should ensure that council meeting business papers contain sufficient information to allow councillors to make informed decisions and to allow them to effectively monitor and review the council's operations and performance. This will assist councils in ensuring they are complying with statutory requirements, keeping within the budget approved by the council, and achieving the strategic goals set by the council in its delivery program and operational Plan.

The governing body may direct the general manager to provide councillors with advice but

cannot direct them as to the content of that advice.

Requests by councillors for assistance or information outside of meetings should be made to the general manager unless the general manager has authorised another staff member to receive such requests. The *Model Code of Conduct for Local Councils in NSW* contemplates that councils should adopt a policy to provide guidance on interactions between councillors and staff. The policy should be agreed to by both the governing body and the general manager. To assist councils, the Office of Local Government has prepared a model councillor and staff interaction policy which reflects best practice. This is available on the Office of Local Government's website.

The delegation of functions to the general manager

A governing body may delegate certain functions of the council to the general manager but cannot delegate the functions set out in section 377(1) of the Act. The delegation of a council's functions must be made by resolution and be evidenced in writing. Delegations must be reviewed during the first 12 months of each term of the council (section 380).

The general manager may sub-delegate a function delegated to them by the governing body (section 378). However, the general manager still retains responsibility to ensure that any sub-delegated function is carried out appropriately.

The importance of a good working relationship with the general manager

The position of general manager is pivotal in a council. It is the interface between the governing body which sets the strategic direction of the council and monitors its performance, and the administrative body of the council, headed by the general manager, which implements the decisions of the governing body. A good working relationship between the general manager and the councillors is therefore critical for good governance and a well-functioning council. Where this relationship breaks down, this can quickly lead to dysfunction.

The Centre for Local Government at the University of Technology in Sydney has identified the following as key components of a good working relationship between councillors and the general manager:

- mutual trust and respect
- councillors publicly supporting the work of the general manager
- councillors dealing with any performance concerns through appropriate channels e.g., not the media or council meetings
- councillors not getting involved in the day-to-day operational matters of the council (which makes it difficult for the general manager to do their job)
- councillors having a clear understanding of how and when to approach the general manager or other staff for information or support and following agreed protocols
- regular meetings between the general manager, mayor and councillors to ask questions and share information and advice
- respect of confidentiality, and
- any conflict is dealt with professionally and quickly and where it can't be addressed informally, proper processes are followed.

RECRUITMENT AND SELECTION

Requirements of the *Local Government Act 1993*

One of the prescribed functions of the governing body of a council is to determine the process for the appointment of the general manager (section 223).

When recruiting a new general manager, the position must be advertised in a manner sufficient to enable suitably qualified persons to apply for the position (section 348).

As with the appointment of all council staff, councils must ensure that the appointment of the general manager is made using merit selection principles (section 349). Recruitment using merit selection is a competitive process where the applicant who demonstrates that they have the best qualifications and experience relevant to the role is appointed. Equal employment opportunity principles also apply to the recruitment of general managers (sections 349 and 344).

The recruitment process must be open and transparent, but the confidentiality of individual applicants must be maintained. A failure to maintain appropriate confidentiality may constitute a breach of the Act, the council's code of conduct and the *Privacy and Personal Information Protection Act 1998*.

Councils should engage an external recruitment consultant to assist them with the recruitment process and that person should have a role in verifying that proper processes and procedures are followed in the appointment of the general manager.

There are a range of possible approaches to undertaking the recruitment of the general manager. The guidance contained in these Guidelines reflects what the Office of Local Government considers to be best practice.

The pre-interview phase

As noted above, the council's governing body is responsible for determining the process for recruiting the general manager.

The governing body should delegate the task of recruitment to a selection panel led by the mayor and approve the recruitment process. The panel will report back to the governing body on the process and recommend the most meritorious applicant for appointment by the council.

The selection panel should consist of at least the mayor, the deputy mayor, another councillor and a suitably qualified person independent of the council. Where practicable, the selection panel membership should remain the same throughout the entire recruitment process.

Selection panels should, where possible, have a mix of genders.

The council's governing body should delegate to one person (generally the mayor) the task of ensuring:

- the selection panel is established
- the general manager's position description is current and evaluated in terms of salary to reflect the responsibilities of the position
- the proposed salary range reflects the responsibilities and duties of the position
- the position is advertised according to the requirements of the Act
- information packages are prepared, and
- applicants selected for interview are notified.

The mayor, or another person independent of council staff, should be the contact person for the position and should maintain confidentiality with respect to contact by potential applicants.

Interview phase

Interviews should be held as soon as possible after candidates are short listed.

Questions should be designed to reflect the selection criteria for the position and assist the selection panel to assess the suitability of the candidate for the position.

Interviews should be kept confidential.

All written references must be checked. The selection panel must delegate the task of contacting referees to one panel member. Other panel members should not contact referees.

If contact with someone other than a nominated referee is required, the applicant's permission must be sought.

At least 2 referees must be contacted and asked questions about the candidate relevant to the selection criteria.

Where tertiary qualifications are relied on, they should be produced for inspection and if necessary, for verification.

Appropriate background checks must be undertaken, for example, bankruptcy and criminal records checks and whether the candidate has been disqualified from managing a corporation by the Australian Securities and Investments Commission. For guidance on better practice recruitment background checks, see the Australian Standard AS 4811:2022 Workforce Screening and the Independent Commission Against Corruption's publication, *Strengthening employment screening practices in the NSW public sector* which is available on its website.

Selection panel report

The selection panel is responsible for preparing a report to the council's governing body that:

- outlines the selection process
- recommends the most meritorious applicant with reasons
- recommends an eligibility list if appropriate
- recommends that no appointment is made if the outcome of interviews is that there are no suitable applicants.

This report should be confidential and reported to a closed meeting of the council.

The appointment of a general manager is a non-delegable function of the council under section 377 of the Act and a general manager cannot be appointed without a formal resolution of the council.

The council's governing body must by resolution approve the position of the general manager being offered to the successful candidate before the position is offered to the candidate.

Finalising the appointment

The mayor makes the offer of employment after the governing body has resolved to appoint the successful candidate. The initial offer can be made by telephone.

Conditions such as term of the contract (1-5 years) and remuneration package (within the range approved by the governing body of the council) can be discussed by telephone but must be confirmed in writing.

The standard contract of employment for general managers approved by the Departmental Chief Executive of the Office of Local Government under section 338 of the Act must be used. The approved standard contract is available on the Office's website. The terms of the approved standard contract must not be varied. Only the term of the contract and the schedules to the approved standard contract can be adapted by councils.

General managers must be employed for 1–5 years.

The contract governs:

- the duties and functions of general managers
- performance agreements
- the process for renewal of employment contracts
- termination of employment and termination payments
- salary increases, and
- leave entitlements.

It should be noted that the Departmental Chief Executive of the Office of Local Government cannot approve individual variations to the standard terms of the contract.

Candidates who are placed on the eligibility list and unsuccessful applicants should be advised of the outcome of the recruitment process before the successful applicant's details are made public.

Record keeping

Councils should retain all records created as part of the recruitment process including the advertisement, position description, selection criteria, questions asked at interview, interview panel notes, selection panel reports and notes of any discussions with the selected candidate. These records are required to be stored and disposed of in accordance with the *State Records Act 1998*.

DAY-TO-DAY OVERSIGHT AND LIAISON WITH THE GENERAL MANAGER

While one of the prescribed functions of the governing body is to monitor the general manager's performance, day-to-day oversight of and liaison with the general manager should be undertaken by the mayor.

The mayor's role in the day-to-day management of the general manager should include:

- approving leave
- approving expenses incurred, and
- receiving and managing complaints about the general manager in accordance with the *Procedures for the Administration of the Model Code of Conduct for Local Councils in NSW*.

The council's governing body should ensure there are adequate and appropriate policies in place to guide the mayor in the day-to-day oversight of and liaison with the general manager and keep those policies under regular review.

Some of the key policies the governing body should ensure are in place are those relating to:

- leave
- travel
- credit cards
- purchasing and procurement
- expenses and facilities
- petty cash, and
- financial and non-financial delegations of authority.

The governing body should also ensure there are appropriate policies in place with respect to the expenditure of council funds and reporting requirements in relation to that expenditure.

The council's governing body should satisfy itself that any policy governing the conferral of a benefit on the general manager, such as use of a motor vehicle, allows the actual dollar value of that benefit to be quantified so it can be accurately reflected in the general manager's salary package in Schedule C to the approved standard contract.

PERFORMANCE MANAGEMENT

Managing the performance of the general manager

The general manager is made accountable to the council for their performance principally through their contract of employment.

The role of the governing body is to monitor the general manager's performance in accordance with their contract of employment.

The performance of the general manager must be reviewed at least annually against the agreed performance criteria for the position. Councils may also choose to undertake more frequent interim reviews of the general manager's performance.

The agreed performance criteria must be set out in an agreement that is signed within three months of the commencement of the contract. Development of the performance agreement is discussed below.

Establishing a performance review panel

The governing body must establish a performance review panel led by the mayor, and delegate the task of undertaking the general manager's performance reviews to the panel. The extent of the delegation should be clear.

It is recommended that full responsibility for performance management be delegated to the performance review panel, including discussions about performance, any actions that should be taken and the determination of the new performance agreement.

Performance review panels should comprise of the mayor, the deputy mayor, another councillor nominated by council and a councillor nominated by the general manager.

The council's governing body may also consider including an independent observer on the panel. Panel members should be trained in the performance management of general managers.

The role of the review panel includes:

- conducting performance reviews
- reporting the findings and recommendations of reviews to the council, and
- development of the performance agreement.

The governing body and the general manager may agree on the involvement of a suitably qualified external facilitator such as a human resources professional to assist with the performance review process and the development of a new performance agreement. That person may be selected by the governing body or the performance review panel.

Councillors who are not members of the performance review panel may be invited to contribute to the performance review process by providing feedback to the mayor on the general manager's performance relevant to the agreed performance criteria.

All councillors should be notified of relevant dates in the performance review cycle and be kept advised of the panel's findings and recommendations.

The panel should report back to the governing body of the council in a closed session on the findings and recommendations of performance reviews as soon as practicable following any performance review. This should not be an opportunity to debate the results or revisit the general manager's performance review. The general manager should not be present when the matter is considered.

The performance agreement, action plan and any associated records that contain specific information about the work performance or conduct of the general manager are to remain confidential unless otherwise agreed to by the general manager or are required to be disclosed by law. The unauthorised disclosure of this information may constitute a breach of the Act, the council's code of conduct and the *Privacy and Personal Information Protection Act 1998*.

Establishing the performance agreement

The performance agreement is the most important component of successful performance management. The performance agreement should include clearly defined and measurable performance indicators against which the general manager's performance can be measured.

As one of the general manager's key responsibilities is to oversee the implementation of the council's strategic direction, it is important to align the general manager's performance criteria to the goals contained in the community strategic plan, and the council's delivery program and operational plans.

The performance agreement should also include indicators relevant to the general manager's personal contribution to the council's key achievements and their core capabilities, including leadership qualities.

The performance agreement should also include indicators related to promoting and maintaining an ethical culture within the council. These could include the conduct and measurement of the outcomes from staff surveys and the promotion of whistleblowing procedures under the *Public Interest Disclosures Act 1994* and the reporting of suspected wrongdoing to appropriate oversight agencies including the Independent Commission Against Corruption and the Office of Local Government.

The performance agreement should contain but not be limited to key indicators that measure how well the general manager has met the council's expectations with respect to:

- service delivery targets in the council's delivery program and operational plans
- budget compliance
- organisational capability
- timeliness and accuracy of information and advice to councillors
- timely implementation of council resolutions
- management of organisational risks
- promotion of an ethical culture
- ensuring a safe workplace and facilitating compliance with the *Work Health and Safety Act 2011*, and
- leadership and providing a consultative and supportive working environment for staff etc.

Performance review process

The approved standard contract requires that the performance of the general manager must be formally reviewed at least annually. The governing body of the council may also undertake interim performance reviews as appropriate.

The assessment should include:

- a self-assessment by the general manager, and
- an assessment by the review panel of the general manager's performance against the performance agreement.

The performance review meeting should be scheduled with sufficient notice to all parties in accordance with clauses 7.6 and 7.7 of the approved standard contract. These require:

- the general manager to give the council 21 days' written notice that an annual performance review is due, and
- the council to give the general manager at least 10 days' written notice that the performance review is to be conducted.

The meeting should concentrate on constructive dialogue about the general manager's performance against all sections of the performance agreement.

The meeting should identify any areas of concern and agreed actions to address those concerns.

In undertaking the performance review, care must be taken to ensure that the review is conducted fairly and in accordance with the principles of natural justice. The appointment by the council, in agreement with the general manager, of a suitably qualified external facilitator to advise on the process (see above) should assist councils to comply with these requirements.

The council's governing body must advise the general manager, in writing, in clear terms, the outcome of any performance review.

The new performance agreement for the next period should be prepared as soon as possible after the completion of the previous period. The agreement should be presented to the governing body of the council for discussion in a closed meeting together with the outcomes of the previous review period.

REMUNERATION AND REWARD

Under the approved standard contract, general managers are entitled to an annual increase in their salary package on each anniversary of the contract, equivalent to the latest percentage increase in remuneration for NSW public sector senior executive office holders as determined by the Statutory and Other Offices Remuneration Tribunal.

Councils may also approve discretionary increases to the general manager's total remuneration package under the approved standard contract as a reward for good performance. Discretionary increases may only be approved after a formal review of the general manager's performance has been undertaken and the general manager's performance has been assessed as being better than satisfactory.

Any discretionary increases should be modest and in line with community expectations and only apply for one year unless the council determines that it is to apply for the balance of the contract. All discretionary increases in remuneration, together with the reasons for the increase, must be reported to an open meeting of the council.

Councils may also on one occasion during the term of the contract approve the payment of a retention bonus to the general manager as an incentive for them to serve out their contract. If approved, the retention bonus is to be accrued on an annual, pro-rata basis for the remainder of the contract and is to be paid at the end of the contract period.

SEPARATION

Termination of the general manager's employment

The approved standard contract sets out how the general manager's employment contract can be terminated before its expiry date by either the governing body or the general manager (see clause 10 of the approved standard contract). The circumstances in which the general manager's employment contract may be terminated are set out below:

By agreement

The contract may be terminated at any time by written agreement between the council and the general manager.

Resignation

The general manager may terminate the contract by giving 4 weeks written notice to the governing body of the council.

Incapacity

A council may terminate the general manager's contract by giving them 4 weeks written notice or by paying the equivalent of 4 weeks' remuneration calculated in accordance with Schedule C of the approved standard contract where:

- the general manager has become incapacitated for 12 weeks or more
- they have exhausted their sick leave, and
- the duration of the incapacity is either indefinite or for a period that would make it unreasonable for the contract to be continued.

Poor performance

A council may terminate the general manager's contract by giving them 13 weeks written notice or by paying the equivalent of 13 weeks' remuneration calculated in accordance with Schedule C of the approved standard contract on grounds of poor performance.

A council may only terminate the general manager's contract on the grounds of poor performance where:

- a performance review has been conducted, and
- the council has concluded that the general manager's performance falls short of the performance criteria or the terms of their performance agreement, and
- the general manager has been afforded a reasonable opportunity to utilise dispute resolution under clause 17 of the contract (see below).

No fault termination

A council may terminate the general manager's contract at any time by giving them 38 weeks written notice or paying the equivalent of 38 weeks remuneration calculated in accordance with Schedule C of the approved standard contract. If there are less than 38 weeks left to run in the term of the general manager's contract, the council can pay out the balance of the contract in lieu of notice.

Where the council proposes to terminate the general manager's contract on these grounds, if either party requests it and both parties agree, they may participate in mediation in relation to the proposed decision to terminate the contract. If the council does not agree to participate in mediation, it must give the general manager reasons for its decision where the general manager requests them.

Where a council terminates the contract on these grounds, it must give the general manager reasons for its decision to terminate their employment where the general manager requests it.

Summary dismissal

Councils may summarily dismiss the general manager on the grounds set out under clause 10.4 of the approved standard contract. These include:

- serious or persistent breach of the employment contract
- serious and wilful disobedience of any reasonable and lawful instruction or direction given by the council,
- serious and wilful misconduct, dishonesty, insubordination or neglect in the discharge of the general manager's duties and functions under their contract,
- failure to comply with any law or council policy concerning sexual harassment or racial or religious vilification
- serious or persistent breach of the council's code of conduct
- commission of a crime, resulting in conviction and sentencing (whether or not by way of periodic detention), which affects the general manager's ability to perform their duties and functions satisfactorily, or that brings the council into disrepute
- absence without approval for a period of 3 or more consecutive business days.

Automatic termination

The general manager's contract of employment is automatically terminated where the general manager becomes bankrupt, or they are disqualified from managing a corporation under Part 2D.6 of the *Corporations Act 2001*.

Where this occurs, the general manager's employment with the council automatically ends without the need for a decision by the council to terminate their contract of employment.

Suspension of the general manager

Councils may suspend the general manager, for example while allegations against them are being investigated. Suspension should be on full pay for a clearly defined period. Councils should not suspend a general manager's employment without first seeking expert legal advice. It would not be appropriate to seek advice from council human resources staff on the proposed suspension of the general manager.

Any decision to suspend a general manager should be made at a closed council meeting, having first carefully considered the expert legal advice received in relation to the specific matter.

The principals of procedural fairness apply to any decision to suspend a general manager, i.e., the general manager must be advised of the circumstances leading to their suspension, the reasons for the suspension, the period of the suspension and be given a right to respond to the decision to suspend.

Dispute resolution

The approved standard contract contains a dispute resolution clause at clause 17. These provisions are designed to encourage councils and general managers to attempt to resolve disputes when they arise.

Councils are required to offer the general manager an opportunity to utilise dispute resolution before they can terminate their employment for poor performance.

Where it is proposed to terminate the contract on the "no fault" grounds (clause 10.3.1(e)), if either party requests it and both parties agree, they may participate in mediation under clause 17 in relation to the proposed decision to terminate. If the council does not agree to participate in mediation, it must give the general manager reasons for its decision where the general manager requests them.

The governing body of the council should ideally resolve to delegate this function to the mayor or a panel of 3 councillors including the mayor.

If the dispute involves the mayor, then the deputy mayor should take the mayor's place. If there is no deputy mayor then the governing body should resolve to appoint another councillor to take the mayor's place.

The governing body of the council and the general manager should agree on an independent mediator to mediate the dispute. The approved standard contract allows the Departmental Chief Executive of the Office of Local Government to appoint a mediator where the parties cannot agree on one.

Councils and general managers may also agree on a mediator when the contract is made.

RENEWING THE GENERAL MANAGER'S CONTRACT

Clause 5 of the approved standard contract sets out the process for renewing the general manager's contract of employment. The key steps in the process are as follows:

- At least 9 months before the contract expires (or 6 months if the term of employment is for less than 3 years), the general manager must apply to the council in writing if seeking re-appointment to the position
- At least 6 months before the contract expires (or 3 months if the term of employment is for less than 3 years), the council must respond to the general manager's application by notifying the general manager in writing of its decision to either offer the general manager a new contract of employment (and on what terms) or to decline their application for re-appointment
- At least 3 months before the contract expires (or 1 month if the term of employment is for less than 3 years) the general manager must notify the council in writing of their decision to either accept or decline the offer made by the council.

Approval may be sought from the Departmental Chief Executive of the Office of Local Government to vary these timeframes in exceptional or unforeseen circumstances.

The terms of the new contract of employment, and in particular the schedules to the new contract, should be set out in the letter of offer. Before offering a new contract, the council should carefully review the terms of the schedules to the new contract.

The governing body should ensure that the performance criteria of the new performance agreement adequately reflect its expectations of the general manager's performance.

The governing body should also consider previous performance reviews conducted under previous contracts.

The process of deciding whether to offer the general manager a new contract should be as follows:

- a performance review is conducted
- findings and recommendations are reported to a closed council meeting in the absence of the general manager
- the closed meeting considers and decides whether to offer a new contract of employment to the general manager and on what terms as set out in the schedules to the contract
- the mayor informs the general manager of the council's decision.

Details of the decision to offer a new contract and a salary package should be reported to an open council meeting.

Appendix 1 – Performance management timelines

Timeline	Activity	Responsibility
At commencement of each new council	Provide induction training on performance management of the general manager	Council
Within 3 months of the commencement date of the contract	A performance agreement setting out agreed performance criteria must be signed between the general manager and the council	Council or council panel General Manager
Within 2 months of the signing of the performance agreement	The general manager must prepare and submit to the council an action plan which sets out how the performance criteria are to be met	General Manager
21 days' notice (before annual review)	The general manager gives the council written notice that an annual performance review is due	General Manager
At least 10 days' notice	The council must give the general manager written notice that the performance review is to be conducted	Council or council panel
After 6 months	The council may also decide, with the agreement of the general manager, to provide interim feedback to the general manager midway through the annual review period	Council or council panel General Manager
Prior to the annual review	Ensure all councillors on the review panel have been trained in performance management of general managers	Council
Prior to the annual performance review	The general manager may submit to council a self-assessment of their performance	General Manager
Annually	The general manager's performance must be reviewed having regard to the performance criteria in the agreement	Council or council panel General Manager
Annually	The performance agreement must be reviewed and varied by agreement	Council or council panel General Manager
Within 6 weeks of the conclusion of the performance review	Council will prepare and send to the general manager a written statement with council's conclusions on the general manager's performance during the performance review period	Council or council panel
As soon as possible after receipt of the statement	The general manager and the council will agree on any variation to the performance agreement for the next period of review	Council or council panel General Manager

Appendix 2 – Stages of performance management

STAGE	ACTION	PROCESS
1. Developing performance agreement	▪ Examine the position description and contract ▪ List all position responsibilities from the position description ▪ Identify stakeholder expectations ▪ List the key strategic objectives from the delivery program and operational plans ▪ Develop performance measures (identify indicators - set standards)	▪ Good planning ▪ Direct and effective communication ▪ Open negotiation ▪ Joint goal setting
2. Action planning	▪ Develop specific strategies to meet strategic objectives ▪ Identify resources ▪ Delegate tasks (e.g., put these delegated tasks into the performance agreements for other senior staff)	▪ Detailed analysis ▪ Two-way communication ▪ Detailed documentation
3. Monitoring progress (feedback halfway through the review period)	▪ Assess performance ▪ Give constructive feedback ▪ Adjust priorities and reset performance measures if appropriate	▪ Communication ▪ Avoid bias ▪ Counselling ▪ Coaching ▪ Joint problem solving
4. Annual	▪ Assess performance against measures ▪ Give constructive feedback ▪ Identify poor performance and necessary corrective action ▪ Identify outstanding performance and show appreciation	▪ Evaluation of the reasons behind performance being as assessed ▪ Open, straightforward communication (as bias free as possible) ▪ negotiation ▪ Counselling, support, training ▪ Documenting ▪ Decision making
5. Developing revised agreement	See stage 1	See Stage 1

Flood Management Advisory Committee Terms of Reference

V3



IWC2022/0222

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1 Introduction

Inner West Council (Council) established the Flood Management Advisory Committee ('Committee' or 'FMAC') on 23 August 2016 in accordance with the NSW Government Flood Prone Land Policy and the NSW Flood Risk Management Manual (The Manual).

These terms of reference set out the Committee's objectives, authority, composition and tenure, roles and responsibilities, reporting and administrative arrangements.

2 Objective

The objective of the Flood Management Advisory Committee is to assist the Council in the preparation of Floodplain Risk Management Plans for the Inner West Council local government area which will:

- Reduce the impact of flooding and flood liability on the community.
- Reduce private and public losses resulting from flooding.
- Recognise flood prone land as a valuable resource which should not be necessarily sterilised.
- Take into account social, economic, ecological and cultural factors.

The Committee acts as both a focus and forum for the discussion of technical, social, economic and environmental matters, and for the distillation of possibly differing viewpoints on these matters into ongoing management plans.

3 Function and Scope

The function and scope of the Committee will include but not be limited to the following:

- To assist Council in the development of Flood Studies and Floodplain Risk Management Studies and Plans for the Inner West Council local government area.
- To provide a link between Council and the local community.
- To identify objectives and strategies related to the improvement of the management of the floodplain.
- To monitor and review the implementation of flood planning in the Inner West Council local government area.
- To provide input into known flood behaviour as part of a flood study or flood risk management plan.
- To assist in the collection of information to support flood modelling and design.
- To facilitate coordination of flood management between local and state government agencies.
- To support and review the implementation of Floodplain Risk Management Plans within local planning processes, works programs and education campaigns and encouraging community participation.

The Committee does not consider specific development issues proposals/applications but focuses on broader management issues, Council policies and strategies affecting flood prone lands.

4 Delegation

The Committee is advisory in nature providing recommendations to Inner West Council. The Committee has not been delegated authority by Council. Any recommendations of the Committee must be ratified by resolution of Council and implemented by a member of Inner West Council staff with an appropriate delegation.

The Committee does not have any power to incur expenditure or to bind the Council to any decision upheld by the Committee.

5 Membership and Appointments

5.1 Membership of the Committee

Council recognizes its local community as a valuable partner in the management of the floodplain and the FMAC is a valued part of Council's local democracy.

The Committee comprises representatives from the local community with interest or expertise in flooding, elected representatives of Council, representatives of various NSW State Government departments / authorities / corporations, Council staff, and specialist consultants as engaged by Council.

Membership on the Committee is voluntary and by invitation from Inner West Council.

The Committee will consist of:

Members (voting)

- 2 Councillors nominated as per the terms of reference
- Up to 8 Local Community Representatives appointed as per the terms of reference
- 1 representative nominated by the NSW State Emergency Service Local Cluster

Technical Advisory Members (non-voting)

- 1 representative nominated by Sydney Water
- 1 representative nominated by the NSW SES Metro Zone
- 1 representative nominated by the NSW SES Ashfield-Leichhardt Unit
- 1 representative nominated by the NSW SES Marrickville Unit
- 1 representative from Transport for NSW
- Up to 2 representatives from the NSW Department of Climate Change, Energy, the Environment and Water
- Inner West Council Coordinator Stormwater & Asset Planning
- Inner West Council Manager Engineering Services
- Inner West Council Director Infrastructure
- Inner West Local Emergency Management Officer

Invitees & Observers (non-voting)

- Relevant officers from Inner West Council within Civil Works, Operations, Planning and Environment
- Representatives from other Councils or Government Agencies where they impacted by a Flood Study or Floodplain Risk Management Study and Plan being undertaken by Inner West Council

Additional observers can be invited to committee meetings at the discretion of the Committee Facilitator. Membership can be altered at any time by Council resolution.

5.2 Appointment of Chairperson and Deputy Chairpersons

Up to two elected representatives of Council may be members of the committee. The elected representatives of Council to serve on the committee shall be nominated by Council.

For the purposes of this charter the term "elected representatives" includes elected members of Council and, where there are no elected members of Council, persons that have been nominated by Council as members of Local Representation Advisory Committees.

The Chairperson and Deputy Chairpersons of the Committee shall be nominated by Council from the nominated elected representatives unless determined otherwise by Council.

If neither the Chairperson nor the Deputy Chairpersons of the Committee is able or willing to preside at a meeting of the Committee, the Committee may elect a member of the Committee to be acting chairperson of the Committee for that meeting.

5.3 Appointment of Community Representatives

Up to eight Community Representatives may be members of the committee, selected from members of the community who reside or operate on flood prone land, have expertise in local flood management, or represent local sporting groups, social groups, environmental groups or chambers of commerce impacted by flooding.

Expressions of interest for Community Representatives will be called for at intervals as required. Advertising for expressions of interest will be on Council's website.

Expressions of interest must be in writing. Expressions of interest will be prioritised by relevant Council staff.

Recommendations for appointment to the Committee will be prioritised based on the following selection criteria:

- Residence or property ownership or business operator within Inner West LGA.
- Representation across all Council's catchments.
- Knowledge of local catchment flooding issues.
- Commitment to represent the interests of the Inner West community concerning floodplain management issues.

- Ability to attend Committee meetings and public meetings within LGA as required.
- Ability to commit to a long term membership of the Committee.
- Preparedness to observe Council's Model Code of Conduct.

Successful applicants will be notified in writing and appointments of Community Representatives to the Committee will be reported to Council by the committee.

Community Representatives membership may be determined for up to two terms of Council (or remainder thereof).

Community Representatives shall serve on the Committee in a voluntary capacity.

5.4 Casual Vacancies

Any member of the Committee may, by giving notice in writing addressed to the Committee, resign as a member.

Membership on the Committee shall cease if:

- A member resigns in writing to the Committee;
- If a member (or representative) is absent without notification of absence for three (3) consecutive Committee meetings; or
- Upon resolution of Council to remove a member from the Committee.

In the event that a casual vacancy is caused by the resignation of a member, the Committee Facilitator will advise the Committee at its next meeting that a vacancy has arisen, and will provide a report to the next available Council meeting concerning a prospective replacement having regard to the following:

- If the member was nominated as a representative of an organisation, then the organisation shall be invited to nominate a replacement representative.
- If the member was nominated as a Community representative, then the Committee Facilitator will review original expressions of interest received and ascertain if any of the individuals who previously nominated are prepared to be considered as a member of the Committee.
- If there are no previous or current nominations then an expression of interest will be called.
- Should a vacancy occur within six (6) months of the end of term of the current Council, the vacancy will not be filled until the first term of the new Council.

6 Responsibility of Members

6.1 Code of Conduct

Council's Model Code of Conduct applies to the Flood Management Advisory Committee Members (FMAC Members) .

Failure by a Council Official or FMAC Member to comply with the standards of conduct prescribed under the Mode Code of Conduct may constitute misconduct and could result in suspension or removal from the advisory committee or working group.

Failure by a member of staff to comply with Council's Model Code of Conduct may also give rise to disciplinary action.

Council has zero tolerance for aggressive, humiliating, bullying, intimidatory or violent behaviour towards Council Officials or FMAC Members.

Respect is one of our core values and Council Officials and FMAC members are required to:

1. Treat everyone equitably and fairly
2. Embrace diversity
3. Acknowledge and value the needs of FMAC Members
4. Actively listen, to understand each other's point of view
5. Value feedback and respond constructively

6.2 Understanding and Contribution

Members of the Committee are expected to:

- Understand the relevant legislative and regulatory requirements appropriate to Inner West Council
- Contribute the time needed to study and understand the papers provided.
- Apply objectivity and good judgment.
- Express opinions frankly, ask questions that go to the fundamental core of issues.
- Members of the Committee are not permitted to speak to the media as a representative of the Committee unless approved by Council. General information with regard to purpose and objective of the Committee is available on Council's website

6.3 Conflict of Interest

All FMAC members are required to disclose conflicts of interest in accordance with the Conflict of Interest Policy. All FMAC Members are required to undertake an initial Disclosure of Interests upon commencement as a FMAC Member and annually thereafter. Any new Conflict of Interest that arises must be disclosed as soon as practicable and no more than one month post becoming aware of the new interest. **Refer** Schedule 1 Disclosure of Interest.

6.4 Role of the Chairperson

The Chairperson is responsible for:

- Opening the meeting and following the agenda
- Allocating times to be devoted to agenda items and ensuring that these times are observed
- Encouraging all members of the Committee to express their point of view
- Determining the most effective way of dealing with the issues raised and making the necessary arrangements to achieve this
- Summarising the progress of the discussion and degree of consensus reached at the end of each agenda items, and confirming this with the Minute taker before moving on
- Closing the meeting and confirming the date, time and place of the next meeting
- Liaising and reporting to the Council.

6.5 Committee Facilitator

The designated Committee Facilitator is the Director - Infrastructure or their nominee.

The Committee Facilitator is responsible for:

- Establishing the meeting agenda in conjunction with the Chairperson
- Preparing and distributing the agenda
- Ensuring the agenda and minutes are published
- Ensuring that relevant matters are brought before the Committee
- Ensuring that the input and decisions of the Committee are incorporated into Council activities.
- Booking venues
- Taking accurate minutes in the format determined by the Committee; and
- Distributing the minutes

7 Meetings

7.1 Frequency

The Committee will meet a minimum of four times a year, at quarterly intervals. Special meetings of the committee may be called where required at critical points in the review and delivery of Flood Studies and Flood Risk Management Plans, or there are pressing issues to be put forward to the Committee.

Meetings will allow for hybrid attendance (face-to-face and online) to ensure that members have as many options available to take part in the Committee.

The meetings of the Committee are to be called by the Committee Facilitator. The proposed date, time, location and business to be transacted at each meeting will be notified to all members of the Committee at least seven days prior to the meeting.

7.2 Quorum

The quorum for a meeting of the Committee will be 50% of the current voting members.

7.3 Meeting procedures

The following procedures shall apply during meetings:

- Meetings of the Committee shall be conducted under the Council's Model Code of Conduct.
- The Chairperson may call a special meeting if, in the Chairperson's opinion, there are matters of urgency that require attention.
- The Committee may invite people to attend meetings to observe, make representation or provide expert or technical advice.
- Provision shall be made on each agenda for General Business to be raised at each meeting.
- The agenda for the meetings shall be issued on the week preceding the Committee meeting.
- Council's role is to note the Committee's Minutes and to consider recommendations made by the Committee. Such recommendations will be highlighted for the attention of Council.
- The minutes shall be drafted and distributed after each meeting to Committee members.

7.4 Meeting Conduct

Members shall respect the views and opinions of each other, allowing for one person to speak at a time and participate in the meeting with decorum. The Chairperson will facilitate the meeting to ensure the meeting keeps to the agenda allowing for all agenda items to be considered.

When the Chairperson rises or speaks during a meeting:

- Any FMAC Member then speaking or seeking to speak must cease speaking.
- Every FMAC Member present must be silent to enable to Chairperson to be heard without interruption.

A Council Official or FMAC Member commits an Act of Disorder if they:

a. Contravenes the Flood Management Advisory Committee Terms of Reference
b. assaults or threatens to assault Council Officials or a FMAC Member
c. moves or attempts to move a recommendation that has an unlawful purpose or that deals with a matter that is outside the jurisdiction of the Flood Management Advisory Committee
d. insults, or makes unfavourable personal remarks about, or imputes improper motives to any other Council official or FMAC Member
e. or does anything that is inconsistent with maintaining order at the meeting or is likely to bring the Council or the Flood Management Advisory Committee into disrepute.

Where a FMAC Member commits an act of disorder the Chairperson reserves the right to expel any person from the meeting.

8 Sub-Committees & Working Groups

Sub-Committees or Working Groups may be established to support the Flood Management Advisory Committee and Council in the delivery of flood risk management projects.

Working Groups will contain relevant technical staff from Council, the Department of Planning and Environment, State Agencies, and selected consultants.

Sub-Committees and Working Groups will report to the Flood Management Advisory Committee on the progress of the matters assigned to them.

9 Breaches of this Terms of Reference

Breaches of Terms of Reference may result in an investigation of the alleged breach in line with relevant Council policies including the Model Code of Conduct.

Any alleged criminal offence or allegation of corrupt conduct will be referred to the relevant external agency.

10 Dissolution

The Committee may at any time be dissolved and disbanded by resolution of Council.

11 Administrative Changes

From time-to-time circumstances may change leading to the need for minor administrative changes to this document. Where an update does not materially alter this document, such a change may be made including branding, Council Officer titles or department changes and legislative name or title changes which are considered minor in nature and not required to be formally endorsed.

12 Version Control – Terms of Reference History

This Terms of Reference will be formally reviewed every three years from the date of adoption or as required.

Governance use only:

Document	**Flood Management Advisory Committee Terms of Reference**	***Uncontrolled Copy When Printed***	
Custodian	Manager Engineering Services	Version #	Version 3
Approved By	Council	ECM Document #	39705892
Next Review Date	April 2027		

Amended by	Changes made	Date Adopted
Engineering Services	Amended Contact Officer	29/9/2017
Engineering Services Governance and Risk	Significant updates to the entire document as part of the required review into meeting schedule, membership and committee governance. Terms of reference amended to align with standard IWC governance procedures	09/04/2024

Schedule 1 – Conflict of Interest Disclosure Form

CONFLICT OF INTEREST DISCLOSURE FORM

Information	A conflict of interest arises if it is likely that a person with a private or personal interest could be influenced in the performance of his or her public or professional duties by that interest, or that a reasonable person would believe that the person could be so influenced. Council's Code of Conduct requires Council officials to declare potential Conflicts of Interest and take appropriate action to resolve these situations immediately.
Types of Interests	1. **Pecuniary Interest** Is an interest that you have in a matter because of a reasonable likelihood or expectation of an appreciable financial gain or loss to you, or to another person with whom you are associated. This could include your partner, close relative and business associate. (Section 4 (4.1) Code of Conduct). **2. Non-Pecuniary Interest** Is a private or personal interest, which you have which may arise from a friendship, a family member, sporting, social, religious or cultural association. This may include money, interests of a financial nature or a non-financial benefit.
How a Conflict of Interest would arise:	• Where you have a personal interest that would lead you to be influenced in the carrying out of your Council work or public duties. • Where you have a personal interest that could lead a reasonable person to think you could be influenced in the carrying out of your Council work or public duties. • Where you know of a family member, relative, friend, associate or anybody close to you has an interest that could lead you to be influenced or a reasonable person to think you could be influenced, in the carrying out of your Council work or public duties.
Identify, Declare and Manage Conflict of Interest?	Where you have a non-pecuniary conflict of interest in a matter for the purposes of clause 5.2 of the Code of Conduct, you must disclose the relevant private interest you have in relation to the matter fully and in writing as soon as practicable after becoming aware of the non-pecuniary conflict of interest. How you manage a non-pecuniary conflict of interest will depend on whether or not it is significant, refer to Clause 5.6 to 5.9 of the Code of Conduct for guidance. If you determine that a non-pecuniary conflict of interests is less than significant and does not require further action, you must provide an explanation of why you consider that the conflict does not require further action in the circumstances. Where you have a significant non-pecuniary or pecuniary conflict of interest you must not participate in consideration of, or decision making in relation to, the matter in which you have the significant non-pecuniary or pecuniary conflict of interest.

Employee's Details	**Name:** Click or tap here to enter text. **Position:** Click or tap here to enter text. **Directorate:** Choose an item.
Description of Conflict of Interest	Click or tap here to enter text. **Type of Conflict** ☐ Pecuniary ☐ Non-Pecuniary – Significant ☐ Non-Pecuniary – Non-Significant **Date Conflict Declared:** Click or tap to enter a date. ☐ The details I have provided are correct to the best of my knowledge and the declaration is made in good faith. **Signature of Employee:** _____ **Date:** Click or tap to enter a date. **Please submit this form to your Manager/Senior Manager/Director or General Manager**
Action taken to avoid any impact from the Conflict of Interest	Click or tap here to enter text. ☐ Manager will monitor the employee's adherence to the action plan stated above. **Manager's Name:** Click or tap here to enter text. **Signature of Manager/Snr Manager:** _____ **Date:** Click or tap to enter a date. **Signature of Director/GM:** _____ **Date:** Click or tap to enter a date.
Endorsement by Employee	☐ I note the proposed action, endorse it, and agree to abide by it. If the circumstances as set out in this declaration changes, I will resubmit a new declaration setting out the circumstances for approval. **Signature of Employee:** _____ **Date:** Click or tap to enter a date.
Completed Forms	Send completed forms to Governance@innerwest.nsw.gov.au

Local Traffic Committee Terms of Reference

V2



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1 Introduction

The Roads and Traffic Authority is legislated as the organisation responsible for the control of traffic on all roads in New South Wales. Traffic is controlled by the installation of prescribed traffic control devices, such as regulatory signs, or traffic control facilities, such as medians.

New South Wales has many roads, which range from freeways to local streets. All these roads require the control of traffic. The RTA believes that the most effective means of dealing with the number and range of traffic related matters, particularly those which arise on regional and local roads, is to deal with them at the local level. The RTA has therefore delegated certain aspects of the control of traffic on regional and local roads to the Councils of Local Government areas.

The RTA continues to manage NSW's State Road network. However, local government continues to also play an important role in the management of this road network by providing traffic input and advice when necessary.

These guidelines provide the policy and framework for Councils to exercise the traffic functions delegated to them by the RTA. They outline the delegated functions, the limitations that apply to Councils when exercising their delegated functions, the responsibilities of the various parties involved in the process, and the roles of the local and regional traffic committees.

Note: These guidelines do not cover B-double route approvals as they are the subject of a separate delegation.

These guidelines have been prepared by the RTA:

(i) in accordance with current NSW legislation; and

(ii) in consultation with RTA's Legal Branch, the NSW Police, LGSA, and representatives from a number of metropolitan Councils.

It is important to note that the legislative power to control traffic through the authorisation of traffic control devices, lies with the RTA and the delegation of this power does not remove the RTA's ability to exercise those delegated functions should circumstances warrant action.

2 Definitions

In the Local Traffic Committee Guidelines, the following terms have the following definitions and abbreviations:

Classified Roads	any of the following: a main road, a State highway, a freeway, a controlled access road, a secondary road, a tourist road, a tollway, a State work. See Roads Act 1993, Part 5 for further details.
Council	the council of a local government area and includes an Administrator.
Delegation	'Delegation to Councils – Regulation of Traffic' document.
LGSA	Local Government Association of NSW and the Shires Association of NSW.
LTC	Local Traffic Committee.
Prescribed traffic control device	a sign, signal, marking, structure or other device to direct or warn traffic on a road or road related area (or part of a road or road related area) that is prescribed by the regulations for the purposes of this definition.
Regulate traffic	for the purposes of the Roads Act means to restrict or prohibit the passage along a road of persons, vehicles or animals.
Roads Act	*Roads Act 1993*.
Roads and road related areas	have the same meaning as in ARR Rules 12 and 13. Each reference to a road includes reference to a road–related area unless otherwise expressly stated.
Regional Road	a road shown to be a Regional road in the RTA's Schedule of Classified Roads and State and Regional Roads.
RR	*NSW Road Rules 2008*.
RTA	Roads and Traffic Authority, NSW.
RTC	Regional Traffic Committee.
State Road	a road declared to be a State Road under the *Roads Act 1993* and documented in the RTA's Schedule of Classified Roads and State and Regional Roads.

STMA	*Road Transport (Safety and Traffic Management) Act 1999.*
STMR	*Road Transport (Safety and Traffic Management) Regulation 1999.*
Sub-delegate	any Councillor, the General Manager or an employee of the Council who has been formally delegated by the Council.
TMP	Traffic Management Plan.
Traffic control facility	(a) traffic control lights and equipment used in connection with traffic control lights; or (b) any sign, marking, structure or device containing or relating to a requirement or direction, contravention of which is an offence arising under: (i) the *Transport Administration Act, 1988* or the regulations; or (ii) any other Act, regulation or by-law prescribed for the purposes of Section 45E of the *Transport Administration Act, 1988*; or (c) any sign, marking, structure or device that is intended to promote safe and orderly traffic movement on roads or road related areas or to warn, advise or inform the drivers of vehicles or pedestrians of any matter or thing in relation to vehicular or pedestrian traffic or road conditions or hazards; or (d) any bridge or subway or other facility for use by pedestrians over, across, under or alongside a road or road related area; or (e) any other thing prescribed as a traffic control facility by the Regulations under the *Transport Administration Act, 1988*.

3 Delegations and Functions

Traffic control facilities and prescribed traffic control devices may be authorised for use on a road or road related area, whether a public road or on private land, only by the RTA or Councils. In addition, traffic may be regulated for various purposes by means of notices or barriers erected by a roads authority.

The *Transport Administration Act 1988* confers the following powers to the RTA:

- to exercise the functions relating to safety and traffic management set out in Section 52A;
- to delegate its functions to other public agencies such as councils (Section 50);
- to give directions to public authorities in relation to RTA functions under Part 6 (Section 53A).

The *Road Transport (Safety & Traffic Management) Act 1999* provides for a system of traffic laws relating to all vehicles (motorised and non-motorised) and pedestrians found in subordinate legislation made under the Act. Principally, these are:

- *Road Transport (Safety and Traffic Management) Regulation 1999; and*
- *Road Rules 2008.*

Part 8 (Sections 114 to 124) of the Roads Act, 1993 deals with the regulation of traffic on public roads by erecting notices or barriers or taking any other action which may be necessary in order to manage traffic. The reference to regulating traffic in Part 8 should not be confused with the authorisation of prescribed traffic control devices under Division 1 of Part 4 (Sections 50 to 55) of the *Road Transport (Safety and Traffic Management) Act, 1999*. For the purposes of Part 8, regulating traffic includes such things as implementing road closures and other physical restrictions. Road closures effected by this part of the legislation remain as public roads after the road closure.

Note: ***Road closures effected under Part 4 of the Roads Act, 1993 do not remain as a public road.***

A Council can regulate traffic for the specific reasons set out in Division 1 of Part 8 (Section 115) of the *Roads Act, 1993* such as carrying out work on a road, etc. whereas the RTA can regulate traffic for any purpose.

If a Council wishes to regulate traffic for purposes other than those specified in Division 1 of Part 8 (Section 115) of the *Roads Act, 1993*, (e.g., for amenity reasons) it must seek the advice of its Local Traffic Committee. The procedures for regulating traffic covering road closures, traffic calming, etc. are detailed in Division 2 of Part 8 (Sections 116 to 119) of the *Roads Act 1993*.

The delegation of these functions is carried out by the RTA, issuing Councils the RTA document, Delegation to Councils – Regulation of Traffic.

The functions delegated to Council in the *Delegation* are:

1. authorisation of prescribed traffic control devices covered under Division 1 of Part 4 (Sections 50 to 55) of the *STMA*.;
2. regulation of traffic under Division 2 of Part 8 (Sections 116 to 119) of the *Roads Act*.;
3. authorisation of special event parking schemes under Division 2 of Part 5 (Clauses 122 and 123) of the *STMR* on public roads other than classified roads.

The Council may sub-delegate their powers to Councillors, the General Manager or an employee of the Council for Items 1 and 3 above.

The Council **may not** sub-delegate Item 2.

Note: There is a separate delegation for B-double route approvals.

3.1 Limitations

The exercise of functions delegated to Council is subject to a number of conditions or limitations as documented in Schedule 4 (Limitations) of the Delegation.

Councils:

- are only permitted to authorise the implementation of certain traffic control facilities / prescribed traffic control devices on roads and road related areas within their area of operations. Council cannot exercise a function on a State Road as defined in the RTA document Schedule of Classified Roads and State and Regional Roads.
- may only authorise prescribed traffic control devices as nominated in the RTA's online Traffic Signs Database indicated as "Delegated to Council for Authorisation – Yes".
- listed in Schedule 1 of the Delegation, must not exercise delegated functions listed in Schedule 4 of the Delegation including referral of issues for formal advice until a TMP has been assessed by the RTA. Refer to Section 3.1.1 TRAFFIC MANAGEMENT PLANS.
- must not exercise a function in respect of the following signs:

  Permissive parking signs
  No Parking signs
  No Stopping signs

  on any public road or road or road related area (or any part thereof), which falls within a 1 km radius of any train station listed in the RTA's document Nominated Train Stations with Commuter Parking, and which has current unrestricted parking, without the approval of the RTA.
- are not empowered to authorise traffic control lights.
- are not empowered to interfere with traffic control lights, including the addition of any signs.
- may authorise portable traffic control lights for roadworks, see RTA's document, Portable Traffic Signals Guide to Use.
- cannot authorise an internally illuminated traffic control device.
- must obtain the advice of the NSW Police and the RTA prior to exercising their delegated powers.
- must establish an LTC. Refer to Section 5 LOCAL TRAFFIC COMMITTEE.
- may authorise "Roadwork Speed Limit" signs under the conditions outlined in the Delegation.
- may sub–delegate traffic management powers (delegated functions), in respect of Division 1 of Part 4 (Traffic control devices) of the STMA, and Division 2 of Part 5 (Special Event parking schemes) of the STMR.

- **may not** sub–delegate traffic management powers (delegated functions), in respect of Division 2 of Part 8 (Sections 116 to 119) of the Roads Act.

3.1.1 Traffic Management Plans

A Council, listed in Schedule 1 (Delegates) of the RTA's Delegation, must develop and submit to the RTA, a TMP if it intends to do any of the following:

- prohibit the passage of pedestrian, vehicle or motor vehicle traffic on a road or road related area by physical means or regulatory signs or both;
- install or display any road sign, marking or physical device that prohibits or compels a vehicle with respect to a turning movement;
- change a two-way street into a one-way street or reversing the direction of a one-way street; and
- reduce the number of traffic lanes on a road or road related area by physical means or regulatory signs or both.

A TMP is not required if a council certifies to the RTA in writing that a NO TRUCKS or NO BUSES traffic control sign is to be erected solely for the purposes of protecting a road from damage by the passage of motor vehicles.

Where a Council seeks to exercise its delegated powers in respect of a function that requires a TMP, the Council must submit the TMP to the RTA for review prior to the matter being referred to the LTC for formal advice.

The TMP must outline the scope of the traffic management changes proposed. It must also include an assessment of the impact of those changes and proposed measures to ameliorate any potential impact arising from the proposal.

See the RTA document, Procedures for use in the preparation of a Traffic Management Plan.

Note: The RTA's acceptance of the TMP merely indicates that due process has been followed and does not indicate its position on the proposal when it is referred to the LTC for consideration.

4 Exercising delegated functions

Councils may only exercise their delegated functions in accordance with the Delegation. Councils may sub-delegate certain powers to Councillors, the General Manager or an employee of the Council. Refer to Section 3 DELEGATION OF FUNCTIONS.

The Delegation requires Council to seek the advice of the NSW Police and the RTA prior to exercising their delegated functions. This is usually done via the LTC.

In cases where the LTC advice is unanimous, and Council intends to follow that advice, Council may authorise the implementation of the facility or device without further notifying the RTA or the NSW Police.

If the elected Council wishes to exercise a delegated function when the LTC advice is not unanimous, or the elected Council wishes to act contrary to unanimous LTC advice, then Council must notify in writing, both the NSW Police and the RTA representatives on the LTC.

Note: Council does not need to notify the NSW Police or the RTA if Council decides not to proceed with any proposal for any reason.

Council then must refrain from taking any action for 14 days so that the NSW Police or the RTA is given an opportunity to appeal to the Chairperson, Regional Traffic Committee should they wish.

In the case of an appeal, the decision of the Chairperson, Regional Traffic Committee is binding and final for matters under the STMA. For matters under the Roads Act, further appeals may be made to the Minister for Roads. Refer to Section 6 REGIONAL TRAFFIC COMMITTEE, for more details.

5 Local Traffic Committee

5.1 General

The LTC has no decision-making powers. The LTC is primarily a technical review committee, which is required to advise the Council on matters referred to it by Council. These matters must be related to prescribed traffic control devices and traffic control facilities for which Council has delegated authority.

The LTC should consider the technical merits of the proposal and ensure that the proposal meets current technical guidelines.

The Council must refer all traffic related matters to the LTC prior to exercising its delegated functions. Matters related to State Roads or functions that have not been delegated to the elected Council must be referred directly to the RTA or relevant organisation. Such matters must not be referred to the LTC. However, the RTA will generally seek the views of the Council on State Road traffic issues via the informal items process.

A Council is not bound by the advice of its LTC. Refer to Section 4 EXERCISING DELEGATED FUNCTIONS.

Where required, a TMP must be submitted to, and reviewed by, the RTA before that matter can be referred to the LTC. Refer to Section 3.1.1 TRAFFIC MANAGEMENT PLANS.

The LTC should not consider any proposal requiring a TMP prior to the review of the TMP by the RTA.

Similarly, the LTC should not consider any proposal to alter unrestricted parking to permissive or restricted parking on roads within a 1 km radius of any train station nominated in the RTA's document *Nominated Train Stations with Commuter Parking*, without the prior approval of the RTA.

Note: The LTC should not be confused with a separate Council Traffic Committee, formed by Council under the Local Government Act. The establishment of which is a Council prerogative. Refer to Section 8 TRAFFIC ENGINEERING ADVICE.

5.2 Members

The LTC is to be made up of four formal members. The members are as follows:

- one representative of Council
- one representative of the NSW Police
- one representative of the RTA
- the local State Member of Parliament (MP) or their nominee.

The Council's representative may be any Councillor or Council officer. The Council representative may be a sub-delegate if Council has formally approved this.

Where a Council LGA is represented by more than one MP, or covered by more than one NSW Police LAC, MPs or NSW Police officers representing the relevant electorate or LAC are entitled to be members of the LTC. However, they are only permitted to vote on matters, which effect their electorate or LAC. Refer to Section 5.3.6 VOTING.

The Council (in consultation with the formal members of the LTC) may also decide to have additional informal (non-voting) advisors to the LTC who can provide input into the process. These additional advisors can include a:

- Road Safety Officer
- Ministry of Transport representative
- Fire Brigade representative
- Ambulance Service representative
- Bus operator representative
- Transport Workers Union representative
- Chamber of Commerce representative

Generally, informal advisors are not required to attend every LTC meeting. Their attendance is only required when items appear on the Agenda which effect their area of expertise or responsibility.

The informal advisors of the committee are not entitled to a vote. Refer to Section 5.3.6 VOTING.

5.3 Meetings

The LTC is not a committee within the meaning of the *Local Government Act 1993*. The operating arrangements for the LTC are contained in these guidelines.

At LTC meetings the following are at the discretion of Council:

- conduct at meeting
- frequency of meetings
- format of meetings. [Within the following guidelines.]
- provision for a public gallery.

5.3.1 Meeting Formats

The most common format for LTC meetings is a monthly face to face meeting held in the offices of the Council.

The meeting is to be convened by a Council representative. The convenor may be the Council's voting member or may be an additional non-voting member of the LTC.

While there is no need for a specific quorum to allow an LTC meeting to proceed, it must be remembered that any advice can only be returned to the elected Council by the LTC if the views of the RTA and the NSW Police have been obtained.

Acceptable alternative meeting formats include:

- Electronic meetings – where the advice of the members is sought via facsimile or email. This allows items to be considered as they arise and may reduce response time.
- A combination of electronic (for minor issues) and face-to-face meetings. This allows minor issues to be addressed between meetings. The response time for minor issues may be reduced using this format and this format can result in shorter face to face meetings. It may even be possible to increase the interval between meetings.

Note: Should Council wish to adopt these (or any other) alternate formats then they should seek the advice of the RTA prior to making a final decision."

It is strongly recommended that any format where the LTC and the normal Council meeting are held concurrently is to be avoided. The LTC is principally a technical review committee, and due consideration and debate is required when considering a proposal. This particular meeting format does not lend itself to this process.

Note: Any change to the meeting format must be agreed to by the formal members of the LTC. When proposing to discuss a format change, reasonable advanced notice must be provided.

5.3.2 *Agendas, minutes, and reports*

All LTC meetings require the preparation of an agenda.

An LTC agenda must be prepared by Council and circulated to all formal members and informal advisors of the committee a minimum of one week prior to the meeting. This will allow members to fully consider the issues and determine their response on each item. This period will also allow a site visit if necessary.

For each agenda item, Council must prepare a report which must contain a brief summary of the issue, details of the proposed solution including a plan if the proposal involves signs, lines or structures, details of the policies / guidelines / standards used (if any) and the proposed recommendation to the elected Council. This report must be sent to the members of the LTC with the Agenda.

Note: For the information of the members of the LTC, the meeting papers should also include a summary of the final decisions made by the elected Council (or their sub-delegate) on items addressed at the previous meeting or on any items addressed since the last meeting.

The LTC agenda should only contain items, which require the elected Council to exercise its delegated functions. If no action is required, or advice only is being sought, or the issue does not require the exercise of delegated functions then the issue should not appear on the LTC agenda. Such issues should be dealt with as general traffic advice. Refer to Section 8 TRAFFIC ENGINEERING ADVICE.

Items, which do not appear on the agenda (i.e., items without notice), must only be considered if the elected Council has referred the issue and Council officers have been able to prepare a report on the proposal in the normal manner. Items raised without notice must be referred to the next meeting (or dealt with separately between meetings) if any member of the committee requests time to consider the issue.

All LTC meetings require the preparation of minutes.

Council must prepare the minutes of the meeting. Copies of the LTC minutes must be forwarded to all LTC members for their concurrence prior to the recommendations either being presented to the elected Council or acted on by the Council's sub-delegate.

Note: B-double routes are the subject of a separate delegation and should have a separate agenda and minutes.

Note: The RTA members of the LTC must keep a copy of all minutes for the future reference of the RTA.

Councils may also need to prepare a report to the elected Council. This report must indicate the type of support from the LTC (i.e., unanimous or not unanimous). Where the advice is not unanimous, dissenting votes should be noted. Refer to Section 5.3.6 VOTING.

Note: All proposals recommended by the LTC must still be formally approved by the elected Council (or their sub-delegate), subject to certain limitations. Refer to Section 3.1.

5.3.3 Site visits

It is recommended that each member of the LTC undertake a site visit prior to considering any proposal. This site visit may be undertaken individually by LTC members or may be organised by Council as a joint visit of all members of the LTC.

Where this is not practical due to issues such as time or distance, then it is recommended that modern electronic alternative methods be used.

5.3.4 Public participation

The role of the LTC is to consider the technical aspects of any proposal and make a recommendation to the Council. The merits of the scheme, from a public perspective, is the responsibility of the Council and thus residents' views should be taken into account by the Council rather than the LTC.

However, there is nothing preventing the LTC members from agreeing to allow residents, or other interested stakeholders, to address the committee, if it so chooses. In addition, the LTC members may agree to limit the number of public presenters on any particular item and/or place time limits on them. Any such constraints should be conveyed to the presenters at the time they are notified of the LTC's agreement for them to address the committee.

The LTC's advice to Council is not binding upon the Council therefore ideally this advice should not be released to the public until the Council has decided whether or not to exercise its delegated authority. However, where Council has decided to allow the public to be in attendance at the LTC meetings, the convenor must make it clear to the public gallery that the Council is still required to accept the recommendation of the LTC to finalise the issue. This should be done after each item to cater for members of the public who may only attend the meeting for a specific item.

5.3.5 Media participation

The role of the LTC is to consider the technical aspects of proposals and provide their advice to Council. Media involvement, or interest, in the process should be addressed through the normal Council meeting process.

However, should the media be interested in a proposal, they can attend the LTC meeting if the Council has decided to allow a public gallery. Again as with the general public, the convenor must make it clear that the Council is still required to accept the recommendation of the LTC to finalise the issue. This should be done after each item to cater for the media who may only attend for a single item. The media is not permitted to address the LTC.

5.3.6 Voting

While an organisation, which is a voting member, may choose to send more than one representative, that organisation is still limited to one vote only.

For example:

- Where the LTC is chaired by a convenor who is a member of the elected Council and the LTC also has a Council staff member on the committee, the Council as an organisation is still only entitled to one vote [i.e., the Council representatives are not entitled to a vote each]
- Where the Council representative is also the convenor, the Council is still only entitled to one vote. There is no casting vote available to the convenor in the case of a tied vote.
- Where a Council LGA is represented by more than one State MP, only the MP representing the State electorate containing the proposal is permitted to vote. However, if the proposal is actually contained in more than one State electorate, then each State MP for those electorates may vote.
- Where a Council LGA has more than one NSW Police LAC, only the NSW Police officer representing the LAC containing the proposal is permitted to vote. However, if the proposal is actually contained in more than one LAC, then each NSW Police officer for those LACs may vote.

Council must consult with the Ministry of Transport where public passenger transport matters are affected.

LTC advice to Council on a proposal referred to it by Council must be one of the following:

1. unanimous support;
2. majority support;
3. split vote;
4. minority support; or
5. unanimous decline.

A Council's action on the above LTC advice will be:

(a) If Council is in agreement with the LTC unanimous support then the proposal may be approved. In these cases there is no conflict between Council and the advice of the LTC, consequently there is no need for Council to inform the RTA or the NSW Police representatives of the decision.

(b) If Council is in agreement with the LTC unanimous support, but no longer wants to proceed, the proposal may still be rejected.

(c) If Council is in agreement with the LTC unanimous decline then the proposal may be rejected. Again, there is no conflict between Council and the advice of the LTC. Consequently, there is no need for Council to inform the RTA or the NSW Police representatives of the decision.

(d) If Council decides to proceed with a proposal where the advice of the LTC is not unanimous support, then the Council must first advise the RTA and the NSW Police representatives in writing of their intention to approve the proposal. The RTA or the NSW Police may then lodge an appeal to the RTC. Refer to Section 5.4, APPEALS.

(e) If Council decides to proceed with a proposal where the advice of the LTC is a unanimous decline, then the Council must first advise the RTA and NSW Police representatives in writing of their intention to approve the proposal. The RTA or the NSW Police may then lodge an appeal to the RTC. See Section 5.4, APPEALS.

Flowcharts have been provided to assist with the understanding of this process.

Refer to the relevant flowcharts in Appendix A for:

- the Road Transport (Safety and Traffic Management) Act, 1999; or
- the Roads Act, 1993.

Due to the fact that the RTA and the NSW Police have the power to appeal certain decisions of the Council, the LTC cannot provide its advice to Council until both the RTA and the NSW Police have provided their vote on the issue.

5.4 Appeals

5.4.1 Road Transport (Safety and Traffic Management) Act 1999

Where a determination of Council to proceed is contrary to a unanimous decline or is based on the non–unanimous advice of the LTC, then Council must notify both the NSW Police and the RTA representatives of its decision. Council must not exercise any of the functions, in relation to the subject proposal, for a period of 14 days from the date of notification in writing.

An appeal may only be lodged by either the NSW Police or the RTA. The appeal is made to the Chairperson, RTC and must be lodged within the 14 day period. As a matter of courtesy, it is expected that the appellant informs Council in the initial stages of their intention to lodge an appeal.

To assist with the process the appeal should be lodged using RTC Form 1 Regional Traffic Committee – Appeal. A copy of this form can be found in Appendix A of this document.

The RTA provides secretarial services to the RTC and appeals must be forwarded to:

Secretariat
Office of the Chairperson
Regional Traffic Committees
Level 16 101 Miller Street
Locked Bag 928
NORTH SYDNEY NSW 2059

Facsimile: 8588 4164
Email: regional_traffic_committee@rta.nsw.gov.au

The Secretary will then notify all parties in writing that an appeal has been lodged.

The Chairperson, RTC notifies Council regarding the outcome of the appeal hearing. It is important that Council does not act until further advice has been received from the Chairperson, RTC about the issue under appeal.

The Chairperson's decision may:

i. uphold the appeal, i.e., not support the Council's decision, or
ii. reject the appeal. Rejection of the appeal could either support the Council's decision unconditionally or apply conditions.

Refer to Appendix A of this document for the Terms of Reference for the RTC and flowcharts indicating the process involved in the implementation or rejection of a proposal.

5.4.2 Roads Act 1993 – Division 2 of Part 8

The appeal process is similar to that specified above for *Road Transport (Safety and Traffic Management) Act, 1999* matters. However, in cases where Council is not satisfied with the determination by the Chairperson, RTC, Council may further appeal to the Minister for Roads.

The Minister's decision may be:

i. rejection of the Council appeal, or
ii. approval of the Council proposal either unconditionally or with conditions.

See the flowcharts in Appendix A which indicate the process involved in the implementation or rejection of a Council proposal.

6 Regional Traffic Committee

The RTC operates across the state. Meetings are generally held in the offices of the local Council.

The purpose of the RTC is to deal with appeals from the RTA or the NSW Police members of the LTC on matters delegated to Councils.

The members of the RTC are:

- Independent Chairperson (appointed by the RTA with concurrence from the LGSA)
- LGSA nominee (usually a Local Government Engineer from the region)
- RTA representative (usually the Regional Traffic Manager)

It should be noted the LGSA and RTA representatives merely provide advice as required by the Chairman.

In addition, nominees of the NSW Police, Council and the local State MP may attend as observers.

When a notice of appeal and relevant information is lodged with the RTC, the Chairperson will convene a meeting and the appeal matter is discussed. The Chairman shall determine who, if anyone, shall be permitted to address the appeal based on the documented evidence presented by each party prior to the Appeal. Generally the members of the RTC and each party to the appeal attend the meeting only.

The decision of the Chairperson, RTC in regard to such matters is final, except in matters relating to the *Roads Act, 1993*, wherein Council may further appeal to the Minister for Roads. Refer to Section 5.4.2.

Note: The RTC should not be confused with the Regional Development Committee, which deals with SEPP11 issues under the Environmental Planning and Assessment Act 1979.

7 Responsibilities

7.1 Council

The Council has responsibility for:

- exercising the delegated functions related to the Roads Act 1993
- documenting the sub-delegation of Council powers

Note: Councils cannot sub-delegate their Roads Act powers.

- seeking the advice of the NSW Police and the RTA prior to exercising delegated functions.
- obtaining the views of local residents affected by any proposal, if necessary. [This is to be done outside the LTC process]

- preparing any TMP required under Schedule 4 of the Delegation or when considered necessary by Council.
- seeking the approval of the RTA to any proposal to alter unrestricted parking to permissive or restricted parking on any road within a 1 km radius of any train station nominated in the RTA's document Nominated Train Stations with Commuter Parking, [This is to be done outside the LTC process]
- convening meetings of the LTC.
- referring items to the LTC.
- providing secretarial services to the LTC.
- preparing the LTC meeting agenda.
- preparing a technical report on each issue.
- documenting the LTC advice (including providing a report to the elected Council)
- providing minutes of meetings to all LTC members
- providing a summary of the final decisions made by Council on items addressed at previous LTC meetings or any addressed since the last meeting.
- notifying the RTA and the NSW Police if the elected Council intends to exercise its delegated functions contrary to the advice of the LTC.

Note: Deciding not to proceed does not constitute exercising a function and therefore does not require notification.

7.2 RTA

The RTA has responsibility for:

- reviewing any TMP submitted to it.
- approving any proposal to alter unrestricted parking to permissive or restricted parking on any road within a 1 km radius of any train station nominated in the RTA's document Nominated Train Stations with Commuter Parking,
- providing advice on Council proposals referred to the LTC.
- appointing the Chairperson of the RTC (with the concurrence of LGSA)
- providing secretarial services to the RTC.

7.3 NSW Police

The NSW Police have responsibility for:

- providing advice on Council proposals referred to the LTC.

7.4 Local State Member of Parliament

The local State Member of Parliament has responsibility for:

- providing advice on Council proposals referred to the LTC.
- nominating someone to represent them if necessary.

7.4 Local State Member of Parliament

The local State Member of Parliament has responsibility for:

- providing advice on Council proposals referred to the LTC.
- nominating someone to represent them if necessary.

8 Traffic engineering advice

Councils often require advice on, or investigation of options for, difficult traffic problems. Council may also wish to consider traffic issues, which are outside the *Delegation* (e.g., installation of speed limits or traffic control signals). As these problems or issues do not require the exercise of delegated functions at that point in time (though they may or may not require it in the future) they should not be dealt with as formal items by the

LTC.

Council may take advantage of the knowledge and experience of the LTC members to help them to resolve or clarify an issue. When wishing to utilise the expertise of the LTC members in this manner, Council could either include items on the agenda under a separate Informal Items section or produce a separate agenda.

Informal items should be dealt with following the completion of formal LTC items where Council intends to exercise a delegated function. Any outcomes from discussions on informal items cannot be included in the LTC report to the Council. However, Council can use any outcomes from these discussions in their deliberations on such issues.

9 Model Code of Conduct

Council's Model Code of Conduct applies to the Local Traffic Committee Members (LTC Members).

Failure by a Council Official or LTC Member to comply with the standards of conduct prescribed under the Mode Code of Conduct may constitute misconduct and could result in suspension or removal from the advisory committee or working group.

Failure by a member of staff to comply with Council's Model Code of Conduct may also give rise to disciplinary action.

Council has zero tolerance for aggressive, humiliating, bullying, intimidatory or violent behaviour towards Council Officials or LTC Members.

Respect is one of our core values and Council Officials and LTC members are required to:

- Treat everyone equitably and fairly
- Embrace diversity
- Acknowledge and value the needs of LTC Members
- Actively listen, to understand each other's point of view
- Value feedback and respond constructively

10 Meeting Principles

Meeting Conduct

Members shall respect the views and opinions of each other, allowing for one person to speak at a time and participate in the meeting with decorum. The Chairperson will facilitate the meeting to ensure the meeting keeps to the agenda allowing for all agenda items to be considered.

When the Chairperson rises or speaks during a meeting:

- Any LTC Member then speaking or seeking to speak must cease speaking.
- Every LTC Member present must be silent to enable to Chairperson to be heard without interruption.

A Council Official or LTC Member commits an Act of Disorder if they:

a. Contravenes the Local Traffic Committee Terms of Reference

b. assaults or threatens to assault Council Officials or a LTC Member

c. moves or attempts to move a recommendation that has an unlawful purpose or that deals with a matter that is outside the jurisdiction of the Local Traffic Committee

d. insults, or makes unfavourable personal remarks about, or imputes improper motives to any other Council official or LTC Member

e. or does anything that is inconsistent with maintaining order at the meeting or is likely to bring the Council or the Local Traffic Committee into disrepute.

Where a LTC Member commits an act of disorder the Chairperson reserves the right to expel any person from the meeting.

Conflicts of interest

All LTC Members are required to disclose conflicts of interest in accordance with the Conflict of Interest Policy. All LCT Members are required to undertake an initial Disclosure of Interests upon commencement as a LTC Member and annuals thereafter. Any new Conflict of Interest that arises must be disclosed as soon as practicable and no more than one month post becoming aware of the new interest. Refer to Schedule 1 Conflict of Interest Disclosure form.

11 Breaches of this Terms of Reference

Breaches of Terms of Reference may result in an investigation of the alleged breach in line with relevant Council policies including the Model Code of Conduct.

Any alleged criminal offence or allegation of corrupt conduct will be referred to the relevant external agency.

12 Administrative Changes

From time-to-time circumstances may change leading to the need for minor administrative changes to this document. Where an update does not materially alter this document, such a change may be made including branding, Council Officer titles or department changes and legislative name or title changes which are considered minor in nature and not required to be formally endorsed.

13 Version Control – Terms of Reference History

This Terms of Reference will be formally reviewed every three years from the date of adoption or as required.

Governance use only:

Document	**Local Traffic Committee Terms of Reference**	***Uncontrolled Copy When Printed***	
Custodian	Manager Traffic and Transport	Version #	Version 2
Approved By	Council	ECM Document #	38822277
Next Review Date	February 2027		

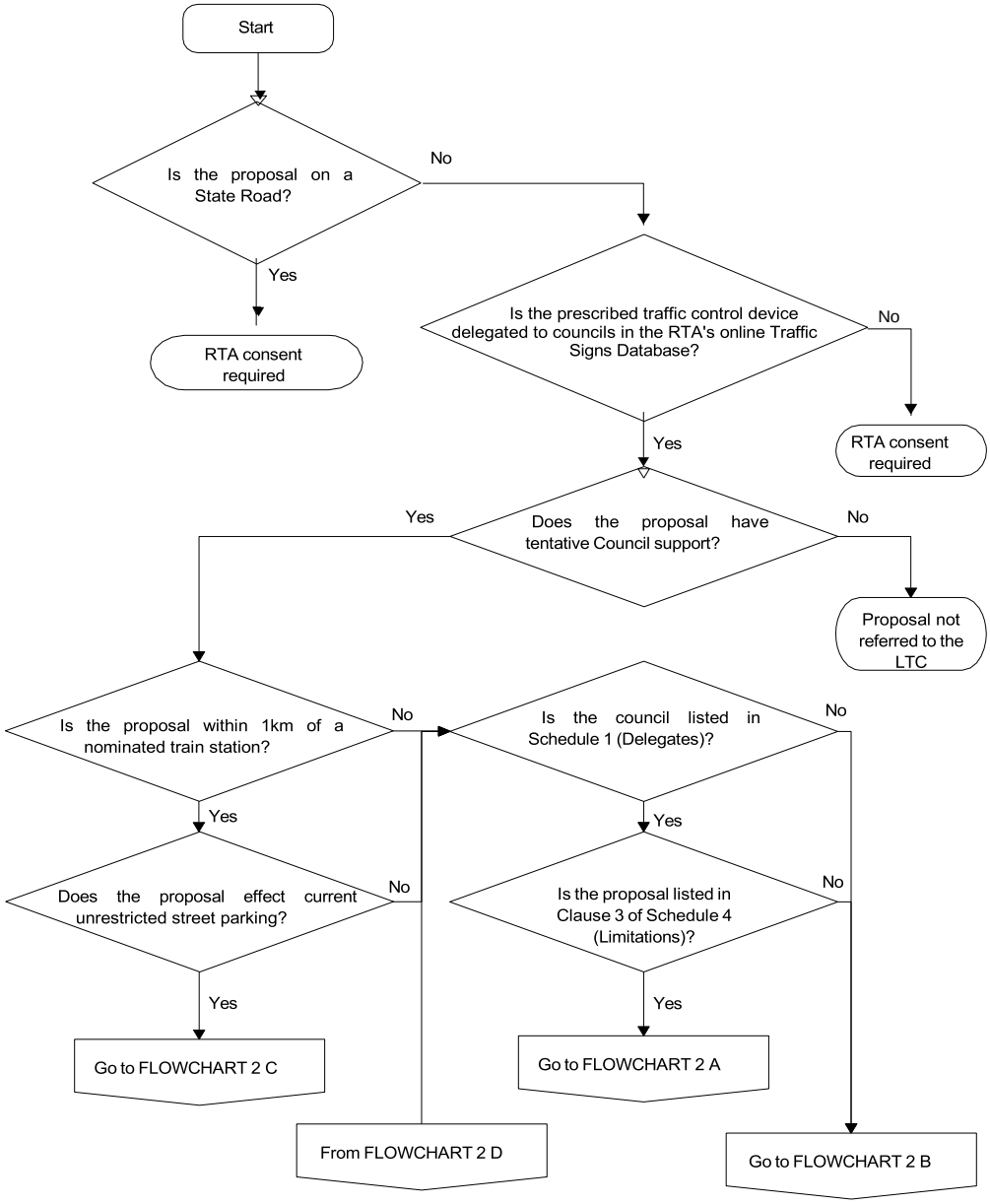
Amended by	Changes made	Date Adopted
Traffic and Transport	Implementation of the RTA 'A guide to the delegation to councils for the regulation of traffic'	TBC
Governance and Risk	Updated to include additional governance mechanisms	13 February 2024

14 Appendix A

Process for Exercising Delegated RoadTransport Powers

FLOWCHART 1

(Road Transport (Safety and Traffic Management) Act 1999)



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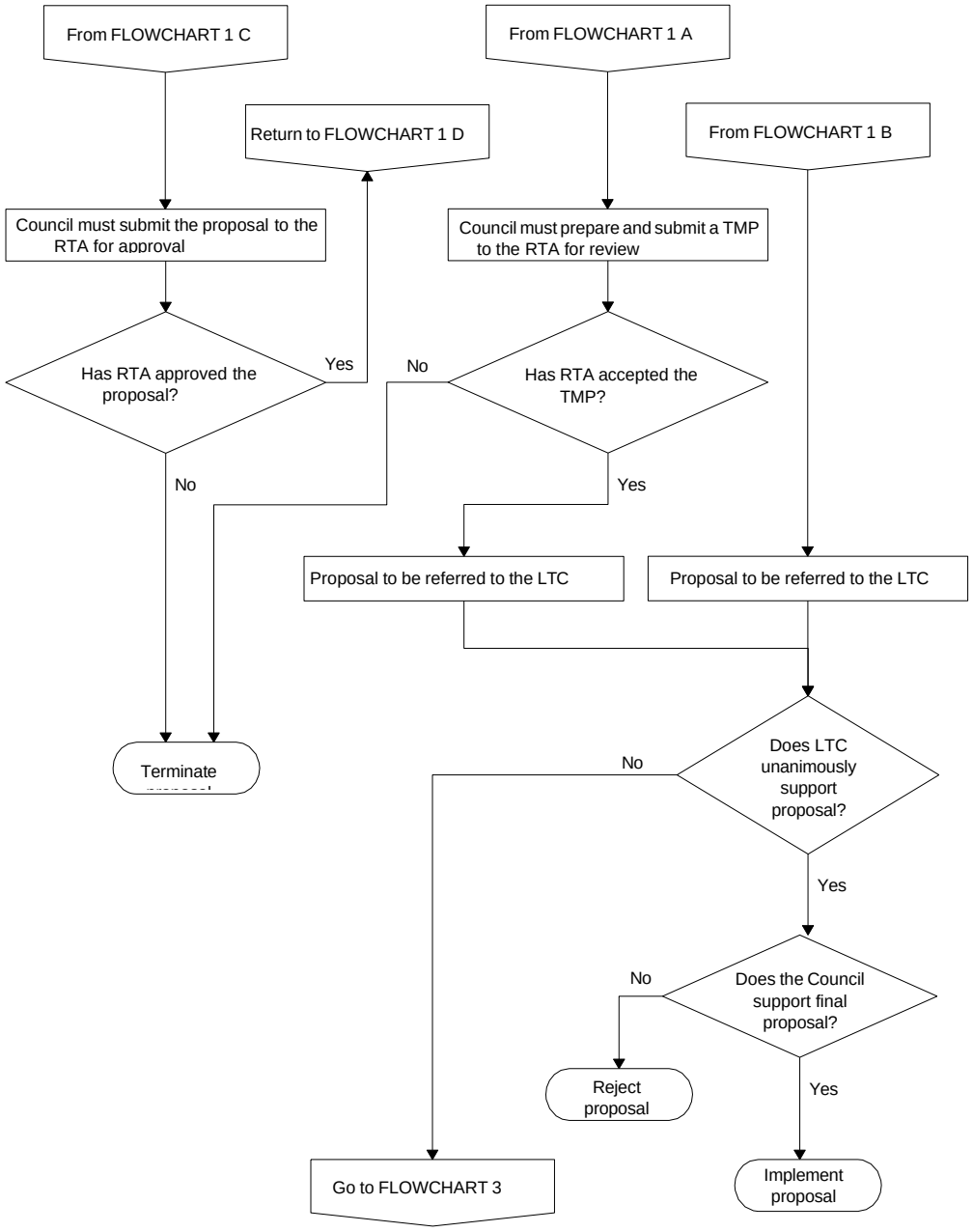
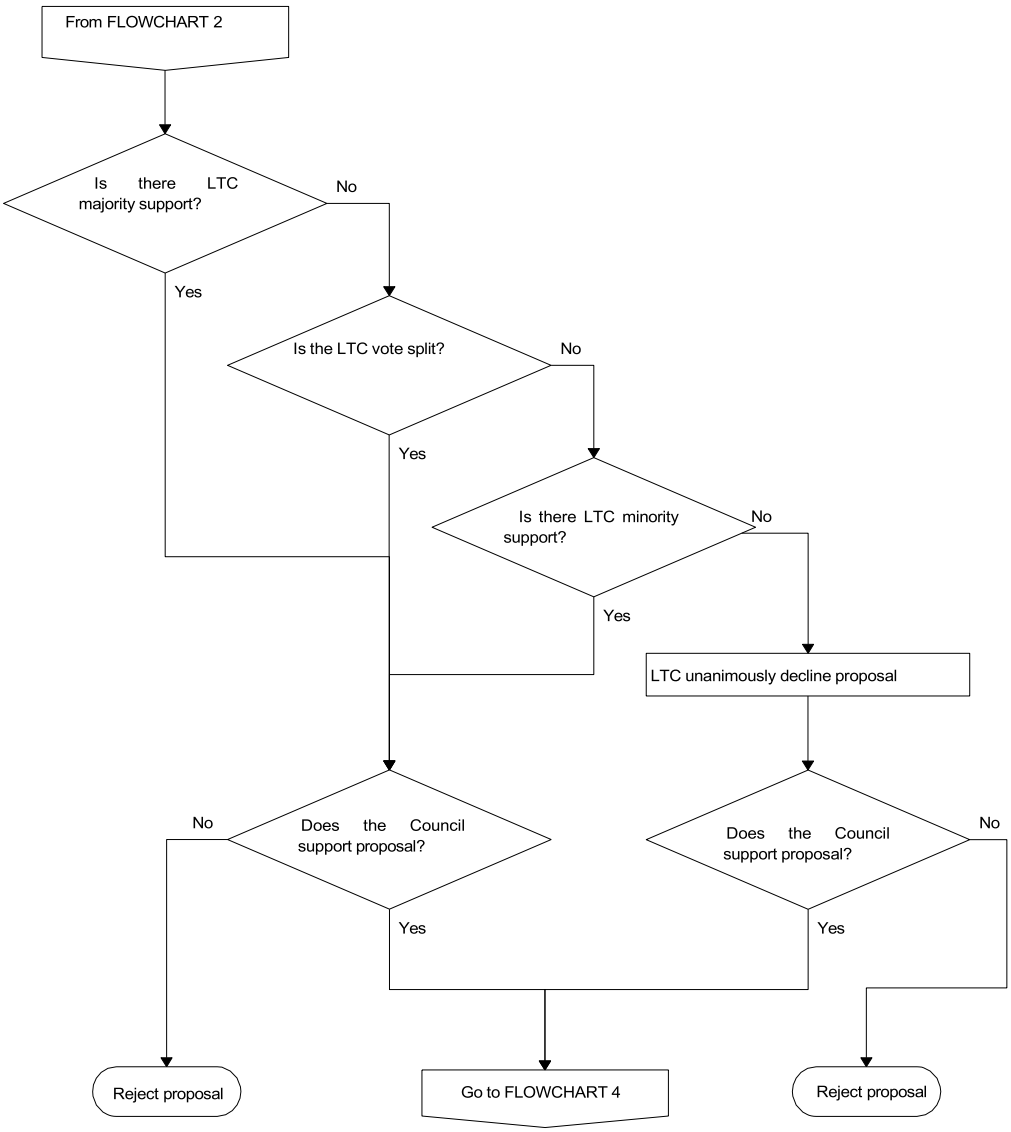
(Road Transport (Safety and Traffic Management) Act 1999)



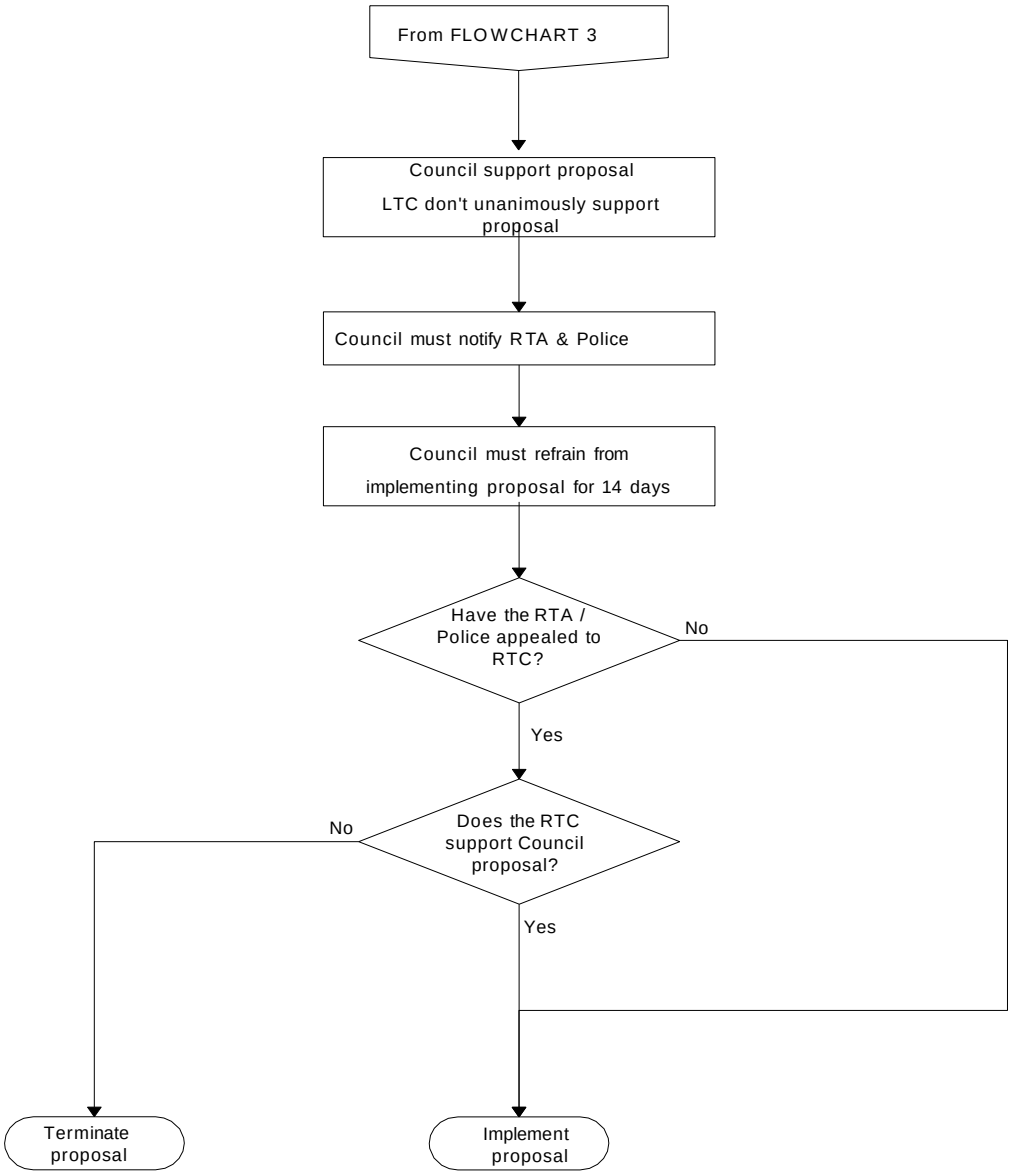
FLOWCHART 3

(Road Transport (Safety and Traffic Management) Act 1999



FLOWCHART 4

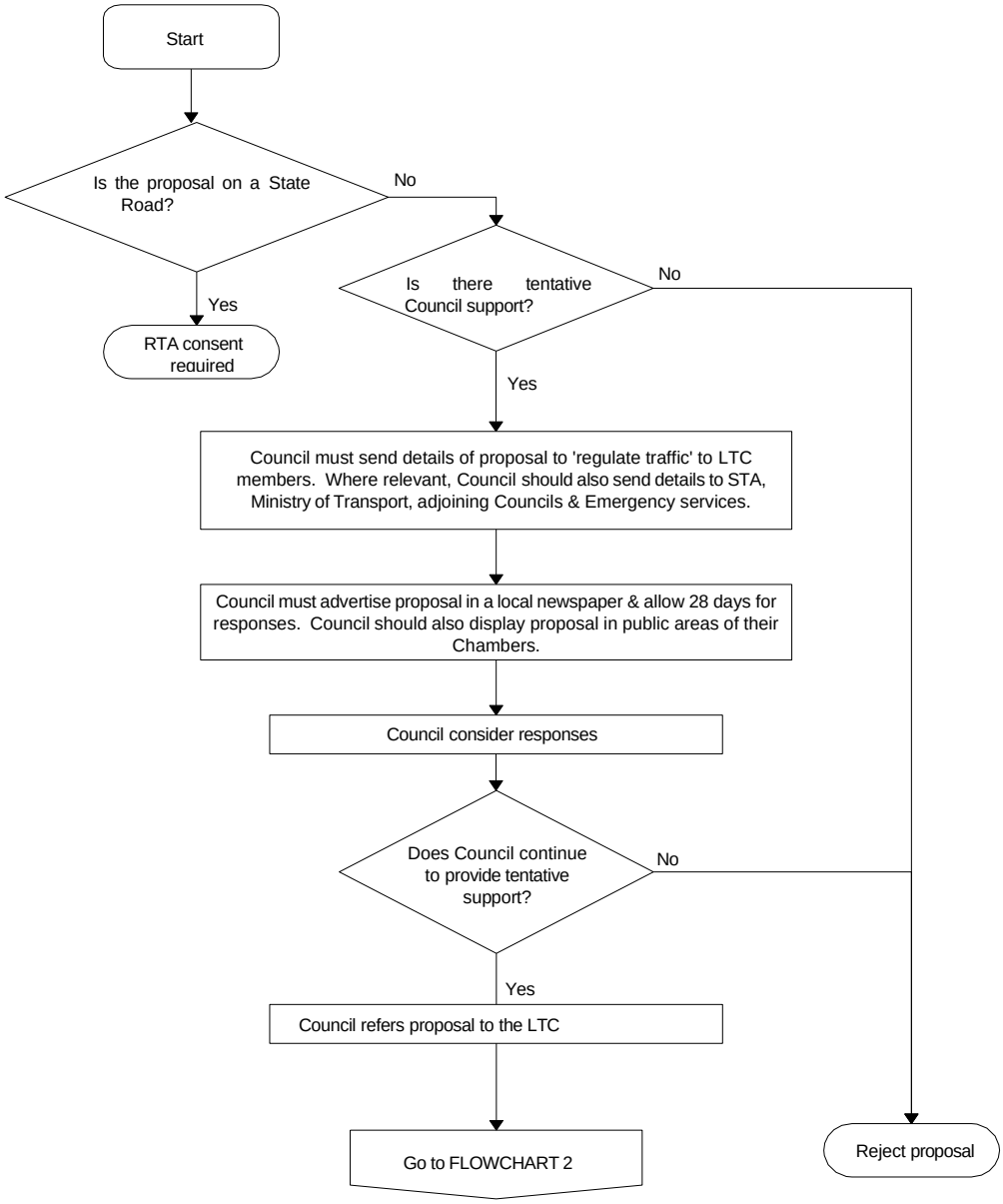
(Road Transport (Safety and Traffic Management) Act 1999)



Process for Exercising Delegated Roads Act Powers

FLOWCHART 1

(Roads Act 1993)



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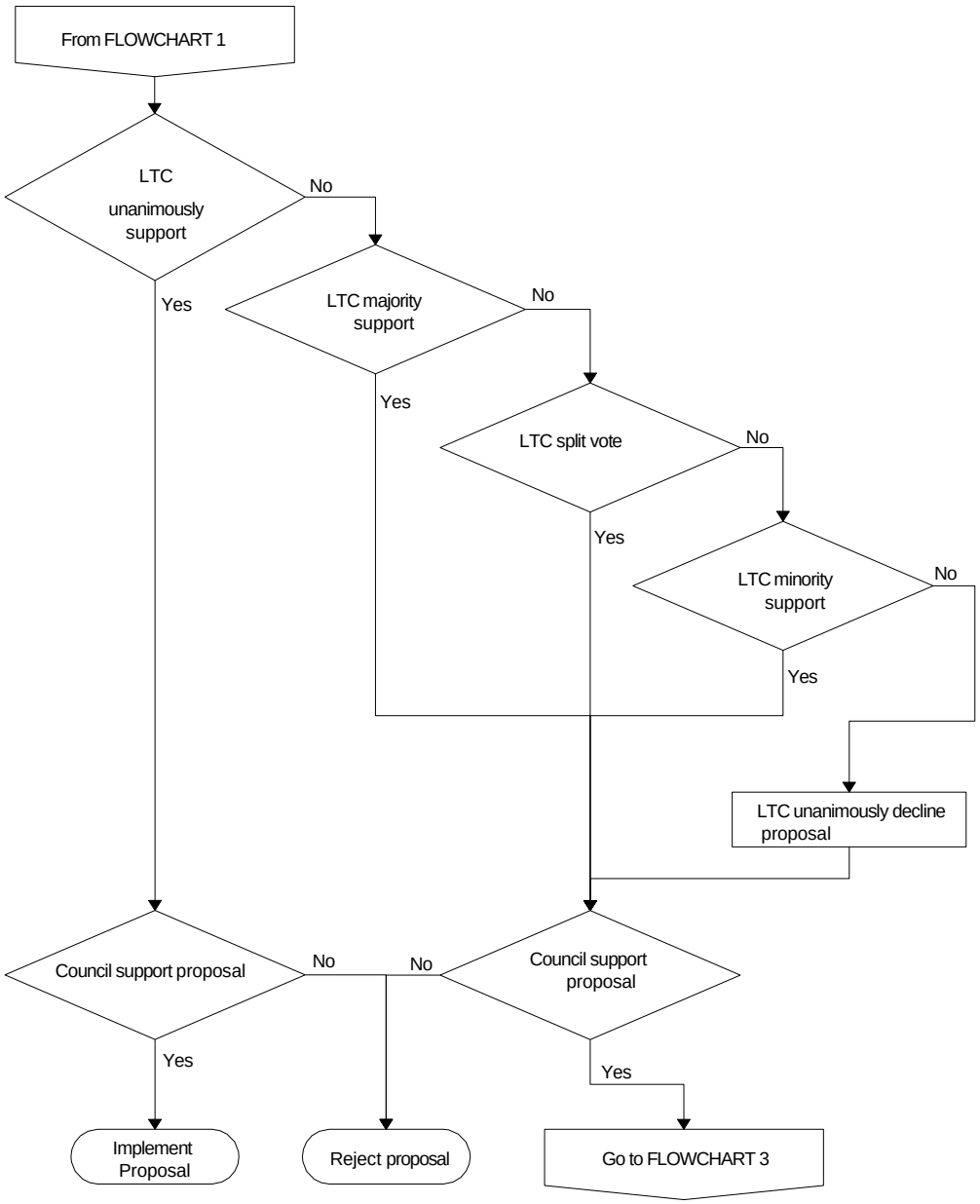
(Roads Act 1993)



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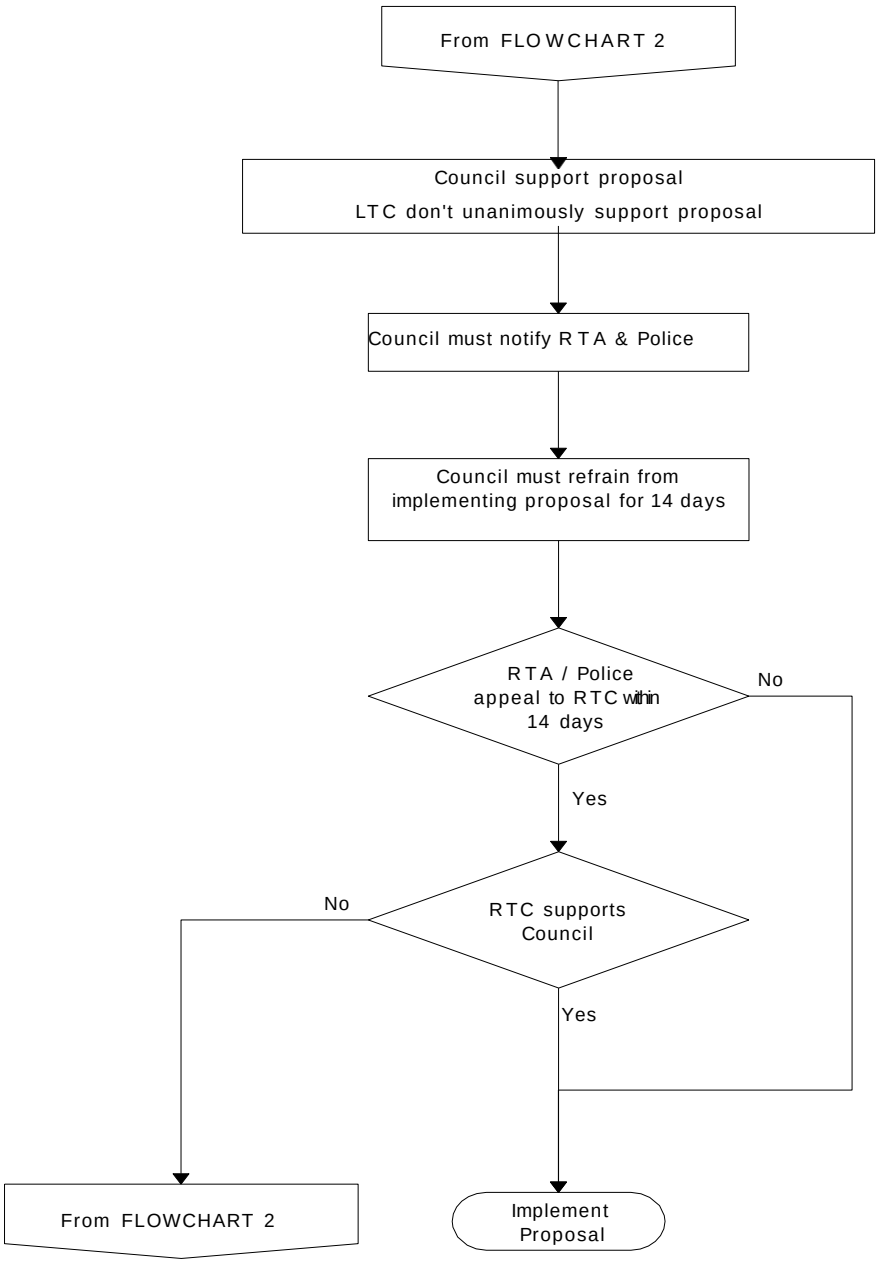
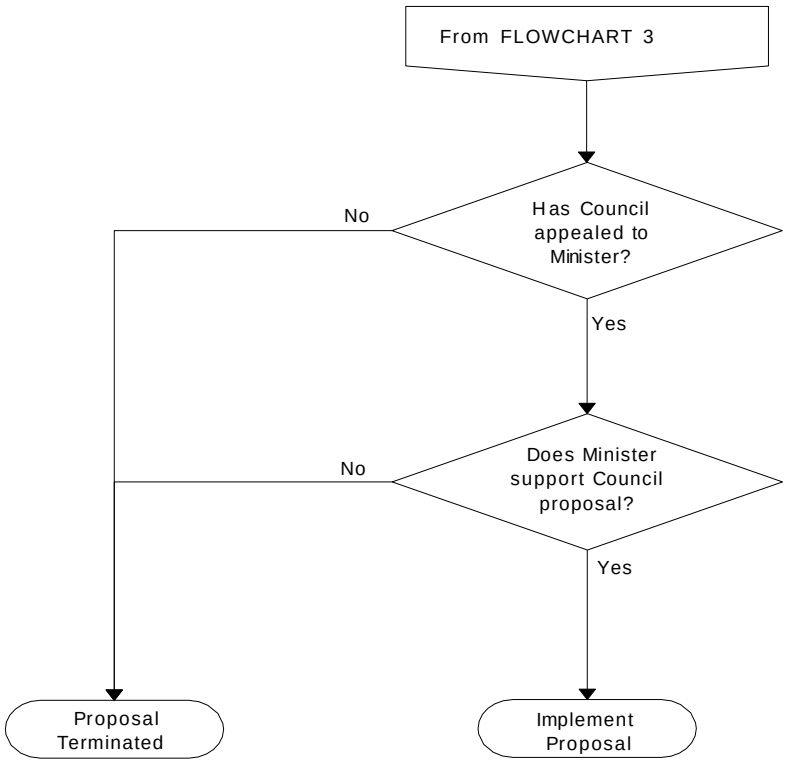
(Roads Act 1993)





FLOWCHART 4

(Roads Act 1993)

RTC TERMS OF REFERENCE

SCOPE	The Regional Traffic Committee deals with appeals from members of the Local Traffic Committees (RTA and NSW Police only) on matters delegated to Councils by the Roads and Traffic Authority.
ROLES	• The Roads and Traffic Authority (hereinafter called "the Authority") pursuant to Section 50 of the *Transport Administration Act 1988* and all other enabling powers hereby delegates to the chairperson of a Regional Traffic Committee appointed by the Authority. -- The exercise of all those functions of the Authority necessary to determine appeals by a member of the Local Traffic Committee in connection with the exercise of any of the functions delegated by the Authority to a council, or any of the functions sub- delegated by it, in respect of: 1. Division 2 of Part 8 (Regulation of traffic by roads authorities) of the *Roads Act 1993*. 2. Division 1 of Part 4 (Traffic control devices) of the *Road Transport (Safety and Traffic Management) Act 1999*. 3. Division 2 of Part 5 (Special event parking schemes) of the *Road Transport (Safety and Traffic Management) (Road Rules) Regulation 1999*.
MEMBERSHIP	• Independent Chairperson, Regional Traffic Committees • Local Government and Shires Associations for each RTA Region • Roads and Traffic Authority for each RTA Region
ENQUIRIES	Should you have any further enquires please do not hesitate to contact the **Secretary, Regional Traffic Committees** by Facsimile on 8588 4164 or Email: regional_traffic_committee@rta.nsw.gov.au

REGIONAL TRAFFIC COMMITTEE APPEAL FORM

SUBJECT OF APPEAL:		
APPELLANT (APPEAL) CONTACT:	Title: Name: Organisation: Phone: Fax: E-mail:	
DATE APPEAL SUBMITTED:	•	
REASON FOR APPEAL:	•	
RELEVANT HISTORY:	• • • •	
SUPPORTING DOCUMENTS:	• • (Please attach documents)	
PARTIES TO APPEAL:	• • •	
DATE RECEIVED RTC use only		

Forward to:

Secretariat
Office of the Chairperson Regional Traffic Committees
Level 16 101 Miller Street
Locked Bag 928
NORTH SYDNEY NSW 2059

Facsimile: 8588 4164
Email: regional_traffic_committee@rta.nsw.gov.au

Schedule 1 – Conflict of Interest Disclosure Form

CONFLICT OF INTEREST DISCLOSURE FORM

Information	A conflict of interest arises if it is likely that a person with a private or personal interest could be influenced in the performance of his or her public or professional duties by that interest, or that a reasonable person would believe that the person could be so influenced. Council's Code of Conduct requires Council officials to declare potential Conflicts of Interest and take appropriate action to resolve these situations immediately.
Types of Interests	1. **Pecuniary Interest** Is an interest that you have in a matter because of a reasonable likelihood or expectation of an appreciable financial gain or loss to you, or to another person with whom you are associated. This could include your partner, close relative and business associate. (Section 4 (4.1) Code of Conduct). **2. Non-Pecuniary Interest** Is a private or personal interest, which you have which may arise from a friendship, a family member, sporting, social, religious or cultural association. This may include money, interests of a financial nature or a non-financial benefit.
How a Conflict of Interest would arise:	• Where you have a personal interest that would lead you to be influenced in the carrying out of your Council work or public duties. • Where you have a personal interest that could lead a reasonable person to think you could be influenced in the carrying out of your Council work or public duties. • Where you know of a family member, relative, friend, associate or anybody close to you has an interest that could lead you to be influenced or a reasonable person to think you could be influenced, in the carrying out of your Council work or public duties.
Identify, Declare and Manage Conflict of Interest?	Where you have a non-pecuniary conflict of interest in a matter for the purposes of clause 5.2 of the Code of Conduct, you must disclose the relevant private interest you have in relation to the matter fully and in writing as soon as practicable after becoming aware of the non-pecuniary conflict of interest. How you manage a non-pecuniary conflict of interest will depend on whether or not it is significant, refer to Clause 5.6 to 5.9 of the Code of Conduct for guidance.

	If you determine that a non-pecuniary conflict of interests is less than significant and does not require further action, you must provide an explanation of why you consider that the conflict does not require further action in the circumstances. Where you have a significant non-pecuniary or pecuniary conflict of interest you must not participate in consideration of, or decision making in relation to, the matter in which you have the significant non-pecuniary or pecuniary conflict of interest.

Employee's Details	**Name:** Click or tap here to enter text. **Position:** Click or tap here to enter text. **Directorate:** Choose an item.
Description of Conflict of Interest	Click or tap here to enter text. **Type of Conflict** ☐ Pecuniary ☐ Non-Pecuniary – Significant ☐ Non-Pecuniary – Non-Significant **Date Conflict Declared:** Click or tap to enter a date. ☐ The details I have provided are correct to the best of my knowledge and the declaration is made in good faith. **Signature of Employee: _____ Date:** Click or tap to enter a date. **Please submit this form to your Manager/Senior Manager/Director or General Manager**
Action taken to avoid any impact from the Conflict of Interest	Click or tap here to enter text.

	☐ Manager will monitor the employee's adherence to the action plan stated above. **Manager's Name:** Click or tap here to enter text. **Signature of Manager/Snr Manager:** _____ **Date:** Click or tap to enter a date. **Signature of Director/GM:** _____ **Date:** Click or tap to enter a date.
Endorsement by Employee	☐ I note the proposed action, endorse it, and agree to abide by it. If the circumstances as set out in this declaration changes, I will resubmit a new declaration setting out the circumstances for approval. **Signature of Employee:** _____ **Date:** Click or tap to enter a date.
Completed Forms	Send completed forms to Governance@innerwest.nsw.gov.au

Major Capital Projects Committee

Terms of Reference

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Section 1 – Overview

1.1 Establishment of Committee

The Major Capital Projects Committee (the "Committee") was established as a Standing Council Committee at the Ordinary Council Meeting held on 8th March 2022.

1.2 Purpose

Following an audit of a major capital project, Council resolved to establish the Committee in accordance with the Code of Meeting Practice (the "CoMP") to review, discuss and make recommendations to Council on all major capital projects.

Major Capital Projects has the meaning as defined from time-to-time by Council's Project Management Framework for "Large" projects and as determined by the Committee.

Section 2 – Committee Membership

2.1 Committee Members

The members of the Committee, as determined by Council annually, are as follows:

- Councillor Darcy Byrne;
- Councillor Mark Drury;
- Councillor Jess D'Arienzo;
- Councillor Pauline Lockie;
- Councillor Kobi Shetty.

2.2 Chairperson

The Mayor will act as Chair.

2.3 Deputy Chairperson

If the Chair is unavailable to act as Chair, then the Committee will elect a Deputy Chair by the majority of Voting Members.

2.4 Tenure of Office

Members will be be determined by Council annually.

Section 3 – Functions of the Committee

The Committee is to review, discuss and make recommendations to Council on all Major capital projects. In addition, the Committee will monitor and progress the compliance of Major capital projects.

Section 4 – Authority of the Committee

The Committee has no decision-making delegation and as such all recommendations will reported to Council on a quarterly basis, for consideration.

Section 5 – Conduct of Committee Business

5.1 Members

Only Committee members have the right to vote at Committee meetings. Attendees who are not members of the Committee may speak at Committee meetings to provide guidance, advice and opinion to the Committee, but shall not be entitled to vote.

Each Committee Member shall be entitled to one (1) vote in respect to any matter and the decision of the Committee shall be by the majority of votes cast in favour. The Chair shall have a casting vote.

Decisions requiring a vote shall not be made at any meeting unless a quorum is present.

5.2 Quorum

The quorum of this Committee shall be three (3) Councillors.

A meeting of the Committee must be adjourned if a quorum is not present: The meeting must be adjourned to a time, date and place fixed:

- by the chairperson, or
- in the chairperson's absence, by the majority of the Councillors present, or
- failing that, by the General Manager.

5.3 Reporting

The Committee minutes will be reported to Council on a quarterly basis for consideration.

5.4 Business Papers

The agenda shall be determined by the General Manager and Committee business papers will be distributed to Committee members and any official attendees as required seven days before the Committee Meeting.

Any additional reports may be tabled post the distribution of the business papers with the approval of the Chair and General Manager.

5.5 Meeting Frequency

Meetings of the Committee shall be held according to the Committee Meeting Schedule adopted by Council.

5.6 Venue

The venue shall be determined, prior to each meeting, with the ability to attend meting

online.

5.7 Minutes

Meeting minutes will be prepared by the meeting Secretary and circulated to the Chair for approval and subsequently to the remaining Committee Members.

Committee minutes will be tabled quarterly to Council, for determination.

5.8 Use of Technology

The Committee will use technology including telephone, video-conferencing and email as arranged by the Chair and/or meeting Secretary, to distribute meeting papers and otherwise to conduct Committee business.

Section 6 - Member Compliance

All Committee members are bound by the provisions of this Terms of Reference, Code of Conduct and Code of Meeting Practice.

Section 7 – Secretary of Committee

Council will provide a secretary and administrative support to the Committee.

The Secretary is responsible for ensuring all Committee agendas, minutes and reports are recorded in Council's corporate record keeping system (ECM) in accordance with Councils records management policies.

Section 8 – Variation of this Terms of Reference

This Terms of Reference may be amended or repealed by a resolution of Council in consultation with or upon the recommendation of the Committee.

NSW GOVERNMENT

Terms of Reference

Community trustee board for
Callan Park

November 2022

Greater Sydney Parklands

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About these Terms of Reference

The community trustee board Terms of Reference identify the membership, responsibilities, authority and operations of the Callan Park community trustee board as part of Greater Sydney Parklands and Transport for NSW (the Department).

Community trustee board for Callan Park

Purpose of the community trustee board

The community trustee board has been established to provide advice and recommendations to the Greater Sydney Parklands Trust (GSPT) in relation to the trust lands.

The role of the board is to provide advice, input and recommendations to planning, processes and policies that may impact future amenity and public access to the parklands as well as the ongoing management of the parklands.

In performing this role, the community trustee board will:

- Provide informed strategic advice to the GSPT Board on matters relating to Callan Park
- Advise, share information and facilitate partnerships that assist Greater Sydney Parklands to develop its plans and increase community connections
- Advocate on behalf of and promote understanding of the needs of and issues affecting the local community, ensuring inclusion and equity of access for community members
- Contribute local knowledge on relevant issues, emerging trends, opportunities and community needs.

Establishment

The community trustee board for Callan Park has been established by legislation under the Act.

The community trustee board will be established by 1 January 2023, with a view to the first meeting being held in early 2023.

Responsibilities of the community trustee board

In accordance with section 39 of the Act, the community trustee board for Callan Park has the following responsibilities:

- Provide advice and assistance to the Trust in the development and review of the plan of management for Callan Park and approve the plan of management for the parkland
- Provide advice to the Trust about proposed new or modified services and facilities for Callan Park, including priorities for investment
- Stay informed about current visitor and local community issues relating to the parkland and provide advice to the GSPT Board about the issues
- Be a consultative body for the Trust and the Centennial Park and Moore Park Trust for Callan Park in relation to—
  - the development and review of the plan of management for the parkland
  - matters of local relevance to the parkland, including the protection and use of Callan Park and the business, leasing and other activities carried out on, or to be carried out on the parkland, and
- Any other function given to community trustee boards by the Trust under this Act or another Act.

Responsibilities of the community trustee board Chair

The Chair of the community trustee board for Callan Park will be a board member appointed to the role by the Minister. Applicants seeking to be considered as a community trustee board Chair will be asked to indicate their interest and expertise when nominating. The Chair will be the key point of contact between the community trustee board and Greater Sydney Parklands.

The community trustee board Chair is expected to:

- Personally chair all community trustee board meetings
- Ensure that all matters dealt with by the community trustee board are consistent with the purpose of the community trustee board
- Be independent and impartial with respect to all community trustee board members
- Create an atmosphere of open and constructive participation within the community trustee board
- Actively work with community trustee board members to try and resolve any disputes that may arise during conduct of board activities
- Ensure confidential matters handled by the community trustee board are kept confidential, in accordance with the Code of Conduct
- Liaise with Greater Sydney Parklands to develop the agenda and key discussion items for meetings
- Advise Greater Sydney Parklands as soon as possible of any potential or actual conflict of interest that may affect their ability to fulfil their role as Chair
- Ensure community trustee board members comply with the Code of Conduct, notify any member who does not comply with the Code and refer any matters of concern to Greater Sydney Parklands through the Secretariat Officer
- Oversee the community trustee board's annual self-review and report any concerns to Greater Sydney Parklands through the Secretariat Officer
- Review and approve summary reports from community trustee board meetings for publication on the relevant Greater Sydney Parklands webpage within seven days of the meeting
- Liaise with GSP staff as required to assist the board to exercise its functions including to arrange their attendance at community trustee board meetings to provide information and respond to queries from members
- If there is an information access application relating to the community trustee board, liaise with the agency and/or Department's GIPA Unit and the board about the appropriate response.

Compliance obligations of the board

The following instruments give rise to obligations with which the community trustee board for Callan Park must comply:

- *Greater Sydney Parklands Trust Act 2022*
- Greater Sydney Parklands' Consultation and Engagement Framework.

The following activities and actions will be undertaken to ensure compliance obligations are met:

- Four meetings of the community trustee board will be held each year
- Summary reports will be produced as part of each meeting.

To provide reasonable assurance to the Minister that compliance obligations are met, the GSPT Board will provide annual reports:

- An attestation statement will be co-signed by the Chair of the GSPT Board and Chair of the community trustee board.

Community trustee board membership

The community trustee board for Callan Park shall be comprised of the following positions:

- One member nominated by the relevant local council (i.e. Inner West Council) as a community representative
- Up to six other members appointed by the Minister on the advice of the Trust

Membership criteria:

- The person has sound knowledge of Callan Park including the activities carried out in the parkland
- The person is able to communicate effectively with local residents, local community groups and other persons who use the parkland
- The overall membership of the board will be reflective of the broad range of views and interests of the community and persons who use Callan Park, and must have regard to the need for the board to:
  - be representative of diversity including, for example, in relation to gender, age and cultural background
  - include representation for local First Nations peoples, and
  - include a representative who has experience or skills in heritage or heritage management.

Appointment of members

Members are selected by a panel following an Expression of Interest process and appointed by the Minister, in accordance with the approved Consultation and Engagement Framework, on the recommendation of the Trust. The Minister appoints the Chair to the community trustee board for Callan Park, noting that the Chair must have the demonstrated skills and experience to fulfil their role which includes running meetings, communicating effectively and providing recommendations. Further details of the role and function of the Chair are provided in the accompanying Code of Conduct.

The Minister may reappoint the Chair and members of the community trustee board for Callan Park to serve one additional term only.

Terms of appointment

How long is membership for?

A community trustee board member holds office for a period not exceeding five years. Members will be appointed for two years in the first instance.

Members are eligible (if otherwise qualified) for re-appointment. However, a member cannot hold office for more than two consecutive terms.

Terms of individual members may be staggered to support board continuity and knowledge exchange.

What happens when new members are appointed?

Once appointed, members will be provided with appropriate documentation as part of a process of onboarding and induction. Each member must acknowledge in writing their acceptance of these documents and declare any conflicts of interest before commencing as a board member.

Resignations/terminations

The Minister may, on the recommendation of the Chair of the Trust, remove a member from office at any time. A member may be removed prior to the expiry of their term if:

- The member cannot commit adequate time to their role
- There has been a disagreement with other members that cannot be resolved
- There is a conflict of interest that cannot be mitigated
- The member no longer meets the membership criteria
- The member has failed to attend an adequate number of meetings without providing an apology or valid reason (i.e. is absent from three consecutive meetings of the board)
- The member breached the community trustee board's Code of Conduct.

In the case of a termination, Greater Sydney Parklands will notify the relevant member of their intention and allow for the member to respond before a decision is made.

Meeting arrangements

Support during meetings

All records, including the agenda, outcomes and any reports or recommendations, will be prepared and kept by the officer responsible for secretariat support.

The secretariat will coordinate with Greater Sydney Parklands and the Chair of the community trustee board as appropriate to draft and prepare the agenda for each board meeting. Agendas will be circulated to members one week prior to the meeting.

The secretariat support must also coordinate with the Chair of the board to ensure that the summary report of the meeting is promptly finalised, signed by the Chair, and distributed to members for confirmation as soon as is practicable after each meeting.

The summary report of the previous meeting should also be tabled at the next board meeting for approval.

Meeting frequency

The community trustee board for Callan Park will meet at least four times per year.

A notice of each meeting confirming the date, time, venue and agenda will be sent to each member of the community trustee board as soon as practicable prior to the meeting date. Meeting dates for the full calendar year are set in advance to enable members to schedule meetings.

Board meetings may be held in a range of formats, including online using the relevant technology as agreed to by majority of members of the community trustee board, in order to provide flexibility and accessibility for members.

Business outside of meetings

The community trustee board for Callan Park may, for urgent issues, consider a matter out-of-session by the circulation of papers among all the members. The resolution is to be approved in writing by a majority of members.

Matters decided by a community trustee board out-of-session must be noted by the board at the next formal meeting and be recorded in the summary report of that meeting.

Attendees

The community trustee board for Callan Park may grant permission for non-member attendees to be present on the recommendation of the GSPT Board.

NSW Government MPs are welcomed and encouraged to attend meetings; however, they are not eligible to propose motions or vote on recommendations.

The persons nominated by relevant local councils (i.e. Inner West Council) as community representatives, but not chosen by the Minister, may attend meetings of the board but are not members of the board, and are not entitled to participate or vote at a meeting of the board.

Quorum

The quorum for a meeting of the board requires the following conditions to be met:

- Although not a decision-making body, a quorum is required for recommendations
- The quorum for a meeting of the community trustee board is a majority of its members.

Publication of decisions

The confirmed summary report of the meeting will be made publicly available. The summary report, including actions and recommendations, will be published on Greater Sydney Parklands' or the relevant parkland webpage within seven days of each meeting, referred to the GSPT Board and circulated to members.

If Greater Sydney Parklands provides secretariat support and holds documents of the community trustee board, those documents may be subject to an information access application under the Government Information (Public Access) Act 2009 (GIPA Act). If there is an information access application relating to the board, the agency and/or Department's GIPA Unit will liaise with the board about the appropriate response.

Please note that the Department is the decision maker in relation to GIPA applications made to it for documents it holds even though those documents that relate to the work of the community trustee board.

Conduct of members

The community trustee board will abide by the board Code of Conduct.

Conflicts of interest

Conflicts of interest must be disclosed and dealt with by the community trustee board for Callan Park in a transparent way and in accordance with Departmental policy.

A conflict of interest arises in relation to a person's duties as a member of the community trustee board, if for example:

- The member has interests which could improperly influence the performance of his or her responsibilities as a board member
- There is the potential for a board member to personally benefit or provide benefits to associates from access to non-public information, or the results of non-public discussions, or decision-making processes.

Communication with the media and third parties

Views that are publicly expressed by a community trustee board member may be perceived or construed by the broader community as those of the community trustee board for Callan Park, Greater Sydney Parklands and/or the Department. Community trustee board members may speak to the media about their own views but must not purport to represent Greater Sydney Parklands.

Any requests from the media to a community trustee board member or Chair should be forwarded to Greater Sydney Parklands' Director Community, Engagement and Partnerships who will liaise with the Chair regarding the media request.

General correspondence and enquiries should be made through the Secretariat Officer.

Submissions to the community trustee board for Callan Park must be addressed to the Chair.

The Chief Executive is the designated media spokesperson for Greater Sydney Parklands.

Remuneration and allowances

Remuneration and out of pocket expenses

In line with the Act, positions on the community trustee board for Callan Park are voluntary and not remunerated.

The Chair and members of community trustee board for Callan Park are not entitled to out of pocket expenses.

Review

Periodic reporting on performance

Unless otherwise provided for by the establishing legislation, the community trustee board for Callan Park will conduct an annual evaluation of its performance and self-evaluate its level of effectiveness. The evaluation framework will be prepared by the Secretariat and endorsed by the members. The evaluation report should identify:

- How the board or committee is delivering on its objectives including a summary of key activities undertaken during the period
- Meetings held during the period and attendance
- Current membership and any changes that have occurred during the period
- Risk management strategies
- Results of any reviews undertaken, and
- Ratification of the terms of reference and any subsequent amendments.

Board review

Formal reviews are generally undertaken every five years. Greater Sydney Parklands must review the approved Consultation and Engagement Framework at least every five years, under the Act. An evaluation and review of the community trustee board's performance may be considered as part of this review.

A formal review of a community trustee board and its members may consider whether:

- The board is fulfilling its functions and objectives, its successes and the outcomes of its work in respect of its Terms of Reference and the legislation
- Delivery through the board is the most cost-effective approach
- The board has an appropriate number of members for the functions being performed
- Members have the appropriate mix of skills, experience, and diversity, and/or
- Individual members are fulfilling their responsibilities.

Review of Terms of Reference

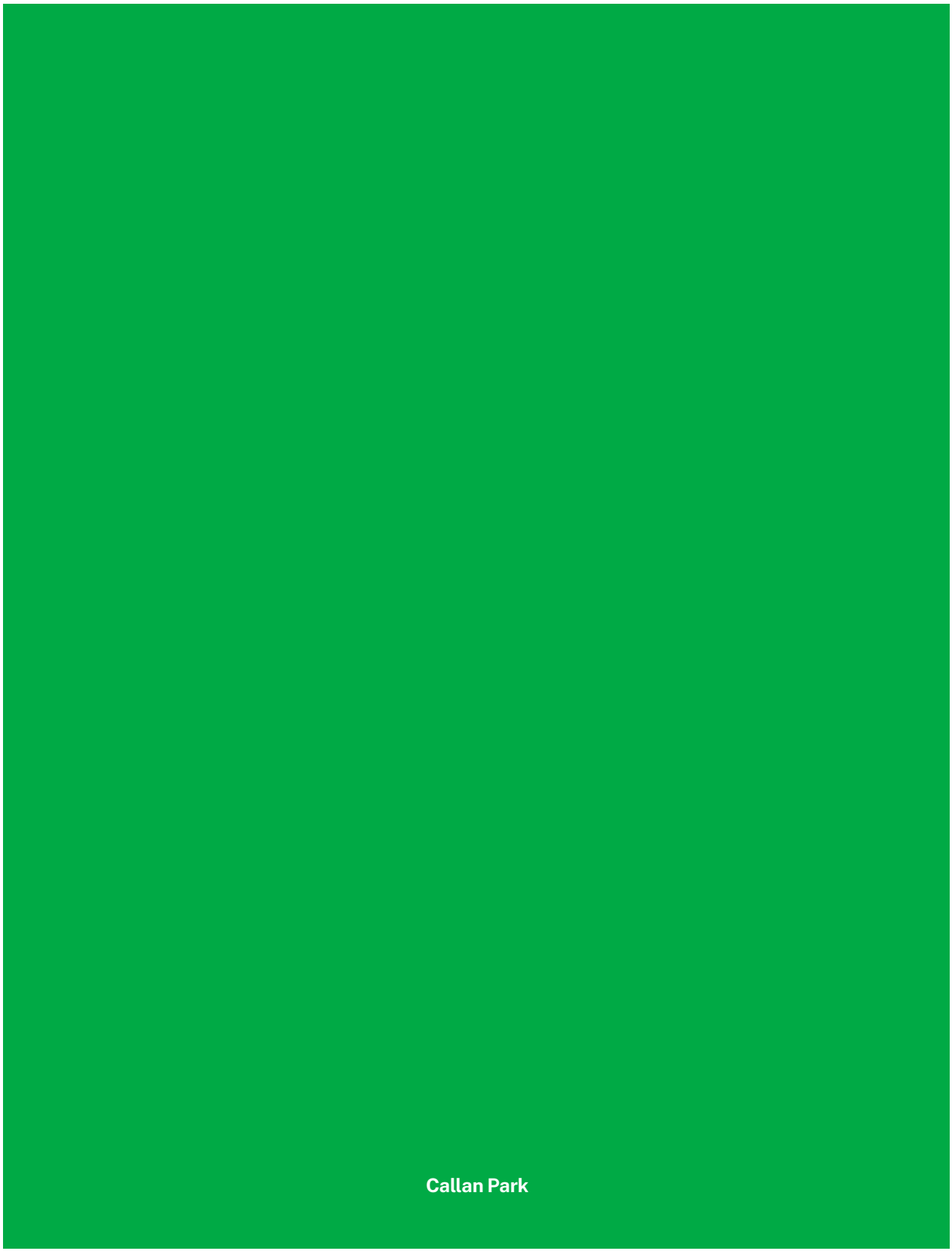
The Greater Sydney Parklands Trust Board will review the Terms of Reference annually to ensure they remain consistent with the community trustee board's objectives and responsibilities.

Agreement

These terms of reference are agreed by the community trustee board for Callan Park as at / / [Insert Date] and remain in force until otherwise amended, replaced or voided.

Chair [Insert Name]:

Signature: Date: / /


Callan Park

Cooks River ALLIANCE

Together for a healthy Cooks River catchment.

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Acknowledgement of Country

We respectfully acknowledge the traditional custodians of the Cooks River catchment, their living culture and unique role in the life of this region, together with other Aboriginal people who have made it their home.

1. Purpose

These Terms of Reference detail the framework for collaboration between organisations in relation to the operation of the Cooks River Alliance (The Alliance). The Terms of Reference is accompanied by a Code of Meeting Practice which sets out processes for decision making.

The Terms of Reference should be considered in conjunction with the Alliance's Memorandum of Understanding 2021-24 (MOU) which sets out the principles for establishment of the Alliance, membership and financial contributions of member organisations.

The Terms of Reference may be reviewed and then amended by resolution of the Alliance Management Committee.

The Alliance Terms of Reference was first adopted by the Alliance Board in December 2011 and was last amended and adopted in October 2021.

2. Mission

The Alliance is a partnership between councils, government agencies and the community, that combine resources, experience, knowledge and skills to improve the health of the Cooks River catchment. The Alliance takes a whole of catchment approach to decision making on issues that impact the river and catchment.

The Alliance's mission is to work together to achieve the community's vision for the river:
'A loved and healthy river valley enriching the heart of Sydney.'

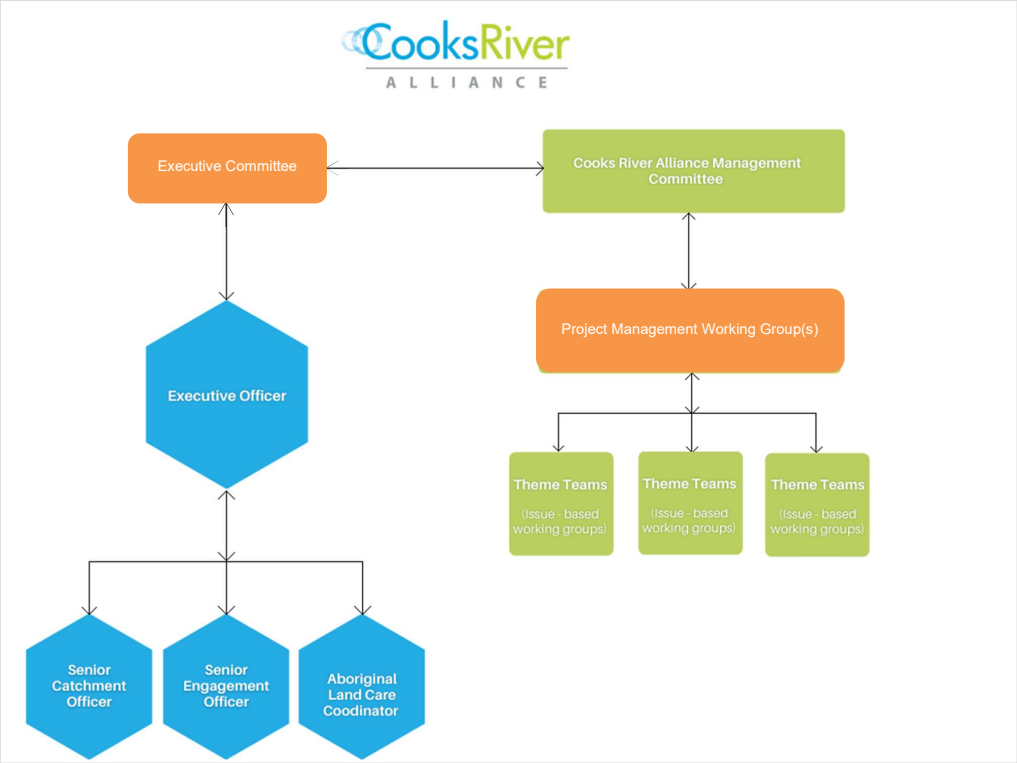
2.1 Cooks River Alliance's Strategic Plan

The Cooks River Alliance's Strategic Plan 2021-2024 directs the work of the Alliance. The plan outlines the goals, actions and Key Performance Indicators (KPI's) for the Alliance to deliver on its vision.

The Strategic Plan is developed in consultation with key stakeholders outlined in Section 6.1.2 and 6.1.3, and endorsed by the Management Committee.

The Management Committee will review Alliance activities against the goals, actions and KPI's outlined in the Strategic Plan on a quarterly basis.

3. Overview of the Alliance structure



The Management Committee provides strategic direction, makes decisions and provides approvals for all key Alliance activities.

The Executive Committee works with Alliance staff and the Management Committee to provide administrative direction and strategic advice.

Project Management Working Groups oversee the delivery of agreed Alliance projects and develop actions for endorsement by either the Executive Committee or Management Committee depending on the nature of the specific action. Further details on decision making protocols for the Executive Committee and Management Committee are outlined in sections 4.4 Function and 5.3 Function. Project Management working groups can form theme teams to work on specific issues or projects as needed.

4. The Management Committee

4.1 Membership

Alliance member organisations that participate on the Management Committee are Cooks River catchment organisations that are a signatory to the Cooks River Alliance MoU 2021-24 and have made an agreed financial or in-kind contribution to the Alliance. At the time of adopting these Terms of Reference, these member organisations are Bayside Council, Canterbury-Bankstown Council, Inner West Council, Strathfield Council and Sydney Water.

The Management Committee may invite other organisations onto the Committee either as financial or non-financial voting members. An organisation must demonstrate that it is a custodian or manager of the river and catchment and that it shares the Alliance mission.

4.2 Representatives

Management Committee representatives from each organisation are:

a) Voting Delegates - Councillors from member Councils, being one delegate and an alternative from each member Council. Councillors also represent the interests of the Alliance at internal meetings within their organisation.
b) Voting Delegates - Senior staff representatives or nominees from Sydney Water, being one delegate and an alternative. Senior staff representatives also represent the interests of the Alliance at internal meetings within their organisation.
c) Observers - Staff representatives nominated by each of the member organisations to attend meetings, advise voting delegates and receive minutes of the meetings.

Member organisations are entitled to one vote for each agenda item at Alliance Management Committee meetings. Management Committee members cannot vote at a Management Committee meeting by proxy.

The Alliance Executive Officer and other Alliance staff shall attend Management Committee meetings as required in an administrative capacity and to report on Alliance activities.

In the event that a voting delegate is unable to attend the Management Committee meeting, a nominated employee from the relevant organisation may act as the voting delegate. Representatives shall be able to speak for the whole-of-council or member organisation and be at a level within the organisation to either make decisions in relation to Alliance outcomes or have ease of access to senior management. Non-voting representatives are not permitted to vote for Chair and Deputy Chair of the Management Committee.

Members may request additional staff members to attend Management Committee meetings.

The Management Committee may delegate a matter for resolution to the Executive Committee. The Management Committee may delegate a matter or proposal to be determined by vote by member organisations by electronic transmission including email or teleconference. Management Committee representatives nominated as observers may also represent their member organisation on the Alliance Executive Committee.

4.3 Visitors

The Alliance's Management Committee may invite others to participate as observers or speakers at Management Committee meetings. Visitors will be afforded the status of observers.

4.4 Function

The Alliance Management Committee provides strategic direction and is the key decision-making and approvals body of the Alliance. The Management Committee make decisions and approves:

- Annual election of a Chairperson and Deputy Chairperson
- Alliance governing documents
- Alliance Strategic Plan 2021-24

- Annual budget
- Expenditure above $10,000
- Membership of the Alliance
- Items referred by the Executive Committee for decision
- Any other strategic or governing decisions as arises.

4.5 Chairperson

The Chairperson, or in his/her absence a Deputy Chairperson, shall preside over all meetings of the Management Committee.

The Chairperson is responsible for:

a) Ensuring he/she conducts all business with a high level of impartiality, firmness, tact and courtesy;

b) Representing the Alliance and being the premier spokesperson;

c) Guiding the Management Committee meetings according to the agenda and time available;

d) Encouraging and facilitating Management Committee discussions as relevant to the meeting agenda, and;

e) Ensuring all discussion items at meetings end with a decision, action or definite outcome.

The Chairperson shall be the public representative of the Alliance to the community and shall act as the media spokesperson. The Chair shall also utilise the interests of all members to maintain focus on objectives and ensure the smooth running of Alliance meetings.

The Chairperson and Deputy Chairperson shall be Voting Delegates from member organisations and will be elected for a period of 12 months by the Alliance Management Committee.

The Chair may also attend meetings of the Executive Committee as required.

4.6 Deputy Chairperson

The Deputy Chairperson may exercise any function of the Chairperson at the request of the Chairperson, or if the Chairperson is prevented by illness, absence or otherwise from exercising any function.

The Chair may also attend meetings of the Executive Committee as required.

5. Executive Committee

5.1 Membership

The Cooks River Alliance Executive Committee is made up of:

- Alliance Executive Officer
- Other Alliance staff as required
- Member organisations

The Alliance Chair and Deputy Chair Alliance shall also be invited to attend Executive meetings in an administrative capacity as required.

Members of the Executive Committee are to be nominated by member organisations and endorsed on an annual basis by the Management Committee.

5.2 Representatives

Representatives for the Executive Committee include senior staff representatives from member organisations, being one delegate and an alternative as nominated by each member organisation. Representatives shall be able to speak for the whole-of-council or member organisation and be at a level within the organisation to either make decisions in relation to Alliance outcomes or have ease of access to senior management. Executive members also represent the interests of the Alliance at internal meetings within their organisation.

Member organisations are entitled to one vote for each agenda item at Alliance Executive Committee meetings. Committee members cannot vote at an Executive Committee meeting by proxy. In the event that a representative is unable to attend the Executive Committee meeting, a nominated employee from the relevant organisation may act as the representative.

5.3 Function

The function of the Alliance Executive Committee is to act as an administrative committee, monitor progress and to assist in the delivery of Alliance Strategic Plan by:

- Monitoring and overseeing the progress of Alliance operations in accordance with agreed performance outcomes/assessment criteria
- Organisation membership of Project Management Working Groups
- Project Management Working Groups' guidelines and action plans
- Advising on issues to be reported to the Alliance Management Committee and determination of meeting agendas
- Determining expenditure above $5,000 and below $10,000
- Determining matters where delegated by the Management Committee
- Assisting the Alliance Executive Officer with administrative (including financial) determinations
- Providing a direct supervisory role for the Alliance Executive Officer

The Executive Committee will convene to determine staffing matters such as recruitment and performance management, consistent with local government practices.

6. Project Management Working Group

6.1 Membership

6.1.1 Project Leaders

A Project Management Working Group has a lead officer (designated Project Manager), Alliance Staff and a representative from each member organisation taking the role of project leader for their organisation. Representatives must have the ability to make decisions relating to Alliance activities or to easily access senior management and expertise related to the project.

6.1.2 General Members

A Project Management Working Group can also consist of representatives of any of the following that are located within the catchment, share the Alliance mission and are invited by the Executive Committee:

- Local government (financial and non-financial)
- NSW and Australian Government Agencies and departments
- Community organisations

6.1.3 Other Stakeholders

Other stakeholders may be invited to participate as required. Stakeholders would typically be representatives from:

- Industry and business
- Government authorities
- Other government agencies not represented on the Working Group
- Other interest groups

6.2 Function

A Project Management Working Group brings together specialist staff from different organisations to plan collaboratively and align programs of work across the catchment on a specific project. It is managed by Alliance staff with the support of project leaders. Project Management Working Groups will assist in the creation, coordination, membership, guidelines and action plans of project related theme teams.

Project Management Working Groups will meet as required and maintain a written record of meetings. Records of meetings will be made available to all member organisations. Decision-making powers will be in accordance with each Working Groups adopted Terms of Reference and other relevant governance documents.

6.2.1 Role of Project Leaders

Project Leaders' function is to:

- Work closely with Alliance staff to deliver agreed projects
- Attend Project Management Working Group meeting
- Seek alignment between the work of the Alliance, its members and other organisations to deliver on Alliance priorities
- Make recommendations to/ seek decisions from the Executive and Management Committees on specific project matters
- Identify the need for theme teams, assist with identifying members and oversee their actions

6.2.2 Theme teams

A Project Management Working Group may establish theme teams (also known as issue-based working groups) as required to research or investigate specific issues, concerns and/or actions. Theme teams shall consist of technical officers, or other relevant staff, from organisations in a Project Management working group. They will be led by an Alliance staff member or a nominated Project leader. Additional stakeholders may be

invited by a Project Management Working Group to be part of a theme team or to attend a relevant Project Management working group meeting.

Theme teams will meet as required and maintain a written record of meetings. Records of meetings will be made available to all member organisations. Decision-making powers will be in accordance with each team's adopted Terms of Reference and other relevant governance documents.

7. Alliance staff

The host organisation employs Alliance staff on a fixed contract basis. The length of Alliance team contracts and the Alliance team job descriptions and appointments are approved by the Executive Committee. Alliance staff are appointed in accordance with hiring requirements of the host organisation, with final approval provided by the Management Committee.

Alliance staff report to the Alliance Executive Officer who in turn reports to the Executive and Management Committees. The Alliance Executive Officer reports directly to the appropriate Manager at the host organisation for operational matters such as office accommodation, finance and HR.

7.1 Executive Officer

The Alliance Executive Officer manages the overall administrative functioning of the Alliance and coordinates the collaborative efforts between members to deliver on the vision for the Cooks River Catchment. The Executive Officer also leads and directs any additional Alliance staff.

The main responsibilities of the Executive Officer are to:

a) Undertake key administrative functions of the Alliance to ensure its effective operation, including coordinating meetings, maintaining records, preparing budgets, financial reporting and program evaluation.
b) Oversee the successful delivery of Alliance projects, including developing and implementing the Strategic Plan, establishing mutually beneficial relationships with and between members and building the capacity of members and the community through targeted education and engagement activities.
c) Identify strategic opportunities and partnerships to advance the Alliance's mission and advocate for relevant policy and regulatory reform that supports the vision for the river.
d) Provide regular communications about the Alliance's activities, prepare the Chairperson and Vice-Chairperson for media enquiries and oversee the development of communications and promotional materials.
e) Act as an Alliance media contact in partnership with the Chairperson and Vice-Chairperson

The Executive Officer may authorise expenditure to the value of $5,000 provided the expenditure is related to actions endorsed in the Strategic Plan.

7.2 Additional Alliance Staff

Additional Alliance staff can be employed based on funding availability and skills needs. The areas of skill required to run the Alliance effectively include, but are not limited to project management, catchment knowledge and communications. It is recognised that no less than a minimum of two positions are required to effect the efficient operation of the Cooks River Alliance. Staff needs will be determined by the Executive Officer in consultation with the Executive and Management Committees.

Program responsibilities of additional staff are outlined in the Alliance Strategic Plan.

8. Alliance Administration

8.1 Financial

Each Alliance member's financial contribution is based on the amounts outlined in the MOU. Unless otherwise agreed, the annual membership contributions are the final contribution rate from the previous year with the addition of the CPI. Member financial contributions are paid to and held by the host organisation.
Alliance membership fees will provide core funding to cover Alliance staff salaries and general administration costs.

Member financial contributions will be exclusively used for Alliance purposes and as approved by the Executive Officer, Executive Committee or Management Committee dependent on the level of expenditure.

8.2 Hosting and Administration

The Alliance team will be hosted by one of the member organisations.

The host organisation will provide accommodation and support services in accordance with the arrangements set out in Appendix One.

8.3 Annual Report

An Annual Report and Annual Financial Statement will be submitted to the Management Committee meeting in of the first quarter (30 September) of the following financial year where feasible.

The Annual Report shall contain a summary of the activities of the Alliance and performance against KPIs.

9. Appendix A - Cooks River Alliance Hosting Agreement

This agreement was first endorsed by the Alliance Board on 10 June 2015 and included as Appendix One of the Cooks River Alliance Terms of Reference.
Variations were subsequently endorsed in November 2017 and October 2021.

Terms and Conditions

Duration and termination provisions
The Alliance requires hosting support from July 1 2021 until June 30 2024.

a) Variations to the agreement will be presented to the Management Committee for consideration and adoption.

b) Should the designated Hosting Organisation be unable to continue hosting arrangements, notice will be given to the Management Committee of at least 12 months in order to negotiate alternative hosting arrangements.

1) Accommodation

a) The Hosting Organisation will provide office accommodation for Alliance staff members.

b) Any variation to accommodation arrangements for personnel associated with the Alliance e.g., staff, contractors, volunteers etc must be negotiated and agreed with the Hosting Organisation prior to engagement.

2) Contract administration

a) The Hosting Organisation will provide assistance for preparation of contracts, where matters are referred to the Organisation's legal services in a reasonable timeframe and in accordance with hosting council policy and procedures.

b) Urgent legal drafting may be sent to external legal firms on the Organisation's legal panel and the costs will be charged to the Alliance.

c) Contracts will be established in accordance with the Hosting Organisation's legal and policy requirements and registered into the Organisation's contracts register.

3) Employment and Recruitment of Alliance staff and Human Resource Management

a) Position descriptions, duration of employment agreement and salary of Alliance staff positions will be agreed with the Alliance Executive Committee.

b) Salary and on-costs will be paid entirely by the Alliance. On-costs generally consist of superannuation contribution, employee leave entitlements and worker's compensation contribution.

c) Any unused leave contributions that are not taken or transferred at the termination of the Alliance or individual employment contract will be returned to the Alliance budget.

d) Staff employment conditions will be in accordance with the Hosting Organisation policy and award/legal provisions.

e) The Hosting Organisation oversees the recruitment process of Alliance staff. Recruitment processes will conform to the Local Government Act, Award and hosting Organisation's policy and procedures. Selection committees will include representative(s) from the Hosting Organisation, member(s) of the Alliance Executive Committee.

f) The Alliance may be charged for recruitment advertising costs.

4) Financial management, budget administration and administration of grant funds

a) The Alliance Executive Officer is responsible for preparation of financial reports for the Alliance. The Hosting Organisation's Finance section will provide advice and assistance as required and will check accuracy of reports and organise sign off of statements.

b) The Alliance Executive Officer is responsible for managing grant acquittals. The process will be oversighted and signed off by the Hosting Organisation's Finance Section.

c) Alliance accounts will be audited as part of the Hosting Organisation's annual audit.

d) Alliance will pay for specialist external audits and those related to grant acquittals.

5) Contribution to Hosting Organisation

a) The Hosting Organisation will be either reimbursed annually by $10,000 (plus CPI) or reduce membership contribution by $10,000 to partially offset costs of hosting (whichever is relevant).

6) Communications and IT equipment and support services

a) The Hosting Organisation will provide access to landline phones, fax and email facilities.

b) The Hosting Organisation will provide access to IT support and standard IT equipment and software e.g., desktop computer and standard Microsoft Office products.

c) The Alliance will pay for specialist or additional IT equipment other than standard provisions e.g., laptops, notebooks, tablets, cameras, etc.

d) The Alliance will pay for specialist software, where Alliance is the sole or primary user of the software.

e) The Alliance will pay for acquisition of mobile communications devices and phone or data plans and charges.

7) Office equipment (e.g., photocopiers, telephones, printer, fax)

a) The Hosting Organisation will pay for standard office equipment such as furniture to be allocated for staff use. Office equipment that involves excessive costs or has little ongoing value to the Hosting Organisation's business needs may be charged to Alliance.

b) The Hosting Organisation will provide basic stationery and reasonable access to copiers and printers. It is expected that Alliance printing requirements will be reasonable and that the Alliance will procure and pay for large or specialist print jobs.

8) Payroll Administration

a) Payroll will be administered by the Hosting Organisation, in accordance with the Organisation's delegations and policy.

9) Procurement

a) Procurement, including Petty Cash, by the Alliance will be in accordance with legal requirements and the Hosting Organisation's policies and procedures.

10) Provision of vehicles for use by Alliance staff

a) The Hosting Organisation will provide Alliance staff access to pooled vehicles in accordance with the Hosting Organisation's policy and procedures. The Hosting Organisation will not be responsible for providing alternative transport should vehicles not be available.

11) Public Liability and contents Insurance to cover staff

a) The Hosting Organisation will provide public liability and contents insurance for Alliance staff. The Hosting Organisation will not be liable for conduct that invalidates insurance coverage.

12) Staff supervision and performance management of Alliance Manager

a) The Alliance Project Manager will be responsible to the Hosting Organisation for performance and conduct management and report directly to a manager appointed by the Hosting Organisation.

b) The Alliance Executive Committee (staff appointees) will review the Executive Officer performance on a periodic basis, which will involve assessment of the Executive Officer's individual performance and the overall performance of the project. The process will also include coordinating feedback from and to other Alliance member councils.

c) All Alliance staff will be expected to conform with the organisation's policies and directives and comply with the requirements of the hosting Organisation's performance management system.

d) Alliance staff will be directed by the Executive Officer on performance and allocation of Alliance work.

13) Training and development for staff

a) The Hosting Organisation will provide standard training for Alliance staff.

b) Specialist training, including seminars and conferences, and travel costs will be paid by the Alliance.

c) Alliance staff may attend training offered by other member organisations which is consistent with their position responsibilities and workplans.

d) Applications for training will be considered in accordance with the Hosting Organisation's policy and consistent with Alliance staff work plans and position responsibilities.

14) Work Health and Safety and EMS guidelines and training

a) The Hosting Organisation will provide appropriate WH&S and EMS guidelines and training.

History [post 2015]

3.2 amended by the addition of the following (Board resolution of 20.7.16):

> *A reference to 'councillor' includes such other person as may be substituted from time to time to fulfil the role served by the councillor.*
>
> Nov 2017 Board recommendations resolved on 13.8.2017.
> Amendments have been made to reflect the following:
> - Change of title from Program Manager to Executive Officer
> - Inclusion of a Catchment Congress and associated governance structures
> - Removal of a Steering Committee
> - Change from a Board to a Management Committee
> - Inclusion on the Management Committee of the Metropolitan Local Aboriginal Land Council and potentially other agreed organisations.
> - The New Action plan 2017- 2021

December 2017 Executive meeting

4.1 MLALC (or other Aboriginal organisation representation) membership of the Management Committee changed to 'may include' until confirmation of acceptance.

5.1 Membership of the Executive Committee wording changed so that a Host Organisation representative is generally included.

7.1 Executive Officer responsibilities removed as are part of the position description.

10a Host Organisation termination timeframe changed to 12 months' notice.

Hosting fees inclusive of CPI

October 2021 Management Committee meeting

All Clauses referring to Member councils amended to Member organisations.

10.1 Clause amended to include that member financial contributions are to be paid to and held by the host organisation. Member financial contribution will be exclusively used for Alliance purposes and as approved by the Management Committee.

2.1 Cooks River Alliance's Strategic Plan included to outlined forthcoming Strategic Plan for 2021-24.

3. Updated Org Chart in Overview of the Alliance structure

7.1 Additional details regarding Alliance Executive Officer role

6. Project Management Working Group(s) to replace Catchment Congress

5. Removal of Chair and Deputy chair as voting members of the Alliance (TBC)

New South Wales
Public Libraries Association Inc
Constitution (2020)

(Under the Associations Incorporation Act 2009)

NSW Public Libraries Association Constitution
Under the Associations Incorporation Act 2009

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Part 1 – Preliminary

1. *Objectives of the association*

1) The purpose of the Association shall be to enable those councils that are members to meet on a regular basis for common purposes and to undertake united action.

2) These purposes and actions may include but are not limited to:

(a) Unified and strong representation to all levels of government, members of Parliament and other bodies on matters of common interest and concerns for public libraries in New South Wales.
(b) Specifically represent the public library interests of members to relevant Ministers, the Local Government New South Wales, The Australian Library and Information Association, and other professional and administrative bodies.
(c) Work with the State Library of NSW for the betterment of the NSW public library network.
(d) Promote understanding of the value that public libraries contribute to communities across the state.
(e) Take an active role in the development and review of services and standards for public libraries.
(f) Assist Councils to recognise the value of library service to their communities, and support libraries to develop and maintain a profile within their respective Council organisations.
(g) Undertake and encourage research and development on matters of interest to public libraries in New South Wales.
(h) Apply for grants and raise finance for specific purposes where appropriate.

2. *Definitions*

1) In this constitution:
- 'Council' means a Council established under the provisions of the Local Government Act, 1993.
- Member means Council
- Member representative is any one of three people nominated to represent the member Council
- Ordinary member representative means a member representative of the association who is not an office bearer of the Association.
- Secretary/Treasurer means:
  (a) the person holding office under this constitution as Secretary/Treasurer of the Association, or
  (b) if no such person holds that office - the public officer of the Association.
- Special, ordinary or extraordinary general meeting means a general meeting of the association other than an annual general meeting.
- 'The Act' means the Associations Incorporation Act 2009.
- 'The Regulation' means the Associations Incorporation Regulation 2010.

2) In this constitution:
(a) a reference to a function includes a reference to a power, authority and duty, and
(b) a reference to the exercise of a function includes, if the function is a duty, a reference to the performance of the duty.

3) The provisions of the Interpretation Act 1987 apply to and in respect of this constitution in the same manner as those provisions would so apply if this constitution were an instrument made under the Act.

Part 2 – Membership

3. Membership generally

1) Membership shall be open to each Council (member) directly providing or contributing funds towards the operation of a standalone or regional public library service.

2) Representatives from a financial member Council may be elected Councillors of the Council; and/or administrative officers who are senior professional officers of the Council; and/or the Library Director/Manager or Library Officer-in-Charge of the Council's library service.

3) Member Councils will be requested to appoint a NSWPLA Councillor delegate after each local government election and notify NSWPLA of the delegate's name.

4) Only one representative is entitled to vote, and only the voting representative will be counted in the quorum.

5) Each current financial member (Council) shall be entitled to one vote on any motion, with the meeting Chairperson having a casting vote in the event of a tied vote. If one or more Councillor representatives of a member are present at a meeting, then one of the Councillors present shall exercise the voting rights of the member. In the absence of any Councillor representative, the member's voting rights shall be exercised by another representative of the member.

6) Observer status is extended to other elected or professional officers of a member Council or Library Service (not being a nominated representative of the member) at the discretion of the meeting Chairperson.

4. Cessation of membership

1) A Council ceases to be a member of the association if:
   (a) the Council resigns membership; or
   (b) is expelled from the association; or
   (c) ceases to be a Council; or
   (d) revokes its adoption of the Library Act, 1939 (NSW) as amended; or
   (e) fails to pay the annual membership fee under clause 8 within 3 months after the fee is due.

5. Membership entitlements not transferable

1) A right, privilege or obligation that a Council has by reason of being a member of the association:
   (a) is not capable of being transferred or transmitted to another Council, and
   (b) terminates on cessation of the Council's membership.

6. *Resignation of membership*

1) A member of the association who has paid all amounts payable by the member to the association in respect of the member's membership may resign from membership of the association by first giving to the Secretary/Treasurer or Executive Officer written notice of at least one month (or such other period as the Executive may determine) of the member's intention to resign and, on the expiration of the period of notice, the member ceases to be a member.

2) If a member of the association ceases to be a member under subclause (1) and in every other case where a member ceases to hold membership, the Secretary/Treasurer or Executive Officer must make an appropriate entry in the register of members recording the date on which the member ceased to be a member.

7. *Register of members*

1) The public officer of the association must establish and maintain a register of members of the association specifying the name and address of each Council who is a member of the association.

2) The register of members must be kept in New South Wales at the association's official address.

3) The register of members must be open for inspection, free of charge, by any member of the association during normal business hours.

4) A member must not use information about a person obtained from the register to contact or send material to the person, other than for:
   (a) the purposes of sending the person a newsletter, a notice in respect of a meeting or other event relating to the association or other material relating to the association, or
   (b) any other purpose necessary to comply with a requirement of the Act or the Regulation.

8. *Fees and subscriptions*

1) A member Council of the association must pay to the association the annual membership fee.

2) The annual membership fee will increase by the preceding year's rate pegging figure for NSW councils.

3) The voting rights of a member shall be suspended for any period during which membership fees are overdue and remain unpaid.

4) Association auspiced conferences, Zone meetings, forums and consortia purchasing arrangements are only available to councils and/or libraries that are financial members of the Association, unless a non-member rate is available.

9. *Members' liabilities*

The liability of a member of the association to contribute towards the payment of the debts and liabilities of the association or the costs, charges and expenses of the winding up of the association is limited to the amount, if any, unpaid by the member in respect of membership of the association including the provisions of Clause 6.

10. *Associate membership*

1) The Executive of the association may at its discretion invite any individual or organisation to be associate members of the association.

2) Associate members:
(a) shall pay an associate membership fee determined by the association annually at its annual general meeting;
(b) shall be entitled to receive agendas and minutes;
(c) shall be entitled to attend and participate in debate at meetings of members, butshall have no voting rights;
(d) shall not be entitled to hold office in the association;
(e) ceases to be an associate member of the association if:
(f) the associate member fails to pay the annual associate membership fee as required by subclause 2 (a) hereof; or
(g) the invitation of associate membership is withdrawn by the Executive; or
(h) the associate member resigns from associate membership of the association.

11. *Resolution of disputes*

1) A dispute between a member and another member (in their capacity as members) of the association, or a dispute between a member or members and the association, are to be referred to a community justice centre for mediation under the Community Justice Centres Act 1983.

2) If a dispute is not resolved by mediation within 3 months of the referral to a community justice centre, the dispute is to be referred to arbitration.

3) The Commercial Arbitration Act 1984 applies to any such dispute referred to arbitration.

12. *Disciplining of members*

1) A complaint may be made by any member of the association (through its member representative) that some other member of the association:
(a) has refused or neglected to comply with a provision or provisions of this constitution, or
(b) has willfully acted in a manner prejudicial to the interests of the association.

2) On receiving such a complaint, the Executive:
(a) must cause notice of the complaint to be served on the member Council concerned, and
(b) must give the member Council at least 14 days from the time the notice is served within which to make submissions to the Executive in connection with the complaint, and
(c) must take into consideration any submissions made by the member Council in connection with the complaint.

3) The Executive may, by resolution, expel the member Council from the association or suspend the member Council from membership of the association if, after considering the complaint and any submissions made in connection with the complaint, it is satisfied that the facts alleged in the complaint have been proved and the expulsion or suspension is warranted in the circumstances.

4) If the Executive expels or suspends a member Council, the Secretary/Treasurer or Executive Officer must, within 7 days after the action is taken, cause written notice to be given to the member Council of the action taken, of the reasons given by the Executive f or having taken that action and of the member Council's right of appeal under clause 13.

5) The expulsion or suspension does not take effect:
   (a) until the expiration of the period within which the member Council is entitled to appeal against the resolution concerned, or
   (b) if within that period the member Council exercises the right of appeal, unless and until the association confirms the resolution under clause 13 (4), whichever is the later.

6) The Executive shall be entitled at any time at its absolute discretion to withdraw an invitation to a person or organisation for associate membership.

13. *Right of appeal of disciplined member*

1) A member Council may appeal to the association through the member's representative against a resolution of the Executive under clause 12, within 7 days after notice of the resolution is served on the member Council, by lodging with the Secretary/Treasurer or Executive Officer a notice to that effect.

2) The notice may, but need not, be accompanied by a statement of the grounds on which the member Council intends to rely for the purposes of the appeal.

3) On receipt of a notice from a member Council under subclause (1), the general meeting of the association to be held within 28 days after the date on which the Secretary/Treasurer or Executive Officer received the notice.

4) At a general meeting of the association convened under subclause (3):
   (a) no business other than the question of the appeal is to be transacted, and
   (b) the Executive and the member Council through its member representative must be given the opportunity to state their respective cases orally or in writing, or both, and
   (c) the members representatives present are to vote by secret ballot on the question of whether the resolution should be confirmed or revoked.

5) The appeal is to be determined by a simple majority of votes cast by members representatives of the association.

Part 3 - The Executive

14. *Powers of the Executive*

1) Subject to the Act, the Regulation and this constitution and to any resolution passed by the association in general meeting, the Executive:
   (a) is to control and manage the affairs of the association, and
   (b) may exercise all such functions as may be exercised by the association, other than those functions that are required by this constitution to be exercised by a general meeting of members of the association, and
   (c) has power to perform all such acts and do all such things as appear to the Executive to be necessary or desirable for the proper management of the affairs of the association.

15. *Composition and membership of Executive*

1) The Executive shall be elected by members of the Association (through their member representative) by postal ballot or such other ballot as may be determined by the Association at an Annual General Meeting.

2) The Executive shall consist of the following:
   - President,
   - 2 Vice-Presidents
   - 2 Library Manager Members
   - Secretary/Treasurer

   from among the member representatives.
   And shall be elected by the membership in accordance with Clause 15(1) above.
   The Executive shall constitute the Association's Public Libraries Consultative Committee representation.

3) Each member of the Executive is, subject to this constitution, elected to hold office for 2 years until the conclusion of the annual general meeting following the 2-year date of the member's election, but is eligible for re-election.

4) Eligibility of member representatives for the offices of President and Vice Presidents shall be restricted to those member representatives who are elected councillors of the member they represent.

5) On the expiration of the term of President, Vice-Presidents, Library Manager Members, Secretary/Treasurer that person may be nominated for re-election provided that no person can hold an office for a cumulative term exceeding 6 years.

16. *Election of Executive*

1) Nominations of candidates for election as office-bearers of the association or as ordinary Executive members:
   (a) must be made in writing, signed by 2-member representatives of the association and accompanied by the written consent of the candidate (which may be endorsed on the form of the nomination), and
   (b) must be delivered to the Secretary/Treasurer or Executive Officer of the association at least 7 days before the date fixed for the holding of the election ballot.

2) If insufficient nominations are received to fill all vacancies on the Executive, the candidates nominated are taken to be elected and further nominations are to be received at the next annual general meeting.

3) If insufficient further nominations are received, any vacant positions remaining on the Executive are taken to be casual vacancies.

4) If the number of nominations received is equal to the number of vacancies to be filled, the persons nominated are taken to be elected.

5) If the number of nominations received exceeds the number of vacancies to be filled, a ballot is to be held.

6) The ballot for the election of office-bearers and ordinary Executive members is to be conducted in such usual and proper manner as the Executive may direct.

7) For a person to be nominated as a candidate for election as an office-bearer or as an ordinary committee member of the association, their associated Council must be a member of the association.

8) The Executive Officer of the Association shall also assume the position of public officer of the association.

9) The President and Vice-Presidents shall be councillors. The Secretary/Treasurer and Library Manager Members shall be Library Managers.

10) If an office bearer becomes ineligible to retain office with his or her nominated Council, then his or her office shall be treated as a casual vacancy and shall be filled in accordance with Clause 18 hereto.

11) If the President becomes ineligible to retain office then the position of President shall be filled for the time being by a Vice-President, elected by the Executive pending the conduct of a ballot, as prescribed in this Constitution, for the completion of the existing term of office.

12) The Executive shall have custody of all Association documents. These documents can be inspected by members upon request to the Executive. Archived documents are held in the Mitchell Library of the State Library of NSW and may be viewed by request in accordance with the memorandum of agreement between the Association and the Library.

17. Secretary/Treasurer

The position of Secretary/Treasurer shall be filled by one person.

1) The Secretary/Treasurer of the association must, as soon as practicable after being appointed, lodge notice with the association of his or her address.

2) It is the duty of the Secretary/Treasurer to keep minutes of:
   (a) all appointments of office-bearers and members of the Executive, and
   (b) the names of members of the Executive present at a Executive meeting or a general meeting, and
   (c) all proceedings at Executive meetings and general meetings.

3) Minutes of proceedings at a meeting must be signed by the chairperson of the meeting or by the chairperson of the next succeeding meeting.

4) It is the duty of the Secretary/Treasurer of the association to ensure:
   (a) that all money due to the association is collected and received and that all payments authorised by the association are made, and
   (b) that correct books and accounts are kept showing the financial affairs of the association, including full details of all receipts and expenditure connected with the activities of the association.

18. *Casual vacancies*

1) In the event of a casual vacancy occurring in the membership of the Executive, the Executive

may appoint a member representative of the association to fill the vacancy and the member representative so appointed is to hold office, subject to this constitution, until the next scheduled Executive election following the date of the appointment.

2) A casual vacancy in the Executive occurs if the Executive member:
   (a) is no longer associated with a financial member (Council) of the Association, or
   (b) resigns office by notice in writing given to the Secretary/Treasurer, or
   (c) is removed from office under clause19, or
   (d) is absent without the consent of the Executive from all meetings of the Executive held during a period of 6 months.

19. Removal of Executive members

1) The Association in general meeting may by resolution remove any member representative of the Executive from the Executive office held by the member representative before the expiration of the representative member's term of office and may by resolution appoint another member representative to hold office until the expiration of the term of office of the member representative so removed.

2) If a member of the Executive to whom a proposed resolution referred to in subclause (1) relates makes representations in writing to the Secretary/Treasurer or President (such representations not exceeding a reasonable length) and requests that the representations be notified to the members of the association, the Secretary/Treasurer or the President may send a copy of the representations to each member of the association or, if the representations are not so sent, the member is entitled to require that the representations be read out at the meeting at which the resolution for removal from office is considered.

20. Executive meetings and quorum

1) Meetings of the Executive shall be held at the discretion of the President, giving 14 days clear written notice, stating the purpose of such meeting, except business which the Executive members present at the meeting unanimously agree to treat as urgent business, with the Executive meeting no less than three times per annum. Such meetings may be held at such time and place as agreed by the Executive and may include the use of teleconferencing and video conferencing.

2) Any 4 members of the Executive constitute a quorum for the transaction of the business of a meeting of the Executive.

3) No business is to be transacted by the Executive unless a quorum is present and if, within half an hour of the time appointed for the meeting, a quorum is not present, the meeting is to stand adjourned to the same place and at the same hour of the same day in the following week.

4) If at the adjourned meeting a quorum is not present within half an hour of the time appointed for the meeting, the meeting is to be dissolved.

5) At a meeting of the Executive: The President or, in the President's absence, one of the Vice-Presidents is to preside. The Vice Presidents shall decide which one will preside.

6) The Executive may invite representatives of other organisations to attend the Executive

meetings on an as needs basis without voting rights.

7) An Executive advisory committee comprising of the Chairperson and Secretary (or their nominees) from each Zone will act when required as a representative forum for the discussion of major issues and matters and for consultation with the broader Association membership

8) The Association shall operate in geographical zones. These zones shall divide the State into areas for fostering voluntary library co-operation and exchange. Zones may arrange meetings as considered appropriate with a minimum of two meetings per year.

9) The Executive shall be empowered to vary the boundaries of existing zones or create new zones to take account of the membership needs of the Association.

10) The Executive may appoint a person or body corporate to undertake the duties of an Association Executive Office. The duties of the Executive Office to be agreed to by written contract.

21. *Delegation by Executive to sub-committee or working party*

1) The Executive may, by instrument in writing, delegate to one or more subcommittees or working parties (consisting of such member representatives of the association as the Executive thinks fit) the exercise of such of the functions of the committee as are specified in the instrument, other than:
   (a) this power of delegation, and
   (b) a function which is a duty imposed on the Executive by the Act or by any other law.

2) A function, the exercise of which has been delegated to a sub-committee or working party under this clause may, while the delegation remains unrevoked, be exercised from time to time by the sub-committee in accordance with the terms of the delegation.

3) A delegation under this clause may be made subject to such conditions or limitations as to the exercise of any function, or as to time or circumstances, as may be specified in the instrument of delegation.

4) Despite any delegation under this clause, the Executive may continue to exercise any function delegated.

5) Any act or thing done or suffered by a sub-committee or working party acting in the exercise of a delegation under this clause has the same force and effect as it would have if it had been done or suffered by the Executive.

6) The Executive may, by instrument in writing, revoke wholly or in part any delegation under this clause.

7) A sub-committee or working party may meet and adjourn as it thinks proper.

22. *Voting and decisions*

1) Questions arising at a meeting of the Executive or of any sub-committee or working party appointed by the Executive are to be determined by a majority of the votes of Executive

members or sub-committee members present at the meeting.

2) Each member representative present at a meeting of the Executive or of any sub- committee or working party appointed by the Executive (including the person presiding at the meeting) is entitled to one vote but, in the event of an equality of votes on any question, the person presiding may exercise a second or casting vote.

3) Subject to clause 18 (2), the Executive may act despite any vacancy on the Executive.

4) Any act or thing done or suffered, or purporting to have been done or suffered, by the Executive or by a sub-committee or working party appointed by the committee, is valid and effectual despite any defect that may afterwards be discovered in the appointment or qualification of any member representative of the Executive or sub-committee or working party.

Part 4 - General meetings

23. *Annual general meetings - holding of*

1) The association must hold its first annual general meeting within 18 months after its registration under the Act.

2) The association must hold its annual general meetings:
   (a) within 6 months of 1 July each year, or
   (b) within such later time as may be allowed by the Director-General or prescribed by the Regulation.

24. *Annual general meetings - calling of and business at*

1) The annual general meeting of the association is, subject to the Act and to Clause 23, to be convened on such date and at such place and time as the Executive thinks fit.

2) In addition to any other business that may be transacted at an annual general meeting, the business of an annual general meeting is to include the following:
   (a) to confirm the minutes of the last preceding annual general meeting and of any special general meeting held since that meeting,
   (b) to receive from the Executive reports on the activities of the association during the last preceding financial year,
   (c) to elect office-bearers of the association and ordinary Executive members in alternate years,
   (d) to receive and consider any financial statement or report required to be submitted to members under the Act.

3) An annual general meeting must be specified as such in the notice convening it.

4) Guests, visitors, observers and media reporters may only be excluded from an Annual General meeting or an extraordinary meeting at the will of the meeting. Guests, visitors and observers cannot vote but may be permitted to contribute to discussion at the discretion of the Chairperson.

5) Rules of debate and conduct of meetings, and other matters not covered by this constitution, shall be those followed by NSW Local Government Councils in open council, subject to any

specific provision made elsewhere in this constitution.

6) Notices of motion shall be in the hands of the Secretary/Treasurer or Executive Officer at least 45 days clear before the announced meeting day so that they may be circulated to all members at least 30 clear days prior to that meeting.

7) Motions in writing may be submitted by members from the floor of the meeting at the discretion of the Chairperson or the will of the meeting.

25. *Special general meetings - calling of*

1) The Executive may, whenever it thinks fit convene a special general meeting of the association.

2) The Executive must, on the requisition in writing of at least 5 per cent of the total number of member councils, convene a special general meeting of the association.

3) A requisition of member councils for a special general meeting:
(a) must state the purpose or purposes of the meeting, and
(b) must be signed by the member's representative making the requisition, and
(c) must be lodged with the Secretary/Treasurer or Executive Officer and
(d) may consist of several documents in a similar form, each signed by one or more of the member's representatives making the requisition.

4) If the Executive fails to convene a special general meeting to be held within 1 month after that date on which a requisition of member councils for the meeting is lodged with the Secretary/Treasurer or Executive Officer any one or more of the member councils who made the requisition may convene a special general meeting to be held not later than 3 months after that date.

5) A special general meeting convened by a member council or member councils as referred to in subclause (4) must be convened as nearly as is practicable in the same manner as general meetings are convened by the Executive and any member council who consequently incurs expense is entitled to be reimbursed by the association for any expense incurred.

26. *Notice*

1) Except if the nature of the business proposed to be dealt with at a general meeting requires a special resolution of the association, the Secretary/Treasurer or Executive Officer must, at least 30 days before the date fixed for the holding of the general meeting, give a notice to each member council specifying the place, date and time of the meeting and the nature of the business proposed to be transacted at the meeting.

2) If the nature of the business proposed to be dealt with at a general meeting requires a special resolution of the association, the Secretary/Treasurer or Executive Officer must, at least 21 days before the date fixed for the holding of the general meeting, cause notice to be given to each member council specifying, in addition to the matter required under subclause (1), the intention to propose the resolution as a special resolution.

3) No business other than that specified in the notice convening a general meeting is to be transacted at the meeting except, in the case of an annual general meeting, business which may be transacted under clause 24 (2).

4) A member council representative desiring to bring any business before a general meeting may give notice in writing of that business to the Secretary/Treasurer or Executive Officer who must include that business in the next notice calling a general meeting given after receipt of the notice from the member representative.

27. Quorum for general meetings

1) No item of business is to be transacted at a general meeting unless a quorum of member council representatives entitled under this constitution to vote is present during the time the meeting is considering that item.

2) Twenty-member representatives present (being member representatives entitled under this constitution to vote at a general meeting) constitute a quorum for the transaction of the business of a general meeting and an extraordinary general meeting.

3) If within half an hour after the appointed time for the commencement of a general meeting a quorum is not present, the meeting:
   (a) if convened on the requisition of member councils, is to be dissolved, and
   (b) in any other case, is to stand adjourned to the same day in the following week at the same time and (unless another place is specified at the time of the adjournment by the person presiding at the meeting or communicated by written notice to member councils given before the day to which the meeting is adjourned) at the same place.

4) If at the adjourned meeting a quorum is not present within half an hour after the time appointed for the commencement of the meeting, the member representatives present (being at least 3) are to constitute a quorum.

28. Presiding member

1) The President or, in the President's absence, one of the Vice-Presidents, is to preside as chairperson at each general meeting of the association.

2) If the President and the Vice-Presidents are absent or unwilling to act, the member representatives present must elect one of their numbers to preside as chairperson at the meeting.

29. Adjournment

1) The chairperson of a general meeting at which a quorum is present may, with the consent of the majority of member representatives present at the meeting, adjourn the meeting from time to time and place to place, but no business is to be transacted at an adjourned meeting other than the business left unfinished at the meeting at which the adjournment took place.

2) If a general meeting is adjourned for 14 days or more, the Secretary/Treasurer or Executive Officer must give written or oral notice of the adjourned meeting to each member Council of the association stating the place, date and time of the meeting and the nature of the business to be transacted at the meeting.

3) Except as provided in subclauses (1) and (2), notice of an adjournment of a general meeting or of the business to be transacted at an adjourned meeting is not required to be given.

30. Making of decisions

1) A question arising at a general meeting of the association is to be determined by either:
   (a) a show of hands, or
   (b) if on the motion of the chairperson or if 3 or more-member representatives present at the meeting decide that the question should be determined by a written ballot, a written ballot must be taken in such manner as the chairperson directs.

2) If the question is to be determined by a show of hands, a declaration by the chairperson that a resolution has, on a show of hands, been carried or carried unanimously or carried by a particular majority or lost, an entry to that effect in the minute book of the association is evidence of the fact without proof of the number or proportion of the votes recorded in favour of or against that resolution.

3) If the question is to be determined by a written ballot, the ballot is to be taken:
   (a) immediately in the case of a poll which relates to the election of the chairperson of the meeting or to the question of an adjournment; or
   (b) in any case, in such manner and at such time before the close of the meeting as the chairperson directs, and the resolution of the ballot on the matter is taken to be the resolution of the meeting on that matter.

31. Special resolutions

1) A resolution is passed by an association as a special resolution:
   (a) at a meeting of the association of which notice has been given to its members no later than 21 days before the date on which the meeting is held, or
   (b) in a postal ballot conducted by the association, or
   (c) in such other manner as the Director-General may direct, if it is supported by at least three-quarters of the votes cast by member representatives of the association who, under the association's constitution, are entitled to vote on the proposed resolution.

2) A notice referred to in subclause (1) (a) must include the terms of the resolution and a statement to the effect that the resolution is intended to be passed as a special resolution.

3) A postal ballot referred to in subclause (1) (b) may only be conducted in relation to resolutions of a kind that the association's constitution permits, as referred to in subclause (34) (1) of this constitution, to be voted on by means of a postal ballot and, if conducted, must be conducted in accordance with the regulations.

4) A direction under subclause (1) (c) may not be given unless the Director- General is satisfied that, in the circumstances, it is impracticable to require votes to be cast in the manner provided by subclause (1) (a) or (b).

32. Voting

1) On any question arising at a general meeting of the association a member has one vote only which shall be exercised in the manner specified in subclause Part 2 subclause (3)(3) of this constitution.

2) All votes must be given personally

3) In the case of an equality of votes on a question at a general meeting, the chairperson of the meeting is entitled to exercise a second or casting vote.

4) A member Council is not entitled to vote at any general meeting of the association unless all money due and payable by the member Council to the association has been paid, other than the amount of the annual subscription payable in respect of the then current year.

33. No appointment of proxies

1) A financial member may not appoint a proxy to vote at the Annual General Meeting or any other meeting of the Association.

34. Postal ballots

1) The association may hold a postal ballot to determine any issue or proposal (other than an appeal under clause 13).
2) A postal ballot is to be conducted in accordance with Schedule 3 to the Regulation.

Part 5 – Miscellaneous

35. Insurance

1) The association must effect and maintain such insurances to protect members and the association as required from time-to-time.

2) In addition to the insurance required under subclause (1), the association may effect and maintain other insurance.

36. Funds – source

1) The funds of the association are to be derived from annual subscriptions of members, associate members donations and, subject to any resolution passed by the association in general meeting, such other sources as the Executive determines.

2) All money received by the association must be deposited as soon as practicable and without deduction to the credit of the association's bank or other authorised deposit- taking institution account.

3) The association must, as soon as practicable after receiving any money, issue an appropriate receipt.

37. Funds – management

1) The funds of the Association will be lodged in a bank or credit union at a branch convenient for the Executive.

2) An audited statement of income and expenditure will be presented at the Annual General Meeting.

3) Subject to any resolution passed by the association in a general meeting, the funds of the association are to be used in pursuance of the objects of the association in such manner as

the Executive determines.

4) All cheques, drafts, bills of exchange, promissory notes and other negotiable instruments must be signed or authorised by any 2 members of the Executive or employees of the association, being members or employees authorised to do so by the Executive.

5) The Executive shall be empowered to make banking arrangements on behalf of the Association. The executive may by formal resolution delegate powers to operate Association bank accounts to specified officers of the Association with the proviso that there is an agreed minimum that may be authorised by one officer, while electronic transactions over the agreed minimum must be authorised by two officers, one of whom shall be the President or Secretary/Treasurer or their delegate. The agreed minimum to be determined by the Executive and can be changed if required by agreement of a majority of the Executive. All cheques written on the Association accounts shall bear two signatures, being those of the President, or someone delegated by the President in writing, and the Secretary/Treasurer.

38. *Change of name, objects and constitution*

An application to the Director-General for registration of a change in the association's name, objects or constitution in accordance with section 10 of the Act is to be made by the public officer or an Executive member.

39. *Dissolution of the Association*

The Association shall be dissolved if a resolution to this effect is carried by a two-thirds majority at an Annual General Meeting or at a Special General Meeting called pursuant to a special resolution to that effect. In the event of dissolution, all assets (after satisfying all debts and liabilities), and all records of the Association shall be dealt with in such manner as the Annual General Meeting resolving on the dissolution shall determine. In the event of the dissolution of the Association, the liability of individual members shall be limited to $50.00 per member.

40. *By-Laws*

By-laws may be created to enable effective day-to-day management of the Association, either by resolution of a general meeting or in urgent circumstances by executive resolution. If created by executive resolution, these by-laws will be subject to approval at the next general meeting of the Association.

41. *Custody of books etc*

Except as otherwise provided by this constitution, the public officer must keep in his or her custody or under his or her control all records, books and other documents relating to the association.

42. Inspection of books etc

1) The following documents must be open to inspection, free of charge, by a member of the association during normal business hours:
   (a) records, books and other financial documents of the association,
   (b) this constitution,

(c) minutes of all Executive meetings and general meetings of the association.

43. Service of notices

1) For the purpose of this constitution, a notice may be served on or given to a member and/or member representative:
   (a) by delivering it to the member representative personally, or
   (b) by sending it by pre-paid post to the address of the member, or
   (c) by sending it by facsimile transmission or some other form of electronic transmission to an address specified by the member for giving or serving thenotice.

2) For the purpose of this constitution, a notice is taken, unless the contrary is proved, to have been given or served:
   (a) in the case of a notice given or served personally, on the date on which it is received by the addressee, and
   (b) in the case of a notice sent by pre-paid post, on the date when it would have been delivered in the ordinary course of post, and
   (c) in the case of a notice sent by facsimile transmission or some other form of electronic transmission, on the date it was sent or, if the machine from which the transmission was sent produces a report indicating that the notice was sent on a later date, on that date.

44. Financial year

1) The financial year of the association is:
   (a) the period of time commencing on the date of incorporation of the association and ending on the following 30 June, and
   (b) each period of 12 months after the expiration of the previous financial year of the association, commencing on 1 July and ending on the following 30 June.

45. Recognition of Members

1) The Association may recognise the outstanding contributions of individuals to the Association through the presentation at the Association Conference of appropriate awards for service.

2) Life membership may be awarded to members who have rendered 15 years' continuous service to the organisation and/or who have provided an exceptional level ofcontribution to the organisation.

   There will be two categories of life membership:
   - active life membership will be awarded to a person who is still serving on a council or employed. Active life members will retain the ability to vote if so delegated by their council.
   - life membership will be awarded to those who have retired.

3) The Phil Potter Award for Meritorious Commitment to the Library Sector in NSW is awarded periodically through nomination by the Executive to people who have long, outstanding and meritorious service to NSWPLA and the broader library sector. Awardees will be presented with a perpetual trophy, medallion (or pin) and framed certificate.

Parramatta River Catchment Group

Terms of Reference

Parramatta River Catchment Group 2021



Version Control

Version	Changes	Date	Adopted by PRCG
Version 0.2	Update logo and member council names.	25 /10/ 2019	
Version 0.3	Draft Review for Executive endorsement Changes include: • Include Statements of Joint Intent, one vote, • Update Community Rep numbers, addition of Riverkeeper Ambassadors, update of member information • Updated governance structure & roles • Add Masterplan Reference Group • Member contributions and resignation clause • Add Part C – Community Representative Nomination Process • Insert a Table of Contents & format	23 /09/ 2021	7th October 2021

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PURPOSE OF THE GROUP

The Parramatta River Catchment Group (hereinafter, 'the Group'), is an alliance of councils, state government agencies and community groups who will use their combined resources, experience, knowledge and skills to address the complex environmental problems of the Parramatta River and its catchment.

The Group's area of interest shall be the Parramatta River Catchment from Blacktown in the west; to the confluence of the Lane Cove River in the east. It shall include the Parramatta River, all its tributaries and catchment lands.

PURPOSE OF THIS DOCUMENT

These terms of reference detail the framework for collaboration between each party in relation to the operation of the Parramatta River Catchment Group (PRCG). They should be considered in conjunction with the Group's Memorandum of Understanding or Statement of Joint Intent, which provides the broader guidelines on how each party will work together for the development, delivery, operation, administration and management of the Group.

VISION, MISSION AND PURPOSE

Vision

Sydney deserves a world-class river.

Mission

To make Parramatta River swimmable again by 2025.

Purpose

To make Parramatta River a living river.

MEMBERSHIP

Membership of the Group shall consist of two types of members:

Financial members

Financial members include those member councils and state agencies that have signed the Parramatta River Catchment Group Memorandum of Understanding (MoU) and/or a Statement of Joint Intent and have made a financial contribution to the Group.

These members are entitled to one vote on key decisions of the Group and are made up of:

a) Council elected representatives who include one voting delegate and an alternative from each member Council. Councillors represent the interests of the PRCG at Council meetings.

b) Staff representatives who shall be nominated by each of the Councils/Agencies to attend meetings and receive minutes of the meetings. In the absence of a councillor attending a meeting, staff representatives may vote on behalf of their council except in the election of Chairperson or Vice-Chairperson.

c) Council and agency staff shall be able to speak for the whole-of-council/agency, and be at a level within the organisation, to either make decisions in relation to Group outcomes, or have ease of access to senior management. Depending on the issues to be addressed by the Group, additional Council and Agency staff, with areas of expertise specific to identified issues, may be requested to attend meetings.

Financial membership at the date of adoption of these Terms of Reference comprises the following councils and agencies:

- Blacktown City Council
- Burwood Council
- City of Canada Bay Council
- City of Canterbury-Bankstown Council
- City of Parramatta Council
- City of Ryde Council
- Cumberland Council
- Department of Planning and Environment
- Environment Protection Authority
- Hunters Hill Council
- Inner West Council
- Sydney Water
- (Transport for NSW) TBC

Associate members

Associate members include community representatives, Riverkeeper Ambassadors and landholder representatives who do not contribute financially to the Group. While these members do not have voting rights, their value to the Group is acknowledged as key to its success.

Community representatives shall be invited from community and environmental groups, including Non-Government Organisations (NGOs) active in the catchment. It is recognised that Councillors also represent the community.

The total number of community group representatives invited to attend Group meetings shall not exceed six (6) in number. These positions will be reviewed every three years with opportunities for current and new community group representatives to apply through a self-nomination process that is promoted through PRCG social media, newsletter and the Our Living River website. Applicants will be selected according to the Nomination selection criteria as outlined….

Community members shall actively participate and liaise between relevant stakeholder groups, participate in relevant projects and share information on regional activities with other community groups where possible.

Riverkeeper Ambassadors are community representatives who are not financial members who actively organise their own community initiatives that contribute to improving and educating about river health. Riverkeeper Ambassadors are nominated by the PRCG and are community representatives that have more than two years of volunteer service to the river and organise their own environmental activities that volunteers can attend.

Major landholder or business representatives who are not financial members shall be invited to become members of the Group or invited to attend meetings on an as needs basis.

STRUCTURE & ROLES

The Group shall operate at three levels: Full Group, Executive, and Officer level.

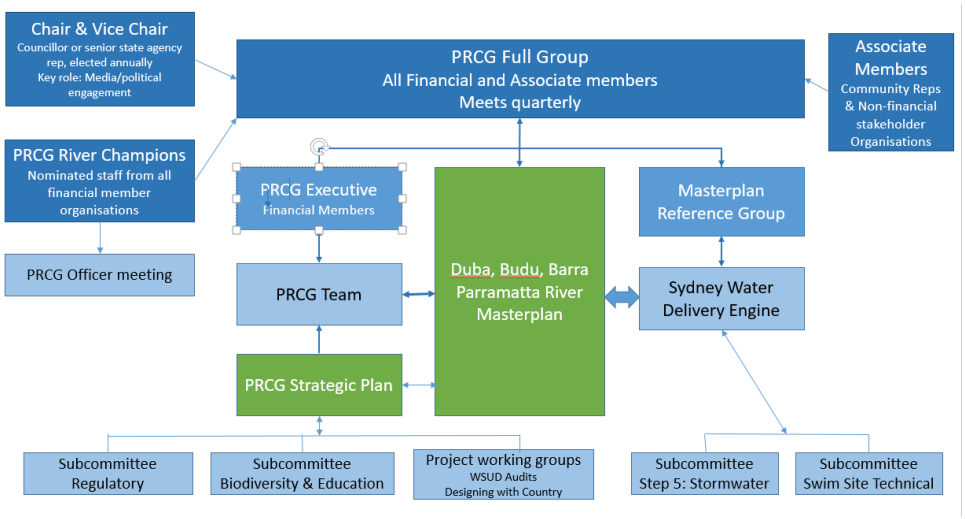

Figure 1. PRCG Organisational Structure.

Full Group

The Parramatta River Catchment Group Full Group is the over-arching decision-making body. It will provide strategic direction to the Coordinator, the Executive Committee and the Working Groups.

The Full Group is made up of elected representatives from member Councils, Council/Agency staff representatives and representatives from major landholders and elected community groups that exist within the Parramatta River catchment area.

The Full Group is empowered to do all things necessary and convenient to implement its mission, aim and objectives.

The above shall not affect the right of an individual Council/Agency acting in its own right on these matters.

The control, regulation, maintenance and management of the exercise of these powers are vested in the meetings of the delegates in accordance with these terms of reference.

Executive Committee

The Executive Committee acts as the committee of management for the Group. The Executive shall assist in the delivery of the Group's objectives by supporting the Coordinator with the operational functions of the Group.

The Executive Committee shall be responsible for the following:

a) Providing advice to the Coordinator on issues to be reported to the Group Committee/Full Group/Board;

b) Preparing and confirming Full Group meeting agendas;

c) Providing assistance and support to the Coordinator in performing his/her role;

d) Applying for grants which will then be reported on to the Group;

e) Performing any other functions as delegated by the Full Group for the effective management of the affairs of the PRCG between meetings;

f) Monitoring the performance of the PRCG Coordinator; and

g) Assisting with selection processes for recruitment of PRCG staff.

The Executive Committee shall consist of the following:

- Host Organisation Manager
- Coordinator; and
- Senior representatives from minimum four (4) other member organisations.

That is preferably five (5) in total with one (1) Agency and at least two (2) Councils represented on the Committee and the Coordinator and other PRCG staff as ex-officio members. The size of the Executive may vary according to the needs and interests of the Group but shall not be less than four (4) and not more than seven (7) in total.

Executive Committee members shall be Senior Officer/Team Leader level within their jurisdiction or above and/or shall be able to approve and endorse financial and other business matters pertaining to the Group.

Nominations for the Executive Committee shall occur once a year with the date for nominations to be determined by the Executive but shall not be longer than twelve (12) months from the previous call for nominations.

Nominations shall be called by email and received no later than three (3) weeks after being called. If the minimum number of four (4) nominations is received then all shall be accepted. If more than seven (7) are received the nominations shall be voted on via email by the officers of the Full Group.

It is preferred that all member organisations nominate a delegate for the Executive at some point to ensure an equal opportunity for all members to be involved in operational decisions of the Group.

The Executive Committee may authorise expenditure to the value of $30,000 in between group committee meetings, provided this financial commitment is related to actions endorsed in the Strategic Plan or Masterplan. This authorisation will be reported at the next Full Group meeting. Expenditures in excess of $30,000 must be approved by resolution of the Group Committee/Full Group/Board.

Where possible, decisions of the Executive shall be based on consensus. In the event of dissent, a vote of committee members will be taken and the majority will prevail.

The PRCG Coordinator shall forward draft minutes of each meeting to each Executive Committee member as soon as practicable after the meeting. Following adoption of the minutes, copies will be provided to all member organisations.

Masterplan Reference Group

A Masterplan Reference Group was established during the development of the Masterplan and was reformed in 2020 to reflect the needs for Masterplan implementation. The Masterplan Reference Group is chaired jointly by Sydney Water and the PRCG Chair, under a separate Terms of Reference.

Staff from the Sydney Water Delivery Engine prepare the agendas and minutes for these meetings. An update of activities of the Masterplan Reference Group will be provided to the Full Group meeting in the Delivery Engine Report.

Sub-Committees

The Group may appoint any number of sub-committees in connection with any work, activity or object of the Group.

The sub-committees will be formed to investigate and address specific issues, concerns and/or projects and shall consist of technical officers, or other relevant staff, from Councils and Agencies. Community members may be invited to join subcommittees where this is considered appropriate. They shall meet as required and report back to the Group at Full Group meetings.

All members shall agree, from time to time, to take the lead role on various projects, administer funds and support the Group as required.

The Group shall have power to co-opt any person to assist and/or comprise a sub-committee.

Chairperson

The Chairperson shall be the public representative of the Group to the community and shall act as the media spokesperson. The Chairperson shall also utilise the interests of all members to maintain focus on the Group's objectives and ensure the smooth running of the Full Group's meetings.

The Chairperson and Vice Chairperson shall be an elected Councillor from a member Council who is the main/voting representative from that council or a senior official from a member State Agency.

The Chairperson and Vice Chairperson shall be elected for a period of 12 months.

The Vice Chairperson may exercise any function of the Chairperson at the request of the Chairperson, or if the Chairperson is prevented by illness, absence or otherwise from exercising the function.

The Chairperson's responsibilities include:

a) Ensuring he/she conducts all business with a high level of impartiality, firmness, tact and courtesy;

b) Representing the organisation and being its public spokesperson, in accordance with the PRCG Media Policy (see Appendix A: PRCG Media Policy);

c) Guiding the Group meetings according to the agenda and time available;

d) Encouraging and facilitating Group discussions as relevant to the meeting agenda, and;

e) Ensuring all discussion items at meetings end with a decision, action or definite outcome.

The Chairperson or in his/her absence, a Vice Chairperson shall preside at all meetings of the Group.

STAFFING ARRANGEMENTS

The PRCG may appoint a PRCG Coordinator and other such staff, as the Group may consider appropriate in order to pursue its mission, aim and objectives.

PRCG staff positions will be appointed by fixed term contact with the host member organisation. Employment conditions including leave will be equivalent to other similar employment arrangements of the host organisation. Conditions, entitlements and rights will be detailed in the employment contract and subject to policies including codes of conduct that apply to host organisation.

The PRCG Coordinator will report operationally to a senior manager of the host organisation. The manager will provide regular performance feedback. The PRCG Coordinator will be provided support and direction from the Executive Team.

PRCG staff, provided that performance is satisfactory, shall remain as an employee for the term of appointment to the PRCG but not longer if the Group does not continue to exist.

Complaints concerning a member of PRCG staff shall be raised initially with the manager from the host organisation. Formal complaints will be managed in accordance with relevant organisational policies, codes or awards.

Coordinator and/or other PRCG staff, as delegated by the Coordinator

The Coordinator shall administer, support and facilitate the collaborative efforts of all members to achieve the Group's objectives and work towards the common purpose and shared responsibility of managing and improving the health and amenity of the Parramatta River catchment.

The primary responsibilities of the Coordinator are:

a) Perform all administrative functions of the Group as necessary for the effective operation of the Group including but not limited to the: coordination of meetings, preparation and maintenance of financial reports, budget recommendations, production of annual reports, and maintenance of accurate records.

b) Coordinate and facilitate the activities of the Group including but not limited to: overseeing the delivery of Group projects, development and implementation of a PRCG strategic plan, building partnerships with other stakeholders, seeking funding

for Group projects, working as a link between members, and building capacity of members through information sharing and training opportunities.

c) Promoting the Group's activities and projects including but not limited to: maintaining the Group's website, acting as a media contact, preparing the Chair and Vice-Chair for media enquiries, providing regular communication and information channels, circulating publicity and other promotional materials, and advocating on behalf of the Group to relevant stakeholders and authorities.

The Coordinator may authorise expenditure to the value of $5,000, following the host organisation's procurement policy, provided this financial commitment is related to actions endorsed in the Strategic Plan and Masterplan. Expenditures in excess of $5,000 must be approved by resolution of the Executive Committee (up to $30,000 as per previously stated in this document) or Full Group (above $30,000).

Additional Staff

The PRCG Full Group may determine and allocate funding to additional staff positions as considered appropriate.

HOSTING AND ADMINISTRATION

One of the member organisations, with their concurrence, shall be nominated at an Annual General Meeting or Ordinary Meeting to be the Host Organisation for a minimum five year term for the purpose of employing staff, providing office accommodation, human resources, management support, storage of equipment and administering Group funds.

Member Contributions

The financial contribution by each member organisation towards costs of the Group shall be apportioned on the following basis:

- An annual membership fee based on the percentage of the population in each LGA that lives within the catchment. This shall then be scaled to fit one of three categories; small, medium or large. This shall ensure an equitable and fair contribution by each council as it takes into account the population pressures placed on the catchment relative to each local government area and the inherent value of the PRCG to each council based on the size of the land where on-ground works may occur.

- State agency members will be considered in the large category and will pay the membership rate at that scale.

Financial contribution are expected within four months of the new financial year, annually. A purchase order will be requested from the contributing organisation and an invoice will be raised. Member contributions will increase annually in line with CPI.

Resignation from the PRCG

A financial member may resign from the PRCG after providing written notice to the PRCG Coordinator of six months of their intention to leave the Group. Planning for delivery, staffing and projects are determined on an annual basis which can involve financial commitment by the group to achieve this and as so, is put in place not to put the group in any financial

hardship or committed projects at risk. If this six months falls at the beginning of a new financial year the member will be required to pay the first six months membership fees.

All funds shall be operated upon in such manner and by such persons for the purpose of and subject to these terms of reference.

A financial report shall be submitted at each quarterly meeting of the Group.

The Group shall, before the end of each financial year, prepare estimates for the following financial year showing:

(a) The amount of proposed expenditure by the Group;

(b) The amount in hand available for such expenditures;

(c) Any additional amount required to be raised to meet such expenditure;(d) Proposed sources of funding for matters itemised in “c”.

The estimates shall be referred to each member organisation for consideration at their Ordinary Meeting. The expenditure shall be contained within the approved budget of the Group, or in accordance with supplementary votes for funds approved by member organisations.

Annual Report

The Group shall submit an annual report to each of the members at the Annual General Meeting or other Board meeting as deemed appropriate.

The Annual Report shall contain a summary of the activities, staffing of the Group and an accompanying financial statement for each financial year.

Amendments

The Terms of Reference shall be reviewed prior to the resigning of the Memorandum of Understanding, or at a 2yr review period. They may be altered to meet the current needs of all members, by agreement and resolution of the majority of members of the Group.

Attachment A – PRCG MEDIA POLICY

Objectives
Regular contact with the media and public communication is important in promoting a positive profile of the PRCG as an effective, pro-active organisation that is improving the social, environmental and economic health of the Parramatta River catchment.

The PRCG's communication with the media must be consistent and coordinated to ensure information is delivered correctly. All forms of public communication should aim to:

1. Promote the PRCG's role, activities and achievements;
2. Promote the PRCG as an apolitical, collegial group with membership made up of local councils, state government organisations and community groups with the shared dedication to make the Parramatta River swimmable again;
3. Be sensitive in its position towards any public position of PRCG members, associate members or individual representatives

The PRCG Members and Associate Members are:

- Blacktown City Council
- Burwood Council
- City of Canada Bay
- City of Canterbury Bankstown Council
- City of Ryde Council
- Cumberland Council
- Hunters Hill Council
- Inner West Council
- City of Parramatta Council
- Greater Sydney Local Land Services
- NSW Department of Primary Industries
- NSW Department of Planning and Environment
- NSW Environment Protection Authority
- NSW Office of Environment and Heritage
- NSW Roads and Maritime Services
- Parramatta Park
- Sydney Water
- Community Representatives
- Riverkeeper Ambassadors

Scope
This media policy applies to all PRCG members, financial and non-financial partners. This policy applies to all forms of communication including broadcast, electronic, print and social media.

Responsibilities and Representation
The management of the media is the responsibility of the Coordinator and/or other PRCG staff as delegated by the Coordinator (herein referred to as 'delegated staff member), as defined in the PRCG Terms of Reference. The Coordinator or delegated staff member is responsible for public communication of the PRCG, including drafting and reviewing media releases referring to the PRCG and coordinating their distribution after approval.

All media enquiries associated with the PRCG must be discussed with the Coordinator or delegated staff member before commenting or committing to comment. It is reasonable to take a media enquiry on notice and indicate that a response will be provided shortly, following

consultation with the PRCG Coordinator or delegated PRCG staff member. The PRCG Coordinator or delegated staff member will ensure that the media response is aligned with the objectives specified in the media policy and Terms of Reference.

This procedure applies to any response involving usage of the PRCG name, including but not limited to, if the speaker is identified as a member, representative or spokesperson of the PRCG. This procedure applies to all forms of public communication, including broadcast, electronic, print and personal social media channels if referencing the PRCG.

Nominated Spokesperson
The Chairperson is the designated public face and media spokesperson for the PRCG. In the absence of the Chairperson, the Vice-Chairperson will assume this spokesperson role. The Chair and Vice-Chair will contact the Coordinator before committing to comment on any matters related to the PRCG.

The Coordinator or delegated staff member will prepare the Chairperson and Vice-Chairperson for public comment in accordance to the agreed objectives and guidelines outlined in this policy. This media preparation may include the development of a media brief, discussion points as well as training and practicing for the interview.

Media content
All media content shall be consistent with any documents endorsed by the PRCG Full Group (e.g. PRCG Terms of Reference, PRCG Strategic Plan, Fauna and Habitat Report). In the case where the PRCG is approached for comment on an issue that is not included in an endorsed document or has not been specifically discussed and endorsed by the PRCG Full Group, or the issue may touch on a public policy position of a PRCG Full or Associate Member, the PRCG Executive Committee shall provide interim advice to the Coordinator or delegated staff member on whether a response shall be made.

PRCG Acknowledgements and Credits
All PRCG members, financial and non-financial, are encouraged to promote their partnership with the PRCG in relevant public communication. Whenever possible, PRCG members should display either the Our Living River ‘badge’ or the PRCG logo (or both), in a visible manner without cropping, distorting or overwriting the image.

Members should consult with the PRCG Coordinator or delegated staff member prior to the use of these logos.

Our Living River Logo	PRCG Logo
LET'S MAKE OUR RIVER SWIMMABLE AGAIN BY 2025	Parramatta River Catchment Group
Usage: The Our Living River logo should be viewed as an initiative for the river and represents the interest to make the river a living waterway. All PRCG members are encouraged to use this logo on their own projects, events and activities related to the purpose/overall cause to make the river a clean and healthy natural resource.	Usage: The PRCG Logo is an organisational logo and represents membership or representation of the PRCG's mission, role and achievements. The PRCG logo should be used for projects, events and activities directly organised, associated or supported by the PRCG.

Other event and campaign logos

Logos have also been created for key campaigns and events, including 'Riverfest', 'Get the Site Right' and 'Love Your Waterways'. Any member or affiliated organisation wishing to use these logos must put their request in writing to the PRCG Coordinator or delegated staff member first, before proceeding to use them in any of their communications material.

Photography and Film

Any request for photography or film footage related to the PRCG must be discussed in consultation with the PRCG Coordinator or delegated staff member before providing or committing to provide the media with such material. The PRCG Coordinator or delegated staff member will endeavour to supply approved imagery or audio-visual material, or advise/authorise the capture of new photographs and film footage if needed.

Strict guidelines apply to the use of imagery including children and minors. PRCG members are never permitted to distribute or use any material including children and minors in any form of communication, both internal and external, unless authorised by the PRCG Coordinator or delegated staff member. The Coordinator or delegated staff member will ensure that the necessary media consent has been obtained by the child and parent or guardian.

Media Opportunities

All PRCG members have a role to identify events or activities that can potentially promote the PRCG through media coverage. In circumstances where there is an opportunity for a positive news story or upcoming event to share with the media, please contact the PRCG Coordinator. The PRCG Coordinator or delegated staff member will advise if and how the news media should be contacted.

Monitoring and Reporting

All media occurrences will be recorded and reported to the PRCG Full Group at their quarterly meetings. PRCG members will have the opportunity to review these occurrences, bring to attention any future media opportunities and reassess this Media Policy for its effectiveness and continued relevance.

Attachment B – CODE OF MEETING PRACTICE

Preamble
The object of this Code is to provide for the convening and orderly conduct of meetings of the Parramatta River Catchment Group and any Committees of this Group.

All meetings of the Group shall be conducted in accordance with this Code.

This Code shall be amended from time to time to meet the current needs of all members, by agreement and resolution of the majority of members of the Group.

Meeting Principles and Protocols
In adopting this Code of Meeting Practice, the members of the Parramatta River Catchment Group commit to the following principles:

a) Meetings should be orderly and efficient and held in an environment which facilitates respect shown for the views of others and regard for reasonableness and fairness.

b) All members have an obligation to conduct themselves at meetings to accepted standards of behaviour and make positive contributions to the issues being considered.

Definitions

Member Organisation – either a Council or Agency, which is party to the Memorandum of Understanding (MoU) and/or is a financial contributor.

Delegate – representative of a member organisation.

Voting delegate – representative of a financial member organisation with the right to cast a vote on behalf of their organisation.

PRCG Full group – The PRCG Full Group structure and role is set out in the PRCG Terms of Reference. The Full Group includes representatives of financial member organisations (Councils and Agencies), community group representatives and associate members.

PRCG Coordinator – a paid staff member of the PRCG who administers, supports and facilitates the collaborative efforts of all members to achieve the PRCG's objectives and work towards the common purpose and shared responsibility of managing and improving the ecological health of the Parramatta River catchment.

PRCG Executive Committee – The PRCG Executive Committee structure and role is set out in the PRCG Terms of Reference. The Executive Committee includes senior officers of up to seven financial member organisations, including the Host Organisation Manager and the PRCG Coordinator.

PRCG Associate Members – non-financial members such as landholders or community group representatives who may attend meetings but do not have voting rights.

PART A – PRCG FULL GROUP MEETINGS

Convening of Meetings

Frequency of Meeting

Ordinary Meetings of the PRCG Full Group shall be held quarterly each year. One of those meetings shall be the Annual General Meeting.

Location of Meetings

Meetings shall be preferably held at a member organisation office as decided by the PRCG Full Group, but if necessary held virtually. The hosting of each meeting shall be rotated amongst the member organisations.

The meeting host will provide refreshments for the meeting.

Meeting times

Ordinary Meetings of the Group will take place in the early evening, commencing at 5:30pm and finishing at 7.30pm unless otherwise agreed prior to the meeting. Supper shall be provided before commencement of the meeting.

Officer Meetings will be held at 3:30pm where scheduled and will finish by 5:00pm. Officer meetings do not have to be held directly before a Full Group meeting, but preferably in the same week.

Notice of Meeting

The PRCG Coordinator shall notify each member organisation notice of meeting time, date and location and the nature of the business to be dealt with at the meeting not less than two (2) weeks before each meeting.

In the case of Extraordinary Meetings, generally two (2) weeks' notice will apply, however in cases of emergency, a minimum of forty-eight (48) hours' notice must be given to all member organisations.

Calling of Extraordinary Meeting

An Extraordinary Meeting of the PRCG Full Group may be convened by the PRCG Co-ordinator only, in consultation with the Chair where required.

Representation at Meetings

General Managers/Senior Agency Official and/or their delegate will ensure that appropriate member organisation representation is provided at PRCG meetings to ensure that interests and issues of all member organisations are represented.

An Extraordinary Meeting of the Group may be convened as and when required, in accordance with this Code of Meeting Practice.

Apologies for Non-Attendance

Where a delegate of a member organisation is unable to attend a meeting of the Group, the member organisation may be represented by another person appointed as alternate delegate

(a proxy). The alternate delegate may, during the absence of a delegate of his/her member organisation, act in his/her place and be subject to vacation of office in the same way as a delegate.

Where a delegate has missed three (3) meetings without notification, the Group shall write to the member organisation seeking an alternate delegate.

Records of meeting attendance shall be published in the PRCG Annual Report.
Where possible a delegate shall submit an apology for non-attendance at any meeting of the Group.

Conflicts of interests

Any delegate who may have a conflict of interest, that being where their private interests conflict with their public role and responsibilities, should ensure that this interest is declared at the beginning of each relevant PRCG meeting (e.g. Full Group, Executive Committee or sub-committee) as soon as a conflict arises. This may involve action such as removing him/herself from the decision making process, leaving the room when a matter is discussed etc. Delegates are expected to manage conflicts of interests to mitigate or avoid real or public perception of bias from their representation to the PRCG.

What Constitutes a Decision of the Group?

A decision of the PRCG Full Group requires either a consensus of all members present at a meeting or a majority of votes at a meeting that meets quorum.

A decision may be made outside of ordinary or extraordinary meetings using any technique or technology that gives the members as a whole a reasonable opportunity to participate. A record of the process used to make a decision using techniques or technologies must be accurately documented.

All decisions made by the Full Group shall be accurately minuted in accordance with this Code.

Addressing the Meeting

With the consent of the delegates at a meeting, leave may be granted for any person to address that meeting.

Chairperson

At every meeting of the Full Group, the Chairperson shall preside, or if her/she is not present, a Vice Chairperson shall preside, or if he/she is not present, the delegates present shall elect a Chairperson to preside at that meeting.

Quorum

Quorum for a Meeting

Business must not be transacted at a meeting unless a quorum, that is the majority of voting delegates from each member organisation, is present.

Each member organisation is entitled to one voting delegate.

If quorum is not present the meeting may continue but only to discuss the items on the original agenda. A meeting without quorum may not make decisions which are binding on the PRCG.

If, after one hour of the time designated for the holding of the meeting, the meeting may be:

(a) Adjourned to another time and another day, and a place to be determined by the PRCG Coordinator in consultation with the Chair; or

(b) Cancelled by the PRCG Coordinator in consultation with the Chair and all major decisions to be made at the meeting will be sought using any technique or technology that gives the members as a whole a reasonable opportunity to participate without attending an adjourned meeting.

Agenda

Agenda and Business Papers for Ordinary Meetings

An agenda outlining the matters to be dealt with at the meeting, business papers detailing specific items of business and minutes of the previous meeting shall be circulated preferably with the meeting notification or as soon as practicable before the meeting but no less than seven (7) days prior to the meeting.

A member organisation may propose agenda items. These shall be submitted to the Coordinator at least three (2) weeks prior to the date of the meeting.

The Financial Statements and Annual Report of the Group for the financial year ending June 30 shall be submitted to a meeting of the Group to be held not later than 30 November each year.

Agenda for Extraordinary Meeting

In the case of an Extraordinary Meeting, the agenda shall deal only with the matters stated in the notice of the meeting.

Business at Meetings

Business of Meetings

The business conducted at a meeting of the Group shall consist of:

a. Matters presented by the PRCG Coordinator
b. Matters of which notice has been given by member organisations, either via staff representatives or from elected delegates
c. Matters which the Chairperson thinks fit to submit to the meetings
d. Consideration of any recommendation or report by any committee of the Group
e. Consideration of any recommendation or report by any community group; and otherwise as the Group decides.

Decisions/Resolutions

Making a Resolution

An objective of the PRCG Full Group is to achieve consensus on decisions made by the Board. When determining if consensus has been reached, the Chairperson shall call for any voting delegate to voice his/her dissent for the decision in question. If no dissent is raised the Chairperson may declare the motion "carried" by the Group.

If objection is signified, discussion will proceed in accordance with this Code and the Chairperson shall again submit the motion to the meeting. If consensus cannot be reached at this point, issues may be determined by a majority vote.

Altering Resolutions of the Group

Any dissent on any decision made after a meeting of the Group shall be raised at the Executive Committee for discussion and clarification.

Voting

Voting Entitlements of Delegates

At meetings of the PRCG Full Group only voting delegates of member organisations that are financial contributors and in attendance may vote.

Each financially contributing member organisation shall have one vote.
Voting shall be conducted as a show of hands where the Chairperson shall call for those voting delegates who are in favour to raise their hands.

In the event of equality of votes the Chair has a casting vote.

The PRCG Full Group may hold a postal/electronic ballot to determine any issue or proposal. A postal/electronic ballot is to be conducted in accordance with this Code of Meeting Practice.

Minutes

Minutes of Meetings

The Group shall ensure that full and accurate minutes are kept of the proceedings of a meeting of the Full Group and are available for all members via the members' only section of the Group's website.

The Coordinator shall forward minutes of each meeting to each member organisation and delegate as soon as practicable after the meeting but no later than two (2) weeks after a meeting. Each member organisation shall note the minutes of each meeting.

Where a decision at the meeting is required to go to a vote, the voting result shall be recorded in the minutes by declaring the names of those delegates voting in favour (through a raising of hands) and the recording all other delegates present as having voted against the matter.

Annual General Meeting

Conduct of business

The Annual General Meeting will be held each year and may occur as part of an Ordinary Meeting as determined by the Coordinator and the Executive Committee.

The following business will be conducted at the Annual General Meeting:

1. Election of Chairperson and Vice-Chairperson
2. Presentation of financial statements
3. Presentation of Annual PRCG Report.

Election of Chairperson and Vice Chairperson

Members of the Group shall elect a Chairperson and Vice Chairperson at the Annual General Meeting. The term of office is for one year.

The following positions are eligible to nominate and vote:

a) Councillors representing a member Council.
b) A senior official from a member State Agency.

The following are not eligible to nominate and vote:

a) Council staff are not eligible to stand for Chairperson or Vice-Chairperson.
b) PRCG Associate members.

The PRCG Coordinator will act as returning officer for the election.

The PRCG Coordinator will call for nominations for the positions of Chairperson and Vice-Chairperson no later than two (2) weeks prior to the AGM and advise the date and time of closure for nominations.

In the event that the number of nominations equals the number of positions and the positions of Chairperson and Vice-Chairperson are filled by different people, the positions will be filled and a result declared.

In the event that more than one nomination is received for either or both positions, the PRCG Coordinator will issue ballots to eligible voting delegates and notify time and date of closure of ballot.

The position of Chairperson will be determined first and the person with the highest number of votes will be declared elected. If the elected Chair nominated for the position of Vice-Chairperson, their nomination will be considered to have lapsed.

In the event, there are multiple nominations for the position of Vice-Chairperson, the person with the highest number of votes will be declared elected.

The elected Chair and Vice-Chairperson will be notified at the Annual General Meeting.

PART B – EXECUTIVE COMMITTEE

Executive Committee Meetings

Frequency of Meetings

Meetings of the Executive Committee shall be held bi-monthly, or as required, to ensure the effective operation of the Executive.

Location of Meetings

Meetings shall be held at the Host Organisation office or online/ other such place as decided by the Executive Committee.

The Executive may hold a meeting of members at two or more venues using any technology that gives the Committee members as a whole a reasonable opportunity to participate.

Notice of Meeting

The PRCG Coordinator shall notify each member of the Committee of meetings and of the nature of the business to be dealt with at the meeting not less than seven (7) days before each meeting (or such other period as may be unanimously agreed upon by the members of the Executive).

Calling of Meetings

Meetings are called by the PRCG Coordinator. However, a meeting may be requested by a member of the Executive Committee. The PRCG Coordinator will notify other Committee Members of the request and the meeting will proceed if the majority of the Committee are in agreement.

Chairperson

At a meeting of the Executive, the members present will determine who will chair meetings.

Quorum

No quorum is required by the Committee.

Decisions of the Executive

Where possible, decisions of the Executive shall be based on consensus. In the event of dissent, a vote of committee members will be taken and the majority will prevail.

PART C – COMMUNITY REPRESENTATIVE NOMINATION

Nomination and Selection Process

1. A call for nominations be made on Day/date/Month Year, usually at the March Full Group meeting, inviting both current and new community group representatives to apply to participate in the PRCG Full Group.
2. Nominations to be advertised via the PRCG Full Group contacts list, Our Living River eNewsletter, Riverkeeper Network contacts list, Council and State government agency. Social media and communications channels and sent directly to known community groups across the catchment.
3. Nominations to be submitted via an electronic application form located on the Our Living River website or to the PRCG Coordinator, info@ourlivingriver.com.au or Parramatta River Catchment Group, C/- City of Canada Bay, Locked Bag 1470, Drummoyne NSW 1470 (Community Representative Application Form).
4. Nominations to close at 5pm on Day/date year two months, usually May, prior to June Full Group meeting where nominees will be endorsed.
5. Once nominations have been received, the PRCG Executive Committee will assess the applications and shortlist a maximum six community representatives for a three-year term, currently June 2021 – June 2024, following the selection criteria below.
6. The Executive Committee will then recommend the six shortlisted community representatives to the PRCG financial representatives for endorsement.

Selection Criteria

1. A maximum six community representatives will be selected. Preferably, at least two (2) current community representatives would continue for another three-year term, to provide continuity to the group and help mentor new representatives.
2. Community groups would need to demonstrate their involvement in the local community, their commitment to improving the environment, and preferably have strong links to regional networks so they could be a conduit of information to and from the PRCG and the broader community.
3. Assessment will be made using the following key selection criteria:
   a) Local government area/s – ensuring a broad geographic representation across the catchment
   b) Type of interest group/s represented – ensuring a range of interests are represented (e.g. aboriginal, cultural, environmental, waterway users, education, industry, business etc.)
   c) Relevance to the Parramatta River catchment – community representatives must have direct involvement in activities within the catchment area
   d) Level of involvement in their local community and community reach – judged by qualitative responses given in application form
   e) Must respond 'yes' to questions 6, 10a, 10b and 10c.

Constitution of the Southern Sydney Regional Organisation of Councils

1. Name

The name of the Organisation is the Southern Sydney Regional Organisation of Councils, hereunder referred to as "the Organisation".

2. Objectives

i. To consider and assess the needs, disadvantages and opportunities of member Councils and of the Southern Sydney Region; to make representations, submissions and promotions relative to meet such needs, disadvantages and opportunities to Commonwealth and State Governments and Departments, Statutory Authorities and other appropriate bodies or individuals.

ii. To submit to such Governments and other appropriate bodies, requests for financial assistance, policy changes and additional resources for the region or for member Councils.

iii. To strengthen the role of Local Government in regional affairs, particularly where the region may be affected by Australian or NSW Government policy.

iv. To facilitate a co-operative approach to the problems, opportunities and challenges of the region and to projects which benefit the region.

v. To facilitate the exchange of ideas and experience between elected members and professional and technical staff to enable a joint approach to the development of skills and expertise within member Councils; and

vi. To advance the interests of the region.

3. Membership

i. Membership of the Organisation is composed of, but not restricted to, the following Councils:-

Ashfield Council
Bankstown City Council
Botany Bay City Council
Burwood Council
City of Canada Bay
City of Canterbury council
City of Sydney council
Hurstville City Council
Kogarah City Council
Leichhardt Council
Marrickville Council

Randwick City Council
Rockdale City Council
Sutherland Shire Council
Waverley Council
Woollahra Municipal Council

ii. A register of members will be kept at the principal place of administration of the association.

4. Representation

i. A member Council will be represented on the Organisation by two delegates.

ii. A member Council shall annually appoint two persons representing the Council to the Organisation, one of whom should be the Mayor or the Administrator. Each such delegate may hold office until the appointment of his/her successor.

iii. The office of delegate shall become vacant if the delegate:-

(a) ceases to hold office at his/her Council;

(b) resigns by letter addressed to the delegate's Council;

(c) is absent from three consecutive meetings of the Organisation without having obtained leave of absence from the Organisation; or

(d) is replaced by his/her Council at any time.

iv. Where the office of a delegate becomes vacant, the Council shall appoint another delegate.

v. Where either delegate of a Council is unable to attend a meeting of the Organisation, the Council may be represented by another member of the Council duly appointed for the purpose of being an alternative delegate. Such other member may, during the absence of a delegate of his/her Council, act in his/her place and be subject to vacation of the position in the same way as the delegate.

5. Meetings

i. The delegates shall hold ordinary meetings of the Organisation at least every three months and the meeting held during November shall be the Annual General Meeting. The delegates may also hold special meetings of the Organisation as and when required.

ii. The Financial Statements and Annual Report of the Organisation shall be submitted to a meeting of the Organisation to be held not 30 November each year.

iii. Meetings shall be held, in turn, at an office of each member Council or as decided by the Organisation.

iv. The Secretary shall notify each member Council and delegate of meetings not less than 7 days before each meeting and of the nature of the business to be dealt with at the meeting and, in the case of Special Meetings, 48 hours notice must be given.

v. The Secretary shall send minutes of each meeting to each member and delegate not more than fourteen days after the meeting.

vi. At every meeting of the Organisation the President shall preside but if he/she is not present the Senior Vice President shall preside; if he/she is not present the Junior Vice President shall preside or if he/she is not present the members shall elect a Chairman to preside at that meeting.

vii. Any elected representative of a member Council may attend and speak at meeting of the Organisation. Any senior officer of a Council which is a member may also attend and speak at meetings of the Organisation with the consent of a delegate of his/her Council and the President or meeting Chairman.

viii. A Special Meeting of the Organisation may be called by:

(a) The President
(b) Notice to the Secretary signed by three delegates.

6. Voting

i. At meetings of the Organisation each delegate, and each bona fide alternative delegate representing a delegate, shall be entitled to vote. Each member Council shall therefore have two votes.

ii. The President shall have both a deliberative vote and, in the event of equality of votes, a casting vote, other than in the election of President. Senior Vice President, or Junior Vice President.

iii. The election of the Executive being the positions of:

(a) President
(b) Senior Vice President
(c) Junior Vice President

shall be conducted in accordance with the provisions of the Local Government Act for the election of Mayor and Deputy Mayor.

7. Quorum

i. A quorum at a meeting of the Organisation shall consist of a number being at least half the number of member Councils.

ii. A quorum of a Standing Committee of the Organisation shall be two.

8. Business at Meetings

The business conducted at a meeting of the Organisation shall consist of:

i. Matters of which due notice has been given by a member Council or delegate.

ii. Matters which the President determines to be of urgency;

iii. Consideration of recommendations, reports and correspondence;

and otherwise as the meeting by majority vote may decide from time to time.

9. Procedure

The procedure at a meeting of the Organisation shall be in conformity as far as possible with the procedure for meetings of Council and Committees as prescribed by the Local Government Act 1993 and the Local Government (Meetings) Regulation 1993 subject to such arrangement as may be made from time to time by the Organisation.

10. Powers of the Organisation

i. The Organisation shall, for the mutual benefit of the member Councils have power, in accordance with this Constitution, to:-

(a) Make submissions to the Australian and New South Wales Government or any department of those Governments, or other organisations, in respect of the areas of the member Councils;

(b) Carry out the objectives of the Organisation; and

(c) Receive funds in respect of the:-

i. staffing of the Organisation;
ii. carrying out of projects or studies agreed by the Organisation;
iii. for any purpose that may be authorised by the Organisation.

ii. These powers shall not affect the right of an individual Council acting in its own right on any matters.

iii. The control, regulation, maintenance and management of the exercise of these powers is vested in the meetings of delegates in accordance with the constitution subject to any delegation of authority which may have been granted.

iv. By resolution, and within limits defined in such resolution, to authorise the Executive, a member Council representative, a staff member or a properly appointed sub-committee consisting either whole or in part of elected representatives, staff or other persons to exercise or perform on behalf of the Organisation any power, authority, duty or function, the Organisation, by resolution reserves for itself.

11. Executive of the Organisation

The Executive of the Organisation shall be the President, Senior Vice President and Junior Vice President, being elected members representing member Councils.

i. The President, Senior Vice President and Junior President shall be elected from among the delegates each year at the Annual General Meeting. An election shall also be held for any casual vacancy occurring among the Executive and any Executive member so elected shall hold office until the next annual election of the Executive.

ii. The Organisation shall appoint a Secretary and a Treasurer.

iii. The President, Senior Vice President and Junior Vice President of the Organisation in office prior to the Annual General Meeting of the Organisation to held in November 2003 remain in office until the first Ordinary Meeting of the Organisation to be held after the ordinary election of councils to be held on Saturday 27 March 2004.

12. Powers of the President

i. The President shall preside at all meetings of the organisation at which he/she is present.

ii. The President, unless otherwise directed by resolution of the Organisation shall:-

(a) Carry on the regular services and operations of the Organisation within the sums voted by the Organisation for expenditure thereon and in accordance with the constitution and the resolutions of the Organisation.

(b) Control and direct staff of the Organisation.

(c) Suspend any staff of the Organisation and, if necessary, arrange for the carrying on of the duties of that staff member until the next meeting of the Organisation.

(d) Authorise the payment of the salaries and wages of the staff of the Organisation within the sums voted by the Organisation for expenditure thereon.

(e) At any meeting of the Organisation remove or cause the removal of any member of the Organisation, or any elected member of any member Council who, after warning, is guilty of disorder, and at the same or any subsequent meeting, exclude or remove such member unless he/she apologises without reservation.

(f) Give effect to any decision of the Organisation.

(g) Be authorised to make press statements on behalf of the Organisation and authorise any member of the Organisation to make press statements and undertake the day to day administrative requirements.

(h) Call Special Meetings of the Organisation subject to 48 hours notice being given to delegates, except in cases of emergency.

13. Staff

The Organisation shall have the power to appoint any such staff as the Organisation may require from time to time.

14. Advisory Sub-Committees

i. The Organisation may, from time to time, appoint any number of Committees in connection with any work, activity or object of the Organisation.

ii. The Organisation shall have power to co-opt any person to assist and/or comprise a Sub-Committee

15. Office

The Office of the Organisation shall be at such place as the Organisation may, from time to time, appoint.

16. Financial Year

The Organisation's financial year shall commence on 1st July and terminate on 30th June of the following year.

17. Finance

i. The Organisation shall determine, prior to 31st May each year, an Annual Budget which will include:-

- the amount of proposed expenditure by the Organisation;
- the amount in hand available for such expenditure; and
- any additional amount required to be raised to meet such expenditure.

ii. In the event of any expenditure not covered by the Annual Budget, the Organisation shall prepare a statement showing:-

- the amount and nature of the extraordinary expenditure;
- the amount in hand available to meet the expenditure after allowing for estimated ordinary expenditure for the balance of the year; and
- any additional amount required to be raised to meet extraordinary expenditure.

iii. The financial contribution by member Councils towards costs of the organisation shall be equal.

iv. The Organisation shall pay monies received by it to a bank account held in the name of the Organisation and shall use such monies for the purpose of, and subject to, the terms of this Constitution.

v. All accounts shall be operated upon in such manner and by such persons as the organisation shall from time to time determine.

vi. The accounts of the organisation shall be kept according to the same principles as the accounts of a member Council and in such books and form as are approved by the auditors of the organisation.

vii. (a) The Organisation shall appoint an auditor who shall annually audit the accounts of the Organisation.

(b) The audited accounts shall be presented to a meeting of the Organisation prior to 30th November each year.

viii. The assets and income of the Association shall be applied solely in furtherance of its above mentioned objectives and no portion shall be distributed directly or indirectly to the members of the Association except as bona fide compensation for services rendered or expenses incurred on behalf of the Association.

18. Annual Report

The Organisation shall submit an Annual Report to each of the member Councils with the notice of the Annual General Meeting.

19. Co-operation

For the purpose of performing any powers, duties or functions, the Organisation may make use of the services of an employee of a member Council if the prior approval of the Council is obtained.

20. Associate Members

The Organisation may permit a Council or entity not currently a member of the Organisation to become an associate member. Associates may only engage in procurement, commercial or other activities as determined by the Organisation.

Applicants for associate membership shall sign and forward to the Organisation an application to the effect that [Name of Applicant] desires to become an associate member of the Southern Sydney Regional Organisation of Councils Limited and agrees to be bound by the Constitution of the Organisation and pay the associate membership contribution determined by the Organisation.

The Secretary shall place applications for associate membership before the first meeting of the Organisation after the application for associate membership has been received.

The Organisation's decision shall be final and conclusive as to whether any entity shall be admitted as a member or associate.

21. Termination of Membership

A Council may withdraw from membership of the Organisation on giving six months' notice of termination to the Organisation. When such termination takes effect, no contribution shall be refunded, no funds will be distributed and the Constitution remains in force between the remaining members of the Organisation.

22. Amendments

This Constitution may be altered from time to time by a resolution passed at a meeting of the Organisation by votes equivalent to three fourths the number of members entitled to vote.

23. Amalgamation of the Organisation

Where it furthers the objects of the Association to amalgamate with any one or more other organisations having similar objects, the other organisation(s) must have rules prohibiting the distribution of its (their) assets and income to members; and must be exempt from income tax.

24. Termination of the Organisation

Upon the termination of this Organisation the debts and liabilities of the Organisation shall be discharged out of the assets of the Organisation. The balance of the assets shall be shared equally by the member Councils remaining immediately before the termination of the Organisation.

In the event of there being no member Councils remaining, the amount which remains after such dissolution and the satisfaction of all debts and liabilities, shall be transferred to any organisation which has similar objects and which is exempt from income tax.

25. Members' Liabilities

The liability of a member of the Organisation to contribute towards the payment of the debts and liabilities of the Organisation or the costs, charges and expenses of the termination of the Organisation is limited to the amount, if any, unpaid by the member in respect of membership of the Organisation.

26. Common Seal

The common seal of the organisation is kept in the custody of the Secretary/Treasurer. The common seal must only be affixed to an instrument with the authority of the Executive.

27. Custody of Books

The Secretary/Treasurer must ensure the safe keeping of all records, books and other documents relating to the organisation.

28. Inspection of Books

The records, books and other documents of the organisation must be open to inspection, free of charge, by a member of the association at any reasonable hour.

29. Payroll Tax

The Organisation (being a wholly-owned subsidiary of 2 or more councils) may, at the discretion of the member Councils, pay the member Councils an amount approximately equivalent to the amount of tax that would be payable by the Organisation under the Payroll Tax Act 2007 (NSW) but for the exemption set out in section 59 of that Act.

SYDNEY COASTAL COUNCILS GROUP INCORPORATED

CONSTITUTION

Incorporation Number Y2745116 under the Associations Incorporation Act 2009 (NSW)

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SYDNEY COASTAL COUNCILS GROUP INCORPORATED CONSTITUTION

Part A – The Association

1. Definitions

1.1. In this Constitution, except as so far as the context or subject matter otherwise indicates or requires:

Act means the *Associations Incorporation Act 2009* (NSW) as modified or amended from time to time and includes any regulations made under that Act and any exemption or modification to that Act applying to the Association;

Association means Sydney Coastal Councils Group Incorporated;

Constitution means this constitution, consistent with the Act, as amended from time to time and which may include specific rules from the model rules under the Act if so required;

Delegate means an individual appointed by a Member Council to represent it and exercise its rights at general meetings;

Director-General means

a. the Commissioner for Fair Trading, Department of Finance and Services, or

b. if there is no such position in the Department, the Director-General of the Department;

Executive Committee means the committee of management described in Part C of this Constitution and as required by section 28 of the Act;

Member and ***Member Council*** means a Council admitted to membership of the Association where a Council is a local government body established under the *Local Government Act 1993* (NSW);

Objects are the purposes for which the Association is established consistent with the Act;

Office Bearers means the Chair, Vice Chair and Treasurer as the case may be in accordance with clause 21 of this Constitution.

Public Officer means the person appointed by the Executive Committee as the Public Officer of the Association as required under the Act; and

Register means the register of Members established in accordance with clause 10 of this Constitution.

1.2. In this Constitution, the following rules of interpretation apply unless the context requires otherwise:

a. a reference to a function includes a reference to a power, authority and duty;

b. a reference to the exercise of a function includes, if the function is a duty, a reference to the performance of the duty;

c. a gender includes all genders;

d. singular includes plural and vice versa;

e. where a word or phrase is defined, its other grammatical forms or parts of speech have corresponding meaning;

f. a reference to any legislation or to any provision of any legislation includes any modification or re-enactment of it, any legislation substituted for it and any regulations and statutory instruments issued under it;

g. the word person means a natural person and any corporation, association, body or entity whether incorporated or not; and

h. the words 'writing' and 'written' include any mode of representing or reproducing words, figures, drawings or symbols in a visible or communicable form.

2. Name and incorporation

2.1. The name of the Association is *Sydney Coastal Councils Group Incorporated* registered number Y2745116.

2.2. The Association is incorporated under the Act.

3. Objects

3.1. The Association's Objects are to lead sustainable management of the coastal and estuarine environment through collaboration, capacity building, advocacy and research.

3.2. The Association pursues its Objects through a range of activities and services that may include but not be limited to:

a. facilitating cooperation between, and coordination of, actions by Member Councils and coastal stakeholders;

b. developing and exchanging knowledge and tools to support the role and build the capacity of Member Councils;

c. providing a regional and cohesive voice representing Member Councils;

d. identifying and addressing current and emerging regional coastal and estuarine issues; and

e. doing anything ancillary to the Objects.

3.3. The Association may only exercise the powers given to it under the Act to carry out the Objects and to do all things incidental or convenient in relation to the exercise of power.

4. Not-for-profit organisation

4.1. The Association must not distribute any surplus, income or assets directly or indirectly to its Members in the form of dividend or distribution of profits.

4.2. Clause 4.1 does not prevent the Association from making a payment as reimbursement for out-of-pocket expenses incurred in good faith on behalf of the Association, the granting of an honorarium to any officer(s), the payment of reasonable and proper remuneration to any employee(s) of the Association, or payments to any Member(s), in return for services rendered, or expenses incurred on behalf of the Association subject in all cases to any such payments being appropriately authorised in accordance with processes as determined by the Executive Committee from time to time.

Part B - Membership

5. Membership

5.1. Membership of the Association shall consist of those Councils adjacent to marine and estuarine environments and their associated waterways that are admitted as Members in accordance with this Constitution.

5.2. A Member Council may appoint an individual as its Delegate to represent the Member Council and exercise its rights at general meetings. The individual appointed as a Delegate must not be an Executive Committee member.

6. Applying for Membership

6.1. An application for membership must be made by the applicant in the form and manner as may be from time to time prescribed by the Executive Committee.

6.2. The application for membership must be submitted to the Executive Committee or its delegate. The EC must consult with the GM Forum re new membership applications.

6.3. The Executive Committee at its first practical meeting following receipt of the application shall consider the application for membership including the classification of the applicant as a coastal or estuarine Member in accordance with guidelines as determined by the Executive Committee.

6.4. The Executive Committee may refuse any application for membership without being compelled to give the reasons.

6.5. The Executive Committee may delegate the consideration and determination of any membership application.

6.6. Subject to clause 6.4, when a decision regarding an applicant for membership has been made the Public Officer or other individual delegated by the Executive Committee shall send to the applicant written notice of that decision.

6.7. The acceptance of an applicant to be a Member is subject to payment of any relevant fees and if such payment is not made then the Executive Committee may, in its discretion, cancel its acceptance of the applicant for membership of the Association.

6.8. If the applicant is not admitted to membership in due course, then any moneys paid by them for membership will be returned to them.

6.9. Subject to clause 6.7, an applicant becomes a Member and is entitled to exercise the rights and privileges of that membership when their name is entered in the Register.

7. Cessation of Membership

7.1. A Member ceases to be a Member if they:

a. are a council that is dissolved;

b. resign from the Association subject to clause 9.1; or

c. are expelled from the Association.

8. Membership entitlements not transferrable

8.1. A right, privilege or obligation which a person has by reason of being a Member:

a. is not capable of being transferred or transmitted to another person; and

b. terminates upon cessation of the person's membership.

9. Resignation of Membership

9.1. A Member may resign from membership of the Association by giving at least 6 months' notice in writing of the Member's intention to resign.

9.2. Where a Member ceases to be Member pursuant to clause 9.1, and in every other case where a Member ceases to hold membership, the Association shall make an appropriate entry in the Register recording the date on which the Member ceased to be a Member.

10. Register

10.1. The Association shall establish and maintain a register of Members of the Association specifying the name and address of each Council that is a Member together with the date on which the Council became a Member.

10.2. The Register shall be kept at the principal place of administration of the Association. The Register shall be open for inspection by any Member, subject to that Member having made an appointment with the Public Officer for this purpose.

10.3. If a Member requests that any information contained on the Register about the Member (other than the Member's name) not be available for inspection, that information must not be made available for inspection.

10.4. A Member must not use information about a Council obtained from the register to contact or send material to the Council, other than for:

a. the purposes of sending the Council a newsletter, a notice in respect of a meeting or other event relating to the Association or other material relating to the Association, or

b. any other purpose necessary to comply with a requirement of the Act.

11. Membership fees

11.1. Membership fees, including entrance fees, annual fees, levies and charges, and the time and manner of payment of such fees, levies and charges are as determined by the Executive Committee from time to time.

11.2. The Executive Committee may determine different fees as between Member Councils or that no fee is payable by a Member Council.

11.3. No part of any fee paid shall be refunded to a Member Council who ceases to be a Member in accordance with clause 7.1.

12. Member's liabilities

12.1. The liability of a Member Council to contribute towards the payment of the debts and liabilities of the Association or the costs, charges and expenses of the winding up of the Association is limited to the amount, if any, unpaid by the Member Council in respect of membership of the Association.

13. Disciplining of Member Councils

13.1. Where the Executive Committee is of the opinion that a Member Council:

a. has persistently refused or neglected to comply with a provision or provisions of this Constitution;

b. has persistently and wilfully acted in a manner prejudicial to the interests of the Association; or

c. has failed to pay the annual membership fee under clause 11.1;

the Executive Committee may, by resolution:

d. expel the Member Council from the Association; or

e. suspend the Member Council from membership of the Association for a specified period.

13.2. Written notice must be given to the Member Council of the proposed suspension or expulsion at least 28 days before the Executive Committee meeting at which the proposal is to be considered by the Executive Committee.

13.3. The notice given to the Member Council must state:

a. when and where the Executive Committee meeting is to be held which may be held using technology;

b. the grounds on which the proposed suspension or expulsion is based; and

c. that the Member Council may do either or both of the following:

i. attend and speak at that meeting;
ii. submit to the Executive Committee at or prior to the date of that meeting written representations.

13.4. At the Executive Committee meeting, the Executive Committee must —

a. give the Member Council an opportunity to make oral representations;

b. give due consideration to any oral representations and to any written representations submitted to the Executive Committee by the Member Council at or prior to the meeting; and

c. by resolution determine:

i. whether or not to suspend the Member Council's membership and, if the decision is to suspend the membership, the period of suspension; or
ii. whether or not to expel the Member Council from the Association.

13.5. The Executive Committee must give the Member Council written notice of the Executive Committee's decision, and the reasons for the decision, within 7 days after the Executive Committee meeting at which the decision is made.

14. Right of appeal of disciplined Member

14.1. A Member Council may serve notice of appeal to the Association in a general meeting against a resolution of the Executive Committee under clause 13.4, within 28 days after notice of the resolution is served on the Member Council, by lodging with the Public Officer a notice to that effect.

14.2. The notice may, but need not, be accompanied by a statement of the grounds on which the Member Council intends to rely for the purposes of the appeal.

14.3. On receipt of a notice from a Member Council under clause 14.1, the Executive Committee is to convene a general meeting of the Association, on a date and time mutually agreed with the Member Council, to be held within 45 days after the date on which the Public Officer received the notice.

14.4. At a general meeting of the Association convened under clause 14.3:

a. no business other than the question of the appeal is to be transacted, and

b. the Executive Committee and the Member Council must be given the opportunity to state their respective cases orally or in writing, or both, and

c. the Member Councils present are to vote by secret ballot on the question of whether the resolution should be confirmed or revoked.

14.5. A Member Council may not vote by proxy at the meeting.

14.6. The appeal is to be determined by a simple majority of the votes cast.

15. Resolution of internal disputes

15.1. In the case of disputes between Member Councils (in their capacity as Members), and disputes between Members and the Association, all reasonable attempts shall be made by all parties concerned to resolve any dispute. Should such attempts to resolve disputes fail, these disputes are to be referred to a community justice centre for mediation in accordance with the Community Justice Centres Act 1983 (NSW).

Part C - The Executive Committee

16. Powers of the Executive Committee

16.1. The business and affairs of the Association shall be administered by the Executive Committee which shall, subject to the Act and this Constitution:

a. control and manage the affairs of the Association;

b. exercise all the functions as may be exercised by the Association other than those functions that are required by this Constitution or the Act to be exercised by general meeting of Members; and

c. have power to perform all such acts and do all such things as appear to the Committee to be necessary or desirable for the proper management of the affairs of the Association.

16.2. The Executive Committee may delegate any of its powers and/or functions to one or more sub-committees, groups or forums established under clause 39, any employee of the Association or any other person as the Executive Committee thinks fit. In exercising any powers so delegated, the sub-committee, group, forum, employee or person must comply with any terms and conditions that may be set by the Executive Committee.

16.3. The Executive Committee may by resolution make, amend or revoke by-laws for the purposes of giving effect to any provision of this Constitution or to govern the procedures and activities of the Association. These by-laws are binding on the Executive Committee and the Member Councils.

17. Composition of Executive Committee

17.1. The Executive Committee will be constituted as follows: each Member Council may appoint one member on the Executive Committee.

17.2. The Executive Committee must set guidelines for the appointment process of Executive Committee members by the Member Councils.

18. Terms of office

18.1. Executive Committee members will hold office from the end of the relevant annual general meeting at which appointments are announced until the end of the second following annual general meeting.

18.2. A retiring Executive Committee member is eligible for reappointment.

18.3. There is no maximum number of consecutive terms for which an Executive Committee member may hold office.

19. Casual vacancies

19.1. Any casual vacancy occurring in the Executive Committee pursuant to clause 19.2 may be filled by the relevant Member Council appointing another eligible individual. Any individual so appointed to fill a vacancy of an Executive Committee member will hold office for the remainder of the term of that vacancy.

19.2. The office of an Executive Committee member becomes vacant if:

a. the Executive Committee member is removed, by notice in writing to the Public Officer, by the relevant Member Council that appointed them;

b. the Member Council that appointed the Executive Committee member ceases to be a Member of the Association:

c. the Executive Committee member dies;

d. the Executive Committee member resigns office by notice in writing to the Association;

e. the Executive Committee is removed from office under clause 20.1;

f. the Executive Committee member becomes insolvent under administration within the meaning of the *Corporations Act 2001* of the Commonwealth;

g. due to physical or mental impairment, the Executive Committee member is unable to properly perform their duties as an Executive Committee member;

h. the Executive Committee member is absent without the consent of the Executive Committee from all meetings of the Executive Committee held during a period of 6 consecutive months, unless the Executive Committee otherwise resolves to confirm the Executive Committee member's position;

i. the Executive Committee member is convicted of an offence involving fraud or dishonesty for which the maximum penalty on conviction is imprisonment for not less than 3 months, unless the Executive Committee otherwise resolves to confirm the Executive Committee member's position;

j. the Executive Committee member is prohibited from being a director of a company by an order made under the *Corporations Act 2001* of the Commonwealth; or

k. the Executive Committee member is or becomes ineligible under the Act.

19.3. The Executive Committee may act even if there are vacancies on the Executive Committee. However, if the number of Executive Committee members is reduced below the legal minimum of three (3), the continuing members may act only:

a. in an emergency; or

b. for the purposes of appointing additional eligible individuals on to the Executive Committee up to the minimum number; or

c. to convene a general meeting.

20. Removal of Executive Committee member

20.1. The Association in a general meeting may by resolution remove any member of the Executive Committee from office before the expiration of the member's term of office.

20.2. If an Executive Committee member to whom a proposed resolution referred to in clause 20.1 relates makes representations in writing to the Public Officer or Chair (not exceeding a reasonable length) and requests that the representations be notified to the Member Councils, the Public Officer must make a copy of the representations available to each Member Council or, if they are not so sent, the Executive Committee member is entitled to require that the representations be read out at the general meeting at which the resolution is considered.

21. Office Bearers

21.1. The Office Bearers of the Association are as follows:

a. Chair;

b. Vice Chair; and

c. Treasurer.

21.2. The Office Bearers will be appointed by the Executive Committee from amongst their number at the first Executive Committee meeting held after the annual general meeting or at any time a vacancy arises.

21.3. Subject to this Constitution, Office Bearers will hold their position until the first Executive Committee meeting after the next annual general meeting or until they cease to be an Executive Committee member.

21.4. There is no maximum number of consecutive terms for which an Executive Committee member may hold an Office Bearer position.

21.5. If the Chair is an Executive Committee member appointed by a Member Council belonging to the estuarine group of Councils then the Vice Chair must be a member appointed by a Member Council belonging to the coastal group of Councils.

21.6. If the Chair is an Executive Committee member appointed by a Member Council belonging to the coastal group of Councils then the Vice Chair must be a member appointed by a Member Council belonging to the estuarine group of Councils.

22. Meetings of the Executive Committee

22.1. The Executive Committee may meet together for the dispatch of business, adjourn and otherwise regulate its meetings as it thinks fit.

22.2. No business shall be transacted by the Executive Committee unless a quorum is present. The quorum for an Executive Committee meeting shall be a majority of the Executive Committee as then constituted.

22.3. At a meeting of the Executive Committee:

a. the Chair or, in the Chair's absence, the Vice-Chair is to preside as chair; or

b. if the Chair and the Vice-Chair are absent or unwilling to act, such one of the remaining Executive Committee members as may be chosen by the members present at the meeting is to preside as chair.

22.4. The Chair alone, or any 2 members of the Executive Committee, may convene a meeting of the Executive Committee.

22.5. A resolution is passed if at least a majority of votes are cast in favour of it, unless specified otherwise in this Constitution.

22.6. In the event of an equality of votes on any question, the chair of the Executive Committee meeting may exercise a second or casting vote.

22.7. The Executive Committee must ensure that minutes are made of all Executive Committee meetings and decisions made by electronic communication pursuant to clause 23.1.

22.8. Oral, written or electronic notice of a meeting of the Executive Committee should be given to each member of the Executive Committee at least 7 days or such other period as may be unanimously agreed upon by the members of the Executive Committee before the time appointed for the holding of the meeting.

22.9. In cases of urgency, an Executive Committee meeting can be held without notice being given in accordance with clause 22.8 provided that as much notice as practicable is given to each member of the Executive Committee by the quickest means practicable.

22.10. An Executive Committee meeting may be held using technology that allows the Executive Committee members in attendance to clearly and simultaneously communicate with each other.

22.11. An Executive Committee member who participates in an Executive Committee meeting using technology is taken to be present at the meeting and, if the Executive Committee member votes at the meeting, is taken to have voted in person.

22.12. The Executive Committee may, from time to time and at their discretion, invite individuals to attend meetings of the Executive Committee as observers.

23. Resolutions made outside of meetings

23.1. When necessary the Executive Committee may consider and pass a resolution without an Executive Committee meeting being held. The resolution may be passed by written or electronic communication, provided the number of Executive Committee members who vote in favour of the matter equals or exceeds the number for a quorum.

23.2. Any such resolution may consist of multiple copies of the same document, each signed or authorised by one or more of the Executive Committee members. The document may be in the form of electronic communication.

24. Validity of acts

24.1. Any act or thing done or suffered, or purporting to have been done or suffered, by the Executive Committee, is valid and effectual despite any defect that may afterwards be discovered in the appointment or qualification of any member of the Executive Committee.

Part D - General Meetings

25. Calling of General Meetings

25.1. An annual general meeting will be held within 6 months after the end of each financial year. The time and place or technology used for this meeting shall be determined by the Executive Committee.

25.2. The Executive Committee may whenever it thinks fit convene a general meeting of the Association.

25.3. A general meeting will also be convened by the Executive Committee upon the request of not less than 25% of Member Councils entitled to vote at general meetings.

25.4. A request for a general meeting:

a. must state the purpose or purposes of the meeting, and

b. must be signed by the Member Councils making the request, and

c. must be lodged with the Public Officer, and

d. may consist of several documents in a similar form, each signed by one or more of the Member Councils making the request.

25.5. For the purposes of clause 25.4:

a. a requisition may be in electronic form, and

b. a signature may be transmitted, and a requisition may be lodged, by electronic means.

25.6. If the Executive Committee fails to give notice of a general meeting within 1 month after the date on which a request for the meeting is lodged, any one or more of the Member Councils who made the request may convene a special general meeting to be held not later than 3 months after that date.

25.7. A general meeting convened by Member Councils as referred to in clause 25.5 must be convened as early as is practicable in the same manner as general meetings are convened by the Executive Committee.

26. Notice of General Meetings

26.1. Except if the nature of the business proposed to be dealt with at a general meeting requires a special resolution, notice of a general meeting must be given to each Member Council at least 14 days before the date fixed for the holding of the general meeting.

26.2. The notice must specify the place, date and time of the meeting and the nature of the business proposed to be transacted at the meeting.

26.3. An annual general meeting must be specified as such in the notice convening it.

26.4. If the nature of the business proposed to be dealt with at a general meeting requires a special resolution, then notice must be given to each Member Council at least 21 days before the date fixed for the holding of the general meeting, and the notice should specify, in addition to the matters required under clause 26.2, the intention to propose the resolution as a special resolution and state the resolution.

27. Business at General Meetings

27.1. No business other than that specified in the notice convening a general meeting shall be transacted at the meeting except, in the case of an annual general meeting, business that may be transacted pursuant to clause 27.2.

27.2. In addition to any other business which may be transacted at an annual general meeting, the business of the annual general meeting includes the following:

a. to confirm the minutes of the last preceding annual general meeting and of any general meeting held since that meeting;

b. to announce the Executive Committee members;

c. to receive from the Executive Committee reports from the activities of the Association during the last preceding financial year; and

d. to receive and to consider any financial statement or report required under the Act.

28. Quorum at General Meetings

28.1. No business shall be transacted at any general meeting unless a quorum is present at the time when the matter is dealt with.

28.2. The quorum for the transaction of the business of a general meeting is a majority of Member Councils present in person by their Delegate or by proxy.

29. Chair at General Meetings

29.1. The Chair shall chair each general meeting.

29.2. If the Chair is not present within 15 minutes after the time appointed for the commencement, or is unable or unwilling to act, the following may preside as chairperson of the meeting (in order of precedence):

a. The Vice Chair;

b. any other Executive Committee member present who has been appointed as chair by those other Executive Committee members present; or

c. a Delegate present chosen by a majority of the Member Councils present.

30. Adjournment

30.1. If a quorum is not present within 30 minutes after the notified commencement time of a general meeting—

a. in the case of a meeting convened at the request of Member Councils —the meeting must be dissolved;

b. in any other case — the meeting must be adjourned to another date, time and place as determined by the Chair.

30.2. If a quorum is not present within 30 minutes after the time to which a general meeting has been adjourned under clause 30.1.b the Member Councils present at the meeting (if not fewer than 2) may proceed with the business of the meeting as if a quorum were present.

30.3. The chair of a general meeting at which a quorum is present may, with the consent of the majority of Member Councils present at the meeting, adjourn the meeting from time to time and place to place, but no business shall be transacted at an adjournment meeting other than the business left unfinished at the meeting at which the adjournment took place.

30.4. Where a general meeting is adjourned for 28 days or more, written or oral notice of the adjourned meeting must be given to each Member Council stating the place, date and time of the meeting and the nature of the business to be transacted at the meeting.

30.5. Except as provided in clause 30.4 notice of an adjournment of a general meeting or of the business to be transacted at an adjourned meeting is not required to be given.

31. Cancellation of General Meetings

31.1. Except in the case of a general meeting called at the request of Member Councils, the Executive Committee may by resolution, cancel, postpone or change the venue of a general meeting at any time prior to the

meeting. The Executive Committee must give notice of the postponement, cancellation or change of venue to all persons entitled to receive notices of a general meeting.

32. Making of decisions

32.1. Subject to clause 14.4.c, a question arising at a general meeting is to be determined by either:

a. a show of hands, or

b. if on the motion of the chair or if any Member Council present at the meeting decides that the question should be determined by a poll — a poll.

32.2. On a show of hands, the chair's decision is conclusive evidence of the result of the vote. The chair and the meeting minutes do not need to state the number or proportion of the votes recorded in favour or against on a show of hands.

32.3. If the question is to be determined by a poll, the poll is to be conducted in accordance with the directions of the chair.

33. Special resolutions

33.1. A resolution of the Association is a special resolution if it meets the requirements of the Act.

34. Appointment of proxies

34.1. Each Member Council shall be entitled to appoint a proxy by notice given to the Association no later than 48 hours before the time of the general meeting in respect of which the proxy is appointed.

34.2. The Executive Committee may prescribe a form of proxy but a proxy will be valid provided an instrument appointing a proxy is in writing, contains the Member's name and address, the Association's name, the proxy's name or the office held by the proxy, the meeting at which the appointment may be used and how the proxy is to vote on the matter/s before the meeting.

34.3. In the event of a Member Council not nominating a particular person as proxy on the proxy form, the proxy shall be exercised by the chair.

35. Voting

35.1. Upon any question arising at a general meeting a Member Council has one vote.

35.2. Votes shall be given in person via the Delegate or by proxy.

35.3. In the case of an equality of votes on a question at a general meeting, the question is decided in the negative.

35.4. A Member Council is not entitled to vote at any general meeting unless all money due and payable by the Member Council to the Association has been paid.

36. Postal or electronic ballots

36.1. No resolution shall be determined by a postal or electronic ballot unless determined by the Executive Committee. If the Executive Committee so

determines, the postal or electronic ballot shall be conducted under the procedures set by the Executive Committee from time to time and in accordance with the Act.

37. Use of technology at general meetings

37.1. A general meeting may be held using any technology approved by the Executive Committee that gives the Members a reasonable opportunity to participate.

37.2. A Member Council who participates in a general meeting using that technology is taken to be present at the meeting and, if the Member Council votes at the meeting, is taken to have voted in person.

38. Minutes of General Meetings

38.1. The Executive Committee must ensure that minutes are taken and kept of each general meeting.

Part E - Administration

39. Groups and forums

39.1. The Executive Committee may from time to time establish and dissolve groups, forums and technical committees. At the time of adoption of this Constitution, the following groups are established:

a. General Managers Forum; and

b. Technical Committee.

39.2. Any such groups, forums and technical committees must operate in accordance with the terms and conditions set by the Executive Committee.

39.3. The role of the General Managers Forum is to support the Executive Committee in undertaking its functions. This may include the Executive Committee:

a. by agreement delegating certain functions and responsibilities to the General Managers Forum in accordance with clause 16.2;

b. consulting the General Managers Forum:

i. regarding the consideration of applications for membership of the Association;
ii. when developing the Association's annual plan, budget and financial statements;
iii. when developing key submissions; or
iv. regarding the allocation of funding within the Association including funds received from regional grants.

40. Service of notices

40.1. A notice may be served on or given to the Association by:

a. delivering it to the street address or posting it to the postal address of the registered office of the Association; or

b. electronic means of transmission to the email address of the Association.

40.2. A notice may be served on or given to a Member Council either personally to its Delegate or by sending it by post or by electronic means of transmission to the Member Council's address or details shown in the Register.

40.3. For the purpose of this Constitution, a notice is taken, unless the contrary is proved, to have been given or served:

a. in the case of a notice given or served personally, on the date on which it is received by the Delegate or Association, and

b. in the case of a notice sent by post, on the third day after it is posted, and

c. in the case of a notice sent by electronic transmission, on the date it was sent or, if the machine from which the transmission was sent produces a report indicating that the notice was sent on a later date, on that date.

41. Financial year

41.1. The financial year of the Association commences on the 1st day of July and ends on the 30th day of June on the next calendar year.

42. Funds – Source

42.1. The funds of the Association will be derived from membership fees in accordance with clause 11, donations, investments, sponsorship, sale of goods, advertising and such other sources as the Executive Committee determines.

42.2. All money received by the Association shall be deposited as soon as practicable and without deduction to the credit of the Association's bank account.

43. Funds – Management

43.1. The funds of the Association shall be managed and used in pursuance of the Association's purpose in such manner as the Executive Committee determines.

43.2. All cheques, drafts, bills of exchange, promissory notes and other negotiable instruments must be signed as the Executive Committee decides.

44. Custody and inspection of books etc

44.1. The Executive Committee or its delegate shall keep in their custody or under their control all records, books and other documents relating to the Association.

44.2. Member Councils may, by prior appointment with the Public Officer, inspect free of charge:

a. subject to clauses 10.3 and 10.4, the Register;

b. the minutes of general meetings;

c. subject to clause 44.3, the financial records, books and other financial documents of the Association.

44.3. The Executive Committee may refuse to permit a Member Council to inspect records of the Association that relate to confidential, personal, employment, commercial or legal matters or where to do so may be prejudicial to the interests of the Association.

44.4. Subject to clauses 44.3, 10.3 and 10.4, a Member Council may make a copy of the records of the Association referred to in this rule and the Member Council may be charged a reasonable fee for a copy of such a record.

45. Dissolution of the Association

45.1. If upon the dissolution of the Association, there remains after satisfaction of all its debts and liabilities, any property whatsoever, the same shall be transferred to an institution or institutions:

a. having objects similar or in part similar to the Objects;

b. required by its constitution to apply its profits or other income in promoting its objects; and

c. whose constitution shall prohibit the distribution of its income and property among its members.

45.2. Such institution or institutions to be determined by a special resolution of the Association at or before the time of dissolution.

45.3. Voluntary dissolution of the Association may only be achieved by special resolution and following the requirements of section 62 of the Act.

46. Alteration of Constitution

46.1. This Constitution may be altered, rescinded or added to only by a special resolution and following the requirements of the Act.

47. Transitional arrangements

Executive Committee

47.1. Upon adoption of this Constitution, all office bearers (see clause 47.2) and ordinary committee members under the previous constitution that this Constitution replaces continue as members of the Executive Committee and their term will end at the conclusion of the 2020 annual general meeting unless their term ends earlier in accordance with this Constitution.

Office Bearers

47.2. Upon adoption of this constitution, the individuals serving as Chair, vice-Chair (coastal), vice-Chair (estuarine), treasurer and secretary pursuant to the constitution that this Constitution replaces will continue in these roles until the first Executive Committee meeting held after the 2020 annual general meeting so long as they remain a member of the Executive Committee.

47.3. At the first Executive Committee meeting held after the 2020 annual general meeting, the Executive Committee will appoint the office bearer positions of Chair, Vice Chair and Treasurer in accordance with clause 21.

47.4. At the conclusion of the 2020 annual general meeting, the position of secretary under the constitution that this Constitution replaces will no

longer exist. For avoidance of doubt, the Executive Committee may assign the previous duties of the secretary to any individual including a current member of the Executive Committee or an employee of the Association.

Groups, forums, subcommittees

47.5. Upon adoption of this Constitution, any existing group, forum, subcommittee established under the constitution that this Constitution replaces will continue until such time as the Executive Committee determines otherwise. Terms of reference for such groups, forums and subcommittees shall continue as previously determined until changed by the Executive Committee.



Sydney District & Regional Planning Panels Operational Procedures

November 2022

These procedures are provided for general guidance and information only and are made available on the understanding that the NSW Department of Planning and Environment (Department) is not providing legal advice.

The Department has compiled the procedures in good faith, exercising all due care and attention.

The procedures do not affect or replace relevant statutory requirements.

Where an inconsistency arises between the provisions of the procedures and relevant statutory provisions, the statutory requirements prevail.

While every reasonable effort has been made to ensure that this document is correct at the time of printing, the State of New South Wales, its agents and employees, disclaim any and all liability to any person in respect of anything or the consequences of anything done or omitted to be done in reliance upon the whole or any part of this document.

The procedures are not intended to give rise to any rights, claims, benefits, privileges, liabilities, or obligations with respect to matters the subject of the procedures.

It should be noted that the procedures may be affected by changes to legislation at any time and/or be subject to revision without notice.

It is recommended that independent advice be sought in respect of the operation of the procedures and the statutory requirements applying to Sydney District and Regional Planning Panels under the *Environmental Planning and Assessment Act 1979*.

Sydney District and Regional Planning Panels Operational Procedures
© State of New South Wales through the NSW Department of Planning and Environment
November 2022
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Definitions

Capital Investment Value or *CIV* has the same meaning as 'capital investment value' defined in the Dictionary in Schedule 7 of the *Environmental Planning and Assessment Regulation 2021*.

Commission means the Greater Cities Commission.

Council means the council for the local government area in which the land the subject of a panel matter is located.

Days means calendar days unless otherwise stated.

Department means the Department of Planning and Environment.

Development Application or *DA* means an application for consent under Part 4 of the *Environmental Planning & Assessment Act 1979* to carry out development but does not include an application for a complying development certificate.

District means any part of the Greater Cities Region, or other region of the State, declared to be a district by the Minister.

EP&A Act means the *Environmental Planning & Assessment Act 1979.*

EP&A Regulation means the *Environmental Planning & Assessment Regulation 2021*.

Greater Sydney Region means the region comprising the local government areas as described in Schedule 1 of the *Greater Cities Commission Act 2022.*

GCC Act means the *Greater Cities Commission Act 2022.*

LALC means Local Aboriginal Land Council.

LEP means local environmental plan.

LGA means local government area.

LGNSW means Local Government NSW.

LG Act means the *Local Government Act 1993.*

LPP means local planning panel.

Minister means the Minister for Planning.

Panel or *Planning Panel* means a Sydney District Planning Panel or Regional Planning Panel constituted under Schedule 2 of the *Environmental Planning & Assessment Act 1979*.

Planning Panel meeting means a public briefing meeting or a public determination meeting.

Planning proposal has the same meaning as a 'planning proposal' under section 3.33 of the *Environmental Planning & Assessment Act 1979*.

Planning Systems SEPP or *PS SEPP* means the *State Environmental Planning Policy (Planning Systems) 2021*.

Regional Planning Panel means a regional planning panel constituted under clause 10 of Schedule 2 of the *Environmental Planning & Assessment Act 1979*.

Regionally significant development means development that meets criteria set out under Part 2.4, Part 3.3 and Schedule 6 of the *State Environmental Planning Policy (Planning Systems) 2021.*

Planning proposal authority or *PPA* means the public authorities identified under section 3.32 of the *Environmental Planning & Assessment Act 1979*.

SCC means a Site Compatibility Certificate issued under the *State Environmental Planning Policy (Transport and Infrastructure) 2021.*

Secretariat means the Planning Panels Secretariat of the Department which provides technical and administrative support to Planning Panels.

Secretary means the Secretary of the Department of Planning and Environment.

Strategic Planning Panel means a Sydney District or Regional Planning Panel convened for the specific function of considering a strateigc or Aboriginal land planning matter.

Sydney District Planning Panel means a Sydney district planning panel constituted under clause 9 of Schedule 2 of the *Environmental Planning & Assessment Act 1979*.

Transport and Infrastructure SEPP means the *State Environmental Planning Policy (Transport and Infrastructure) 2021*

Unique submission means a submission which is in substance unique, distinctive or unlike any other submission. It does not mean a petition or any submission that contains the same or substantially the same text. Separate unique submissions may be made in relation to the same issue. One individual, or one household, could potentially submit multiple unique submissions.

1. Introduction

The Planning Panels were introduced in NSW on 1 July 2009 to strengthen decision making for regionally significant development and certain other planning functions under the EP&A Act.

These procedures relate to the operation of the Sydney District Planning Panels and Regional Planning Panels.

The Planning Panels are independent bodies representing the Crown and are not subject to the direction of the Minister, except on matters relating to Planning Panel procedures or where the Minister issues a formal direction under the EP&A Act.

These procedures are the Planning Panels charter and have been developed to explain the objectives, powers, and authorities of the Planning Panels. They also detail the means of operating the Planning Panels and clarify the roles of various parties in the work of the Planning Panels.

The procedures should be read in conjunction with the Local Environmental Plan Making Guidelines, relevant Planning Circulars and the Planning Panels Code of Conduct which explains the standard of conduct expected of Planning Panel members.

These procedures will be kept under review and may be amended periodically.

2. Defining the regions and districts

Planning Panels are constituted for each region of the State (other than the Greater Sydney Region), and each district of the Greater Sydney Region (see sections 2.12, 3.2 and Part 3 of Schedule 2 of the EP&A Act).

The nine Planning Panels are the:

- Hunter and Central Coast Regional Planning Panel,
- Northern Regional Planning Panel,
- Southern Regional Planning Panel,
- Western Regional Planning Panel,
- Sydney Eastern City Planning Panel,
- Sydney North Planning Panel,
- Sydney South Planning Panel,
- Sydney Central City Planning Panel, and
- Sydney Western City Planning Panel.

3. Functions of Planning Panels

3.1 Functions

The principal functions of Planning Panels are to determine regionally significant DAs and undertake rezoning reviews of planning proposals. Other functions of Planning Panels include:

- determining Crown DAs,
- determining modification applications for regionally significant development,
- determining DA reviews,
- determining SCCs,
- undertaking independent reviews for specific Local Aboriginal Land Council lands,
- advising the Minister or the Secretary upon request, and
- preparing planning proposals if they are directed to be a planning proposal authority.

Note: Section 2.15 of the EP&A Act contains the functions that may be exercised by Planning Panels.

Note: In relation to preparing planning proposals, see Chapter 14 of this Operational Procedures.

3.2 Legislation

Legislation governing Planning Panels includes:

- the EP&A Act for the constitution and functions of Planning Panels and obligations in respect to councils, with the following key provisions:
    - Division 2.4 and Schedule 2 provides for the constitution of Planning Panels, member appointments, functions and general procedures,
    - Division 3.4 allows for a Planning Panel to act as the planning proposal authority and undertake planning proposal reviews,
    - Section 4.5 specifies that a Planning Panel is the consent authority for regionally significant development, and
    - Section 4.7 sets out the consent functions of a Planning Panel which are to be exercised by the relevant council.
- the EP&A Regulation contains provisions for where a Planning Panel is exercising consent authority functions,
- the Planning System SEPP sets out in Parts 2.4, 3.3 and Schedule 6 development declared to be regionally significant,
- the Transport and Infrastructure SEPP sets out the process for consideration and determination of relevant applications for Site Compatibility Certificates.

3.3 Classes of regionally significant development

The Planning System SEPP identifies the types of development classified as regionally significant (see Parts 2.4, 3.3 and Schedule 6 of the SEPP). The relevant Planning Panel will be the consent authority for regionally significant development.

Note State significant development or development within the City of Sydney cannot be declared as regionally significant development (see section 4.7 of the EP&A Act).

On lodgement of a DA, the council will decide if a DA is regionally significant development.

The capital investment value (CIV) is relevant for some regionally significant development and should be calculated at the time of lodgement. Councils should request a quantity surveyor's certificate or another relevant expert assessment to confirm the CIV from the applicant. The CIV is to be calculated in accordance the Planning Circular PS 21-020 (or as updated).

The Planning Panels determine applications to modify consent for regionally significant development under section 4.55(2) of the EP&A Act which seek to modify:

- new or amended conditions of consent imposed by the Panel;
- development for which the applicant or landowner is:

  - the council,
  - a councillor,
  - a member of council staff who is principally involved in the exercise of council's functions under the Act,
  - a member of the NSW or Commonwealth Parliament, or
  - a relative (within the meaning of the *Local Government Act 1993*) of a person referred to above;
- development that is subject to 10 or more unique submissions by way of an objection; or
- development that contravenes a development standard imposed by an environmental planning instrument by more than 10% or non-numerical development standards.

All other modification applications under sections 4.55(2), 4.55(1) or 4.55(1A) to development consents granted by a Panel are to be determined by the relevant council. A court granted consent may be modified by a Panel under section 4.56 if it is in relation to regionally significant development.

4. Membership of Planning Panels

(Part 4, Schedule 2 of the EP&A Act)

4.1 Chairs and Members

Each Panel consists of 5 members:

- 3 members, including the chair, appointed by the Minister (State members), and
- 2 members appointed by the relevant council (council members).

Property developers and real estate agents are not eligible to be members of a Panel.

The agenda of a Panel meeting may include consideration of multiple matters, each located in different council areas. The council members may change from time to time, depending on the LGA in which the matter under consideration is located.

Panel members can be appointed to more than one Panel, either as a Panel member and/or as an alternate member.

When there is a vacancy on a Panel, the Minister in the case of a State member, and the relevant council in the case of a council member, will appoint another member to that vacancy.

Terms of appointment for Panel members (both State and council members), must not exceed 3 years. Members are eligible for re-appointment. A State member of a Sydney District Planning Panel must not be a member for more than 9 years in total.

The Secretariat is responsible for maintaining a register of all Panel members.

The chair (or, in the absence of the chair, a deputy chair, or a person elected by the members) presides at Panel meetings. The presiding member has a deliberative vote and, in the event of an equality of votes, has a second or casting vote.

Note: In relation to the membership of a Planning Panel responsible for preparing planning proposals, see further Chapter 14 of this Operational Procedures.

4.3 Expertise requirements for members appointed by the Minister

All Panel members appointed by the Minister, including alternates, must have expertise in one or more of the following areas: planning, architecture, heritage, the environment, urban design, land economics, traffic and transport, law, engineering, tourism or government and public administration.

4.4 Council members

Two council members are appointed by each council. At least one council member must have expertise in one or more of the following areas: planning, architecture, heritage, the environment, urban design, land economics, traffic and transport, law, engineering, or tourism.

To reduce the opportunity to improperly influence panel members councils should consider appointing a minimum of 4 alternate members to enable regular rotation.

4.5 Selection of council members

Each council determines how their members are selected. In selecting members, councils should have regard to any conflict of duties that would be created for a person nominated to the Panel if they are in any way responsible or involved in the assessment of matters to be determined by the Panel or involved in voting or deliberating on matters that come before the Panel.

When appointing its nominees to a panel, council should require a statutory declaration to be signed by proposed nominees stating that they are not property developers or real estate agents, as required by section 2.13 of the Act. Council should also arrange probity checks. These checks should include, at a minimum:

a. public register of real estate agents check
b. bankruptcy record check
c. National Police check (ACIC).

This is in line with the checks and declarations required for State members.

Councils are not restricted to nominating people from the council's local area. They can appoint, terminate, and reappoint members at any time, and can determine the duration of each appointment. Generally, so as to ensure the greatest degree of continuity for the Panels, councils should consider appointing members for the maximum term of 3 years. However, councils should reconsider if the nominations to the Panels are appropriate within 12 months following a council election.

Following a change to its nominees, council is to forward the new member's contact details to the Secretariat as soon as possible and this must be a minimum of 14 days before any meeting at which they will act as a Panel member.

If a council fails to nominate 1 or more council members, a Panel may still exercise its functions in relation to the area of the council concerned.

4.6 Payment of council members

Councils determine the fees they pay their Panel members. The Minister has provided guidance to all councils on appropriate rates of remuneration for travel and subsistence allowances for their members.

Each council is responsible for making any payments to its Panel members when they attend Panel meetings.

4.7 Alternate members

The Minister may at any time appoint a person to be the alternate of another member appointed by the Minister and may revoke any such appointment.

A council may also at any time appoint a person to be the alternate of a member nominated by the council and may revoke any such appointment.

Any changes are to be notified in writing to the Secretariat as soon as possible and at least 14 days before undertaking any Panel business.

The alternate will act in the place of the member with all the powers of the member. Although a member may be appointed as an alternate for two or more members, they will only have one vote on any Panel decision.

4.8 Rotation of members

To ensure there is a level of randomisation involved in which panel members and alternates hear a matter, all members are required to regularly rotate with alternate members. This will reduce opportunities for panel members to be improperly influenced. The chair is to determine the frequency of rotation in consultation with the Planning Panel secretariat.

Following a matter being deferred, where possible the same members should reconvene to finalise the determination.

5. Code of Conduct considerations

5.1 Planning Panels Code of Conduct

All Panel members must comply with the Planning Panels Code of Conduct when exercising their functions as a Panel member and make impartial merit-based decisions in accordance with their statutory obligations. The latest version of the Planning Panels Code of Conduct is available online at www.planningpanels.nsw.gov.au. On appointment each Panel member must acknowledge in writing that they will abide by the Planning Panels Code of Conduct.

5.2 Declaration of interests

On being informed of a matter to come before the Panel members should consider if they have an actual, potential or reasonably perceived conflict and, if so, declare the conflict and take any appropriate action, such as allowing an alternate member to take their place.

Panel members are required to complete and sign a declaration of interest form in relation to each matter which is considered by the Panel, either before, or at the commencement of, the Panel's determination proceedings. Any verbal declarations are to be recorded in writing.

To avoid any perceptions of bias, and to meet requirements of the Code of Conduct, councillors who have previously deliberated or voted on a matter that is to come before the Panel (such as a submission from the council on a DA for regionally significant development, a related voluntary planning agreement or a planning proposal) must stand aside from their place on the Panel and allow council's nominated alternative member to take their place. Alternatively, the member may choose to not participate in the deliberations or voting on the matter at the council (or council committee) meeting. They should also not remain in the council chamber during the council's deliberations.

5.3 Representations to Planning Panel members

If a Panel member is approached by any person about a matter to come before the Panel, the Panel member must not discuss the matter.

Any person that approaches a Panel member should be encouraged to make a written submission to the council planning staff for DAs during the exhibition period, or if the matter relates to a planning proposal for which the Panel is the PPA, to the Secretariat. Issues raised in submissions will be addressed in the assessment report to be provided to the Panel.

5.4 Interactions with third parties about matters before the Planning Panel

Panel members are not to discuss any matter that is to be considered by the Panel with councillors, the applicant, their consultants, parties who have made a submission, or any other person with an interest in the matter outside of a Panel briefing, meeting or site visit.

5.5 Public meetings organised by the council or community about the proposed development

To avoid any perception of bias, Panel members should avoid attending public meetings about a proposed development organised by members of the community or council, unless the meeting has been organised at the request of the Panel.

6. Administration

Administration and support for the Panels is provided by the Planning Panels Secretariat. Support includes:

- scheduling of meetings, briefings, and site visits,
- preparing and issuing agendas,
- notification of meetings,
- arranging for travel and accommodation for State appointed Panel members,
- preparing records of decision (with assistance from council),
- arranging for the audio recording of public Panel meetings,
- record keeping for the Panels, and
- being the first point of contact for councils to notify a Panel of any decision made by the Panel which is the subject of a merit appeal in the Land and Environment Court.

The Secretariat is the first point of contact for all Panel matters and publishes a wide range of information on its website:

www.planningportal.nsw.gov.au/planningpanels

The contact details for the Secretariat are:

phone: (02) 8217 2060

email: enquiry@planningpanels.nsw.gov.au

7. Government information, privacy and complaints

7.1 Right to information and privacy management

The Department assists Planning Panels in managing applications made under the *Government Information (Public Access) Act 2009* and the *Privacy and Personal Information Protection Act 1998.*

For applications of this nature visit the Department's website at:

http://www.planning.nsw.gov.au/About-Us/Right-to-Information/How-Can-I-Access-Information

7.2 Complaints

The Department assists Planning Panels in managing complaints. Complaints are investigated and managed in accordance with the Department's Management of Complaints Policy.

Dissatisfaction with determinations of the Planning Panels will not be regarded as a complaint.

If you wish to make a complaint visit the Department's website at: telephone, write or email the Department at:

https://www.planning.nsw.gov.au/Contact-Us?

Complaints made in this way will be recorded in the Department's Complaints Register and will be allocated to the appropriate level for investigation and response.

If you are not satisfied with a response, you can ask for the issue to be considered by a more senior officer.

Code of conduct complaints will be dealt with under the Planning Panels Code of Conduct.

At any time, a person can complain to external bodies such as the Independent Commission Against Corruption (ICAC), the Ombudsman, or the Audit Office of NSW. Allegations of corrupt conduct, misconduct, or serious waste of resources are encouraged to be made directly to these organisations.

Complaints about council, councillors, council staff or local planning panels should be directed to the relevant council.

8. Monitoring, review, and reporting

The Secretariat monitors the progress of DAs referred to the Panels. It is expected that council will complete its assessment report within 60 days after the close of the public exhibition period.

The performance of the Panels is monitored and reported in the Department's Annual Report.

Once a planning assessment is completed by the council and referred to the Panel, the Panel will be expected to:

d. determine the matter within 2 weeks (14 calendar days) for development and modification of consent applications; and
e. provide its advice within 2 weeks (14 calendar days) on planning proposals.

To ensure assessment and determination times are not subject to delay:

a. Panel chairs are obliged to work with senior council staff to ensure that key issues are addressed during assessment, in order to minimise the number of deferrals by the panel at determination stage.
b. Should an application experience unreasonable delays in excess of 180 calendar days from lodgement the Panel chair may require the council to report the matter to the Panel within 4 weeks for determination.

Note: The requirements relating to the timeframes for assessing development applications under the *Environmental Planning and Assessment Regulation 2021* must be considered by Panels.

8.1 Availability of information

The Secretariat makes a range of information publicly available on its website, including:

- Panel notices with dates, locations, meeting format and times (at least 7 days before the Planning Panel meeting),
- the relevant council's assessment report and recommendation (at least 7 days before the Panel meeting),
- records of briefings and Panel meetings, Determinations and Statements of Reasons, decisions on rezoning reviews and Site Compatibility Certificates, resolutions of the Planning Panels and any advice provided by the Panels to the Minister, Secretary or GCC, as relevant,
- audio recordings of Panel meetings, and
- a schedule of meeting dates reserved for Panel business.

Councils remain responsible for receiving, notifying and exhibiting DAs and supporting documents in accordance with statutory provisions and council's own notification and exhibition requirements set out in its community participation plan and for issuing the notice of determination.

9. Liability and indemnification

Panel members are excluded from personal liability as long as the act or omission was done in good faith for the purpose of carrying out their duties under the EP&A Act (see s 2.28 of the EP&A Act).

The NSW Government extends insurance indemnity cover to Panel members. For indemnification provisions to apply Panel members must act honestly and in accordance with the Panel Code of Conduct in the performance of their responsibilities.

For further information please contact the NSW Self Insurance Corporation (icare) at: https://www.icare.nsw.gov.au

10. Roles of councils and other panels

10.1 Role of councillors and council staff

The elected council and council staff have different roles in the assessment of DAs. Under the *Local Government Act 1993*, the independence of council staff is protected in the preparation of advice and recommendations. Staff members are not subject to direction by the council or by a councillor as to the content of any advice or recommendation made by the staff member. Equally, a council or councillor is not bound by the advice or recommendation made by a member of staff.

10.2 Assessment role

Council staff undertake the assessment of a DA. The assessment of a DA includes accepting the DA, consultation, concurrence and obtaining general terms of approval from an agency if required, carrying out community participation requirements and assessment of the matters set out in 4.15 of the EP&A Act. The assessment is documented in a report with recommendations. The report is then considered by the person or body that is the consent authority.

Council is responsible for carrying out community participation requirements on behalf of thePanels (see section 4.7(2)(d) and Division 2.6 of the EP&A Act).

The Department undertakes the assessment of planning proposals and applications for site compatibility certificates referred to the Panels.

10.3 Determination role

Historically, one of the roles of an elected council has been to determine or make decisions on DAs in their capacity as a consent authority. There are occasions, however, where the determination role is performed by other people or bodies, either because the council has delegated that function, or because it has been conferred upon another person or body. For example, where local planning panels have been introduced, elected councils no longer determine DAs (see section 2.17 of the EP&A Act).

The Panel for the area in which the development is to be carried out is the consent authority for regionally significant development (see section 4.5 of the EP&A Act).

10.4 Post-determination role

Council staff are responsible for post-determination functions including:

- notifying Panel determinations on DAs (see sections 4.7(2)(e), 4.18 and 4.59 of the EP&A Act),
- registering Panel development consents on the NSW Planning Portal (see sections 4.7(2)(e) and 4.20 of the EP&A Act), and
- monitoring and enforcing compliance with conditions of the development consent.

The notice of determination should be issued once council receives a copy of the endorsed and final determination from the Panel. The notice of determination must include all conditions imposed by the Panel, including any additional or amended conditions.

The council has no power to amend conditions or include additional conditions following the Panel's determination.

Council will advise any person who made a submission on the DA of the determination.

The council continues to be responsible for the monitoring of, and enforcing compliance with, any conditions of the development consent.

Where an application has been approved subject to a 'deferred commencement' condition council is responsible for determining whether the requirements of the condition have been met (see section 4.16(3) of the EP&A Act). Council advises the chair of the Panel in writing when the matter specified in the condition has been satisfied (see section 277(2) of the EP&A Regulation).

10.5 Support provided to Planning Panels by councils

Planning Panels are entitled on request to the general manager of a council, to use the staff and facilities of the relevant council, have access to council records, and any other assistance or action for the purpose of carrying out their functions (see section 2.27 of the EP&A Act).

It is expected that use of council facilities such as meeting rooms would be arranged prior to Panel meetings.

Support, such as recording the written decisions of the Panel, audio recording of Panel meetings, copying of documents and the provision of professional advice, may also be required.

Generally, the relevant council bears the administrative and council staffing costs associated with Panel meetings. Administrative costs may include those associated with the meeting venue and set up, the attendance of council staff, as well as administrative support.

The chair and members of a Panel will need to be mindful of the regular duties and responsibilities of council staff when requests for assistance are made. Requests by members of Panels for support and assistance from councils should be made through the chair to the general manager (or other person nominated by the general manager) of the council concerned.

10.6 Role of design review panels

Design review panels are established by councils either formally under *State Environmental Planning Policy No. 65 – Design Quality of Residential Apartment Development* with the approval of the Minister, or informally to bring special design expertise to the assessment of certain types of DAs.

Design review panels that are properly integrated in the assessment process are an effective tool which helps to improve the quality of design outcomes. The quality of design has a bearing on many, but not all, of the matters considered in the assessment of a DA.

The role of design review panels in the assessment of applications is not changed by the fact that the application is to be determined by a Panel. However, it is generally more effective in terms of design quality outcomes and timeliness if the design review panel is convened at the pre-DA stage or early in the assessment phase.

Council assessment officers and the Panels should consider the advice of the design review report in their assessment reports and in making a determination. The design review report may be used in the following ways:

- to support the application of relevant planning controls in a flexible manner where the design review panel has identified this will achieve better outcomes
- to establish if the reasonable recommendations of the design review panel have been followed
- as evidence for refusing development consent where the advice of the design review panel has not been adopted

In some instances, the Panel may require additional design quality advice or clarification of design quality matters to finalise their recommendations or to make a determination. In this instance, they may refer the project back to the design review panel. The following criteria can be used to establish when to re-engage with the design review panel:

- The application is poor and has not considered the advice of the design review panel – refusal.
  No return to design review panel

- Application will require minor modifications – to be managed via conditions of consent.
  No return to design review panel

- The application will require significant modification, the extent and nature of which requires advice from the design review panel.
  Return to design review panel

10.7 Role of local planning panels

Although similar in operation, the roles of local planning panels and the Sydney district and Regional Planning Panels do not overlap. Local planning panels determine all DAs that meet criteria set by the Minister.

11. Development application and assessment

11.1 Pre-development application meetings

Pre-DA meetings between applicants and assessment officers are commonly used to inform lodgement requirements and likely assessment pathways before applications are submitted to the consent authority.

Applicants are encouraged to meet with council before lodging a DA, and to respond to the advice of council when preparing the DA.

Applicants should consider the Local Government Design Review Panel manual in relation to pre-application design reviews and the requirements to be met in that process.

11.2 Making of development applications

DAs for regionally significant development are made to the relevant local council.

In the case of development located in two or more LGAs, a separate DA must be lodged with the councils of each LGA. Additionally:

- each DA should only address that part of the development located on land in the relevant LGA,
- neighbouring councils may wish to consider setting up joint assessment procedures, if appropriate, and
- the Panel will determine each DA separately (although the determinations may be made concurrently).

11.3 Notification to the Secretariat

Within 7 days of receiving a DA for regionally significant development, the council registers the DA with the Secretariat.

The registration is made via the NSW Planning Portal. Documents can be automatically linked via the NSW Planning Portal meaning that DA documents and any updated information are electronically transmitted to the Secretariat.

The Secretariat advises relevant Panel members of the DA once the registration is accepted. The DA documents, including the application form are made available to Panel members electronically via the NSW Planning Portal.

These documents allow Panel members to become familiar with the development and to identify if they have any potential conflicts of interest prior to their review of the assessment report and before determining the application.

11.4 Kick-off briefing and timing for determination

Generally within 28 days of the lodgement of a DA, the Secretariat will arrange a Kick-off briefing between the Panel, relevant council staff and the applicant. At this meeting, the applicant will be invited to outline the DA to the Panel, and the Panel chair will identify key issues including areas where further information is required. Importantly, for larger matters, the Panel chair will outline a timeframe for a subsequent briefing between all parties (generally around day 128 since lodgement), and an estimated date for determination (generally no more than 250 days since lodgement).

11.5 Public exhibition of development applications by council

Public exhibition of the DA is undertaken by council staff in accordance with the requirements of the EP&A Act, EP&A Regulation and Council's Community Participation Plan or any relevant development control plan or policy of council. Public exhibition can commence or occur after the Kick-off briefing.

Notification of exhibition, including letters and advertisements, should contain appropriate statements to advise:

- that the {name of relevant} Panel is the consent authority for the application,

- that submissions made in respect of the application should be made to {name of relevant} Council, but will be provided to the Panel and may be viewed by other persons with an interest in the application,
- names and addresses of submitters will be provided to the Panel for notification purposes, and
- other information required by the EP&A Act or EP&A Regulation.

11.6 Requests for additional information

It is the applicant's responsibility to provide adequate information and technical reports on potential impacts of the proposed development.

Holding a pre-DA meeting with council staff will often clarify council requirements for the lodgement of an application. However, the applicant may be requested by council staff to provide further information or reports to properly address all relevant aspects of the development, or to enable an assessment report to be completed.

During the assessment process the Panel may identify issues at a briefing that must be addressed or clarified in council's assessment report, and for which council may request further information.

Amended plans or additional information for a DA must be lodged with council.

11.7 Status reports

Councils must advise the Secretariat if it is evident that there are difficulties in assessing the DA or the assessment report will not be completed within the timeframe indicated in the referral notification.

The Secretariat tracks the progress of DAs registered with it and requests status updates from council for DAs lodged for 70 days or more.

Where a response or concurrence from public agencies delays the assessment of a DA, a council can ask the Secretariat for assistance to ensure the agency responds to council in a timely manner.

Where there is an ongoing and unreasonable delay in the processing of a DA, council may be requested by the Panel to complete its assessment without further delay.

11.8 Assessment of the development application

The council that received the DA is responsible, through its staff, for the assessment of the application.

It is council's responsibility to prepare an assessment report addressing all statutory requirements and properly considering all issues. Usually councils will rely on their own professional staff, however where they do not have the technical expertise required in-house, they may engage external expertise. All costs associated with the preparation of the assessment report are to be covered from application fees, which are retained by council.

The assessment report must clearly identify how the proposal meets the relevant requirements for regionally significant development, and that the Panel is responsible for determining the application.

The assessment report must include a recommendation on the proposed development:

- if the recommendation is for approval of the application, the report must include recommended conditions of consent, and
- if the recommendation is for refusal, the report must include reasons for refusal based on the assessment in the report.

The chair of the Panel may request without prejudice draft conditions of consent where council's report recommends refusal.

In considering an application, a Panel may request additional information to assist in its determination of the application.

Council assessment officers (and the Panels) should consider the advice of any design review report in their assessment reports and in making a determination. The design review report may be used in the following ways:

- to support the application of relevant planning controls in a flexible manner where the design review panel has identified this will achieve better outcomes
- to establish if the reasonable recommendations of the design review panel have been followed
- as evidence for refusing development consent where the advice of the design review panel has not been adopted

In some instances, the Panel may require additional design quality advice or clarification of design quality matters to finalise their recommendations or to make a determination. In this instance, they may refer the project back to the design review panel. The following criteria can be used to establish when to re-engage with the design review panel:

- The application is poor and has not considered the advice of the design review panel – refusal.
  No return to design review panel

- Application will require minor modifications – to be managed via conditions of consent.
  No return to design review panel

- The application will require significant modification, the extent and nature of which requires advice from the design review panel.

  Return to design review panel

11.9 Varying development standards

Where a DA includes a variation to a development standard, an application under clause 4.6 of the relevant LEP is required. Council's assessment report includes an assessment of the application against the relevant statutory provisions.

The function of obtaining concurrence from the Secretary under clause 4.6 is a matter for the council. However, where concurrence is assumed, the council does not need to obtain concurrence. The Panel will determine whether a clause 4.6 application is well founded on the basis of the applicant's justification.

11.10 Local infrastructure contributions

The assessment report should address contributions required in accordance with the council's relevant contributions plan (see section 7.11 and 7.12 of the EP&A Act). The Panel is able to impose additional or different contributions than those set out in the contributions plan. For Crown developments, councils should address contributions in accordance with the relevant planning circular (Circular No. D6, issued September 1995 or as updated).

11.11 Special infrastructure contributions and certification requirements

If the development falls within a special contributions area the council should address the relevant requirements in its assessment report and recommend appropriate conditions in accordance with the Ministerial direction (see section 7.24 of the EP&A Act).

The council must address any "Satisfactory Arrangements" clause in the applicable LEP in its assessment report. These clauses usually state that development consent must not be granted by a consent authority until arrangements to the satisfaction of the Secretary have been made to contribute to regional or State infrastructure. A Panel cannot provide consent to the DA until the Secretary (or delegate) of the Department has certified in writing that satisfactory arrangements have been made.

11.12 Development subject to delays in determination

An applicant with a DA that has a CIV between $10 million and $30 million can refer the DA to the relevant Panel for determination if it remains undetermined for 120 days after being lodged with council (see Schedule 6 of the Planning Systems SEPP). The referral process is outlined below:

- when making a referral, applicants must use the Regional Development Request form available on the Panels website,

- the applicant is to complete the relevant part of the form and submit it **t**o **both** the relevant council and the Secretariat,
- once the council receives the referral form it cannot determine the DA until a decision has been made regarding whether the Panel will have the function of determining the DA, however council can continue to assess the DA,
- the council sends the completed referral form and copies of all DA documents, to the Secretariat within seven days. Council should also send its explanation for the delay in completing its assessment,
- the chair will consider the information in the referral form and advise the Secretariat if the referral is accepted (i.e. the applicant is not responsible for a delay in the application), generally within 14 days of the applicant making the referral. The chair will consider a number of matters in making this decision, including:
  - permissibility and zoning, including whether the determination is dependent on a rezoning,
  - whether the determination is dependent on a voluntary planning agreement or the approval of a masterplan or DCP,
  - whether the landowner's consent has been provided,
  - whether the required referrals and concurrences have been obtained,
  - whether there have been requests for further information, and what the responses were to those requests, and
  - if council has considered the DA and the outcome of that consideration,
- once the chair decides, the Secretariat will notify the council and the applicant as to whether the development is regionally significant development,
- if the referral is not accepted the chair must advise the reason(s) for not accepting the referral,
- if the referral is accepted, council completes the assessment of the application and prepares an assessment report for submission to the Secretariat, and
- a briefing with council may be held prior to determination.

11.13 Council representation to the Planning Panel

An elected council may make a submission on a DA within their LGA that is to be determined by a Panel up to seven days before the Panel meeting.

After the assessment report is sent to the Secretariat, it may be given to the elected council to assist in its decision as to whether it will be making a submission to the Panel. The elected council's submission should not be prepared by persons involved in the assessment of the application but could be prepared by another council officer, or a consultant.

A council submission should not be specifically referenced in the assessment report or recommendations prepared by the council staff. If council makes a submission, a staff representative or individual Councillors may register to address the Panel at the meeting to express the views of council.

Councillors who are also Panel members have an independent role because they have been nominated by their council as its nominee to the Panel.

11.14 Submission of assessment report to the Secretariat

The completed assessment report and recommendation is to be immediately uploaded to the NSW Planning Portal such that it is sent via electronic means to the Secretariat.

The assessment report is not to be endorsed or presented to the elected council before being sent to the Secretariat.

The following items are to be uploaded to the NSW Planning Portal:

- assessment report and any attachments and recommendations (including conditions),
- the Council Assessment Report cover sheet (available on the Planning Panels website),

- final architectural drawings and plans and other reports that the assessing officer considers that the Panel may require in order to make an informed decision,
- copies of each submission received in respect of the DA
- a completed List of Submitters (available on the Planning Panels website) containing the names, postal addresses and email addresses (if provided) of every person or body who made a submission to allow the Secretariat to notify submitters of the details of the Panel meeting,
- in the case of petitions, only the name and address of the head petitioner should be provided, if that person can be identified, and
- the final number of unique submissions received.

Note: Council's assessment report must include a summary and assessment of all submissions so that the Planning Panel can consider the submissions as part of the assessment of the DA. Based on the details provided by council, the Secretariat will notify persons who made submissions of the time, date and venue of the Panel meeting at which the relevant application will be considered. Councils should also upload copies of any late submissions to the NSW Planning Portal and, where necessary, provide further assessment if the issues are not already covered in council's assessment report.

11.15 Written submissions to the Planning Panel

All written submissions must be sent directly to council to be considered as part of the assessment of the DA.

Submissions sent to the Panel will be given to council for assessment. If additional late information is received from the applicant it will be published on the NSW Planning Portal for transparency. Panels will not normally accept information "in confidence" that is not also given to council. However, if confidentiality is requested, the reason must be clearly stated as to why it is confidential and relevant to the assessment matter before the Panel and the chair will consider the request.

11.16 Rezoning, development control plans and planning agreements

Where a DA is lodged concurrently with a planning proposal seeking the rezoning of land under the LEP Council's assessment report must address the DA against the proposed zoning. Council is responsible for progressing the planning proposal. The Panel cannot determine a DA to approve such development until the land is rezoned to permit that development.

Where the provisions of an environmental planning instrument require a development control plan (DCP), (previously known as a master plan) to be adopted by the council before granting development consent, it is the responsibility of council to prepare and adopt the DCP prior to sending the assessment report to the Panel. In such circumstances, the Panel will not determine the application until the DCP is adopted by the council.

If a planning agreement is proposed, it should be negotiated by council staff. Council's assessment report for the Panel would normally make reference to any planning agreement and its relationship to the DA. The planning agreement would normally be exhibited by the council before the assessment report is provided to the Panel, and the planning agreement would be provided to the Panel as part of the supporting documentation for the DA.

The Panel may only impose a condition of consent requiring a planning agreement be entered into if the condition reflects the terms of any offer made by the applicant to enter into a planning agreement (see section 7.4 of the EP&A Act).

11.17 Referral of Crown development applications with a CIV less than $5 million

Crown DAs with a CIV greater than $5 million are regionally significant development. Crown DAs with a CIV under $5 million can be referred to the relevant Panel (see section 4.33 of the EP&A Act) by either:

- the applicant where council (or LPP, if relevant) has not determined in the prescribed period, or
- the council at any time including before the end of the prescribed period.

Before the end of the prescribed period, only a council (not the applicant) can refer an application to the Panel.

For Crown DAs with a CIV of less than $5 million where a council or LPP seeks to refuse consent or impose a condition to which the applicant has not provided their agreement, the application is also to be referred by council to the relevant Panel (see section 4.33(2) of the EP&A Act).

The referral to the Panel must be in writing. Additional procedures for the referral, including the requirement to notify the other party in writing of the referral are set out at sections 4.33(6) and section 4.33(7) of the EP&A Act.

Once the application is referred to a Panel, the council registers the DA on the NSW Planning Portal and uploads its assessment report to the NSW Planning Portal for the Planning Panel to consider.

12. Determination of development applications

12.1 Determining regionally significant development applications

Planning Panels determine regionally significant development as the consent authority.

For contentious matters, where the DA has attracted 10 or more unique submissions by way of objection, the Panels will generally hold a public determination meeting to consider the DA. Refer to **Schedule 1** for more information on the detailed procedures for Panel meetings.

The purpose of the public determination meeting is for the Panel to hear views of the community and other interested parties, such as the applicant and the council, on the DA before the Panel makes a decision.

Public determination meetings may be held wholly or partly by audio link, audio visual link or other electronic means (EP&A Act Schedule 2 clause 25(4)). Such meetings must be recorded with the recording made publicly available on the Planning Panel website.

After reviewing written submissions on a DA, considering the recommendation in council's assessment report and hearing from those wishing to address the Panel, the Panel may determine the application or defer its decision for reasons that will be stated in the meeting record.

In circumstances where the DA is the subject of less than 10 unique submissions by way of objection a Panel is able to determine the application by an electronic circulation of papers.

In some instances, the Panel may require additional design quality advice or clarification of design quality matters to finalise their recommendations or to make a determination. In this instance, they may refer the project back to the design review panel. The following criteria can be used to establish when to re-engage with the design review panel:

- The application is poor and has not considered the advice of the design review panel – refusal.
  No return to design review panel

- Application will require minor modifications – to be managed via conditions of consent.
  No return to design review panel

- The application will require significant modification, the extent and nature of which requires advice from the design review panel.
  Return to design review panel

12.2 Obligation to consult council – if adverse financial impacts

A Panel must not make a decision that will have, or that might reasonably be expected to have, a significantly adverse financial impact on a council without first consulting the council (see section 2.26 of the EP&A Act).

The consultation must be in writing, with the council being given a specified time to respond in writing. Where a briefing with the general manager (or nominee) is to be held to discuss the matter, all relevant Panel members should be present, and a meeting record and outcomes should be sent to the Secretariat.

12.3 Determining Crown development applications

A consent authority for Crown development cannot refuse consent to a Crown DA except with the approval of the Minister, nor can it impose a condition on a development consent for Crown development except with the approval of the applicant or the Minister.

This requirement applies to Crown development that is to be considered by a Panel, where the application is for regionally significant development, or where the DA is referred to the Panel under Division 4.6 of the EP&A Act.

Where the Panel wishes to either refuse an application or impose conditions not agreed by the applicant, or where a Panel fails to determine the DA within the prescribed period, the applicant or the

Panel may refer the DA to the Minister. The Minister may then direct the Panel to approve or refuse the Crown DA within a specified time.

12.4 Determining DAs for coastal protection works

Certain coastal protection works are classified as regionally significant development. Where a Panel is to determine a DA for coastal protection works the chair and the council nominated members will remain on the panel, however the State members will be replaced by members appointed by the Minister who have expertise in coastal engineering or coastal geomorphology (see EP&A Act Schedule 2 clause 20(2) and clause 8A, Schedule 6 of the Planning System SEPP).

12.5 Delegation to council to determine applications

If the Minister agrees, Panels may delegate the determination of applications to councils, a local planning panel of a council or the general manager or other staff of council (see section 2.16(2) of the EP&A Act). Delegation may be for development in a specified area, for a class of application, or be made on a case-by-case basis.

In situations where the determination is delegated, councils must:

- register the application on the NSW Planning Portal,
- inform and update the Secretariat on the processing of the application as requested, and
- provide a copy to the Secretariat of all determination documents, including the assessment report and Notice of Determination.

The chair of the relevant Planning Panel may request the council to not exercise the delegated function in certain circumstances.

Any determination made by council under delegation is a decision of the Panel.

13. Reviews and appeals

13.1 Decision reviews

Planning Panels also review decisions made on DAs by the Panels (see Division 8.2 of the EP&A Act). The Council notifies the Panel when a request to review a decision has been lodged through lodging it on the NSW Planning Portal. The Panel reviewing the decision will be comprised of different members to those members that made the original decision and will be called the Decision Review Panel of the [relevant] Planning Panel.

Note that decision reviews cannot be requested where the following applies:

- the time to lodge a legal appeal has passed,
- a merit appeal has been determined regarding the DA, or
- it is an application for complying development, a Crown DA or a designated development DA.

The Decision Review Panel may ask to be briefed on the decision review request, either by the applicant, Council staff undertaking the assessment, or other experts engaged to assess the application.

The circumstances where this may be needed include where the applicant for the DA has amended the development the subject of the original DA since the original determination.

If needed, the Decision Review Panel may also hold a site visit or public briefing meeting.

Council must prepare an additional assessment report to the Decision Review Panel if the DA or application to modify a development consent has been amended after its initial determination, or if submissions have been made following any further notification.

A Decision Review Panel will only need to hold a public determination meeting if the application was exhibited and 10 or more unique submissions by way of objection were received.

Council must give written notice to the applicant of the result of the review within 7 days of the completion of the review.

13.2 Appeals against a Planning Panel determination

Merit appeals

An applicant who is dissatisfied with a determination or deemed refusal of an application may lodge a merit appeal to the Land and Environment Court within six months against the decision as provided for in the EP&A Act.

Note: An application is deemed to have been refused if it is not determined within 40 days, or 60 days if the application is for designated or integrated development, requires concurrence of a concurrence authority or is accompanied by a biodiversity development assessment report and that proposes a discount in the biodiversity credits required under the report to be retired.

If the development is designated development, then an objector to the development who is dissatisfied with a determination may also lodge a merit appeal in the Land and Environment Court within 28 days as provided for in the EP&A Act.

The council for the area will be the respondent for any merit appeal against a determination made by a Panel on a development application. The council is subject to the control and direction of the Panel in connection with the conduct of the appeal.

The council is to give notice of the appeal to the Planning Panel. It must do this by notifying the Secretariat. Notification to the Panel must be made no more than seven days after the council receives notice of the appeal and must advise whether the council will be actively defending the appeal.

Note: Each Planning Panel chair has delegated authority to act as the Planning Panel's representative to provide instructions and seek legal advice in relation to appeals. Planning Panel delegations are published on the Planning Panels website.

The Panel will determine its level of involvement in an appeal, and what directions (if any) it wishes to issue to the council, on a case-by-case basis. While a Panel has the power to direct and control the council, it may choose not to exercise the power. If a Panel wishes to take a more active role in a council's conduct of the appeal, the Panel can exercise its powers to control and direct council. In some circumstances the Panel may seek to join proceedings and act as the respondent in the place of the council.

Council is to:

1) provide the Panel with a copy of the application commencing the appeal within 7 days of the council being served with it,
2) provide the council's proposed statement of facts and contentions to the Panel at least 7 days before the earlier of:
    a) the day of the first directions hearing for the appeal or
    b) the day the statement is proposed to be filed,
3) identify in the council's statement of facts and contentions the steps taken by the council to notify the Panel of the appeal, and any response received by the council, and
4) provide the Panel, within 3 days, with:
    a) a copy of any directions or orders made by the Court in relation to the appeal,
    b) the dates on which the Court has arranged a conciliation conference under section 34 or section 34AA of the *Land and Environment Court Act 1979,*
    c) the dates on which the appeal will be heard,
    d) a copy of any judgment of the Court in relation to the appeal.
5) Request instructions if a conciliation conference has been arranged:
    a) as to any agreement that might be reached between the parties as to the terms of a decision in the proceedings that would be acceptable to the parties, at least 14 days before the conciliation conference is held, and
    b) as to any proposed in principle agreement that is reached between the parties at or after the conciliation conference, at the time of or no later than 2 days after an in-principle agreement is reached and before any written agreement is executed.

The Panel is to respond to requests from council for instructions within 7 days of the request.

Deemed Refusals

A Panel may determine a DA even though it is subject to a deemed refusal appeal. When a deemed refusal appeal has been filed with the Court, the usual practice is for council's assessment officer to complete their assessment report.

Applications may be deemed to have been refused before a Panel has been briefed on the application. Where a Panel has not been briefed on an application that is subject to an appeal, the Panel may request a briefing from the council.

Judicial review and civil enforcement proceedings

Any person may commence judicial review or civil enforcement proceedings in the Land and Environment Court against a Panel determination. Unlike merit appeals, in these types of proceedings the Panel will be named as a respondent.

A submitting appearance may be filed by the Panel if the grounds of challenge are not related to the powers or procedures of the Panel in determining the application.

Appeals against determinations where council is the applicant

The Panel will be the respondent in merit appeal and judicial review proceedings in the Land & Environment Court where council is the applicant.

14. Planning proposals - Strategic Planning Panels

Planning Panels also undertake LEP making functions, including:

- acting as the planning proposal authority in relation to LEP making if directed by the Minister and in certain circumstances,
- undertaking administrative reviews in relation to LEP making,
- overseeing Aboriginal land planning proposals, and
- providing advice to the Minister or the Secretary on matters relevant to LEP making.

Note: The Independent Planning Commission undertakes these functions if directed by the Minister in relation to LEP making for the City of Sydney LGA.

14.1 Strategic Planning Panels

When convened for specific strategic and Aboriginal land planning functions a Planning Panel will be known as the Strategic Planning Panel of the [relevant] Planning Panel.

14.2 Strategic Planning Panel members

The constitution of a Strategic Planning Panel is to comply with the EP&A Act and this Chapter 14 of the Operational Procedures.

A Strategic Planning Panel will consist of 5 members:

- 3 members, including the chair, appointed by the Minister (State members), and
- 2 members appointed by the relevant council (council members).

At least 2 of the State members appointed by the Minister must have expertise in strategic planning (district or regional strategic planning). The State members may be members or alternate members, so long as they have relevant strategic or Aboriginal land planning expertise.

For matters relating to Aboriginal land planning, specifically land in a development delivery plan made under the Planning Systems SEPP, at least 1 of the State members with strategic planning expertise should also identify as being Aboriginal or Torres Strait Islander or have expertise in Aboriginal land planning.

Note: This Chapter should be read together with Chapter 4 of this Operational Procedures.

14.3 Reviews

A Strategic Planning Panel may conduct certain LEP related reviews, including:

- Rezoning reviews — that may be requested by a proponent before a planning proposal has been submitted to the Department for a Gateway determination,
- Independent reviews — that may be requested by a LALC before a planning proposal for land subject to a development delivery plan made under the Planning Systems SEPP has been submitted to the Department for a Gateway determination.

The Department's LEP Making Guidelines sets out how to apply for a rezoning review, fees and costs, eligibility requirements and information the council or proponent must provide for reviews to be undertaken.

14.4 Rezoning reviews

The Department will provide the Strategic Planning Panel with the rezoning planning proposal, council's comments on the proposal and a summary briefing report for review.

The Strategic Planning Panel will be briefed by the proponent and council and may request a site visit to assist in its consideration of any matter relevant to the planning proposal. All briefings or site visits should follow the procedures set out in Schedule 1 of this Operational Procedures.

Assessment and Determination

The Strategic Planning Panel's review and determination are to be in accordance with the LEP Making Guidelines.

The Strategic Planning Panel will assess the rezoning planning proposal, having regard to the matters outlined in the LEP Making Guidelines and determine whether the planning proposal has:

- strategic merit, and
- site-specific merit.

Planning proposals that do not reasonably meet the strategic and site-specific merit tests are unlikely to proceed to a Gateway determination.

The Department will monitor the progress of the rezoning review to achieve an outcome within a target of 100 days of receiving the initial rezoning review request.

Recommendation

If the Strategic Planning Panel recommends that the planning proposal should proceed to a Gateway determination, it will:

- notify the relevant council that the Strategic Planning Panel will assume the PPA role, if the council has refused to support the planning proposal, or
- identify the PPA (either council or itself) where council has not made a determination on a planning proposal but has informed the panel in writing prior to the Strategic Planning Panel meeting of its nomination.

Planning Proposal Authority

The Strategic Planning Panel may be directed to be the PPA for a planning proposal by the Minister.

The Strategic Planning Panel has delegated authority to direct itself to be the PPA in the following cases:

a. in a case where the recommendation relates to a proposed instrument relating to land owned by a Local Aboriginal Land Council and to which Chapter 3 of the State Environmental Planning Policy (Planning Systems) 2021 applies:

   i. before the recommendation was made, a written request to prepare a planning proposal has been submitted to the Department of Planning and Environment by the Local Aboriginal Land Council, or

b. in any other case:

   i. before the recommendation was made, a written request to prepare a planning proposal has been submitted to the council, and
   ii. after the recommendation was made, the council has been given an opportunity to be the planning proposal authority, unless the council has previously refused to support the request to prepare a planning proposal.

Note: The appointment function under s 3.32(2)(c) of the EP&A Act has been delegated by the Minister to the Planning Panels and the Independent Planning Commission under an instrument of delegation.

14.5 Independent reviews

An independent review is an administrative review process closely aligned with rezoning reviews. Independent proposal reviews give LALCs an opportunity for an independent body to give advice on planning proposals for land subject to a development delivery plan made under the Planning Systems SEPP.

Assessment and Determination

When a Strategic Planning Panel is undertaking an independent review, it must consider the:

- strategic merit - consideration must be given to the consistency of the planning proposal with the relevant development delivery plan for the land, and
- site-specific merit - consideration must be given to the social and economic benefit to the Aboriginal community facilitated by the proposal.

The Strategic Planning Panel must determine whether or not to recommend that a planning proposal be submitted for a Gateway determination under section 3.34 of the EP&A Act.

Further detail on the independent review process can be found in Planning Circular PS 22-001 Independent review of planning proposals for identified Aboriginal land, or as updated.

14.6 Planning Proposal Authority

As the PPA, the Strategic Planning Panel performs functions that a council normally would in preparing a LEP. This includes:

- submitting a planning proposal that satisfies the requirements of section 3.33 of the EP&A Act including any requirements issued by the Secretary for a Gateway determination,
- undertaking any necessary agency consultation prior to public exhibition of the planning proposal,
- exhibiting the planning proposal in accordance with the terms of the Gateway determination (if all relevant Gateway conditions have been met Panel endorsement to proceed to exhibtion is not necessary),
- considering a recommendation report, addressing submissions received during public exhibition,
- holding a public meeting if the planning proposal is the subject of 10 or more unique submissions by way of objection following public exhibition,
- if required by the Minister, conducting a review of the planning proposal if there has been any delay in the matter being finalised, or if for any other reason the Minister considers it appropriate to do so,
- providing a revised planning proposal to the Minister following consideration of any submission or report during community consultation or for any other reason,
- submitting a request to the Department, as delegate of the Minister, that the LEP be legally drafted and made.

The Minister (or delegate) remains responsible for determining the planning proposal.

The Secretary is responsible for making arrangements for the drafting of any required LEP to give effect to the final proposals of the PPA.

14.7 Support provided to the Planning Panel in its role as PPA

The Secretariat are to provide any necessary support for agency and community consultation (public exhibition) and can facilitate the provision of technical support from other parts of the Department and briefings to the Strategic Planning Panel.

14.8 Strategic Planning Panel decisions and advice to be made publicly available

A Strategic Planning Panel will need to make decisions throughout the LEP making process when undertaking reviews or acting as PPA. Decisions of the Strategic Planning Panel must be made publicly available on the relevant Planning Panels website within 7 business days of any decision.

14.9 Community consultation

There is no requirement for a Strategic Planning Panel meeting to be held prior to determining a rezoning review. The Gateway determination details requirements, if any, for community consultation on planning proposals. The Strategic Planning Panel may hold Panel meetings at any time, at the discretion of the chair, and request briefings from relevant parties at any time.

Submissions received as part of the public exhibition of a planning proposal for which the Strategic Planning Panel is the PPA must be made publicly available on the Panels' website.

15. Site compatibility certificates

Panels determine applications for SCCs made under section 3.14 of the Transport and Infrastructure SEPP.

Written applications are to be lodged with the Department. The Department prepares an assessment of the application and a recommendation for the relevant Panel. The Panel considers the application and the Department's assessment report and those matters set out at section 3.14(6) of the SEPP. The Panel may determine an application by issuing a SCC or refusing to do so.

The Panel may request a briefing and/or a site visit to assist in its considerations.

A briefing or site visit will be attended by the Panel and Department staff and follow the procedures set out in Schedule 1.

Decisions on SCCs will generally be made by a resolution following a circulation of papers in accordance with the procedures set out in Schedule 1.

Schedule 1: Procedures for briefings, meetings and decisions.

1 Briefings and site visits

The chair may agree to a site visit or a briefing prior to a Planning Panel making a decision or providing advice on a matter.

A site visit or briefing is solely to identify and clarify issues with the proposal. Panel members will not offer opinions on the merits of the proposal or ask those involved with the assessment of the proposal for their opinion or recommendations at site visits or briefings.

However, the Panel may identify issues that it expects to be addressed or clarified in any assessment report.

A site visit or briefing will be attended by the Panel and relevant council or Department assessment staff or other persons engaged in the assessment of the DA or matter to be determined by the Panel. Secretariat staff may also attend site visits and briefings. In some circumstances, other parties, including the applicant or people who made submissions on an application or matter may also be invited to attend a site visit or briefing. The invitation of parties is at the discretion of the chair.

Briefings on DAs may include a presentation by council assessment staff on key elements of the proposal and the planning controls that affect it (such as zoning), and an overview of issues of concern arising through the Council's assessment or raised in submissions. The timing of the submission of the assessment report and tentative date for a determination may also be discussed.

The assessment officer briefing the Panel during a site visit should have available a set of large-scale plans and be able to point out relevant features of the site and the proposed development.

Only Panel members who will sit on the Panel to determine the matter should attend the briefing.

Briefings and site visits on planning proposals and site compatibility certificates follow the same format, with Departmental staff briefing the Panel.

It is not mandatory that the Panel be briefed prior to considering a matter. However, the Panel will typically hold a Kick-off briefing within 28 days of the DA being lodged. At this Kick-off briefing, the Panel chair will identify key issues, any areas where further information is to be requested and set out a timetable for the next phases of the assessment process, including the estimated timing for determination. Where there is an additional assessment briefing, it should take place no later than 128 days after the lodgement of the DA. The assessment of a DA should not be delayed for a briefing to occur.

Panel members may identify further issues where they need clarification or more information. A Panel may request briefings with council or Department staff or the applicant at any time to clarify any element of the proposal and the assessment report prior to the Panel making its decision.

Briefings are not determination meetings and Panel members should not make any comment that would indicate pre-determination of the matter.

The chair should take into consideration the availability of all members of the Panel and any other necessary persons when deciding to conduct a site visit.

Entry to any private land may only take place with the express permission of the owner of the land, and it is the responsibility of council staff, in relation to a DA, or Department staff in relation to a planning proposal, to seek owner's consent when required.

A written record of the briefing or site visit is made including time, date, attendees, any declarations and key issues discussed and is published on the Planning Panels website within 7 days. Site visits or briefings are not recorded by audio/ video record, an audio record or a transcription record.

It may be appropriate to invite the applicant or proponent to attend a briefing or site visit when:

- it would be beneficial to gain a joint understanding between the Panel, council and applicant of the key issues and timing for resolution relating to a DA or planning proposal,
- the Panel could benefit from additional technical explanation on a complex matter,

- the development or other options are still being considered (e.g. if a major re-design has been requested by the council), or if
- material to be presented may be commercially sensitive or confidential.

Site inspections and briefings are not public meetings of the Panel.

2 Meetings

The Panel may meet on-line, in-person or a combination of both. The Panel will generally conduct its business on-line.

Public briefing meetings

If the matter before the Panel attracts significant community interest, the Panel may consider calling a public briefing meeting**.**

Public briefing meetings are held to hear submissions in a public forum and to meet with key stakeholders to discuss unresolved issues. Community groups and individuals may register to speak to the Panel at the public briefing meeting. Public briefing meetings are held at the discretion of the Panel. A recording will be made of public briefing meetings and made available on the Planning Panel website.

Panel members should not make any comment that would indicate pre-determination of the application at a public meeting.

Determination meetings

For contentious matters, where a DA has attracted 10 or more unique submissions by way of objection, the Panels will generally hold a public determination meeting to consider the DA.

Notice of a public determination meeting is given at least 7 days before the meeting. Notice of the meeting (including the time, date, meeting format and if relevant, venue for the meeting) are:

- notified on the Panels website, and
- given to every person who made a submission to the council (in the case of petitions, only the head petitioner).

The meeting agenda, any business papers, assessment reports and attachments (including any representations made by council) are distributed to members of the Panel and uploaded on the Planning Panels website in advance of the meeting.

People wishing to address the Panel must register prior to the meeting.

The chair determines the order of presentations to the Panel and the amount of time given to each speaker. At the meeting, it is acceptable to provide the Panel with written material which summarises the matters to be presented to the panel by the speaker. However, written material must be kept to a minimum. Any written material provided may be made available on the Planning Panel website.

3 Procedures for public meetings

Planning Panel meetings are to be conducted in public.

Meeting dates and agendas

Expected determination timeframes for DAs are estimated soon after the DA is lodged and referred to the Planning Panels. Regular status updates on DAs ensure that DAs are determined in a timely manner. Briefings and meetings are scheduled on an as-needs basis. Generally, Panels will have a regular schedule of proposed meeting dates that is determined at the beginning of each year by the Secretariat in consultation with the chair. Meeting dates can be utilised for any Panel related business including public briefing meetings, Panel briefings including Kick-off briefings and site visits, meetings with relevant Government agencies (eg concurrence authority) or Panel meetings. Panel public determination meetings are generally arranged within 14 days of receiving council's assessment report.

Additional meetings or briefings of a Panel may be organised at the discretion of the chair and via the Secretariat.

The council notifies the Secretariat of any revised date for completion of the assessment report as soon as it is aware of any delay and advises of the reasons for the delay.

The meeting time and venue

The meeting time, meeting format and if relevant, venue is determined by the chair in consultation with relevant councils, and taking into account:

- the location of the proposed developments to be considered at the Panel meeting,
- the number of persons who have expressed an interest in the different matters to be considered at the Panel meeting,
- if the meeting is being held on site, the availability of a suitable venue and the accessibility of the proposed venue for those persons, and
- local considerations and logistics.

The meeting time, meeting format and if relevant, venue should:

- maximise accessibility to people who have expressed an interest in the matters to be considered at the meeting, and
- facilitate the open exchange of information between the Panel members and other parties.

Notice of meeting

Notice of a Panel meeting is to be given by the Secretariat at least 7 days before the meeting. Notice is given to Panel members, the general managers (or their nominee) of the councils in that region or district, every person who made a submission to the council (in the case of petitions, only the head petitioner) in respect of an item to be considered at the meeting and the applicants for those items. A notice is placed on the Panels website and may be placed in the local newspaper.

The notice is to include details of:

- the time, date and format of the meeting,
- if relevant, the venue for the meeting,
- the matter under consideration (DA/s or planning proposal),
- the availability of the assessment report, supporting documentation and recommendations, and
- other matters to be considered at the meeting.

Distribution of meeting papers

The meeting papers including assessment reports and attachments, including any representations made by councils, are to be distributed to members of the Panel and uploaded on the Panels website by the Secretariat no less than 7 days prior to the meeting.

Opening and closing meetings

The chair will open the meeting with an Acknowledgement of Country followed by introducing the Panel and its members, state the purpose of the meeting, read out any apologies and call for declarations of interest following the declarations of interest procedures.

The chair will note any site visits or briefings the panel has had the benefit of and describe the order of proceedings and time limits for speakers.

The chair may also request council staff to briefly summarise the key issues that have arisen in the assessment report.

The panel will then listen to those wishing to address the panel. After the presentations the panel will make its determination and the chair will read out the decision of the panel before closing the meeting.

Declarations of interest procedures

The declarations of interest procedures set out below follow the requirements of the Panels Code of Conduct (Code):

1. The chair calls on Panel members to complete and sign written declarations of interest forms prior to the meeting for each panel matter (under clause 4.1 of the Code). Any verbal declarations must be recorded in writing.

   Note: Under the Code, a panel member should declare the following interests:

   a. an actual, potential or reasonably perceived conflict of interest (see clause 3.1 of the Code),

   b. a pecuniary interest listed under clauses 3.10 – 3.12 of the Code,

   c. a non-pecuniary interest (see clause 3.14 of the Code),

   d. a conflict of duties listed under clauses 3.18 – 3.25 of the Code,

   e. a pecuniary interest or non-pecuniary interest arising from a political contribution or donation (see clause 3.26 of the Code),

   f. a position and pecuniary interest in corporations, partnerships or other businesses that may be relevant to the activities of the Panel in accordance with the Department of Premier of Cabinet's Guidelines *'Conduct Guidelines for Members of NSW Government Boards and Committees'* (see clause 4.3 of the Code),

   g. a personal dealing with council (see clause 5.1of the Code), and

   h. a gift or benefit listed under clauses 5.2 – 5.6 of the Code.

2. The chair reviews the written and signed declarations and the management measures put in place for any declared interests.
3. If the chair is satisfied that reasonable and appropriate management measures are consistent with those set out in the Code, then a note to this effect is to be made on the meeting record.
4. Should the chair have concerns, the chair is to raise these concerns with the member and suggest additional reasonable and appropriate management measures including, if warranted, that the member not take part in the determination for the matter (see clause 3.8 of the Code).
5. The chair is to provide the member an opportunity to respond.
6. The chair is to consider any response prior to making a final decision on the reasonable and appropriate management measures and note the response, the decision, and the chair's reasons for the decision in the meeting record.

Presentations at a Panel meeting

The chair determines the order of presentations to the Panel. Panel members may ask questions of those making presentations. The amount of time given to each speaker is at the discretion of the chair.

At the Panel meeting, it is at the chair's discretion whether to accept written material which summarises the matters to be presented to the Panel by the speaker. Any allowed written material must be kept to a minimum.

By registering to speak at a meeting, speakers agree to being audio recorded and to the publication of that recording on the Panels website.

a) Presentation by the assessment officer

The chair may request that the assessing officer responsible for preparing the assessment report (or a representative) presents a summary of the DA or planning proposal, as the case may be, and outline any relevant assessment issues at the start of the presentations. For meeting being held in person, the assessment officer should have available at the Panel meeting a set of large-scale plans (including any amended plans).

Generally, it is council's professional planning and assessment staff that prepare DA assessment reports for the Panel's consideration.

Where a Panel is acting in the role of the PPA for a planning proposal matter the Department provides technical assistance, which may include the provision of an assessment report for the Panel.

The assessment officer (or representative) should inform the chair of any late submissions received, and of any issues raised which may not have been addressed in the assessment report.

The assessment officer (or representative) should be present throughout the Panel meeting, so that the chair can seek clarification where necessary of assessment issues that may arise during the course of the meeting. Other technical experts from the council/Department may also be present (such as traffic engineers) and the chair may ask for clarification of specific issues. Any questions to council/Department staff can only be made by Panel members and are to be directed through the chair.

b) Presentation by the applicant or proponent

The applicant, in the case of a DA, or the proponent, in the case of a planning proposal, will be given the opportunity to outline the proposal and respond to the assessment report. The applicant/proponent may also be required to respond to submissions made at the meeting. The time allocated to the applicant/proponent, including their consultant(s), is at the discretion of the chair, but is generally 15 minutes. Additional time may be allocated where professional consultants have been engaged by the applicant/proponent to present at the meeting.

c) Presentation by people or groups who made submissions

Panel meetings enable people or groups to make a presentation to the Panel meeting. People who wish to address the Panel must register with the Secretariat prior to the meeting by contacting the Secretariat by telephone or email within the timeframe specified in the notification letter (generally two days before the Panel meeting).

For those people who are of the view that they would not be appropriately or adequately represented by any groups, they may register to speak to the Panel as individuals.

The chair will advise on the time allocated for verbal submissions which will vary from meeting to meeting depending on a number of considerations such as the number of registered speakers.

As a guide:

- individual submitters will have 3 minutes to speak,
- a speaker for a community organisation/group will have 10 minutes to present. Additional time may be allocated where professional consultants have been engaged by community groups to present at the meeting.

In addition, where a large group of people have common issues to raise at the meeting, the chair may ask that a spokesperson be appointed to speak on behalf of the group. In such cases, the spokesperson will generally be allocated more time than individual speakers.

The chair seeks to ensure that all groups or individuals who request to address the Panel are heard. Any requests for extending time limits should be made to the Panel at the meeting and may be granted at the discretion of the chair.

Speakers should focus their oral presentations on the assessment report and its recommendation rather than re-stating information outlined in their earlier written submissions. The Panel has been provided with all submissions and associated documents before the Panel meeting.

d) Presentation by people or groups that have not made a submission

The chair has the discretion to allow any member of the public to address the Panel, even if they have not made a submission or registered to speak by the relevant deadline. Considerations may include the number of persons that made submissions and have requested to address the meeting and the available time.

e) Presentation by an expert engaged by the Panel

For the purpose of making a decision on a matter, such as a DA or a planning proposal, a Panel may obtain independent assessment reports, advice and assistance that the Panel may require, particularly in relation to complex technical matters. This would be in addition to any assessment report or other information provided by the relevant council/Department in assessing the application.

Selection of such experts is to be determined by the chair in consultation with the other Panel members.

Depending on the circumstances, the expert may submit a report with recommendations directly to the Panel. In addition, the expert may be invited to present the outcomes of their report at the Panel meeting.

The independent assessment report should be made available on the Planning Panels website prior to the meeting, except where this information includes legal advice provided to the Panel and is subject to legal professional privilege.

Adjourning during a Planning Panel meeting

A Panel may adjourn a meeting where:

- a briefing is required to hear confidential or sensitive information, and/or
- the panel wishes to confer amongst itself before reconvening the meeting for voting and determination.

Before the adjournment the panel chair publicly states the reasons for the adjournment which are recorded in the audio and written record of the meeting.

If the meeting is adjourned so that the panel may confer amongst themselves prior to making a decision, the chair briefly summarises the matters discussed in the adjournment after reconvening the meeting. The panel may discuss the matter further in the meeting and/or make its determination.

Panel discussions during adjournments are not recorded.

4 Decisions and determinations

The Panel will strive to make its decisions unanimously. Where a decision cannot be made by unanimously, the decision will be made by majority vote. The chair will have a second or casting vote if required because of an equality of votes.

Quorum for a Planning Panel decisions

A quorum is a majority of the Panel's members, including the chair, i.e. a total of three members. The decision of the Panel will be deferred if a quorum is not present.

Where conflicts of interest are known before a decision is to be made, alternate members will be used to make a quorum.

The Planning Panel's consideration

In addition to the assessment report, the Panel is to take into account all written submissions, as well as the views expressed by those addressing the Panel should a public meeting be required.

Deferring the decision

A decision may be deferred for any reason including to obtain additional information or advice.

Should the Panel determine to defer a decision on an application, it must provide a written record of the reasons for deferral.

Where the determination of a proposal is deferred pending the provision of additional information, the panel must specify the timeframe in which the information is to be provided to the council for assessment.

It is the council's responsibility to follow up on any requests for additional information or amendments from the applicant, to determine whether re-exhibition is required, and to provide a supplementary assessment report to the Panel.

The Panel's reasons

The Panel must provide reasons for its decisions, which are to be recorded in the 'Determination and Statement of Reasons' template provided by the Secretariat.

The Panel may rely on the conclusions and recommendations within the assessment report, however, the Panel must identify where it has its own reasons for making the decision and where it adopts the reasons from any assessment report of Council or the Department. As part of setting out its reasons the Panel is to:

- provide a summary of the main issues raised in submissions,
- demonstrate how the Panel considered the community's concerns, and
- demonstrate how the Panel dealt with the issues raised, should they have been found to have merit i.e. requested further studies, applied appropriate conditions or, agreed with council recommendation that the applicant had satisfactorily addressed the concerns.

Determinations on DAs

The determination must clearly state whether a DA is unconditionally approved, approved with conditions, has a deferred commencement or refused.

Any new conditions of consent or changes to the recommended conditions of consent must be recorded.

If the Panel resolves to approve an application that is recommended for refusal, the Panel may seek a further report from the council's planning officer providing recommended conditions of consent. The Panel may request without prejudice conditions of consent before a Panel meeting if council's report recommends refusal.

The determination and statement of reasons must include the following:

- the decision of the Panel,
- the date of the decision,
- the reasons for the decision (having regard to any statutory requirements applying to the decision), and
- how community views were considered in making the decision.

DA determinations must be publicly notified in accordance with clause 20 Schedule 1 of the EP&A Act. The date that the determination has effect is the date that it is registered (by the Panel secretariat) on the NSW Planning Portal (EP&A Act s.4.20(1)). The council will provide the Notice of Determination after this date.

The decision of the Panel is not subject to a 'Rescission Motion' as in local government.

Decisions of Decision Review Panels are called a 'Review of Decision' Determination and Statement of Reasons.

Determinations on matters other than DAs

Decisions made by the Panels on SCCs, Rezoning Reviews and where the Panel is the PPA will include the following:

- the decision of the Panel,
- the date of the decision, and
- the reasons for the decision (having regard to any statutory requirements applying to the decision).

Resolutions of the Panels

The Panels may from time to time make resolutions on certain matters, e.g. to authorise the chair to provide instruction in relation to legal appeals on behalf of the Panel.

Resolutions of the Panel will be published on the Panels website.

Dissenting views

If the decision (and reasons for the decision) is not unanimous, all members of the Panel (i.e. including the minority) still need to give reasons.

Timing of Determination and Statement of Reasons

It is preferable that the Panel record both its decision and its reasons at the time of the determination.

Signatures

All members of the Panel must sign the Determination and Statement of Reasons. Where one or two members are in dissent, they must still sign, as the reasons will set out their dissenting views.

5 Transactions of business outside meetings

A Panel can transact its business by the circulation of papers, (including the electronic transmission of the information in the papers) (known as an electronic determination) (see Schedule 2, Clause 26 of the EP&A Act). The chair and each Panel member have the same voting rights as they have at a public meeting.

The chair may decide that the Panel can complete its business through an electronic determination. These circumstances may arise when:

- there are less than 10 unique submissions by way of objection,
- the Panel has held a public meeting and deferred its decision to request specific additional information from an applicant or council (such as amended drawings) and if council, after having accepted the amended drawings, has decided that re-exhibition of is not required,
- the Panel is voting on a procedural matter, or
- the Panel is voting on a decision following a briefing in relation to a Rezoning Review, Planning Proposal or site compatibility certificate.

Prior to an electronic determination the council report and recommendation is made available on the Planning Panels website for 7 days.

Following consideration of the assessment report, the Panel advises the Secretariat of its decision and a record of decision is completed and endorsed by all members.

Resolutions approved by circulation of papers are recorded in writing and made publicly available on the Panels website within 7 days. The circulation of papers is generally done electronically and are not recorded by audio/ video record, an audio record or a transcription record.

6 Records of proceedings

The chair is responsible for ensuring that full and accurate records are kept of the proceedings of Panel meetings, briefings and other business.

An audio recording will be made for all public briefing meetings and determination meetings and will be published on the Panels website. By registering to speak at a meeting, speakers agree to being recorded and to the publication of that recording. Where a speaker has not registered to speak but wants to make a submission at the meeting it is at the chair's discretion and the speaker is asked to agree to being recorded and that recording being published.

Document templates for written records of proceedings are provided by the Secretariat.

Secretariat or council staff will assist in the preparation of draft written records. A copy of the unconfirmed written record is provided to all Panel members who participated in the proceedings. Panel members may submit any proposed corrections to the unconfirmed record to the Secretariat for confirmation by the chair.

Alternatively, a Panel may choose to complete and endorse the final record immediately after completing the meeting or briefing. In this case, draft records are not circulated.

When the written records have been confirmed and endorsed by the chair the written record is placed on the Panels website.

The confirmed written record is available within 7 days of the Panel meeting or briefing.

Record details are to include:

- the opening and closing times of the meeting,
- the details of the matter considered by the Panel,
- the names of all members of the Panel, including the chair, and any other attendees at the meeting,
- any disclosure of interest made by a member, the reason for that disclosure of interest and whether the member making the disclosure participated in the discussion or determination of the matter,
- any adjournments and reasons for the adjournment,
- the names of each person heard by the Panel in respect of a matter,
- any decision of the Panel,
- reasons for the decision,
- the names of each member who voted for or against the decision, and reasons for dissent, where the decision is not unanimous, and
- the signatures of all the members making the decision.

A written record of briefings or site visits are made including time, date, attendees, any declarations and key issues discussed and are published on the Panels website within 7 days. Site visits or briefings are not recorded by audio/ video record, an audio record or a transcription record.

The Secretariat, with assistance from the relevant council, is responsible for recording decisions for Panel meetings.

Panel members are required to provide any notes made during a meeting, briefing or site inspection to the Secretariat for registration as a record. This includes handwritten or electronic notations.

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Introduction

This Code of Conduct (Code) applies to all members of the Sydney District and Regional Planning Panels (panels), including:

- chairs
- state appointed members
- council nominees
- alternates acting for panel members.

The Code outlines the standards of conduct expected of panel members. It is the personal responsibility of each panel member to comply with this Code. The Code will be kept under review and will be subject to changes that may be required to reflect the experience of the implementation and operation of the panels.

Purpose of the Code

This Code sets out the minimum requirements of behaviour for panel members in carrying out their functions. The Code has been developed to assist panel members to:

a. understand the standards of conduct that are expected while carrying out the functions of a panel member
b. act honestly, ethically and responsibly
c. exercise a reasonable degree of care and diligence
d. act in a way that enhances public confidence in the integrity of the role of panels in the planning system.

As public officials, members of the panels have a particular obligation to act in the public interest. All members of the panels must:

- comply with the ethical framework for the public sector set out in the *Public Sector Employment and Management Act 2002* and the *Government Sector Employment Act 2013*
- have a clear understanding of their public duty and legal responsibilities
- act for a proper purpose and without exceeding their powers.

Application of the Model Code of Conduct for Local Councils in NSW (Model Code)

Councils are required under the *Local Government Act 1993* to adopt a code of conduct. Such codes must incorporate the provisions of the 'Model Code' prescribed under the Local Government (General) Regulation 2005.

Council's adopted code applies to, amongst others, councillors, the general manager, council staff and members of council committees. The Model Code does not apply to planning panel members. However, parts of the Model Code have been used to assist in the development of this Code, along with other relevant codes of conduct applying to members of state boards and other statutory bodies.

It is recognised that councillors and council staff may undertake functions as a member of a planning panel separate to their ordinary functions as a councillor or member of council staff. When exercising functions **as a panel member**, councillors and council staff must ensure that they comply with this Code.

Council staff are not subject to this Code where they are responsible for:

- dealing with development matters under the *Environmental Planning and Assessment Act 1979* (EP&A Act),
- preparing assessment reports, and/or
- assisting a planning panel in the exercise of its functions.

The Model Code requires that council staff act lawfully, ethically and fairly. In relation to development decisions, council staff must ensure decisions are properly made and parties involved in the development process are dealt with fairly. People must not use their position to influence other council officials in the performance of their duties or to obtain a private benefit for themselves or for somebody else.

Code of Conduct

1. Key principles

Integrity

1.1. You must not place yourself under any financial or other obligation to any individual or organisation that might be reasonably thought to influence you in the exercise of your functions as a planning panel member.

Leadership

1.2. You have a duty to promote and support the key principles of this Code by demonstrating leadership and maintaining and strengthening the public's trust and confidence in planning panels and their role in the planning system.

Selflessness

1.3. You have a duty to make decisions in the public interest. You must not make a decision or take action that causes or results in you obtaining:

- a financial benefit (including avoiding a financial loss), or
- other benefits for yourself, your family, friends or business interests.

Impartiality

1.4. You should make decisions on merit and in accordance with your statutory obligations when carrying out your functions as a planning panel member.

Accountability

1.5. You are accountable to the public for your decisions and actions and should consider issues on their merits, taking into account the views of others.

Openness

1.6. You have a duty to be as open as possible about your decisions and actions.

Honesty

1.7. You have a duty to act honestly and in good faith for the proper purpose.

Respect

1.8. You must treat others with respect at all times.

2. General conduct obligations

General conduct

2.1. You must not conduct yourself in carrying out your functions as a planning panel member in a manner that is likely to bring the planning panel into disrepute. Specifically, you must not act in a way that:

a. contravenes the EP&A Act[1]

b. is improper or unethical

[1] A reference to the *Environmental Planning and Assessment Act 1979* (EP&A Act) includes a reference to the Environmental Planning and Assessment Regulation 2000.

c. is an abuse of power
d. causes, comprises or involves intimidation, harassment or verbal abuse, or
e. causes, comprises or involves discrimination, disadvantage or adverse treatment.

2.2. You must act lawfully, honestly and exercise a reasonable degree of care and diligence in carrying out your functions as a planning panel member, having regard to the statutory obligations under the EP&A Act.

Fairness and equity

2.3. You must consider issues consistently, promptly, conscientiously and fairly.

2.4. You must take all relevant facts known to you, or that you should be reasonably aware of, into consideration and have regard to the particular merits of each case. You must not take irrelevant matters or circumstances into consideration when making decisions.

Making decisions and taking actions

2.5. You must ensure that decisions and actions are reasonable, fair and for the proper purpose and that parties involved in the development process are dealt with fairly.

2.6. You must ensure that no action, statement or communication between yourself and others (such as applicants, objectors, councillors and members of the public) conveys any suggestion of willingness to provide improper concessions or preferential treatment, or suggests that you are not bringing an open mind to the decision.

2.7. You should attend all briefings, meetings and other business of the planning panel as far as is possible, and allow the necessary time to prepare.

3. Conflicts of interests

General

3.1. A conflict of interests exists where there is an actual, potential, or reasonably perceived conflict between a panel member's private interests or other duties, and the impartial performance of their functions as a planning panel member.

An 'actual' conflict of interests is where there is a direct conflict between a member's duties and responsibilities and their private interests or other duties.

A 'potential' conflict of interests is where a panel member has a private interest or other duty that could conflict with their duties as a panel member in the future.

A 'reasonably perceived' conflict of interests is where a person could reasonably perceive that a panel member's private interests or other duties are likely to improperly influence the performance of their duties as a panel member, whether or not this is in fact the case.

3.2. Panel members must avoid or appropriately manage any conflicts of interests. The onus is on the individual panel member to identify a conflict of interests and take appropriate action.

3.3. Any conflicts of interests must be managed to uphold the probity of planning panel decision making. When considering whether or not a conflict of interests exists, panel members should consider how others would view their situation.

3.4. Private interests can be of two types: pecuniary or non-pecuniary.

3.5. A conflict of duties may also constitute a conflict of interest.

Management of conflicts

3.6. Where possible, the source of the conflict of interest should be removed. For example, by way of divestment of the interest / issue that is creating the conflict such as the sale of shares, or by severing the connection, for example resignation from a position in another organisation giving rise to the conflict or ceasing to provide services.

3.7. The overriding principle for managing conflicts of interests is early and complete disclosure to the chair. The onus for this disclosure lies with individual planning panel members.

3.8. Where the panel chair considers that an actual, potential or reasonably perceived conflict of interests has not been disclosed or appropriately managed by a panel member, the conflict may be considered by the chair, and wider panel if considered necessary after hearing submissions from the panel member. The chair will make a decision as to how to manage the situation, which can include determining that the panel member should step aside from the panel for that matter, and record reasons for that decision. In making the decision, the chair is to have regard to upholding the reputation of the planning panel. If a panel member fails to step aside where requested their comments or vote is not to be considered in the determination of the matter.

3.9. When the conflict of interest arises as a result of an interest of the chair, the deputy chair is to assume the chair's leadership role in the management of the conflict process.

Pecuniary interests

3.10. A pecuniary interest is an interest that a person has in a matter because of a reasonable likelihood or expectation of appreciable financial gain or loss to the person[2].

3.11. A person does not have a pecuniary interest in a matter if the interest is so remote or insignificant that it could not reasonably be regarded as likely to influence any decision that person might make[3].

3.12. A member has a pecuniary interest in a matter if the pecuniary interest is the interest of the member, the member's spouse or de facto partner or a relative[4] of the member, or a partner or employer of the member, or a company or other body of which the member, or a nominee, partner or employer of the member, is a member.

3.13. The obligation on planning panel members with respect to pecuniary interests are set out in clause 27 of Schedule 2 of the EP&A Act (attached at **Appendix A**). All planning panel members must comply with the requirements set out in this provision. In particular:

a. If a member has a pecuniary interest in a matter being considered or about to be considered at a meeting of a planning panel and the interest appears to raise a conflict with the proper performance of the member's duties in relation to the consideration of the matter, the member must, as soon as possible after the relevant facts have come to the member's attention, disclose the nature of the interest at or before a meeting of the planning panel.

b. After a member has disclosed the nature of an interest in any matter, the member must not, unless the Minister or the planning panel otherwise determines:

[2] The term 'pecuniary interests' adopted by this Code is based on the definition of that term in s.442(1) of the *Local Government Act 1993*.
[3] See s.442(2) *Local Government Act 1993* or if it is an interest referred to in s.448(a), (b), (e) or (g) of the *Local Government Act 1993*.
[4] The term 'relative' adopted by this Code is the definition of that term under s 3 of the *Local Government Act 1993*.

- be present during any deliberation of the panel with respect to the matter, or
- take part in any decision of the panel with respect to the matter.

Non-pecuniary interests

3.14. A non-pecuniary interest is a private or personal interest that a person has that may, for example, be based on a family or personal relationship, membership of an association, society or trade union or involvement or interest in an activity which may include an interest of a financial nature[5].

3.15. You should consider possible non-pecuniary interests that may arise while carrying out your duties as a planning panel member. Where possible, the source of potential conflict should be removed.

3.16. However, where this is not possible, if a member has a non-pecuniary interest in a matter and the interest appears to raise a conflict with the proper performance of the member's duties, the member must follow the procedures set out in clause 27 of schedule 2 of the EP&A Act in the same manner as if the interest was a pecuniary interest.

Conflicts of duties

3.17. A conflict of duties is a conflict between competing and incompatible public duties. For example, a conflict of duties arises where public officials hold more than one official position which requires them to address competing objectives or interests.

3.18. Panel members must ensure that any employment, business or other roles or activities they engage in will not:

a. conflict with, impair or otherwise prevent the full exercise of their functions as a planning panel member

b. involve using confidential information or resources obtained through their role as a planning panel member, or

c. discredit, bring into disrepute or disadvantage the reputation of the planning panel.

3.19. The following situations are considered to represent a conflict of duties for panel members (however this list is not exhaustive):

a. members who have current or previous involvement in a specific project, or site, that is subject of a DA for regional development, or a planning proposal that is subsequently reviewed by a planning panel, for example as a consultant,

b. councillor members where they have deliberated or voted on, or otherwise considered, a matter, and/or been present when such consideration is undertaken, in their role at council and that matter, or a related matter, subsequently comes before the panel. Matters which are considered to be related to a panel matter include, but are not limited to:

- a planning proposal for the site
- a voluntary planning agreement for the development or planning proposal
- a Masterplan for the development or planning proposal
- a Plan of Management for the development
- property matters related to the site, including leases, licences, purchase of land, disposal of land and management of lands
- legal matters related to the site, development or proposal

[5] The term 'non-pecuniary interest' as adopted by this Code is based on the meaning of that term under the Local Government Model Code of Conduct.

- consideration on whether to make a submission to the panel on a DA for regional development

c. council staff members that have:

- presented, or been present at a council meeting, that considers an assessment report for the planning panel, or a related matter as per section 3.19(b)
- been directly or indirectly involved in the preparation of the assessment report for the planning panel
- approved agenda items for reporting to council meetings or have been a signatory to correspondence in relation to matters that may come before a panel.

3.20. Members of a particular planning panel will have a close working relationship with each other. Therefore, to avoid a perception of bias, a planning panel member must not represent an applicant, council or submitter at a planning panel meeting for a planning panel of which they are a permanent member or have been used regularly as an alternate member. A planning panel chair must not represent an applicant, council or submitter at any planning panel meeting.

3.21. A planning panel member may not undertake any employment, business or other roles or activities, in relation to a DA, planning proposal or development site for which the member has participated in making a determination on as a panel member, for at least two (2) years following the determination.

3.22. Councillors who have deliberated or voted on a matter in their role at council and that matter, or a related matter, subsequently comes before the panel, are to stand aside from their place on the panel, and allow council's nominated alternative member to take their place, to avoid any perceptions of bias or pre-judgement.

3.23. A councillor must stand aside from their place on the panel if suspended as a councillor for any reason (including under sections 438I, 438W 440C, 440I, 482 or 482A of the *Local Government Act 1993*), for the period of that suspension. This is because the roles and responsibilities of a panel member are so similar to that of a councillor that the continuation of the suspended councillor on the panel during the period of his or her suspension would adversely affect the reputation of the panel.

3.24. A councillor must stand aside from their place on the panel if dismissed as a councillor due to misconduct under section 440B, 482 or 482A of the *Local Government Act 1993*. This is because the roles and responsibilities of a panel member are so similar to that of a councillor that the continuation of the dismissed councillor on the panel would adversely affect the reputation of the panel.

3.25. A conflict of duties may arise for council staff[6] (including general managers and other senior staff) who are nominated to sit as a member of the planning panel. In selecting its members to a planning panel, council should have regard to the conflict of duties that may be created for a person nominated to the planning panel if they were in any way responsible for or involved in the assessment and recommendation of a matter to be determined by the planning panel, approving agenda items for reporting to council meetings, or being signatory to correspondence in relation to matters that may come before a panel.

Council employees (including general managers and other senior staff) who are nominated to sit as a member of the planning panel must ensure that appropriate measures are in place to manage potential conflicts and ensure they will be able to comply with the requirements of this Code[7].

[6] A reference in this section to council 'staff' includes a reference to council contractors or consultants.
[7] In particular Part 6 of the Code.

Political Donations

3.26. Planning panel members should be aware that political contributions or donations may give rise to a pecuniary or non-pecuniary interest. It is the responsibility of planning panel members to determine in each instance whether such an interest arises and whether the provisions of this Code and clause 27 of schedule 2 of the EP&A Act applies.

3.27. Where a planning panel member makes a disclosure under clause 27(1)(b) of schedule 2 to the EP&A Act with respect to an interest which arises because of a political donation, the planning panel is required to take this into consideration in determining under clause 27(6) whether it is appropriate for the member to be present during any deliberations or take part in any decision with respect to the matter.

4. Recording declarations of interest

4.1. Planning panel members are required to complete and sign a declaration of interest form in relation to each matter which is considered by the panel, either before, or at the commencement of consideration of the matter.

4.2. Where any pecuniary or non-pecuniary interest in a matter before the planning panel has been disclosed by a member, whether declared before or at the commencement of the panel meeting, this will be noted in the panel's decision record , even when the member is not in attendance.

Records of all panel briefings and meetings are made available on the planning Panels website.

4.3. As a member of a government board or committee, all planning panel members are also required to adhere to the Department of Premier and Cabinet's Guidelines 'Conduct Guidelines for Members of NSW Government Boards and Committees' ("the DPC Guidelines").

In accordance with the DPC Guidelines, planning panel members are required to disclose interests which include positions and pecuniary interests in corporations, partnerships or other businesses that may be relevant to the activities of the planning panel.

These declarations will be required to be made by panel members on an annual basis. Taken together, schedule 2 of the EP&A Act and the requirements of the DPC Guidelines ensure that the pecuniary interest disclosure requirements for planning panel members are the same as those for local government councillors.

4.4. A register of declarations made by planning panel members, will be maintained by the Planning Panels Secretariat (secretariat), in accordance with the DPC Guidelines. Upon request, the register of declarations will be available for inspection at the secretariat during normal office hours.

5. Personal benefit

Personal dealings with council

5.1. Planning panel members may have reason to have private dealings with a council that is within the region where they are a planning panel member (for example as a ratepayer). Planning panel members must not expect or request preferential treatment in relation to any matter in which they have a private interest because of their role as a planning panel member. Planning panel members must avoid any action that could lead members of the public to believe that they are seeking preferential treatment.

Gifts and benefits

5.2. Planning panel members must not:

a. seek or accept a bribe or other improper inducement,

b. seek gifts or benefits of any kind,

c. accept any gift or benefit that may create a sense of obligation on your part or may be perceived to be intended or likely to influence you in carrying out your public duty,

d. accept any gift or benefit of more than token value, or

e. accept an offer of money, regardless of the amount.

5.3. A gift or benefit is any item, service, prize, hospitality or travel which has an intrinsic value and/or value to the recipient, a member of their family, relation, friend or associate.

5.4. Generally speaking token gifts and benefits include:

a. free or subsidised meals, beverages or refreshments provided in conjunction with:

i. the discussion of matters before the planning panel

ii. conferences, or

iii. social functions organised by groups.

b. invitations to and attendance at local social, cultural and sporting events,

c. gifts of single bottles of reasonably priced alcohol at end of year functions and public occasions, and

d. ties, scarves, coasters, tie pins, diaries, chocolates or flowers.

5.5. Gifts and tokens that have more than a token value include, but are not limited to, tickets to major sporting events, corporate hospitality at a corporate facility at major sporting events, discounted products for personal use, the frequent use of facilities such as gyms, use of holiday homes, free or discounted travel.

5.6. As a general rule, any gift from an applicant, objector or associate of an applicant or objector in relation to a matter to be determined by a planning panel would fall into a category referred to in paragraph 5.2(c) and therefore should not be accepted.

5.7. The planning panels secretariat is to maintain a register of gifts for each planning panel to ensure the receipt and disposal of gifts is conducted in an open and transparent manner. When offered a gift or benefit, planning panel members must inform the secretariat of the following information for the purposes of making a recording on the register of gifts:

- the person who made the offer and the date on which the offer was made
- whether or not you accepted the gift/benefit
- whether the gift or benefit was allocated to another person or body
- the value of the gift or benefit.

Planning panel members should also advise the planning panel chair of any such notification to the planning panels secretariat.

6. Relationship between planning panel members, council and council staff

Obligations of planning panel members

6.1. Section 2.27 of the EP&A Act provides that a planning panel is entitled:

a. to have access to, and to make copies of and take extracts from records of the council relevant to the exercise of the planning panel's functions
b. to the use of staff and facilities of the council in order to exercise the planning panel's functions
c. to any assistance or action by the council for the purposes of exercising the planning panel's functions.

All such requests for assistance will be made by the planning panel chair to the general manager (or such other staff member nominated by the general manager).

6.2. Planning panel members have a responsibility to promote and support an effective and co-operative working relationship with the council, general manager and council staff and contractors.

Inappropriate interactions

6.3. Planning panel members must not engage in inappropriate interactions when exercising functions as a planning panel member.

6.4. In relation to council staff[8], planning panel members must not:

a. approach, make requests of, make enquiries or issue instructions to council staff other than through the planning panels secretariat and in accordance with this Code
b. be overbearing or threatening to council staff
c. make personal attacks on council staff in a public forum
d. direct or pressure council staff in the performance of their work or recommendations they make, or
e. influence or attempt to influence staff in the preparation of assessment reports or other information to be submitted to the planning panel.

6.5. If a planning panel member is approached by any person about a development application that is to be determined by the planning panel, the planning panel member must not discuss the development.

6.6. The planning panels Operational Procedures recognises that there may be some circumstances where it is appropriate for the planning panel to be briefed by the applicant with council staff in attendance. Where this occurs, a record of the meeting, including attendees and matters discussed, will be made publicly available.

However, individual members of the planning panel must not hold private meetings, briefings, site visits or discussions in respect of the matter.

6.7. Where meetings, briefings or site visits occur panel members should not express any views that would indicate pre-judgement of the matter.

7. Relationship between planning panel members and others

7.1. Planning panel members must adhere to the Key Principles and General Conduct Obligations contained in this Code when dealing with others, including council staff, councillors, Department of Planning, Industry and Environment staff and the secretariat.

[8] A reference in this clause to council 'staff' includes a reference to council contractors or consultants.

8. Protecting and using information

8.1. Information must be handled in accordance with section 10.5 of the EP&A Act.

8.2. In addition to the obligations under section 10.5 of the EP&A Act, planning members must:

a. protect confidential information,

b. only release confidential information if you have authority to do so,

c. only use confidential information for the purpose it is intended to be used,

d. not use confidential information gained through your position as a planning panel member for the purpose of securing a private benefit for yourself or for any other person,

e. not use confidential information with the intention to cause harm or detriment to the planning panel or any other person or body, and

f. not disclose any information discussed during a confidential session of a planning panel.

8.3. When dealing with personal information, planning panel members must comply with the *Privacy and Personal Information Protection Act 1998*.

9. Use of public resources

9.1. Planning panel members may be provided with equipment and other resources to perform planning panel functions. All such resources are to be used only for planning panel purposes and in accordance with any guidelines or rules about the use of those resources.

10. Public comment/media

10.1. The planning panel chair is responsible for speaking to the media on behalf of the planning panel, to allow its decisions to be properly represented and communicated. The chair can authorise another planning panel member to speak to the media on behalf of the planning panel at any time. Other non-authorised members can speak to the media about planning panel matters however, in doing so, they do not represent the views of the planning panel.

11. Lobbying

11.1. All planning panel members must comply with the *NSW Lobbyists Code of Conduct* published on the Department of Premier and Cabinet's website (www.dpc.nsw.gov.au). The Lobbyists Code regulates contact between registered lobbyists and Government representatives and *M2014-13- NSW Lobbyists Code of Conduct* restricts the circumstances in which a lobbyist can be appointed to a NSW Government board or committee.

11.2. Members of the planning panel have a responsibility to consider the Lobbyists Code and declare if they could potentially be considered a lobbyist. The application of the Lobbyists Code then takes precedence for further action and decisions and would be monitored by the chair.

12. Breaches of this Code

Reporting suspected breaches

12.1. Planning panel members are required to report suspected breaches of the Code to the planning panel chair or the Minister.

12.2. Any other person may report a suspected breach of the Code under the planning panels' Complaints Handling Policy.

Reporting possible corrupt conduct

12.3. Planning panel members are subject to the *Independent Commission Against Corruption Act 1988* and the *Ombudsman Act 1974*. Planning panel members are urged to report suspected corrupt conduct, as well as maladministration and serious and substantial waste of public resources.

12.4. The *Public Interest Disclosures Act 1994* provides protection to public officials who voluntarily report suspected corrupt conduct. Access to a Public Interest Disclosure Officer can be arranged through the Department of Planning, Industry and Environment. The planning panel chair is under a duty to report to the Independent Commission Against Corruption (ICAC) any matter that they suspect on reasonable grounds concerns or may concern corrupt conduct[9].

12.5. Planning panel members, or any other persons, can also report directly to the following investigative bodies:

a. Corrupt conduct should be reported to the Independent Commission against Corruption (ICAC) [10],

b. Maladministration[11] should be reported to the NSW Ombudsman, and

c. Serious and substantial waste of public money should be reported to the NSW Auditor General.

Handling of suspected breaches

12.6. Suspected breaches of the Code will be handled in accordance with the planning panels' Complaints Handling Policy.

12.7. The planning panel chair may take such steps as s/he thinks appropriate to investigate and take action in respect of the alleged breach.

12.8. A person who is alleged to have breached the Code must be given:

a) the full particulars of the alleged breach[12]

b) an opportunity to respond to the allegations

c) the right to have a legal or other representative present during any meetings/discussions in respect of the matter.

12.9. Serious breaches of the Code may be referred to the Minister in respect of state members or the relevant council with respect to council nominees. Proven breaches of the Code may warrant removal from office.

12.10. The Minister may remove a planning panel state member from office at any time and without notice. The Minister must provide a written statement of the reasons for removing the member from office and make that statement publicly available.

[9] Section 11, ICAC Act.
[10] Section 10 of the ICAC Act allows any person to make a complaint to the Independent Commission Against Corruption about a matter that concerns or may concern corrupt conduct.
[11] Maladministration is defined in s 11(2) of the *Public Interest Disclosures Act 1994*
[12] These particulars should not include the details of the person who made the allegation.

12.11. The relevant council may remove its nominee/s from office at any time and without notice. The general manager of the applicable council must provide a written statement of the reasons for removing the member from office and make that statement publicly available. The council must also notify the planning panels secretariat.

12.12. The Minister may remove any member if the Independent Commission Against Corruption recommends that consideration be given to the removal of the member because of corrupt conduct by the member.

13. Acknowledgement of this Code

13.1. On appointment all planning panel members are required to acknowledge in writing that they will abide by the principles, obligations and requirements of this Code.

Appendix A

Extract from Schedule 2 of the *Environmental Planning and Assessment Act 1979*

27 Disclosure of pecuniary interests

(1) If:

(a) a member has a pecuniary interest in a matter being considered or about to be considered at a meeting of the planning body

(b) the interest appears to raise a conflict with the proper performance of the member's duties in relation to the consideration of the matter

the member must, as soon as possible after the relevant facts have come to the member's knowledge, disclose the nature of the interest at a meeting of the planning body.

(2) A member has a pecuniary interest in a matter if the pecuniary interest is the interest of:

(a) the member, or

(b) the member's spouse or de facto partner or a relative of the member, or a partner or employer of the member, or

(c) a company or other body of which the member, or a nominee, partner or employer of the member, is a member.

(3) However, a member is not taken to have a pecuniary interest in a matter as referred to in subclause (2) (b) or (c):

(a) if the member is unaware of the relevant pecuniary interest of the spouse, de facto partner, relative, partner, employer or company or other body, or

(b) just because the member is a member of, or is employed by, a council or a statutory body or is employed by the Crown, or

(c) just because the member is a member of, or a delegate of a council to, a company or other body that has a pecuniary interest in the matter, so long as the member has no beneficial interest in any shares of the company or body.

(4) A disclosure by a member at a meeting of the planning body that the member, or a spouse, de facto partner, relative, partner or employer of the member:

(a) is a member, or is in the employment, of a specified company or other body, or

(b) is a partner, or is in the employment, of a specified person, or

(c) has some other specified interest relating to a specified company or other body or to a specified person,

is a sufficient disclosure of the nature of the interest in any matter relating to that company or other body or to that person which may arise after the date of the disclosure and which is required to be disclosed under subclause (1).

(5) Particulars of any disclosure made under this clause must be recorded by the regional panel in a book kept for the purpose and that book must be open at all reasonable hours to inspection by any person on payment of the fee determined by the planning body.

(6) After a member has disclosed the nature of an interest in any matter, the member must not, unless the Minister or the planning body otherwise determines:

(a) be present during any deliberation of the panel with respect to the matter, or

(b) take part in any decision of the panel with respect to the matter.

(7) For the purposes of the making of a determination by the planning body under subclause (6), a member who has a direct or indirect pecuniary interest in a matter to which the disclosure relates must not:

(a) be present during any deliberation of the panel for the purpose of making the determination, or

(b) take part in the making by the panel of the determination.

(8) A contravention of this clause does not invalidate any decision of the planning body.

(9) This clause extends to a council nominee of a Sydney district or regional planning panel, and the provisions of Part 2 (Duties of disclosure) of Chapter 14 of the *Local Government Act 1993* do not apply to any such nominee when exercising functions as a member of the panel.



Engagement Outcomes Report

October 2024

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Summary

This engagement was in response to Council resolution C0524(1) Item 49 of 21 May 2024: Planning Reforms and Inner West Council LEP. The consultation period was from 21 June to 6 August 2024.

1,221 responses were received through the YSIW page survey, email, and interactive map. While we heard from a wide range of demographic groups, renters, those younger than 30, and those older than 80 were underrepresented in our survey results when compared with Census data for the Inner West.

A five-point unipolar scale was used for several questions to identify the level of agreement to the planning principles put forward by Council. Such a scale is used regularly by Council to understand community views across a range of diverse consultations including the independently managed community satisfaction survey. The unipolar scale allows respondents to identify where their view sits along the scale rather than pick from two opposing views. It also gives respondents the option of responding "don't know/unsure". It is Council's usual practice to use this type of scale to measure levels of participant support, satisfaction, or agreement, as it seeks to understand the nuance of community opinion rather than polarised viewpoints.

There was general support from the community for the following planning principles:

- Council support of the NSW Government's Policy that 30% of all new housing on government owned land be maintained in perpetuity as public housing (77%)
- Incentives for conversion of land owned by religious and faith-based organisations to social and affordable housing (75%)
- Setting a target of 1000 more new public housing dwellings being delivered on government and Inner West Council owned land (72%)
- Deliver local place-based planning controls (70%)
- Protecting and expanding existing employment lands to attract increased employment and new industries (64%)
- Upzoning of precincts around the following train stations
    - Ashfield (75%)
    - Marrickville (71%)
    - Dulwich Hill (66%)

Note: General support refers to those who answered agree completely, very much agree, or moderately agree to the relevant survey question.

While there was general support from the community for the following planning principles; many in the community did not agree with the statement at all:

- Increased densities in town centres and on main streets through shop top housing should be investigated in order to protect high value heritage conservation areas from upzoning (66% agree; 20% do not agree at all)
- Increased residential densities around light rail stations (65% agree; 21% do not agree at all)
- High value heritage conservation areas should be protected from upzoning (62% agree; 28% do not agree at all)
- Providing density incentives to amalgamate lots in areas identified for upzoning (59% agree, 25% do not agree at all)
- Government owned land in the Bays Precinct should be the focus of upzoning prior to consideration of any additional rezoning in adjoining suburbs (58% agree; 28% do not agree at all)
- Upzoning of precincts around the following train stations
    - Croydon (64% agree; 21% do not agree at all)

While there was majority support for increasing residential densities around light rail stations, support for specific stations ranged from 32-46%. The light rail stations where over 40% of respondents agreed with increased residential densities included Leichhardt North, Lilyfield, Dulwich Hill, Rozelle Bay, and Taverners Hill.

Although 61% of the respondents agreed with incorporating the State Government's Pattern Book for improved design into Council's planning controls; 14% did not agree at all and 16% did not know or were unsure.

While 48% of respondents agreed with Council's support of Haberfield heritage conservation area being listed on the State Heritage Register and excluded from any change in density, 36% of respondents did not agree at all.

The additional infrastructure and community facilities identified as most required to support the higher population resulting from increased housing supply in the Inner West were:

- Open and recreational spaces
- Public transport
- Schools
- Active transport

The key themes that Council should consider when developing planning controls include:

- need to locate new housing and additional density near transport hubs and provide adequate infrastructure for new residents
- need for a range of diverse and accessible housing typologies to be provided
- provision of public, social, and affordable housing
- protect heritage character vs reviewing heritage restrictions
- provision of on-site parking spaces in new developments to ensure that competition for on street parking is not increased
- sustainability including provision for EV charging in new developments and additional tree canopy

Other key considerations identified were:

- adverse impact on existing residents / neighbourhood character
- need to improve development assessment and strategic planning processes including community engagement
- improve quality of buildings / more regulation.

Background

The National Housing Accord was developed to respond to the current housing crisis and requires the NSW Government to work in collaboration with councils to deliver planning and land use reform that will make housing supply more responsive to demand over time and deliver at least 314.000 new homes by mid-2029. Inner West Council has been set a target of building 7,800 new homes by June 2029.

The NSW Government announced two housing reforms in December 2023 to assist with the delivery of additional housing:

- Transport Oriented Development (TOD) Program that includes four railway stations in the Inner West – Croydon, Ashfield, Dulwich Hill, and Marrickville.

- Diverse and Well-Located Housing Program (or Low and Mid-Rise Housing (LMR)) that has broader application across the Inner West. Stage 1 of this reform was introduced on 1 July permitting Dual Occupancy development in the R2 zone subject to a range of exclusions.

Inner West Council was successful in achieving a deferral from the implementation of these housing reforms within the Inner West until December 2024, to provide Council the opportunity to complete local planning work.

At the Inner West Council Meeting of 21 May 2024, the following Notice of Motion was endorsed that outlined principles for consideration during the preparation of plans to address the NSW Government Housing Reforms.

C0524(1) Item 49 Notice of Motion: Planning Reforms and Inner West Council LEP

- *The proposed principles of the Local Environmental Plan will include:*
    a. *delivering place-based planning through local planning controls;*
    b. *upzoning of precincts around Ashfield, Croydon, Dulwich Hill, and Marrickville train stations;*
    c. *support for increased densities on main streets through shop top housing in order to protect high value heritage conservation areas from upzoning;*
    d. *providing density incentives for the amalgamation of lands in areas identified for upzoning;*
    e. *increased residential densities around light rail stations;*
    f. *the finalisation of the Parramatta Road Corridor Stage 1 program through the rezoning of parts of Leichhardt, Taverners Hill and Kings Bay precincts;*
    g. *support for the suburb of Haberfield being listed on the State Heritage register and being excluded from upzoning;*
    h. *support for the Master Planning of the Bays Precinct with dwelling targets to be determined on Government owned land prior to consideration of any additional rezoning in adjoining suburbs;*
    i. *support for the NSW Government policy of 30% of all new housing on government owned land to be maintained in perpetuity as public housing;*
    j. *setting a target of 1,000 or more new public housing dwellings to be delivered on State Government and Council owned land;*
    k. *incentives for the conversion of land owned by religious and faith-based organisations for social and affordable housing;*
    l. *progression of the new Special Entertainment Precincts which Council is currently undertaking consultation on;*
    m. *protecting and expanding existing employment lands to attract increased employment and new industries; and*
    n. *incorporating the State Government's Pattern Book for improved design into Council's planning controls.*
5. *That Council undertake community consultation and engagement on the principles of the Local Environmental Plan.*

This resolution is the primary impetus for the engagement program that is the subject of this engagement outcomes report.

How we promoted engagement

Council distributed a flyer outlining the principles:

- By letterbox drop to every property in the Inner West, being 118,698 properties
- By post to every property owner who resided outside the Inner West, being approximately 21,000 letters. These included State Government agencies and private owners

The flyer directed interested community to the Your Say Inner West - Principles for Planning website:
https://yoursay.innerwest.nsw.gov.au/principles-planning-inner-west

The Your Say page provided:

- Background information
- A document library of relevant information
- A timeline of key events to date



How we collected feedback

Four methods were provided for feedback, queries, and responses:


INTERACTIVE MAP


SURVEY


TELEPHONE


EMAIL

These methods resulted in approximately 40 calls and 37 emails. Nine responses related to specific sites that the participant would like to develop. Two responses made by organisations (Save Dully and the Australian Conservation Foundation) did not relate specific sites.

During the engagement period the Your Say page had:

- 5,145 visits
- 3,284 visitors
- 1,184 contributions
- 904 contributors

These 904 contributors:

- Completed 924 surveys
- Identified 260 map pins with an addition 448 likes to pin comments

Of the visitors – 514 had used Your Say Inner West previously and 2,526 were first time users.

People could pin the interactive map with respect to four topics:

- *Housing – areas you think have opportunities for housing* – 145 pins
- *Ideas – Bid ideas or opportunities for improvement* – 63 pins
- *Improve – Issues or challenges facing the Inner West* – 44 pins
- *Research – Places or buildings important to the community* – 8 pins

Overall, 260 map pins were uploaded from a total of 84 contributors.

Who did we hear from?

Online survey

Council gathers basic demographic information as part of the participant registration online at Your Say Inner West. We received 924 responses through the online survey.

The following table compares the demographic data of respondents who completed survey against the demographic data of Inner West LGA from the 2021 census. This comparison provides an understanding of whether we heard from a representative group of our local community.

Demographic characteristics	Who we heard from	Our community	Trend
Sex:			
• male	54%	49%	^
• female	39%	51%	v
• non	1%	Not counted	NA
• non-binary	1%	Not counted	NA
• prefer not to say	5%	Not counted	NA
Age:			
• Under 18 (ABS group includes 19-year olds)	0.5%	15%	v
• 18-24	5%	10%	v
• 25-29	5%	9%	v
• 30-39 (30-34 are the largest group)	22%	19%	^
• 40-49	22%	15%	^
• 50-59	19%	13%	^
• 60-69	17%	9%	^

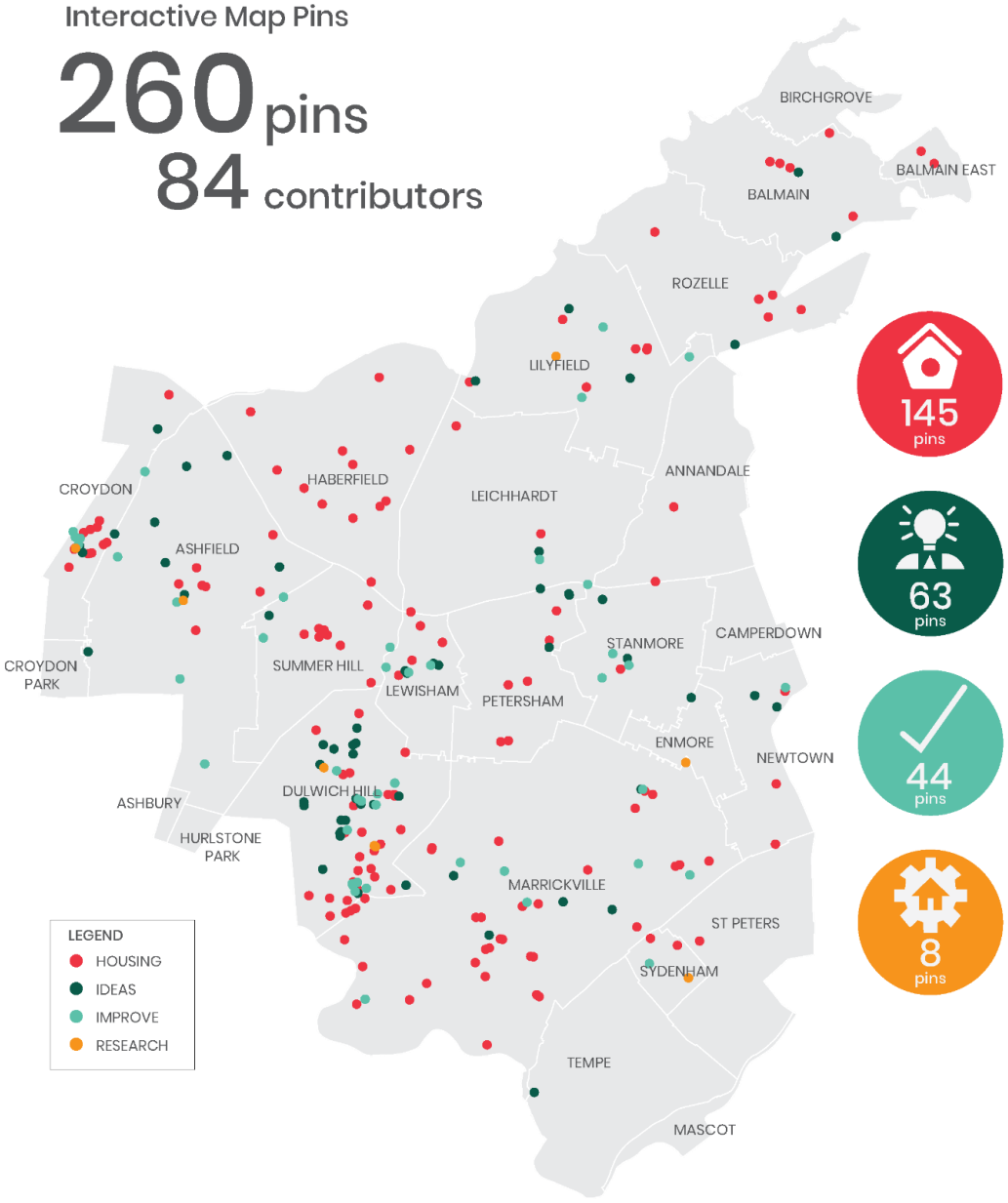
• 70-79	8%	6%	^
• Over 80	1%	4%	v
Tenure:			
• own their home outright	33%	24%	^
• have a mortgage	44%	28%	^
• are renting	15%	43%	v
• live in social housing	0.3%	3%	v
• occupied rent free	1%		NA
• prefer not to say	7%		NA
Do you identify with any of the following?			
• I am Aboriginal and/or Torres Strait Islander	1%	1%	=
• I live with disability	6%	4.8%	^
• I am of Culturally and Linguistically Diverse background	15%	2.5%	^
• I prefer not to answer	13%		NA
• None of the above	67%		NA

Connection to the Inner West	
• I live here	89%
• I work here	21%
• I am a business owner	8%
• I am a ratepayer but live elsewhere	3%
• I prefer not to say	3%
• Other	4%

Interactive Map Pins

260 pins

84 contributors

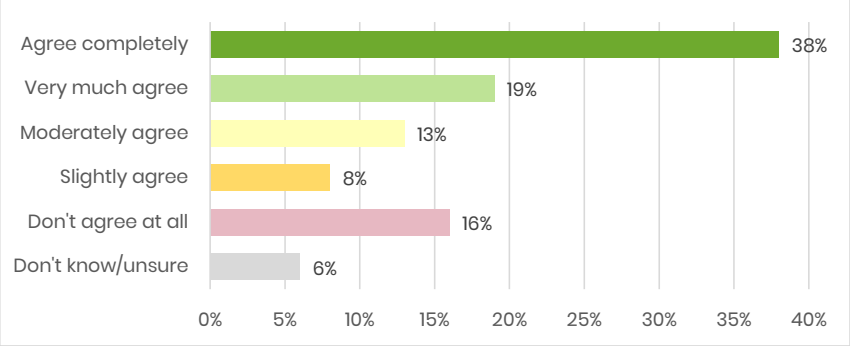


What we heard

Survey

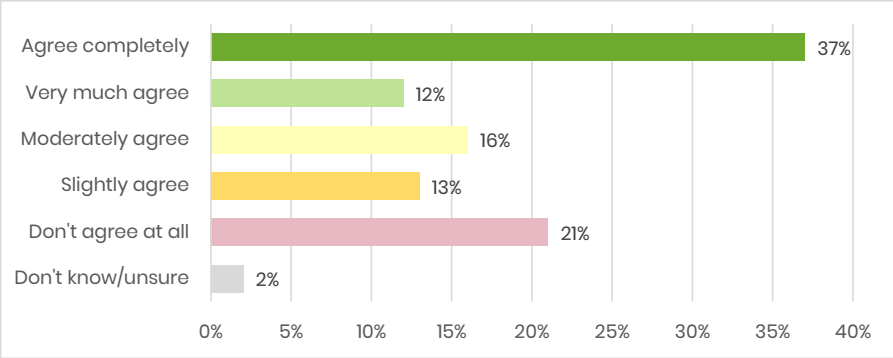
The survey asked the following questions to which participants could indicate their level of agreement.

Do you agree that Inner West Council should deliver local place-based planning controls?



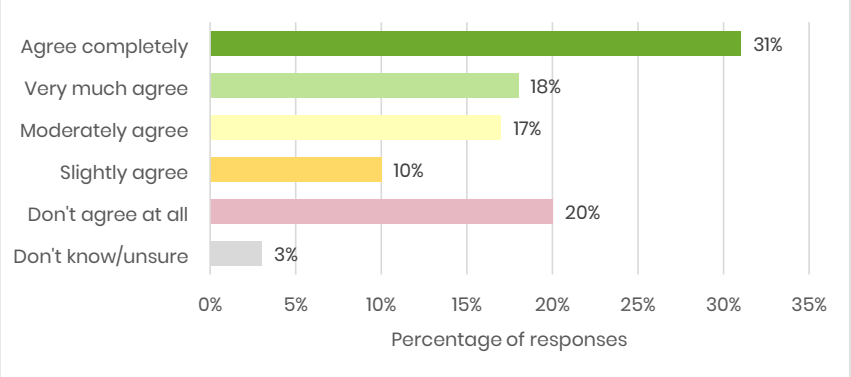
Council officer's response: The support to deliver local place-based planning controls is noted and will inform the future planning controls including amendments to LEP and DCP for housing investigation areas.

Do you agree with increased residential densities around light rail stations?



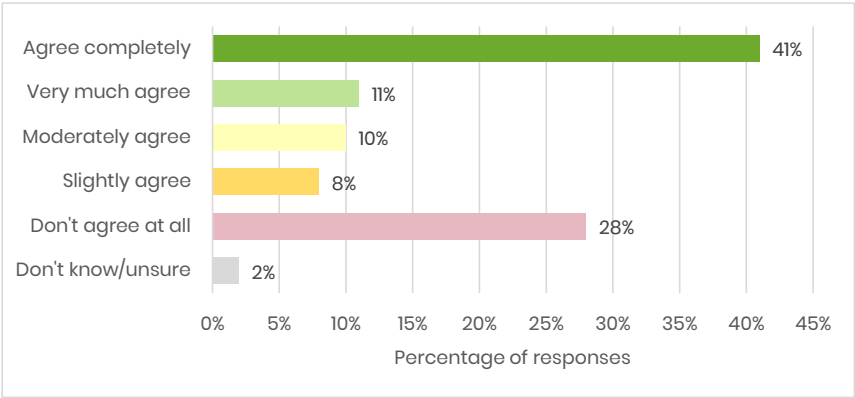
Council officer's response: 65% of submissions support the delivery of increased residential densities around light rail stations. This support is noted and will inform future Council-led housing investigation work. The light rail station areas are affected by the NSW Government's proposed Low and Mid Rise (LMR) Housing Reforms which are intended to be finalised by late 2024. Council is currently awaiting advice from NSW Government regarding how these reforms would apply in the Inner West.

Do you agree that increased densities in town centres and on main streets through shop top housing should be investigated in order to protect high value heritage conservation areas from upzoning?



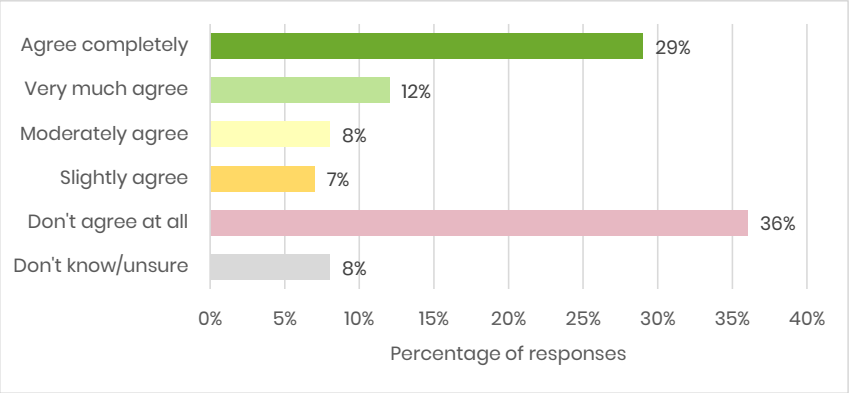
Council officer's response: 66% of submissions support the delivery of increased residential densities around town centres and on main streets through shop top housing in order to protect high value heritage conservation areas from upzoning. This support is noted and will inform future Council-led housing investigation work. Similar to light rail areas, the areas surrounding the town centres are affected by the NSW Government's proposed Low and Mid Rise (LMR) Housing Reforms which are intended to be finalised by late 2024. Council is currently awaiting advice from NSW Government regarding how these reforms would apply in the Inner West.

Do you agree that high value heritage conservation areas should be protected from upzoning?



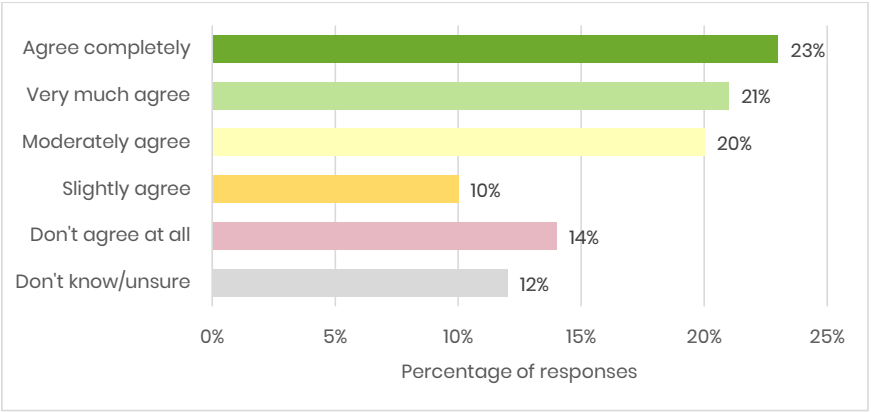
Council officer's response: 62% of submissions agree that high value heritage conservation areas should be protected from upzoning whereas 28% don't agree with this principle. Balancing conservation of high-value heritage areas with provision of additional density and housing opportunities will be considered as part of future Council-led housing investigation work.

Do you agree with Council's support of the Haberfield Heritage Conservation Area being listed on the State Heritage register and excluded from any change in density?



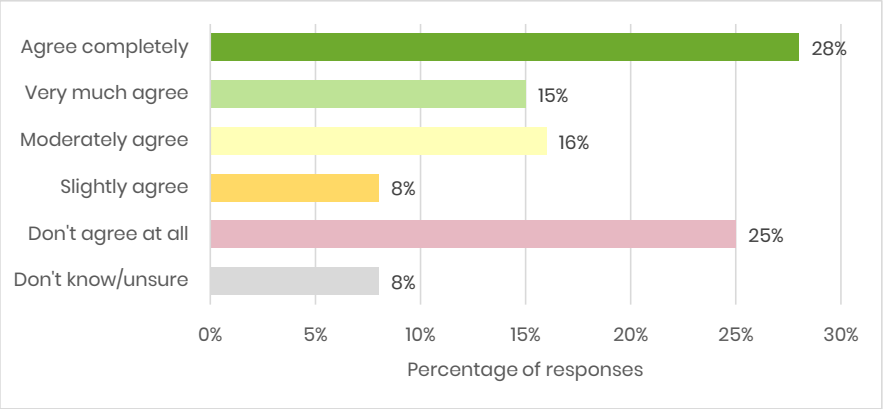
Council officer's response: Council submitted its nomination to the Heritage Council to list Haberfield on the State Heritage Register as a result of the 2017 Council resolution and related detailed community engagement as undertaken in 2021. Council was informed in February 2023 by the State Heritage Register Committee that the nomination will not be progressed as there was an ongoing review being undertaken of the Heritage Act 1977.

Do you agree with protecting and expanding existing employment lands to attract increased employment and new industries?



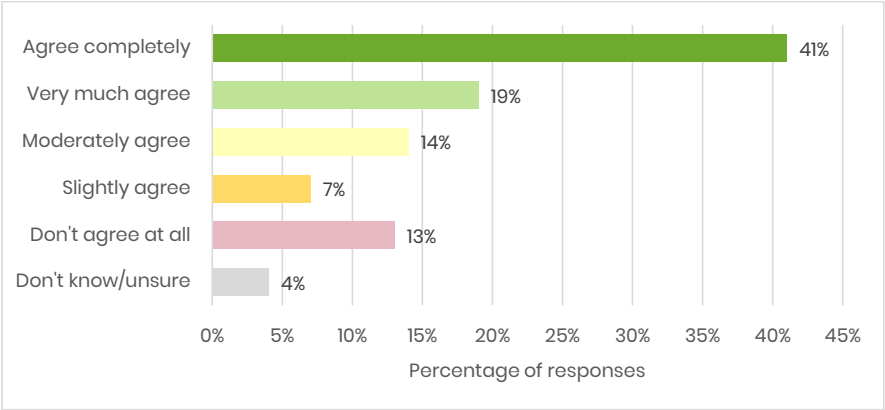
Council officer's response: 64% of the submissions support the principle of protecting and expanding existing employment lands to attract increased employment and new industries. This support is noted and will inform Council's future work relating to the update of the Employment & Retail Lands Strategy.

Do you agree with providing density incentives to amalgamate lots in areas identified for upzoning?



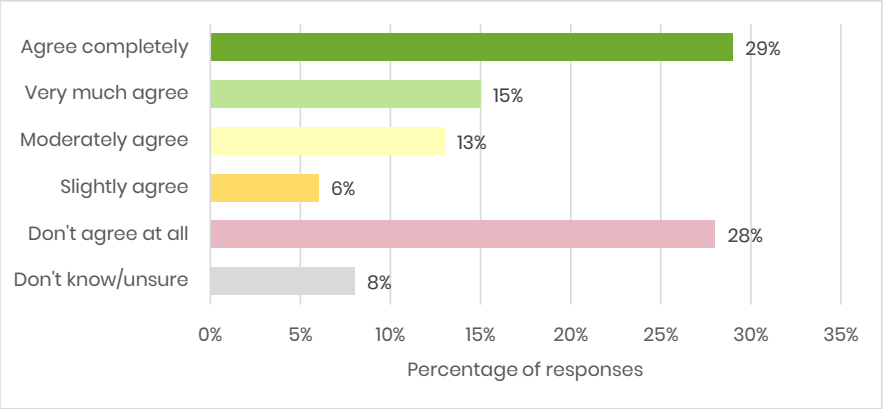
Council officer's response: 59% agree with providing density incentives to amalgamate lots in areas identified for upzoning while 24% don't agree with this principle. The application of this principle depends on the context, and this will be considered as part of future Council-led housing investigation work.

Do you agree with incentives for the conversion of land owned by religious and faith-based organisations to social and affordable housing?



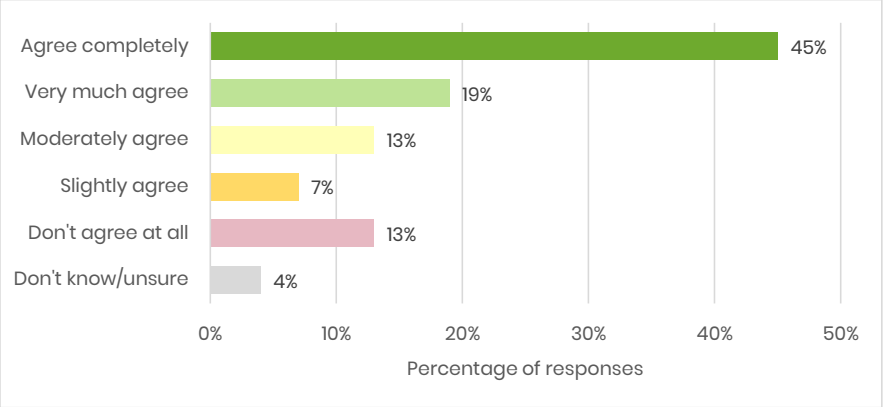
Council officer's response: The majority of submissions support the conversion of land owned by religious and faith-based organisations to social and affordable housing. Council will continue to collaborate with faith-based organisations to provide social and affordable housing.

Do you agree that Government owned land in the Bays Precinct should be the focus of upzoning prior to consideration of any additional rezoning in adjoining suburbs?



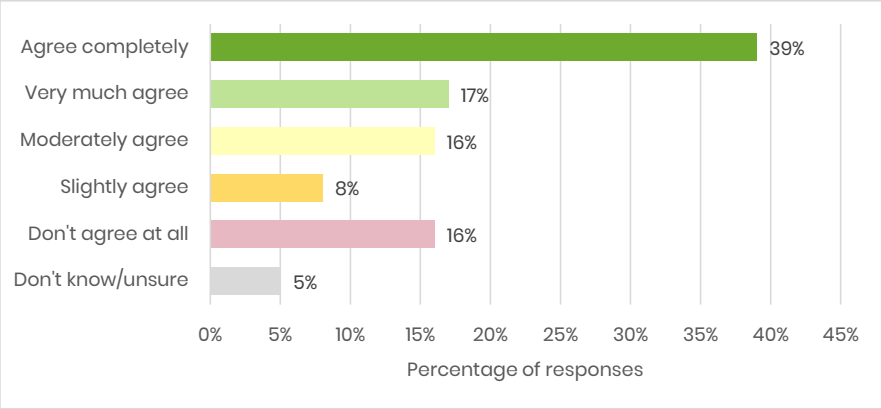
Council officer's response: The planning of Bays Precinct is being led by Placemaking NSW/ State Government as part of Transit Oriented Development (TOD) – 1 Accelerated Precincts and is expected to be finalised in 2025. Council will continue to advocate to NSW Government that Government owned land in the Bays Precinct should be the focus of upzoning prior to consideration of any additional rezoning in adjoining suburbs. Council-led housing investigation work will exclude the consideration of suburbs adjoining Bays Precinct until such time that NSW Government has finalised the TOD 1 – Bays Precinct.

Do you agree with Council's support of the NSW Government's Policy to provide 30% of housing on government owned land to be maintained in perpetuity as public housing?



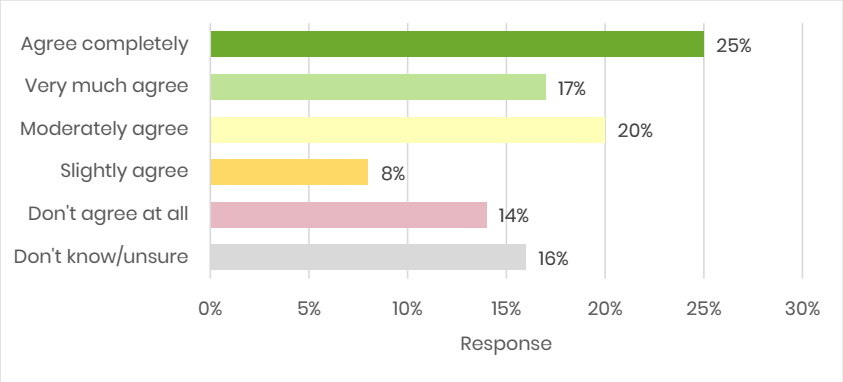
Council officer's response: The high level of support for the NSW Government policy of 30% of all new housing on government owned land to be maintained in perpetuity as public housing is noted. Council will continue to advocate to NSW Government for new housing on government owned land in the Inner West to include 30% public housing.

Do you agree with setting a target for 1,000 more new public housing dwellings being delivered on Government and Inner West Council owned land?



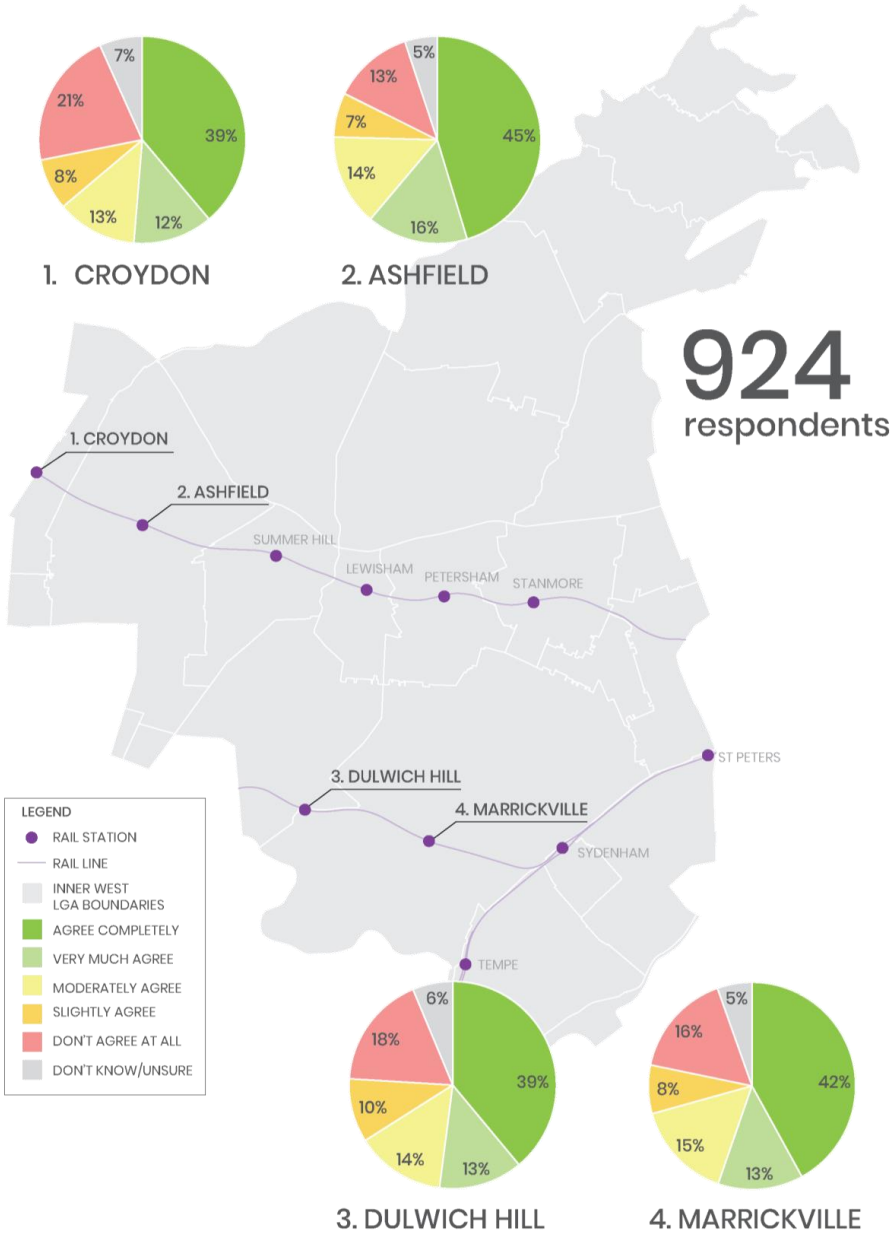
Council officer's response: 71% support setting a target for 1,000 more new public housing dwellings being delivered on Government and Inner West Council owned land. This will be considered as part of the future plans for Council owned sites. Council will also continue to advocate to NSW Government to maximise public housing on government owned land. In addition, Council will receive some affordable housing units through the affordable housing contribution schemes as part of the new planning controls.

Do you agree with incorporating the State Government's Pattern Book for improved design into Council's planning controls?



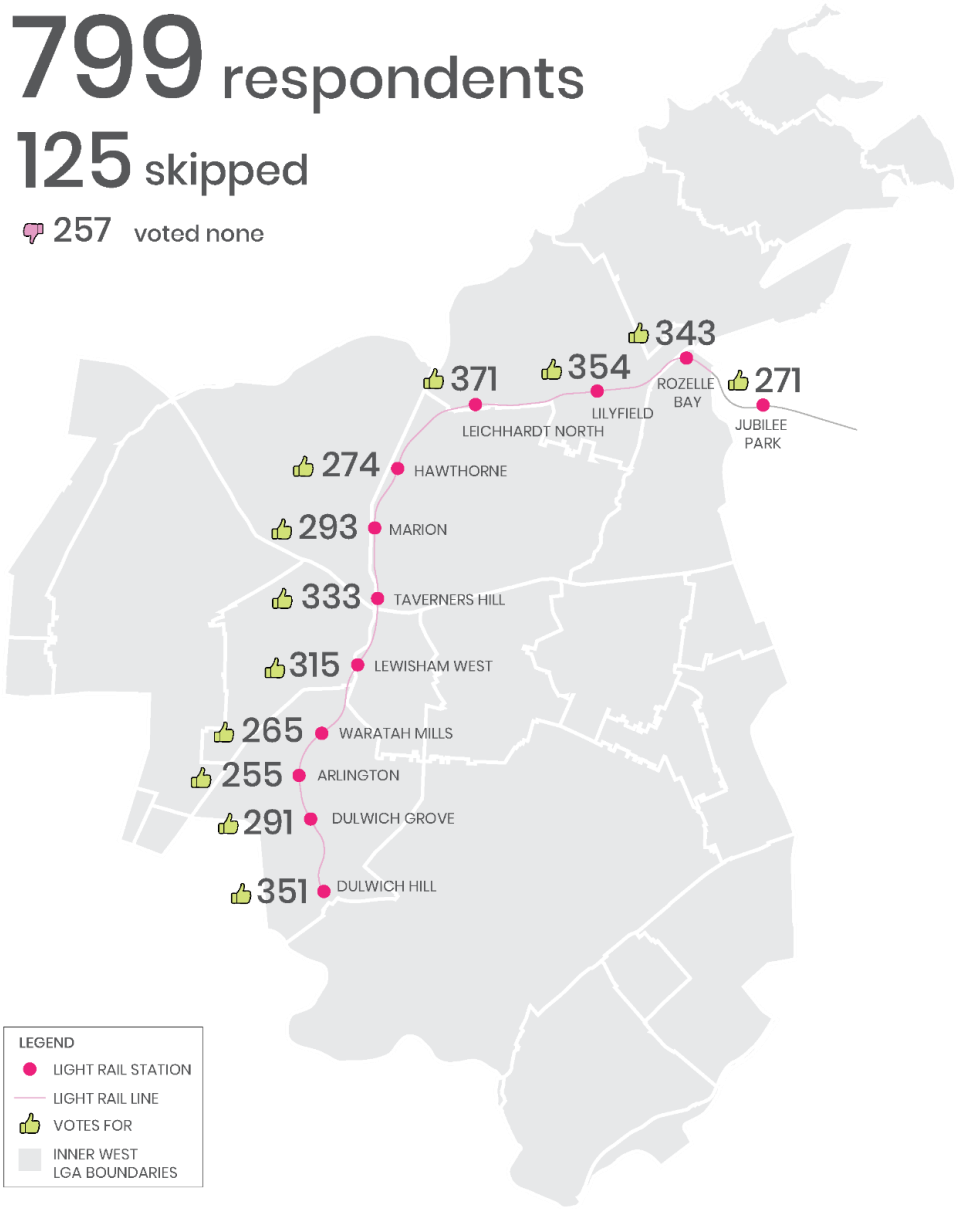
Council officer's response: The preparation of the Pattern Book is being led by State Government and is expected to be released in 2025.

Do you agree with upzoning of precincts around the following train stations? (Ashfield, Croydon, Dulwich Hill, Marrickville)

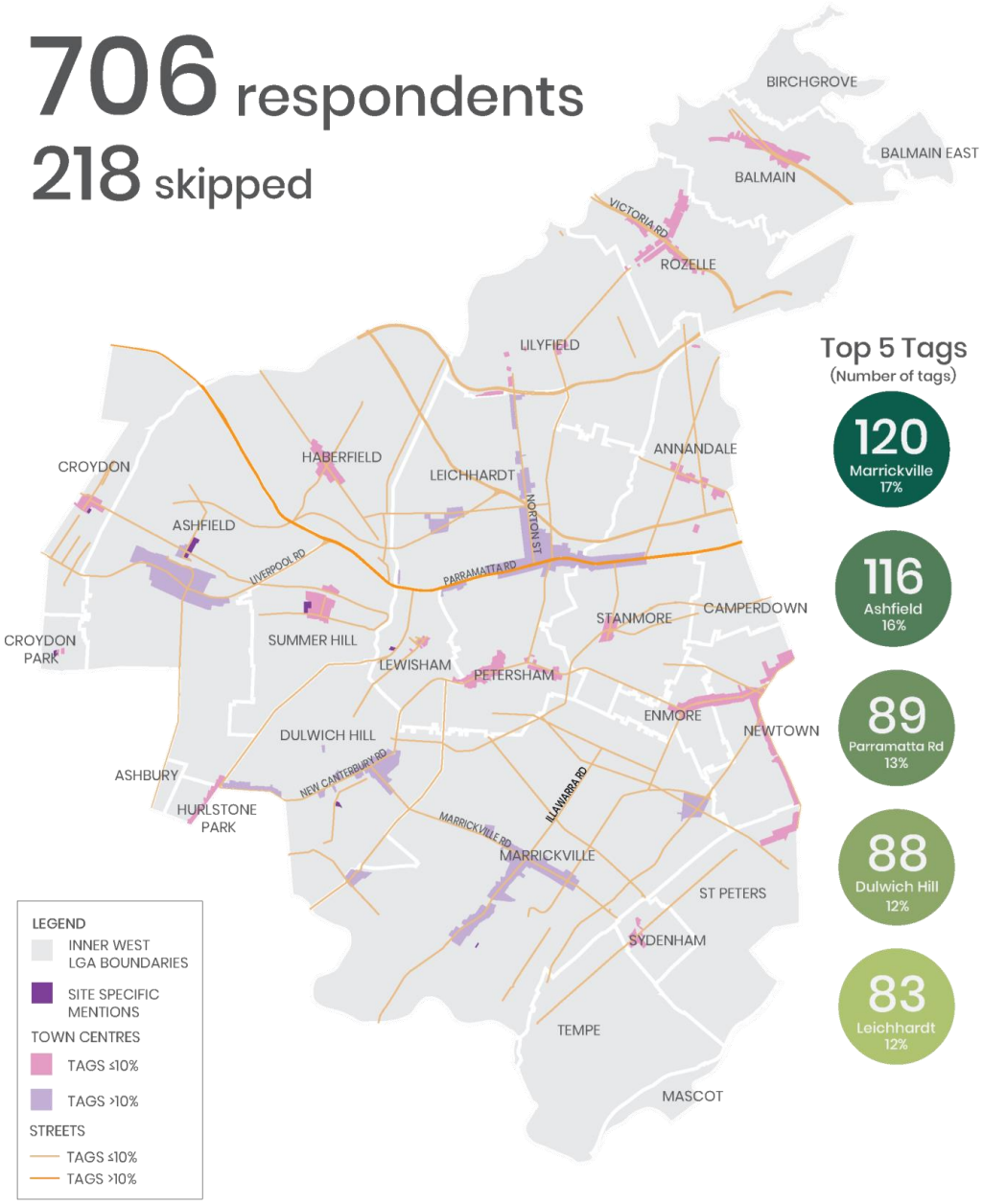


The survey and interactive map also asked participants to indicate areas where they considered that densities should be increased.

Did you have any light rail stations in mind where residential densities should be increased?



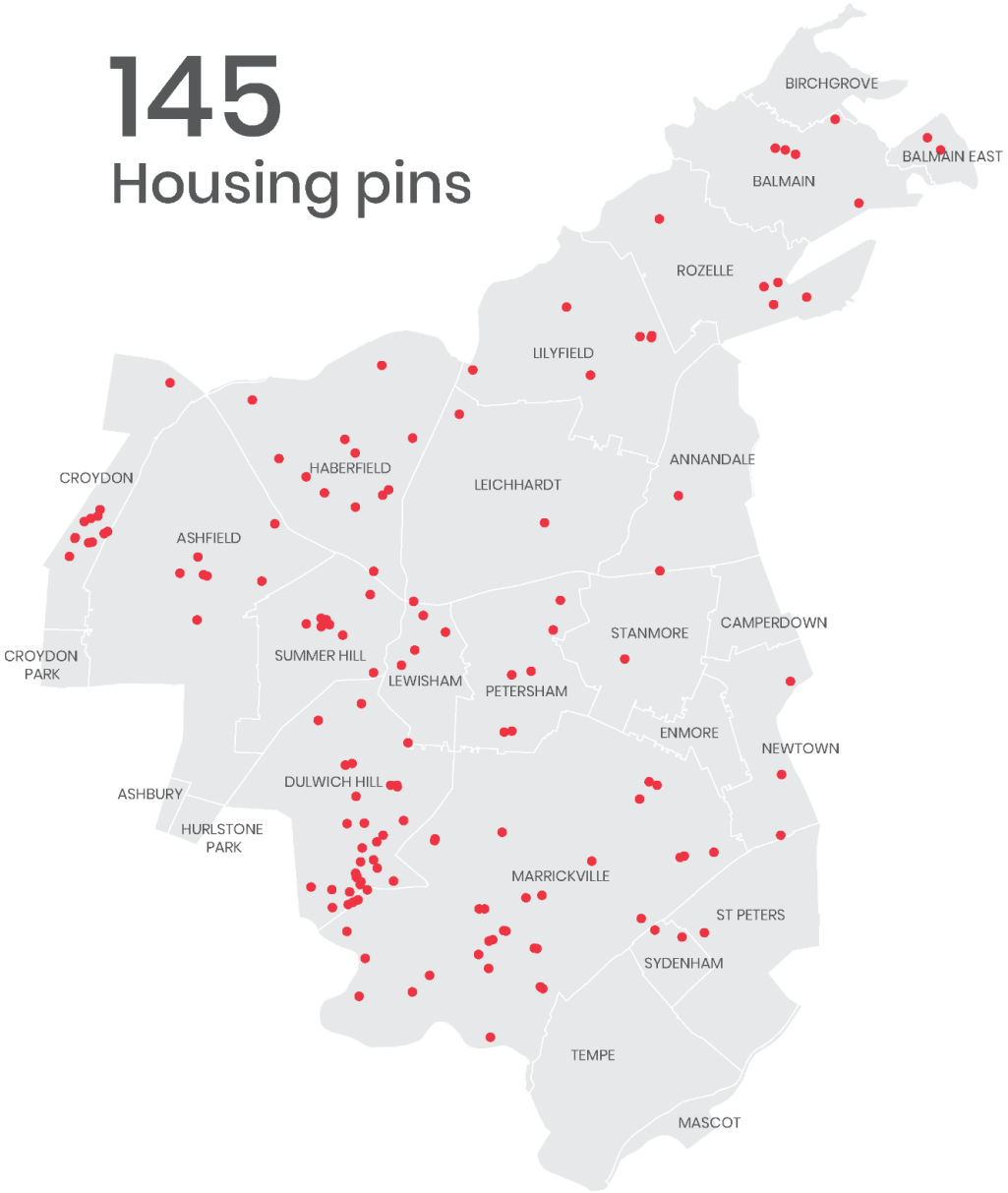
Which town centres or main streets do you think are appropriate for increased densities through shop top housing?



Interactive Map

145 pins related to areas that people identified as having opportunities for housing.
The locations identified for additional housing are identified on the map below.

145
Housing pins



Key themes raised in the responses

In total 1,221 responses were received through the YSIW page survey, email, and interactive map. The tables below themes responses gathered by email, on the interactive map, and the from open ended survey questions.

As part of the survey, Council asked the following four open ended questions to which participants could respond with free text.

- *What additional infrastructure is required in these areas to support the higher population resulting from increased housing supply?* (755 responses)
- *Are any additional council facilities needed to for future residents if additional housing is built in this area?* (555 responses)
- *What other matters do you think we need to consider when preparing planning controls?* (721 responses)
- *Do you have any further comments?* (521 responses)

Infrastructure and Community Facilities

The table below outlines the additional infrastructure and community facilities that respondents identified as being needed to support the additional population that would result from increased housing supply.

Infrastructure/Community facilities	# of times raised
Open and recreational spaces	**637**
Public transport	**448**
Schools	**321**
Active transport	**303**
Healthcare – hospitals and medical centres	**137**
Roadworks	**136**
Water and electricity utilities	**95**
Libraries	**88**
Affordable and social housing	**79**
Childcare centres	**69**
EV charging	**65**
Waste management	**62**
Community centres	**43**
Stormwater and drainage	**36**
Police and emergency services	**32**
Creative spaces and facilities	**28**
Community gardens	**25**
Council and commuter carparks	**15**

Public toilets	**14**
Community facilities – not specified	**2**

Key themes for consideration when planning

Key issue (# of times raised)
Support housing development and density (486) • Concentrate development in specific areas and precincts, close to existing infrastructure • Near transport hubs such as light rail and train stations • Mixed, diverse, and accessible housing for different life stages, including larger family-sized apartments and smaller units for downsizers • Spread development more fairly and evenly across whole of LGA • To address the housing shortage and affordability crisis, particularly for younger people • To address the need for public or social housing
Protect local heritage character (274) • Development should not have an adverse impact on existing heritage conservation areas • Development should not have an adverse impact on established pattern of period houses and streetscape character
Ensure amenity and high quality, sustainable design in new development (266) • Architectural design should reflect the character of existing buildings in the surrounding area • Incorporate local architectural styles into new developments • EV charging facilities in new buildings • Use of sustainable materials and best practice design
Parking (247) • More parking for residents • New developments provide sufficient off-street parking • Provide on-street residential parking schemes for existing residents • Protect parking for local businesses in local centres

Limit increases in density (176) • As it would result in adverse impacts on existing residents and local neighbourhood, predominantly low scale, single-storey areas • Lack of existing infrastructure to support new development • Developers forcing out existing residents from local neighbourhoods
Improve development assessment and strategic planning process (117) • Existing processes not effectively managing development and failing to address the housing needs adequately • State government should take a more active role and ensure councils better align with community needs • Council should manage process that aligns with both local community needs and State government objectives • More local input into planning decisions • Pattern book may lead to producing generic development outcomes • Planning authorities to provide examples of successful development projects to guide current efforts and build confidence in the planning process
Preserve natural environment (113) • Provide additional landscaping to improve local biodiversity and for cooling • Protect existing trees and increase the canopy cover
Review/ ease heritage restrictions (100) • Existing heritage restrictions used to block new development • Need to balance heritage protection with demand for new housing • Allow modifications to heritage homes to increase density while maintaining heritage character
Identified areas to consider for redevelopment (93) • Repurposing vacant and underutilised properties • Vacant shopfronts, or floor above existing shops in local villages • Government owned land for public or social, and affordable housing • Redeveloping car parks, golf courses, and underutilised factory buildings
Improve community engagement processes (92) • Survey biased towards obtaining agreement • Calls for more engagement, and open consultation
Improve building inspection/regulation to ensure quality of builds (45) • Greater scrutiny of private certifying authorities • Improving existing regulations to provide accountability by developers and approving authorities
Support economic development and vibrant main streets (141) • Programs required to improve shopfronts in local villages centres • Encourage a greater variety of retail and other services in villages centres • Maintain employment lands for light industries and urban services to support local population
Limits on car parking (38) • Set maximum car parking rates, implement car share initiatives • Minimise on-street parking congestion and improve traffic flow • Reduce car dependency and support pedestrian friendly streets and sustainable transport (20) • Remove minimum parking requirements to reduce cost of new development (4)
Ensure feasibility (24) • Proposed densities needing to be feasible for development to occur

Next Steps

The outcomes of this engagement will inform the Council-led housing investigation work currently being undertaken for the Transit Oriented Development (TOD) precincts of Ashfield, Croydon, Marrickville and Dulwich Hill. The NSW Government has set a deadline of December 2024 for submission of an alternative masterplan. Further, Council is also

investigating housing opportunities adjacent to the light rail stations close to TOD precincts (i.e. Dulwich Hill, Arlington and Waratah Mills) to proactively consider the NSW Government's Low Mid Rise Housing Reforms.

Council's future housing investigation work will also consider the areas and themes raised by the community as part of this engagement.