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REPORTS FOR COUNCIL DECISION

C1020(1) Item 1   Use of Technology in Parking Management and Enforcement

INNER WEST

arrb SHAPING OUR TRANSPORT FUTURE

INNER WEST

Use of Technology in Parking Management and Enforcement 43-19

ARRB Project No.: APC 10011

Author: Michael Moses/Laurie Smith

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Final Report

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SUMMARY

BACKGROUND AND STATED GOALS

Inner West Council (Council) has resolved that Council officers investigate and report to Council on the introduction of new technology to operate their parking infrastructure. The resolution requires investigation and consideration of the following three key issues:

1. The use of technology in parking management and enforcement including:
2. The process to integrate such technology within Council's existing parking infrastructure.
3. A project plan which includes costings and timeframe to implement and deliver the technology.

Council have engaged the Australian Road Research Board (ARRB) to undertake a thorough investigation and report on the findings and recommendations.

CONTEXT

Integrated Transport Strategy

The technology platform recommended in this report supports the policy framework and recommendations developed in Council's draft Integrated Transport Strategy (ITS). The ITS recommends Council involvement in the rollout of new technology to ensure it benefits the community and Council should be aware of technology development, as well as be involved in trialling and testing to help shape best directions.

Public Domain Parking Policy

The draft Public Domain Parking Policy (PDPP) recognises parking schemes and controls need to be developed to better manage excessive demand and to balance competing demands for parking space in the public domain including on-street and in council managed carparks. It acknowledges time limits help to ensure parking turnover in shopping precincts, limit commuter parking in residential neighbourhoods and encourage alternative forms of sustainable transport use.

The technology recommended in this report provides the platform to manage Council's parking inventory more efficiently and effectively while also providing data to enable Council to make more informed policy decisions on parking in the public domain.

KEY FINDINGS

The key findings from the study are:

*   Council manage 75 off-street car parks with a total capacity of 3,232 parking spaces and have 310 existing on-street Pay and Display (PnD) parking meters installed throughout the LGA.
*   Council employ 40 parking officers and 9 rangers and 6 Companion Animal Officers in their enforcement division. The current method of enforcement is dated, labour intensive, inefficient and utilises minimal technology.
*   Council's current patrol frequencies and staffing levels are consistent with other LGAs using the visual on foot inspections and chalking method.

Current industry best practice used to manage parking in LGA's requires the establishment of an integrated technology platform which ideally includes:

*   Parking machines and access control (for off-street car parks).
*   Enforcement technology.
*   Bay monitoring (detection) technology.

- A Phone Application.
- Precinct guidance linked to a website and phone App to provide live streamed bay availability.
- 'Back of house' enforcement, administration and reporting systems.

There are three types of parking machines that can be used to manage both on-street and off-street parking:

- Pay and Display (PnD), where a ticket is purchased and displayed on the dashboard of the vehicle. This technology requires staff to constantly refill the machines with paper rolls.
- Pay by Bay (PbB), where a fee is paid to occupy a designated bay. PbB machines require curb side bay numbering and on-street bay delineation marking which needs to be maintained.
- Pay by Plate (PbP), where a fee is paid which is linked to a licence plate number. The driver is required to enter the licence plate accurately.

Less PbB and PbP machines are needed to manage the same number of bays compared with PnD as drivers are not required to return to their vehicle once they have paid.

TfNSW are the approving authority for all parking equipment to be installed on-street. Currently, they require all parking machines to be capable of accepting cash payments. However, there is an opportunity for Council to make application through Council's Traffic Committee to Transport for NSW for Cashless Pay Parking Trials pending updated legislation.

All credit/debit card readers incorporated in parking machines must be EMV and PCI compliant. The hardware and software requirements for compliance can change from year to year and the maintenance of EMV and PCI compliance can be costly post tender if not specified correctly.

There are two tested technology options that can be employed for bay monitoring:

- Bay sensors installed in the ground to detect occupied bays.
- CCTV camera surveillance, which consists of pole mounted cameras monitoring occupancy of bays.

Phone Applications can be used to:

- Pay for parking
- Manage permit parking.
- Provide precinct and bay finding guidance.
- Assist with enforcement and compliance.

The 'back of house' systems can be tailored to satisfy Council's requirements including:

- Generating and managing the issue of website E-permits such as Resident Parking permits.
- The introduction of seasonal, promotional, and discounted dynamic pricing.
- Integration with Council's finance and spatial data systems.
- Integration with Office of State Revenue NSW for the provision of penalty notices, processing and debt collection services.
- Reporting and data analytics.

RECOMMENDATIONS

ARRB recommends the following:

INTEGRATED TECHNOLOGY PLATFORM

Parking Machines for On-street and Off-street Parking

The PnD parking machines should be replaced with latest technology PbP parking machines. The installation of PbP technology will:

- Reduce the number of machines required from the existing 310 to 240.
- Provide customers with ticketless and frictionless access to off-street parking.
- Negate the need for consumables and labour costs associated with regular replenishment of receipt and ticket rolls.
- Enable integration with mobile LPR enforcement.
- Allow integration with the existing enforcement handheld devices.
- Be capable of providing trip origin and trip destination data.

Mobile LPR Enforcement

The PbP parking machines integrated with mobile LPR enforcement systems in on-street parking and off-street car parks car parks is the latest and most efficient, tested and proven technology available for parking management.

It is recommended a minimum of 2 mobile LPR camera systems are installed on Council vehicles and integrated with the PbP machines. Enforcement software used on smart phones connected to Bluetooth printers, in addition to the mobile LPR system, is the recommended solution.

Latest technology provides a successful read rate of licence plates while the vehicle is travelling at up to 50 kilometres per hour. Simultaneously logs the licence plate number, captures a clear image, and checks the plate number against payment and E permit lists. Mobile LPR enforcement technology requires minimal interaction between the PPO and the parker which mitigates the risk of abusive confrontations and will improve the levels of enforcement and compliance.

Based on experience of other LGAs and data provided by various suppliers, the quantifiable benefits derived from the implementation of two mobile LPR units integrated with new PbP meters and the enforcement system will:

- Increase patrol frequency by circa 40%.
- Improve compliance by circa 20% - 25%.
- Improve bay turnover and availability by circa 25%.

Further integration with bay monitoring and car park occupancy monitoring will increase all of the above benefits by an additional 5% - 7%.

Bay Monitoring, Occupancy, Precinct Guidance and Enforcement

Bay monitoring using either inground vehicle detection sensors or camera technology will:

- Improve enforcement efficiency in time restricted on and off-street parking areas.
- Provide Council with data on parking trends and history to assist in future planning.

Council should consider undertaking trials of bay and occupancy monitoring technology which will enable the collection and analysis of parking data, it is recommended trials are conducted with small (up to 500 bay) systems of bay sensors, camera bay monitoring and LPR camera occupancy technology installed in the time restricted off-street parking areas in Dulwich Hill, Ashfield and Summer Hill.

Upon completion of the trials, Council can examine the efficiency of each by determining the cost of each per bay and return on investment. It is further recommended Council consider the installation of VMS signage in the Dulwich Hill trial district.

Phone Application

The use of a white labelled parking phone App that can be tailored to Inner West Council's logos, colours, etc. with a link from Council's website and phone application is recommended. Council should implement the mobile phone App in all precincts to allow residents and users to:

- Locate and be guided to available parking locations.
- Self-manage their E-permit applications and renewals.
- Provide parking costs, time restrictions and availability (where possible).
- Pay for parking sessions and top up payment remotely if time restrictions are not exceeded.
- Pay for parking infringements and view parking infringement details and photographic evidence.

Software

It is recommended the software management system must have full integration with all available existing parking technology and provide an open architecture interface to future proof development with emerging technologies. ARRB proposes only cloud-based management and storage systems, with robust password restricted user access, are utilised to prevent any unlawful access or corruption of Council computer servers, systems and networks.

It is further recommended a dedicated SQL server/Database solution is implemented within the parking division to provide critical analytics for in-house/on demand reports.

E-permits

The phone App will include provision for permit holders to apply online and manage their own residential parking or other types of E permit following approval by Council.

Should Council provide rate payer parking E permits at no cost, the E permits could be validated when the rate payer is financial. i.e. payment of Council rates by the due date. This process may also be automated with the correct integration of the phone App with TechOne, Council's financial package.

Payment Options and Receipts

ARRB recommend payment of E permits, parking fees and infringement notices should be future proofed with the technology being capable of accepting payment by:

- Credit and debit cards.
- Smart phones, smart watches, and token rings.
- Mobile phone Apps.

It is further recommended paper receipts are replaced with electronic digital receipts issued via email.

Cash Payment

All off-street car parks should no longer accept cash payment. Cash payment is to be retained for on-street parking payment only.

Council is to determine the locations where the percentage of cash used is less than 10% and make application to Transport for NSW for Cashless Pay Parking Trials for all these on-street parking areas.

Body Cameras

The practice of enforcement officers wearing body cameras in other LGAs has reduced the incidents of verbal and physical abuse by approximately 60%. Enforcement officers turn the camera on when feeling threatened and advise the person they are conversing with that their conversation is being recorded and monitored.

It is recommended all PPO's and Rangers be provided with body cameras as a means of mitigating the potential risk of verbal and physical assault.

Remote Monitoring

As an option, Council should consider off site security monitoring of parking machines to detect illegal forced entry and vandalism and body camera duress activation.

COSTS

The table below presents a summary of the whole of life costs based on a technology lifespan of 7 years.

Technology item	Capital cost	Ongoing costs	Whole of life cost
Parking Equipment and Enforcement	$3,107,358	$3,557,879	$6,665,237
Vehicle Detection and Precinct Guidance (Inground Sensors)	$273,229	$182,031	$455,260
Vehicle Detection and Precinct Guidance (Cameras)	$442,693	$360,684	$803,376
Vehicle Occupancy Systems (LPR entry/exit cameras)	$118,450	$88,151	$206,601
Phone Application	$36,800	$362,277	$399,077
Total	$3,978,529	$4,551,021	$8,529,550

PROJECT PLAN

Implementation

It is recommended Council adopt the project plan methodology and relevant considerations proposed by ARRB regarding:

- Stakeholder engagement.
- Public communications.
- Equipment supply constraints.
- Installation methods.
- Traffic Management and disruptions.

Timetable

The timetable for the tender process and project delivery is estimated to take approximately 34 weeks. Factors that may alter the timelines at the tender stage are the approval processes, proponent evaluations, recommendations and final Council approval.

The major stages include:

- RFT process including specifications, documentation, tender release process, evaluation, approval and appointment – 20 weeks.

- Project preliminary works including, delivery, configuration and pre commissioning testing – 10 weeks.

- Pre installation field works including civil, electrical, site communication tests, etc. – 6 weeks.

- Installation, commissioning, training, acceptance testing and handover – 8 weeks.

The three major delivery stages are based on a 14-week period with multiple processes running concurrently. It also assumes there will be no delays during the equipment manufacturing and shipping stages. COVID-19 country and industry lockdowns may delay this process.

Project Rollout

It is recommended the project be implemented as a staged rollout in the following order and manner:

- Enforcement systems including mobile LPR systems on two Council vehicles with consideration for a third system based on the efficiency achieved, new handheld device enforcement software and integration of both into a new back of house management system.

- PbP Machines and Phone App, including replacement of existing PnD meters with PbP meters, integration of all systems with a phone App for payment of parking and infringements.

- Vehicle detection, bay monitoring, car park occupancy and precinct guidance in the following locations:
    - Bay monitoring with 186 inground sensors and VMS Precinct Guidance signs in Dulwich Hill.
    - Camera monitoring of 500 bays in Summer Hill and Ashfield.
    - Fixed LPR camera car park occupancy systems in two Ashfield off-street car parks.

CONCLUSION

During the past 20 years or so, there has been a distinct change in the paradigm of parking management. The traditional approach to parking has been that of demand satisfaction where motorists should nearly always be able to easily find convenient, free parking at every destination.

More recently, due to the value of land and the costs of constructing additional parking spaces and while also considering curb side parking is a finite resource, municipal authorities have moved away from demand satisfaction to a demand management approach. Under this new 'demand management' approach, measures are implemented to ensure that parking facilities are used more efficiently. This study considers how the introduction of new technology can achieve this outcome.

The proposed technology, which is latest tested and proven in the marketplace, will enable Council to enhance its parking service offerings as well as increase the performance of its parking infrastructure. It will support the PPO staff by allowing them to undertake enforcement more efficiently and in a safer manner. These efficiencies will mean PPO staff can be deployed more promptly to other reactive tasks in the areas of development compliance, companion animals, fire, food and health.

Increased compliance will improve parking accessibility which will enhance the liveability of various precincts. The technology will also deliver cross-divisional benefits to Council such as improved data for future planning purposes. It is prudent Council has sought a review of the use of technology in parking management and enforcement as the opportunity exists for Council to achieve industry best practice in managing parking on behalf of the community.

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FIGURES

1 INTRODUCTION

The Inner West Council (Council) Local Government Area covers approximately 35 square kilometres and includes over 192,000 residents distributed over five wards. The Council was formed on 12 May 2016 from the merger of the former Ashfield, Leichhardt and Marrickville councils.

Council has resolved that Council officers investigate and report to Council on the introduction of new technology to operate their parking infrastructure. The resolution requires investigation and consideration of the following three key issues:

1. The use of technology in parking management and enforcement including:
    – Mobile Phone Payment Solutions.
    – Electronic Permit Systems.
    – Vehicle Detection Sensor Systems.
    – License Plate Recognition Systems.
2. The process to integrate such technology within Council's existing parking infrastructure.
3. A project plan which includes costings and timeframe to implement and deliver the technology.

Council have engaged ARRB to undertake a thorough investigation and report on the findings and recommendations.

2 BACKGROUND DOCUMENTATION AND INFORMATION

Council provided ARRB with the following information and documentation for reference and consideration:

- Car Parks Register 110719
- Balmain meters cp plan
- Leichhardt meters cp plan
- Newtown meters cp plan
- Rozelle meters cp plan
- Our Place Inner West Going Places, An Integrated Transport Strategy for Inner West – Draft Report for Exhibition, Cardno.
- Public Domain Parking Policy – Draft Report August 2019, Inner West Council.

2.1 PARKING INVENTORY

- Council manage 75 off-street car parks with a total capacity of 3,232 parking spaces:
  - 6 car parks have more than 100 spaces to a total of 1,253
  - 14 car parks have more than 50 spaces to a total of 923
  - 55 car parks have less than 50 spaces to a total of 1,056
- The total number of pay and time restricted on-street vehicle spaces in all precincts is not available. A full parking survey would be required to determine the total number.
- Most car parks have time restriction during specific hours and unrestricted outside those hours, some have no time restriction and two have pay parking.

There are also on-street time restricted parking spaces located throughout the LGA.

2.2 TECHNOLOGY

- Council have 310 existing on-street Pay and Display (PnD) parking meters installed throughout the LGA precincts. 288 of these are Parkeon brand meters with the remaining 22 being Duncan brand. The plans provided by Council indicate parking meters are installed in the following locations:
  - Balmain - 115 meters
  - Leichhardt - 88 meters
  - Newtown - 26 meters
  - Rozelle - 81 meters.

2.3 METHODOLOGY

- Enforcement staff patrol the streets and car parks to determine unpaid parking and overstay offences by viewing the pay and display tickets on individual vehicle windscreens in the pay parking precincts.
- Overstay offences in time restricted areas are detected by chalking the tyres of vehicles and returning following the time restriction expiry and inspecting each vehicle again.
- PinForce software supplied by DCA is used on handheld devices with Bluetooth printers to issue infringements to offending vehicles.

3 SITE INSPECTIONS

On 30 October 2019 following ARRB's inception meeting with Council, ARRB conducted site inspections of selected on-street pay parking areas and off-street car parks within the LGA precincts. The inspection was undertaken in a motor vehicle with a video camera attached to capture video evidence of the areas.

On-Street Parking

The on-street pay parking areas are a mixture of marked bays and unmarked bays within retail precincts, as presented in Figure 3.1, Figure 3.2 and Figure 3.3.

Figure 3.1 On-street meter parking in Darling Street Balmain with marked bays

Figure 3.2 On-street meter parking in Darling Street Rozelle with marked bays

Figure 3.3 On Street meter parking in King Street Newtown with unmarked bays

Other locations showed on-street parking areas with no bay markings evident as presented in Figure 3.4Figure 3.4.

Figure 3.4 On-street time restricted parking in Marion Street Leichhardt with no bay markings

Off-Street Parking

With the exception of Edgeware Road and Lennox Street car parks in Newtown, which are pay parking car parks, the off-street car parks are all time restricted as presented in Figure 3.5 with a mixture of multideck covered parking and at-grade parking as presented in Figure 3.6 and Figure 3.7.

Figure 3.5 Off-street pay parking car park Lennox Street Newtown

Figure 3.6 Entry to off-street car park Brown Street Ashfield – time restricted only

Figure 3.7 Off-street car park Marion Street Leichhardt – time restriction parking only

4 TECHNOLOGY FINDINGS AND RECOMMENDATIONS

4.1 REVIEW OF EXISTING TECHNOLOGY AND COUNCIL REQUIREMENTS

Unlike on-street parking, off-street parking provides an opportunity to install access control to ensure compliance with minimal labour intervention.

4.1.1 ACCESS CONTROL

In simple terms, there are two forms of access and egress control which can be implemented in the car parks, namely:

Unimpeded – frictionless with no visible barriers to entry which requires manual enforcement and intervention.

Impeded – barriers to access are installed which requires minimal enforcement, however, remote monitoring is necessary to engage with non-compliant parkers. Boundaries of the car parks also need to be fenced or have hedge type garden beds installed to discourage parkers driving over the curb and leaving without payment.

Several options are available using both unimpeded and impeded control systems and operations.

4.1.2 UNIMPEDED ACCESS

Pay and Display Machines

Drivers pay for their parking at the Pay and Display (PnD) machine and receive a ticket with the date and expiry time printed on it. They place the ticket on the dashboard of the car with the date and time visible through the windscreen to enforcement officers.

PnD meters have ongoing constraints with non-compliance, infringement and enforcement.

Pay by Bay Machines

Each marked parking bay has a unique number painted at the entry of the bay. Drivers pay at the Pay by Bay (PbB) machine by entering a bay number then paying for the preferred parking time. There is no need to return to the vehicle to display a ticket.

Enforcement staff attend the PbB meter and inspect each occupied bay number to ensure payment has been made.

This system can be enhanced by using inground bay sensors to record the entry time and ensure the bay has been paid for within a programable grace period and if no payment has been made, enforcement staff are alerted.

Pay by Plate Parking Machines

Drivers pay for their parking using the PbP machines located at each car park. The system has limitations, but it is possible to expand the functionality of the system by:

Introducing a phone application for payment of casual parking.

Introducing Licence Plate Recognition (LPR) cameras to record vehicle licence plates in and out of each car park.

Using PbP machines with credit/debit card payment only.

This system will in part mitigate the constraints associated with non-compliance, infringement and enforcement when used in conjunction with mobile LPR cameras by enforcement staff.

Central Pay LPR

Another option is to install LPR cameras and central pay machines as a PAYG system. The cameras will record vehicle licence plates in and out of each car park located along the foreshore with the data collected being fed to the pay machines. Upon returning to their vehicle, parkers will input their licence plate number into the pay machine and be prompted to pay the displayed fee. Parkers can pay by means of either coin, notes or credit/debit cards.

The system is capable of generating reports associated with non-payment of users and subsequently infringements can be generated.

Phone Application with Beacons

This solution entails phone applications which can detect electronic beacons via Bluetooth communications and register beacon detection in a cloud-based database. These beacons can be installed at the entries and exits of each car park. The user can download the phone application and register their details as a casual user on the website, including their credit/debit card details. The users credit/debit card will be charged as a Pay as You Go (PAYG) user. The parking session begins when the vehicle is detected entering the car park and ends when the vehicle is detected leaving. The PAYG user's credit/debit card is then debited the appropriate tariff.

The system does not cater for casual parkers who have not downloaded and registered with the phone application or do not have the application open on their mobile phone when parking their vehicle.

It is also difficult to distinguish which account is to be charged when two occupants of the same vehicle have registered and have the phone application open on their mobiles.

Parking Sensors or CCTV cameras in Combination with Parking Meters

This system involves all parking bays being allocated with bay numbers. The numbers are painted on the sealed surface and concealed parking sensors are fitted within each bay or CCTV surveillance cameras are installed to view multiple bays. Pay by Bay (PbB) machines would then be installed.

Once a vehicle parks in a bay, the driver is provided with a grace period to pay for the bay either at the payment machine or through a phone application for casual payment.

Following the initial grace period, parking bays which are occupied but not paid for, will trigger an alert on the enforcement system. Attendance at the vehicle is required to issue an infringement notice by enforcement officers.

4.1.3 IMPEDED ACCESS

Boom Gated, Ticketed Central Pay

This configuration includes boom gates and ticket machines located at the entries and exits of each car park with central pay machines located throughout the carpark to allow parkers to receive a ticket on entry and pay by means of coin, notes or credit/debit cards at the pay machines.

The system can accept credit/debit card payments on entry and exit. The central pay machine and exit station are capable of issuing receipts automatically or on request.

LPR for Entry, Boom Gated Exit Only

This system has an LPR camera and road spikes located at the entry, and an exit station, LPR camera and boom gate located at the exit of each car park, with central pay machines located throughout the car park.

This allows all users unimpeded entry, and impeded exit. Casual parkers pay by means of coin, notes or credit/debit cards at the pay machines, when detected by the LPR camera at the exit, drive out unimpeded.

The system can accept credit/debit cards payments at the exit station. The central pay machine and exit station are capable of issuing receipts automatically or on request.

The road spikes located at the entry prevent parkers exiting via the entry lane.
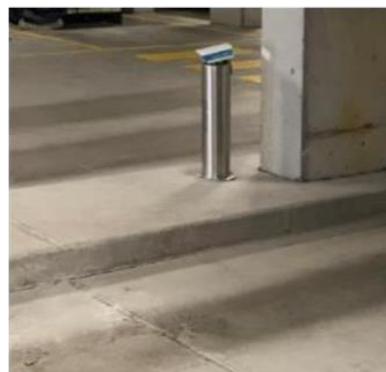
LPR Boom Gated Entry and Exit

In this scenario an LPR camera and boom gate are located at the entry and an exit station, LPR camera and boom gate located at the exit of each car park, with central pay machines located throughout the car park. This creates unimpeded entry for all users and impeded exit for all users. Casual parkers pay by means of coin, notes or credit/debit cards at the pay machines, when detected by LPR camera at the exit, drive out unimpeded.

The system is capable of accepting credit/debit card payments at the exit station. The central pay machine and exit station are capable of issuing receipts automatically or on request.

Phone App (Bluetooth Boom Gated Entry and Exit)

An electronic beacon, ticket machine and boom gate are located at the entry and electronic beacon, exit station and boom gate are located at the exit of each car park, with central pay machines located throughout the car park. This allows parkers (who are registered with the phone application and have it open on their mobile phones) to enter and exit via the push of a button or a voice command on their phone. Casual parkers who have not downloaded the application will take a ticket on entry and pay with cash or credit/debit card at the pay machine or credit/debit card at the exit.

The central pay machine and exit station are capable of issuing receipts automatically or on request.

One Way Road Spikes (Alligator Teeth)

One-way road spikes at the entries can be used in place of boom gates to prevent vehicles exiting via the entry lane and avoiding payment. Under Australian standards road, spikes must be accompanied with appropriate signage.

Road spikes generally do not provide a good customer experience as motorists and car park users do not like driving their vehicles over them fearing they may not work correctly and damage their tyres.

4.1.4   PRECINCT GUIDANCE

Precinct guidance and wayfinding with the use of dynamic variable messaging signage (VMS) on the main approach roads to a precinct can be employed to direct visitors to available car park spaces along the main streets and off-street car parks. The use of inground sensors or CCTV surveillance of the street spaces would need to be installed to record and transmit space vacancies.

The available parking capacity on the street and in a car park will be transmitted to and displayed on the VMS signs to indicate the number of vacant bays available.

Phone Apps when integrated and used with precinct guidance systems can also provide navigation to vacant parking spaces along streets and car parks.

4.1.5 ADVANTAGES AND DISADVANTAGES

Table 4.1 highlights the relative benefits and disadvantages for each type of system described above and considers their customer service and efficiency.

Table 4.1 Benefits and disadvantages of parking control systems

Type	Benefits (+)	Disadvantages (-)
Pay and display	+ Unlimited layout of spaces can be accommodated + Automatic issue of ticket and receipt + Easily relocated /expanded for additional spaces + Alternatives available if a machine is not working + Can be used on-street and off-street + Easily understood by the public + Fewer queries on infringements + A two-part ticket can be used for discounts/validation	− Extra walking distance to the machine and back to the car − Uses more paper − Additional maintenance costs due to more moving parts − Awkward for some parkers, such as disabled or parents with small children − Payment is generally in advance when driver arrives at car park − Requires regular enforcement
Pay by bay	+ Shorter walking distance for drivers + Paperless - more environmentally friendly + Less moving parts therefore less maintenance + More efficient for enforcement as rangers only visit the machine, not each space + Receipt can be generated on demand	− Restricted number of spaces − Spaces must be marked and numbered − Overlap is used, unless machine resets to zero − No alternative if a machine is not working − Not used off-street − Inconvenient to relocate − Numbering requires maintenance − Fixed fee structure encourages overlap − Confusing for some parkers, especially elderly − Requires regular enforcement
Pay by plate	+ Shorter walking distance for drivers + Paid time overlap (> 10% revenue) + More efficient for enforcement and can target repeat offenders + Spaces do not need to be marked + Less queries on infringements + Unlimited layout of spaces + Paperless - more environmentally friendly + Receipts emailed to users on request + Can be used on- and off-street + Discourages free parking period over multiple visits (i.e. drivers moving vehicles for free parking)	− Extra time consumed to enter plate numbers may result in lengthy queues − Possible error when typing in the number plate − Higher maintenance on keypad − Confusing for some parkers, especially elderly − Regular enforcement required
Mobile phone	+ No machines on-street + No maintenance costs + Paperless – more environmentally friendly + Can be used on- and off-street + Very low set up costs + Digital receipts available	− Assumes all drivers have a smart phone − Detailed signage required − Administration for debt collection − Requires sophisticated enforcement software − Requires regular enforcement

Type	Benefits (+)	Disadvantages (-)
Boom gated Central Pay Tickets	+ Shorter walking distance for drivers + Only requires minimal enforcement for disability bays and no-standing zones + Hourly and variable fee structure can be accommodated + Receipt can be generated on demand + Customers retain ticket with record of time of entry + Hourly and variable fee structure can be accommodated	- Extensive civil works required - High maintenance and consumables costs - Can lead to queuing at entry during peak times - Requires remote monitoring and human intervention - Maximum 300 vehicular entries per hour - Delays resulting from ticket jams - Requires regular replenishment of ticket stocks - Requires RFID cards for staff parking - Capital costs - Inconvenient to relocate
LPR Central Ticketless	+ Elimination of permits and associated manual processing + Elimination of PbP machines + Financial rate payers can be provided with permits for discounted and/or free parking + Minimal enforcement required + More user-friendly with the availability of pre-paid casual parking + Reduction in cash handling + Simple user-friendly operation + Heightened security with boom gates + Low maintenance of equipment + More detailed reporting by location + Potential to introduce hourly parking + Issue of permits via a web site + Potential to link space availability VMS signs to equipment counting system + Capable of processing up to 400 vehicle entries per hour + Receipt can be generated on demand	- Confusing for some parkers, especially the elderly - Civil works required - Capital costs

4.2   AUSTRALIAN STANDARDS AND GUIDELINES

4.2.1   STANDARDS

On-Street parking is governed by Australian Standards AS2890.5 – 2004, and Off-Street parking is governed by AS2890.1 – 2004.

These standards describe the requirements for parallel parking, 90-degree parking and angle parking, bay lengths and widths, traffic isle widths, accessible bay sizes and layout, signage, entry and exit widths, undercover car park heights turning circles and swept paths, etc.

Generally, Council's on-street and off-street parking is in line with the current Australian Standards.

4.2.2   LEGISLATION

Legislation governing pay parking is contained in the Safety and Traffic Management (Road Rules) Regulation 1999 (STMR) and the Australian Road Rules 1999.

This legislation allows Councils to introduce pay parking in their precincts, install meters or parking machines, establish mobile phone parking, fix fees and carry out enforcement, etc.

4.2.3 TFNSW STANDARDS AND GUIDELINES

TfNSW (formally RMS) set guidelines for the planning and operation of pay on street parking in New South Wales in line with the Australian Standards, Australian and State Legislation. All pay parking machines used in New South Wales must also be approved by TfNSW before use.

The equipment, controls and enforcement systems recommended and specified are in line with all approvals, guidelines and legislation.

4.2.4 CASHLESS OPTIONS

All parking machines installed in New South Wales must be approved by TfNSW and only approved machines will be considered during the tender evaluation.

Payment methods for parking machines is governed by the Road Transport (Safety and Traffic Management) Regulation 1999, Part 4. Clauses 97, 101 and 111A and confirmed in Section 5 of the RMS guidelines for Pay Parking. '*Meter parking or ticket parking schemes must allow payment of fees for parking in cash (notes or coins or both) even if such schemes allow other methods of payment (such as credit/debit cards, smart cards or mobile phones)*'.

Any parking machine installed on roads and road related areas as defined in the Road Transport (Safety and Traffic Management) Regulation 1999 must therefore also accept payment in cash. However, cashless pay parking scheme trials are available on application.

Without requiring legislation being changed there is an opportunity for Council to make application through Council's Traffic Committee representative to Transport for NSW for Cashless Pay Parking Trials. The trials have no expiry date but are generally approved for 3 years.

The application must provide RMS with the information presented in Figure 4.1.

Figure 4.1 Pay parking trials for cashless parking with RMS approval

Pay parking trials

The implementation of any cashless metered or ticket pay parking scheme must be done on a trial basis only and with RMS approval. [2]

Information required by RMS for evaluating cashless pay parking trials includes:

- Type of cashless device or system, eg app, meter, ticket machine
- Method/s of payment
- Extent of area of operations in which the trial is to be conducted
- Location of prescribed traffic control devices, including signs, meters/machines, line marking
- Location of no stopping areas.

Other cashless options are:

- Credit and debit cards
- Smart phones, smart watches and token rings
- Mobile phones
- Mobile phone Apps
- Pre booking web sites.

Parking machines located in off-street parking areas do not have to include cash as payment.

4.3 EMV CERTIFICATION AND PCI COMPLIANCE

EMV is an abbreviation for Euro Card, Master Card and Visa. PCI – DSS is an abbreviation for Payment Card Industry Data Security Standard.

EMV certification ensures that the credit/debit card reading equipment used by merchants can accept cards with chip technology and adds an extra layer of security during credit and debit card transactions.

PCI Compliance is security guidelines for anyone that is processing, transmitting or storing credit/debit card data. PCI ensures that a business is operating in a secure network and that information stored for a customer is secure.

All organizations accepting credit or debit card payments by an Electronic Funds Transfer at Point of Sale (EFTPOS) machine, online or phone payment or a machine with an unattended payment terminal with credit or debit card must be EMV and PCI compliant.

Credit/debit card clearance cannot be undertaken directly between field equipment credit/debit card readers and a banking organisation. There must be a clearance company with an approved payment gateway to receive the transactions from the field equipment or phone application, verify card details, funds availability and payment approval in real time. Field equipment connected to a payment gateway, credit/debit card readers and communications system must comply with international EMV and PCI standards.

These standards require credit/debit card readers to be pay wave and insert as well as EMV certified.

The specifications provided by ARRB require the products to be certified and systems compliant with EMV and PCI.

5 KEY FINDINGS

This section provides a summary of the key findings from the review and investigation.

5.1 BACKGROUND DOCUMENTATION AND INFORMATION

- Council manage 75 off-street car parks with a total capacity of 3,232 parking spaces:
  - 6 car parks have more than 100 spaces to a total of 1,253
  - 14 car parks have more than 50 spaces to a total of 923
  - 55 car parks have less than 50 spaces to a total of 1,056
- 2 off-street car parks have pay parking and 73 are time restricted only.
- Council have a combination of 288 Parkeon and 22 Duncan pay and display (PnD) ticket parking meters in 4 precincts.
- PnD meters are dated, inefficient and consumes approximately $25,000 in ticket roll stock per year.
- Enforcement staff are using PinForce handheld enforcement technology and are chalking tyres to determine overstays in all precincts.
- The current method of enforcement is dated, labour intensive, inefficient and utilises minimal technology.
- Council have 40 parking officers and 9 rangers and 6 Companion Animal Officers in their enforcement division.
- Existing technology used in enforcement can be integrated into new systems and technology.
- The pay parking technology needs to be capable of providing efficiencies in the delivery of enforcement as well as the frequency of coverage compared with the existing enforcement model.
- The technology needs to be capable of introducing seasonal, promotional and discounted dynamic pricing.

5.2 SITE INSPECTIONS

- Council do not have a record of parking inventory for on-street parking in the precincts.
- There is no access control or lockable gates to close off the off-street car parks after hours.
- The technology will require the functionality of generating E-Permits or recognising residential parking permits.
- Bay markings do not exist in some retail and commercial time restricted locations
- There is no precinct guidance to parking areas in the precincts.

5.3 INTERNAL STAKEHOLDER ENGAGEMENT

To gain an understanding of Council's requirements and operating procedures, as well as to assist in determining suitable technology, ARRB engaged with various Council departments.

- Prerequisite functionality required by Council was provided in terms of the:
- Parking technology and capability.
- Enforcement technology
- Operating software.
- System access.
- Storage and backup.

- Maintenance and installation.

5.4 TECHNOLOGY INVESTIGATION AND EVALUATION

- Ticketless parking provides customers with frictionless access to off-street parking.

- Mobile LPR enforcement technology requires minimal interaction between the PPO and the parker which mitigates the risk of abusive confrontations and will improve the levels of enforcement and compliance.

- The read rate of number plates using LPR systems has significantly increased during the past decade and now some systems record rates over 99%.

- LPR technology can be used to generate and manage the issue of website E-permits such as Resident Parking permits.

- Pay and display (ticketed) technology requires staff to constantly refill the machines with paper rolls.

- Pay by bay machines require curb side bay numbering and on-street bay delineation marking which needs to be maintained. Pay and display and pay by plate technology does not require any form of line or pavement marking.

- Parking bays can be remotely monitored using parking sensors or CCTV surveillance which provide overstay alerts and improve the efficiency of enforcement.

- Payment using Phone Apps is growing in popularity throughout Australia, does not require on-street or off-street hardware but does need substantial signage infrastructure if used as the only form of payment.

- Payment for off-street parking. Phone Apps can provide customers with notifications warning them to avoid overstaying.

- Phone Apps can provide wayfinding and bay-finding guidance to customers which can be linked to a website.

- Phone App/Beacon access control systems do not cater for parkers who have not downloaded and registered with the phone application. It is also difficult to distinguish which account is to be charged when two or more occupants of the same vehicle have registered.

- Less machines are required when pay by plate or pay by space technology is used.

- A suitable technology platform can be developed which integrates all the technologies used to manage parking.

- The same hardware can be used to manage both on-street and off-street parking.

5.5 AUSTRALIAN STANDARDS AND GUIDELINES

- Transport for NSW (RMS) must approve all on-street parking machines installed in NSW.

- The *Road Transport (Safety and Traffic Management) Regulation 1999 – Part 4, 'Pay parking schemes' clauses 97,101 and 111A*: require all on-street parking must accept cash as a form of payment. Credit/debit card and pay by phone can also be used to pay for parking.

- The NSW Government Transport, Roads and Maritime Services Pay Parking Guidelines Version 4, 2012. Section 5 confirms the RTR regulations.

- Off-street parking machines are not required to take cash as payment for parking.

Cashless pay parking scheme trials are available through application to TfNSW. The trials have no expiry date but are generally approved for 3 years. There is an opportunity for Council to make application through Council's Traffic Committee to Transport for NSW for Cashless Pay Parking Trials pending any updated legislation.

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5.6 EMV CERTIFICATION AND PCI COMPLIANCE

- All credit/debit card readers must be EMV and PCI compliant.
- Credit/debit card payments must use a payment gateway from an approved EMV and PCI clearance company.
- Maintenance of EMV and PCI compliance can be costly post tender if not specified correctly.

6 RECOMMENDED PAY PARKING TECHNOLOGY

6.1 CONSIDERATIONS

When deciding on the most suitable technology the following items should be considered.

6.1.1 LATEST TESTED TECHNOLOGY

Parking Machines and Mobile LPR

PbP parking machines integrated with mobile LPR enforcement systems in off-street car parks and on-street parking is the latest and most efficient proven technology available for parking management.

The use of PbP meters and mobile LPR enforcement systems will:

- Reduce the number of meters required in the existing precincts
- Reduce the number of enforcement staff to carry out the patrols.
- Increase patrol frequency
- Improve compliance and increase parking machine revenue.

Bay Monitoring

There are two types of proven vehicle presence detection systems available in Australia for on-street parking, inground sensors for individual parking bays and camera systems to cover multiple bays.

The technology used to detect vehicles using the inground sensors varies between manufacturers with some using two types of detection technology in the one sensor (Dual Tech) before acknowledging and signalling presence or departure of a vehicle.

There are also two options using camera systems:

- Using existing or new CCTV surveillance systems (Safe City camera systems deployed in retail strips).
- Install camera systems to monitor parking spaces only.

The location and height the cameras are installed will determine the number of parking bays each camera can cover. They can also view no parking / no stopping areas, driveways, etc. and detect illegally parked vehicles. Both systems, with the correct integration, will provide vacant bay numbers for precinct guidance VMS signs and phone Apps. It will also alert enforcement staff of overstays when used with PbP meters and unmetered restricted parking as well as providing statistical information to the parking and planning divisions of peak usage and duration of stay data.

Inground vehicle detection sensors emit a periodic heartbeat/health check to their receivers to ensure they are online and operating correctly. If any sensor fails, the health-check an alert is raised in the management system. Camera surveillance systems and fixed LPR cameras have internal analytics and are capable of providing an alarm to their management system if the field of view is changed or blocked. These features ensure any acts of vandalism are detected.

Inground vehicle detection sensors used to monitor parking bays and parking violations is the most cost-effective method of determining available parking spaces and assists with enforcement. All systems have an open platform communications interface to allow for future proofing and integration development with

emerging parking technology. Bay monitoring using either inground vehicle detection sensors or camera technology will:

- Improve enforcement efficiency in time restricted on and off-street parking areas.
- Provide Council with data on parking trends and history to assist in future planning.

Occupancy

Fixed LPR cameras installed at the entry and exit of off-street car parks will record all entries and exits, including licence plate details. This technology integrated with PbP machines will alert enforcement officers of any vehicle that has entered the car park but has not paid at a PbP machine or using a phone App. It will also alert enforcement officers of all overstays in time restricted metered car parks or time restricted only car parks.

Fixed LPR cameras will:

- Provide an accurate count of bay occupancy for Integration with a phone App for precinct guidance.
- Eliminate the need for enforcement patrols in these car parks.
- Provide Council with data on parking trends and history to assist in future planning.

Precinct Guidance

Providing a dynamic precinct guidance system to a busy retail district using either of the vehicle presence detection systems described above will allow dynamic variable message signs (VMS) to be deployed at the approaches to the districts to advise drivers of the availability of vacant parking bays.

6.1.2 CAR SHARE AND ELECTRIC VEHICLES

Council should make provision for emerging trends and technologies such as car share vehicles and electric charging stations.

Car Share

Car sharing is a rapidly growing industry with an increasing number of highly competitive providers. The critical issue faced by suppliers is securing exclusive car sharing spaces at a convenient pick-up point.

Car sharing is an affordable, convenient and sustainable transport option for residents and businesses. Car sharing enables sustainable travel habits and provides increased connectivity. Additionally, car share provides for efficient use of parking space where a single car share vehicle can replace more than 10 private vehicles which would otherwise compete for the same parking space. Car sharing differs from traditional car rentals in several ways:

- Reservation, pickup, and return is all self-service.
- Vehicles can be rented by the minute, by the hour, as well as by the day.
- Vehicle locations are distributed throughout the service area and often located for access by public transport.

In the City of Sydney, almost 31,000 residents and businesses have joined one of the 3 car share schemes. Members can book a car online whenever they need one and pick it up from one of close to 700 nearby parking spaces.

An opportunity exists for Council to actively partner with car sharing companies and provide designated parking bays throughout the precincts.

Future mobile licence plate recognition systems will have the ability to include car sharing licence plate details and their designated parking bay and zone in the database white list or as an E-permit holder, to avoid the possibility of being incorrectly infringed.

Electric Vehicle (EV) charging stations

The Electric Vehicle Council reports globally, there was a 56 per cent increase from 2016 to 2017 in sales volumes and there are now more than 3 million electric vehicles on the road.

There were also significant technological shifts in 2017 with several new lower cost models coming to market, along with continued decreases in electric vehicle battery costs. Further, several countries have announced their intention to ban the sale of petrol and diesel vehicles and several global automakers have put forward extensive plans to electrify vehicles.

The number of charging stations in Australia has also substantially increased, with a 64 per cent increase from 2017 to 2018. This currently equates to approximately one charging station for every six electric vehicles. An important consideration for electric vehicles and charging infrastructure is the source of electricity used to power the vehicle. Analysis across all states and territories in Australia shows that an average electric vehicle charged from the grid in 2016 emitted less than an average internal combustion engine vehicle in all states except Victoria, where it is only slightly higher.

The New South Wales Government is targeting a cleaner, more efficient transport future through its measures to encourage EV uptake in its Net Zero Plan.

The Government's new Electric Vehicle Infrastructure and Model Availability Program will run competitive funding processes that will co-fund the deployment of fast electric vehicle charging infrastructure. It will also incentivise vehicle fleet owners, such as car rental companies, car share companies, and local councils to procure electric vehicles.

There will be a requirement in the short to medium term for some designated electric vehicle on-street charging bays in the Inner West Council precincts.

Several manufacturers/providers of parking machines in Australia have developed or are in the process of developing electric charging facilities in their machines, however, any machine designated as an EV charging station will require 240-volt mains power. Current solar panel machines are not capable of providing sufficient power to charge EVs.

6.1.3   INTEGRATION OF DISPARATE SYSTEMS. IT ARCHITECTURE AT A HIGH LEVEL

Parking meters, mobile phone applications, mobile licence plate recognition cameras, enforcement software and hardware, financial reporting systems, communications and back of house software are all provided by different organizations and use proprietary protocols and encryptions. All equipment and systems considered for use must be include an open Application Programming Interface (API) to integrate and operate seamlessly at a high level with all other systems.

System suppliers who respond to on and off-street parking equipment tenders and provide completely integrated systems include:

- Manufacturers and suppliers of parking meters.
- Manufacturers and suppliers of vehicle detection sensor/camera systems.
- Phone Application software suppliers
- Enforcement software and hardware suppliers.

Tender submissions will require close evaluation to ensure all high-level integration is provided and supported for the life of the systems offered.

6.1.4   SOFTWARE

The software choice will be determined by the hardware technology and integration with other systems. Software that is cloud based with internet access and reporting is the recommended option as it avoids the use of Council's IT network and services.

The availability of data for analysis purpose will require a dedicated SQL server/Database solution to provide critical analytics for in-house/on demand reports.

6.1.5   PHONE APPLICATION (APP)

Investigation and consideration has been given to the PARK'n PAY phone App which is currently being trialled by other LGAs in NSW under recommendation from the NSW Government.

The PARK'n PAY phone App allows for some of the features required by LGAs but it is limited in it's functionality, does not provide the E permit facilities and is currently integrated with one meter/enforcement supplier.

It is recommended that if PARK'nPAY is considered in a future request for tender (RFT) it must integrate with all available systems and provides all the features required by Council. Consideration may be given in an RFT to the use of multiple phone Apps where PAR'nPAY is integrated with Council's preferred phone App supplier.

The development and certification of a Phone Application for pay parking requires a complex process of writing the App, having it certified for credit/debit card PCI compliance and once completed, maintain the PCI compliance with required updates and annual certification.

Existing phone Apps allow for multiple user types:

- Council vehicles
- Rate Payers
- Residents
- Pensioners
- Accessible parkers
- Visitors/casual parkers

Users can download, register, and apply for the category required directly from the smartphone application.

6.1.6   PAYMENT OPTIONS

Payment options that allow payment of E permits, parking fees and infringement notices should include:

- Credit and debit cards

- Smart phones, smart watches and token rings
- Mobile phones
- Mobile phone Apps

History in other LGAs shows a very successful uptake in the use of mobile phone Apps for payment of parking of up to 30% within 12 months of implementation.

The amount of cash currently being used as payment for parking, as a percentage of all payment forms, is diminishing as payment by credit/debit cards, mobile phones and phone Apps increase. The majority of those still using cash are our aging population who do not use credit cards and mobile phones, they do however use debit cards. Consideration should therefore be given to advertising all payment options on parking machines and communicating all payment options through Council's website and local advertising.

The use of cash for on and off-street parking will continue to decrease over the next five years as the user demographics change. The number of new parking machines deployed throughout the precincts that accept cash should also be reduced.

Payment through the phone App and credit/debit card usage will also reduce cash collection costs.

The residual effects of the Covid-19 virus need to be considered as the population is more aware of the hygienic benefits of contactless payment.

6.1.7 COUNTRY OF MANUFACTURE

The parking machines and mobile LPR equipment available in Australia are manufactured in Australia, New Zealand, UK, France and Germany. Generally, the equipment is manufactured on order and not kept in stock so manufacturing and delivery can take up to 12 weeks from the date of awarding a contract.

The cost of a complete parking machine in a tender environment is approximately 50% less than the sum of all internal parts and housing. It is therefore recommended that Council allow to purchase an additional two machines to allow for replacement parts should any be subjected to vandalism or other damage that is not covered under warranty.

6.1.8 SUPPLIER LOCATION AND SERVICE SUPPORT

The supplier location and resources to provide Council with after sales support, service and maintenance is required to maintain full operation of the equipment with minimal downtime.

Some suppliers have their Australian office in another State and use subcontractors to provide service and maintenance. Should subcontractors be used, their resources, level of training, response times and holding of adequate spare parts to maintain the systems must comply with the requirements in the tender specifications.

Council needs be comfortable with the level of support offered when evaluating tender submissions.

6.1.9 FLEXIBILITY IN ADJUSTING PARKING TIMES AND CHARGES

This feature is generally offered by most parking equipment available in Australia, however carrying out the rate changes can be complex. In most LGA's, as it is only done several times per year, Council staff may find it difficult to remember the procedure to make the changes. Engaging the supplier to carry out the changes after the contract may by costly.

Should Council have this policy, the specifications can be tailored to have the supplier adjust the times and rates twice or three times per year under the warranty provisions and then in a maintenance contract.

Where rate changes are required more frequently in response to special events, seasonal demand, etc. Council Staff will become familiar with the process and will not require supplier assistance or intervention.

Some locations in other countries have adaptive dynamic pricing to encourage parking in underutilized areas by lowering the price automatically and discourage parking by raising the price automatically in busy areas. These systems have constant bay monitoring using sensors or cameras to determine usage and trigger the price reduction or increase. This feature can be specified in a tender to be available should Council adopt this pricing structure.

6.1.10 THE STRENGTHS AND WEAKNESSES OF EACH SYSTEM

Some of the strength and weaknesses of each different type of system are detailed in Table 4.1 titled Benefits and Disadvantages. During the evaluation process following the tender submissions, ARRB can provide Council with a detailed evaluation report of the different tenderers, the systems offered, their level of support and maintenance and highlight their strengths and weaknesses.

6.1.11 THE LEVEL OF USER ACCEPTANCE AND EASE OF USE

A large percentage of drivers do not want to pay for parking and believe it is a facility that should be provided by councils, property owners or governing authorities at no cost to the driver. This belief will always attract complaints from the users. The provision of parking is costly to the provider and must be funded. Payment for parking provides those funds.

The provision of pay parking should provide well laid out car parks, correct bay markings, appropriate signage and parking equipment which is easy to use to encourage compliance and minimise the level of customer complaints.

The ease of use of the parking machines should also be considered during the tender selection process with a live demonstration of equipment payment methods. Ease of use will directly impact user acceptance.

6.2   RECOMMENDATIONS

6.2.1   PARKING MACHINES FOR ON-STREET AND OFF-STREET PARKING

It is recommended Council:

- Determine the locations where the percentage of cash used is less than 10% and make application to Transport for NSW for Cashless Pay Parking Trials for all these on-street parking areas.
- Replace the Pay and Display ticket machines with PbP machines and signage for all on-street parking where trials are approved and existing off-street pay parking car parks with payment by credit/debit card, phone and phone App.
- Replace the Pay and Display ticket machines with PbP machines and signage for all on-street parking where trials are not applied for or approved with payment by cash, credit/debit card, phone and phone App.
- Install PbP machines with appropriate signage with payment by credit/debit card and phone App only in all other off-street car parks where Council wish to introduce pay parking.

6.2.2   BAY MONITORING, OCCUPANCY, PRECINCT GUIDANCE AND ENFORCEMENT

Council should consider undertaking trials of bay and occupancy monitoring technology which will enable the collection and analysis of parking data, it is recommended trials are conducted with small (up to 500 bay) systems of bay sensors, camera bay monitoring and LPR camera occupancy technology installed in the time restricted off-street parking areas in Dulwich Hill, Ashfield and Summer Hill.

Inground Vehicle Detector Sensor for Bay monitoring.

- 14 Seaview Street, Dulwich Hill, 46 bays with 2P time restriction.
- 26 Seaview Street, Dulwich Hill, 58 bays with 4P time restriction.
- 1 Loftus Street, Dulwich Hill, 82 bays with 2P and 3P time restrictions.

Surveillance Cameras for Bay Monitoring

- Hardie Avenue car park Summer Hill with 125 bays and 2P time restrictions.
- Ashfield Civic Centre Rooftop Car Park, 375 Bays with 3P time restriction.

Occupancy

- 2A Brown Street, Ashfield, 79 Bays with 3P time restriction.
- Brown Street Car Park 17-20 The Esplanade, Ashfield, 64 Bays with 3P time restriction.

Upon completion of the trials, Council can examine the efficiency of each by determining the cost of each per bay and return on investment.

It is further recommended Council consider the installation of VMS signage in the Dulwich Hill trial district.

6.2.3 SOFTWARE

It is recommended the software management system must have full integration with all available existing parking technology and provide an open architecture interface to future poof development with emerging technologies.

ARRB proposes only cloud-based management and storage systems are utilised to prevent any unlawful access or corruption of Council computer servers, systems and networks.

The software is to have a robust password restricted user access hierarchy for:

- Traffic/parking/ranger divisions
- Finance
- Supervisors
- Managers/Directors
- Public.

It is further recommended a dedicated SQL server/Database solution is implemented within the parking division to provide critical analytics for in-house/on demand reports.

6.2.4 REMOTE MONITORING

As an option, Council should consider off site security monitoring of parking machines to detect illegal forced entry and vandalism.

6.2.5 PHONE APPLICATIONS

The use of a white labelled parking phone App that can be tailored to Inner West Council's logos, colours, etc. with a link from Council's website and phone application is recommended. Council should implement the mobile phone App in all precincts to allow financial rate payers and users to:

- Locate and be guided to available parking locations.
- Provide parking costs, time restrictions and availability (where possible).
- Pay for parking sessions.

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- Top up payment remotely if time restrictions are not exceeded.
- View parking infringement details and photographic evidence.
- Pay for parking infringements.

Additionally, Council could use the Phone App to provide residents and subscribers with other information such as:

- Revenue utilization.
- Advanced information on changes to traffic and/or parking conditions, e.g. street closure, resurfacing of car parks, closure of car parks or streets for specific events, etc

6.2.6   E PERMITS

The phone App will include provision for permit parkers to apply online and manage their own residential parking or other types of E permit, for example contractor permits, which will be approved by Council prior to issue. The E permit system will incorporate the following functionality:

- The provision of E-permit parking at a discount rate or no charge.
- Depending on the E-permit type applied for, the application should be automatically forwarded to Council for approval.
- The E-permit should not be activated until Council approval is provided
- Discounted rate E-permits should charge the users credit/debit card at the discounted rate.
- Comprehensive daily, weekly and monthly reports in CSV and PDF format of all E permit type use should be automatically generated and sent to Council.

Should Council provide rate payer parking E permits at no cost, the E permits could be validated when the rate payer is financial. i.e. payment of Council rates by the due date. This process may also be automated with the correct integration of the phone App with TechOne, Council's financial package.

Resident parking E permits can either provide parking free of charge in certain zones and/or parking discounts for local residents in certain parts of the LGA.

6.2.7   PAYMENT

ARRB recommend payment of E permits, parking fees and infringement notices should be able to be undertaken using:

- Credit and debit cards
- Smart phones, smart watches and token rings
- Mobile phones
- Mobile phone Apps

6.2.8   MOBILE LPR ENFORCEMENT

It is recommended a minimum of 2 mobile LPR camera systems are attached to Council vehicles and integrated with the PbP machines.

The latest technology development of mobile LPR camera systems can provide:

- Successful read rate at up to 50 kilometres per hour.
- Simultaneously logs the licence plate number, captures a clear image and checks the plate number against payment and E permit lists.

- Identify recorded E permit licence plate details and their current location/zone to determine if payment is required or an infringement detected.
- Clear image processing for reflective and nonreflective Australian licence plates.
- Capturing and track up to 1,000 plates per hour.

The implementation of this system will:

- Reduce the number of PPO's required to patrol the precincts and car parks.
- Cover more areas more frequently and subsequently increase compliance and the number of offences detected and infringements issued.
- Alert officers when a vehicle has not paid for parking or has exceed the time restriction and allow the issuing of an infringement.
- Enable the capture of video and photographic evidence of locations times and dates for later prosecution if required.
- Delay the issuing of an infringement if there is an unsafe situation for enforcement staff preventing the issuing of an infringement at the time the offence is detected.
- Increase bay turnover and availability.
- Enable underutilised PPO staff to be deployed to other reactive' tasks such as driveway obstruction complaints.

Enforcement software used on smart phones connected to Bluetooth printers, in addition to the mobile LPR solution, is the recommended solution. It will allow constant communication with the PbP machines, mobile LPR camera systems and control software to provide:

- Online interrogation of a vehicle
- Capturing of photographic evidence
- Issuing of infringements.
- Reporting
- Phone communications with other Council staff.

Current Levels of Enforcement

An examination of the Parking Patrol Record Sheets for Balmain during October 2019, revealed the following key results:

- Patrol areas are inspected on average <50% of available working days per month.
- The inspections of each street in the patrol areas occurred on average <1.5 times per day

These current patrol frequencies with Council's staffing levels are consistent with other LGAs using the visual on foot inspections and chalking method.

Quantifiable Benefits

Based on experience of other LGAs and data provided by various suppliers, the quantifiable benefits derived from the implementation of two mobile LPR units integrated with new PbP meters and the enforcement system will:

- Increase patrol frequency by circa 40%.
- Improve compliance by circa 20% - 25%.
- Improve existing parking meter revenue through compliance by circa 15%.
- Improve bay turnover and availability by circa 25%.

Further integration with bay monitoring and car park occupancy monitoring will increase all of the above benefits by an additional 5% - 7%.

6.2.9 BODY CAMERAS

The practice of enforcement officers wearing body cameras in other LGAs has reduced the incidents of verbal and physical abuse by approximately 60%. Enforcement officers turn the camera on when feeling threatened and advise the person they are conversing with that their conversation is being recorded and monitored. When activated they can also generate an alarm condition on the system at a remote monitoring site.

It is further recommended all PPO's and Rangers be provided with body cameras as a means of mitigating the potential risk of verbal and physical assault.

6.3 RECOMMENDED TECHNOLOGY PLATFORM AND SPECIFICATIONS

The specifications and required outcomes of the recommended technology platform to be prepared for Council will cover all equipment, integration, installation, commissioning and ongoing maintenance.

ARRB will ensure the specifications include the following features and requirements as a minimum.

6.3.1 PARKING MACHINES

- Manufactured in vandal resistant, anti-corrosive materials, and appropriately sealed for the harsh weather environments.
- Proven ability to work in varying weather conditions.
- LED screen display with intuitive, ease of use operation and automatic variable brightness for operational visibility in all lighting conditions.
- Large easy touch button alpha numeric keypad.
- Battery powered with Solar charging.
- Proven reliability of communications using the local 4G/5G mobile phone data network.
- Configuration options including coin and credit/debit card, smart phone, wristwatch and token ring payment methods.
- Acceptance of debit and credit cards in accordance with PCI DSS compliance requirements.
- Card readers must be fully EMV compliant for chip and pin credit/debit cards.
- Fully compatible with vehicle detection sensors systems and licence plate recognition cameras.
- Compatibility with handheld enforcement hardware, pay by phone and mobile phone Apps.
- Transaction processing times in on and off-line conditions.
- Three-year service warranty.
- Fixed price of additional units during warranty period.

6.3.2 LICENCE PLATE RECOGNITION CAMERA SYSTEMS

- A minimum of two cameras connected to an online processor with GPS integration, LCD/LED screen/keyboard and thermal printer.
- Use the 4G/5G network to communicate with the Management system, enforcement software and handheld infringement devices.
- Be fully integrated with the PbP meters, phone App payment system and enforcement software.
- The LPR cameras should be capable of:
  - reading vehicle licence plates at parallel, 45°,60° and 90° parking angles.
  - Centimetre-accurate GPS position recording.

- Successful read rate at up to 50 kilometres per hour.
- Simultaneously logging of the licence plate number, captures a clear image and checks the plate number against payment and E permit lists.
- Clear image processing for reflective and nonreflective Australian licence plates.
- Capturing and track up to 1,000 plates per hour.

- Be programmable to create car parks/on-street zones or areas and match the GPS coordinates with different time restrictions.
- When the LPR system detects an offending vehicle, it should generate an alarm to notify the enforcement staff in the vehicle.
- Time restricted and overstay paid offence alerts should include a programmable grace period.
- Be capable of generating a fully populated infringement notice for an offending vehicle for non-payment, overstay or parking in a permit only space when requested by enforcement staff.
- Automatically create and forward to the management system, a separate file containing all evidence of the infringement including captured images following the issue of the infringement.

6.3.3   HANDHELD DEVICES

Council currently use the DCA handheld devices with the DCA back of house software. Should Council be satisfied with these enforcement tools and wish to continue using them with new technology, then the DCA software should be compatible with and be capable of full integration with the new meters and LPR cameras chosen. This can be achieved through DCA providing their API interface and the meter and camera manufacturers agreeing to integrate with it or the manufacturers provides their API and Council engage DCA to write the interface.

Other suppliers offer their own infringement software for handheld devices and back of house software. Most handheld device software is compatible with the Samsung handheld devices and infringement printers currently being use by Council. The features and restrictions of infringement software packages are similar. Differences will occur however, in the annual software licences per device and rates charged for software hosting, etc. the specifications should include all Council requirements and comparisons in charges considered during the evaluation process.

The current handheld devices and back of house software should provide the following:

- Ergonomic and safety assessment
- Compatibility with 4G/5G network
- Technically proven to Council's requirements
- Ability to select infringement types
- Inbuilt camera functionality and capability
- Level of weatherproofing and shock proofing
- GPS functionality
- Pay by phone validation
- Bluetooth compatible
- Battery life sufficient for 70% active use over a 9.5-hour shift
- Rapid charge capacity
- Non-infringement data collection
- Proven data security
- Ability to restrict functional access
- Data storage expansion

- Security of access and data
- Offline functionality
- Ability to load mobile application onto PDA
- Ability to review data
- Minimum 7cm diagonal screen
- Removable anti-glare screen
- Centrally controlled software updates (at admin's discretion)
- Default PIN status
- Pre-populating guiding screens
- Dropdown lists for non, pre-populated fields
- Portable charging
- Capable of deploying PDA hardware with existing software
- Keyboard-less device
- Prompt alerts for software upgrades
- Ability to undertake 'office' functions
- Recall registration data
- Identify previous caution notices
- Ability to read bar code, QR and RFID
- Screen font size range
- Integration with other applications
- Fixed price of additional handheld devices during warranty period

6.3.4 INFRINGEMENT ISSUING AND BACK OF HOUSE SOFTWARE

The infringement and back of house software should include as a minimum:

- Compatible and supported by Council's business systems
- Capable of transferring media
- Numerous search and reporting options
- Live updates
- Numerous licences
- Capability for customers to view photos and notes via the internet
- Compatible with other Council infringement requirements
- Compatible and supported by Council's business systems and operating platforms
- Full integration capabilities with enforcement software, mobile phone Apps and mobile phone payment methods
- Compatible with future system and hardware upgrades; ground sensors, licence plate recognition
- Ability to operate concurrently with existing parking meters software
- Unlimited expansion capabilities for the number of meters without additional cost of software licensing
- Comprehensive reporting and exporting capabilities
- Full software support and upgrades at no cost during the warranty period.

6.3.5 PRINTER AND PRINTER PAPER

The printers used in the field by enforcement staff should be capable of:

- Bluetooth printer compatible with handheld device.
- Light weight, able to be attached to utility belt.
- Operate at all angles.
- Pre-determined ticket lengths.
- Ability to print minimum of 500 infringement notices before replacement of ribbon or cartridge.
- Ability for ticket rolls to be replaced on-site.
- Easily interchangeable printer parts.
- Ability to print on pre-printed Council infringement notices or stationery.
- Durable tickets (must be able to withstand minimum 48 hrs in direct sunlight).
- Council's choice of paper supplier.
- Ability to print tickets at different times (e.g. not necessarily at the time of the infringement).
- Fixed price of additional printers during warranty period.
- Maximum of seven-day repair period.

6.3.6 INNER WEST COUNCIL PHONE APPLICATION

Smartphone App will be fully integrated with PbP machines, LPR camera systems and enforcement handheld devices and back of house software. The phone App can be downloaded and used on the following phone operating systems:

- Apple
- Android

The registration process collects:

- Name
- Address
- Mobile number
- Email
- Vehicle Registration
- Credit/debit card details
- Parking E permit product selection.

Smartphone applications should have the ability to enter a zone or location ID with GPS assistance. A parking session is then started by the entry of licence plate details on a parking machine or, if installed, started by the LPR camera on entry and stopped by the exit LPR camera. A choice of electronic wallet or live real-time transactions can be provided. All payment solutions must meet PCI-DSS and KYC compliance requirements.

A smart phone App and website should have the following capabilities:

Search

The ability for the user to search for all parking options declared by Council. The search could be an address or building name. Recognising current location in the precincts and providing closest parking options.

- Once the preferred location is received by the app it will provide the following information:
- Location via icon.

- Parking rates.
- Operating times.
- Any time restrictions or parking conditions.
- Live vacancy (counting also provided from the LPR technology).
- Ability to filter via nearest or price.
- Show parking that is only suitable for entry and exit times entered.

Navigation

A wayfinding and navigation option will be provided for every car park location. Once the user selects their preferred parking location, they press the directions option and are then navigated to the entry of the car park.

The following functionality will be provided:

- Users can choose Google Maps, Apple Maps and Near Maps applications to navigate to car park location.
- If a car park has multiple entry locations, the solution will provide automatic navigation to the best option based on shortest travel time.
- Trip journey reporting.

Website

The payment website will process rate payer E permits. Residents register and apply for the parking E permit via a registration / application process. Information needed includes the following:

- Name
- Address
- Mobile number
- Email
- Vehicle Registration
- Credit/debit card details
- Parking permit product selection.

Council will have the ability to approve these applications before payment and access is provided. Council can check the user is active, financial and ensure they are allocated to the correct user group, so the applicable parking rates are applied. Automation of this process should be possible through integration of the phone App with TechOne.

Console

Council shall have a back-end administration and reporting console. The console will have the following functionality:

- Detailed reporting analytics including, user activity, payment breakdown for all activity and a banking reconciliation.
- Ability to approve parking applications manually.
- Ability to review any queries received on parking payments.
- Process refunds.
- Update rates.

The user will also be provided with console access to their account only. Functionality will include:

- Account details.
- Update account details.
- Activity.
- Payment transactions.

6.3.7 FEATURES

The phone App should have the ability to provide the following:

- Available at no cost to users from the Apple App Store or Android Google store.
- Available in a white labelled version to allow Council to use their own logo and corporate colours
- Capable of providing GPS navigation to an area or car park, parking charge times, parking rates, time limits and bay availability integration.
- Payment must be a simple and customer friendly experience for users and include operational instructions and help desk support between the hours of 8.00 am to 6.00 pm Monday to Friday, excluding public holidays.
- Users must have the ability to select and set the exact time they wish to park and pay.
- Users must have the ability to apply for one of multiple parking E permits:
- Council should have password protected remote access into the Pay by Phone system to generate additional reports where required.
- All information received shall be subject to the provisions of the Privacy Act 1988 and must be collected, used and stored in accordance with this Act and the Council's privacy policy.
- The system shall allow for an adjustable minimum payment amount to be set.
- User vehicle registration should be recorded with the payment to identify and verify payment.
- Provide an alert to the user prior to the expiry of their paid parking and provide the option to top up their payment to extend the time up to the maximum restriction time limit.
- Payment of infringement notices issued to their vehicles shall be capable through the phone App.
- The ability to charge the user a credit card surcharge at the time they pay for parking.
- Not charge any additional fees to the users.
- Email electronic receipts to users following each payment transaction.
- Provide help desk services to Council staff between the hours of 8.00 am and 6.00 pm Monday to Friday, excluding public holidays.
- Individual payment information is accessible in real time by enforcement staff and back of house admin staff.
- Individual payment information is retrievable from the back of house system by authorised staff for a minimum of six months following the transaction.
- Include a comprehensive reporting package to generate and export in CSV or PDF all payment transactions filtered by dates and times, hourly, daily, monthly, yearly, for individual meters, parking locations or areas and the complete system.
- Funds paid for parking settled on a daily basis with a comprehensive financial reporting system that provides both current and historical financial records.
- User information is subject to the provisions of the Privacy Act 1988 and must be collected and stored in accordance with the Act.
- All credit/debit card information and payments fully PCI/DSS and EMV compliant.

6.3.8 WARRANTY SERVICE AND MAINTENANCE

The Warranty, service and maintenance should include:

- Three-year service warranty.
- Full comprehensive service and routine maintenance during warranty period.
- KPIs for service delivery during warranty period.
- Routine and comprehensive maintenance contract following warranty period.
- Determination of reactive and proactive maintenance.
- KPIs for service delivery during maintenance contract period.
- Fixed price of spares during warranty period.
- Fixed hourly technician rates for call outs during and outside of normal business hours.
- Prescribed minimum and maximum response times.
- Liquidated damages for non-performance in meeting KPIs.
- Capped price increases of meters, handheld devices, printers and spares during maintenance contract.

7 ESTIMATED COSTS

The whole of life cost is broken into two separate sections:

1. Capital costs, installation and commissioning.
2. Ongoing costs, including warranty, servicing and maintenance over a seven-year period with an annual inflation rate of 2.5%.

The technology is separated into three separate categories:

1. Parking equipment and enforcement (240 PbP meters and 25 handheld enforcement devices).
2. Vehicle detection system and precinct guidance (500 parking sensors, alternatively, 30 surveillance cameras)
3. Phone App for payment and precinct guidance.

Note, all estimated capital and ongoing costs exclude GST.

7.1 CAPITAL COSTS

7.1.1 PARKING EQUIPMENT AND ENFORCEMENT.

Table 7.1 Parking equipment and enforcement capital costs

Equipment item	Total quantity	Unit cost	Qty cost
Meter Parking			
Meters			
PbP Meters	240	$9,500	$2,280,000
Meter Installation	240	$650	$156,000
Meter Commissioning	240	$200	$48,000
Enforcement			
Handheld Devices (Existing)	25	$850	$21,250
Portable Printer (Existing)	25	$1,000	$25,000
Handheld enforcement software (12 months)	22	$1,800	$39,600
Back of House Software (12 months)	1	$7,200	$7,200
Mobile LPR Systems	2	$55,000	$110,000
Mobile LPR Back of House software	1	$15,000	$15,000
Total Cost			$2,702,050
Contingency + 15 %			$405,308
Total Estimated Capital Cost			$3,107,358

7.1.2 VEHICLE DETECTION SYSTEM AND PRECINCT GUIDANCE

Table 7.2 Inground sensor vehicle detection system and precinct guidance capital costs

Equipment item	Total quantity	Unit cost	Qty cost
Vehicle Detection Bay Sensors for 186 Bays			
Sensor Detection			
Dual Tech inground sensors	186	$240	**$44,640**
Repeater	20	$2,500	**$50,000**
Mapping	1	$5,000	**$5,000**
Software	1	$30,000	**$30,000**
Project Management, installation, training	1	$35,000	**$35,000**
Precinct Guidance			
Static Signs	4	$3,000	**$12,000**
Dynamic Signs	3	$15,000	**$45,000**
Mounting Poles	7	$1,200	**$8,400**
Foundations	7	$650	**$4,550**
Installation	1	$3,000	**$3,000**
Total Cost			**$237,590**
Contingency + 15 %			**$35,639**
Total Estimated Capital Cost			**$273,229**

Table 7.3 Camera surveillance vehicle detection system and precinct guidance capital costs

Equipment Item	Total Quantity	Unit Cost	Qty Cost
Vehicle Detection Cameras for 500 Bays			
Cameras			
6.5 Meter Pole, camera with 112 Degree Lens, Solar Power, back up battery & 4G/5G communications	18	$16,500	**$297,000**
Mapping	1	$7,500	**$7,500**
Software	1	$7,500	**$7,500**
Precinct Guidance			
Static Signs	4	$3,000	**$12,000**
Dynamic Signs	3	$15,000	**$45,000**
Mounting Poles	7	$1,200	**$8,400**
Foundations	7	$650	**$4,550**
Installation	1	$3,000	**$3,000**
Total Cost			**$384,950**
Contingency + 15 %			**$57,743**
Total Estimated Capital Cost			**$442,693**

7.1.3 VEHICLE OCCUPANCY

Table 7.4 Vehicle occupancy with fixed LPR cameras

Equipment Item	Total Quantity	Unit Cost	Qty Cost
Vehicle Occupancy with Fixed LPR cameras			
Cameras			
LPR Camera bank	6	$10,500	$63,000
Site software licence	2	$10,000	$20,000
4G/5G network modem	2	$7,500	$15,000
Installation and commissioning	1	$5,000	$5,000
Total Cost			$103,000
Contingency + 15 %			$15,450
Total Estimated Capital Cost			**$118,450**

7.1.4 PHONE APP FOR PAYMENT AND PRECINCT GUIDANCE.

Table 7.5 Phone App for payment and precinct guidance capital costs

Equipment item	Total quantity	Unit cost	Total cost
Mobile Phone App			
Platform Master License (2 car parks, precinct and parking guidance)	1	$15,000	**$15,000**
Precinct Guidance Platform	1	$6,000	**$6,000**
Parking equipment space availability	1	$6,000	**$6,000**
PCI DSS compliant for parking payment system including gateway fees, credit/debit card charges and merchant fee.	1	$5,000	**$5,000**
Ongoing license (per calendar month)	12	$3,000	**$36,000**
Support estimate (per calendar Month)	12	$1,000	**$12,000**
Transaction fee (including merchant fees)	6%		
15% Contingency			$4,800
Total Estimated Capital Costs			$36,800

7.2   ONGOING COSTS

7.2.1   PARKING EQUIPMENT AND ENFORCEMENT.

Table 7.6 Annual ongoing costs for parking equipment and enforcement

Equipment Item	Total Quantity	Unit Cost	Qty Cost
Annual Ongoing Costs			
Meters			
Routine Maintenance	240	$1,400	$336,000
Reactive Maintenance	240	$150	$36,000
Licensing Hosting & Communications	240	$500	$120,000
Credit card Gateway & Transaction fee	240	$200	$48,000
Receipt paper	1	$10,000	$10,000
Sub Total			$550,000
Enforcement			
Handheld enforcement software (12 months)	25	$1,200	$30,000
Back of House Software (12 months)	1	$7,200	$7,200
Mobile LPR Systems	2	$5,000	$10,000
Mobile LPR Back of House software	1	$1,000	$1,000
Sub Total			$48,200
Total Cost			$598,200
Contingency + 15 %			$89,730
Total Estimated Ongoing Cost			$687,930

7.2.2   VEHICLE DETECTION SYSTEM, OCCUPANCY AND PRECINCT GUIDANCE

Table 7.7 Annual ongoing costs for inground sensor vehicle detection system and precinct guidance

Equipment item	Total quantity	Unit cost	Qty cost
Sensor Detection			
Dual Tech inground sensors	186	$80	$14,880
Repeater	20	$80	$1,600
Mapping	1	$0	$0
Software	1	$1,500	$1,500
Precinct Guidance			
Static Signs	4	$200	$800
Dynamic Signs	2	$3,000	$6,000

Total Cost			$24,780
Contingency + 15 %			$3,717
Total Estimated Capital Cost			**$28,497**

Table 7.8 Annual ongoing costs for camera surveillance vehicle detection system and precinct guidance

Equipment item	Total quantity	Unit cost	Qty cost
Cameras			
Pole, camera, Solar Power, battery & comms	18	$350	$6,300
Mapping	1	$0	$0
Software hosting per bay over 5 years	500	$72	$36,000
Precinct Guidance			
Static Signs	4	$200	$800
Dynamic Signs	2	$3,000	$6,000
Total Cost			$49,100
Contingency + 15 %			$7,365
Total Estimated Capital Cost			**$56,465**

Table 7.9 Annual ongoing costs vehicle occupancy with fixed LPR cameras

Equipment item	Total quantity	Unit cost	Qty cost
Cameras			
Fixed LPR Cameras	6	$1,000	$6,000
Software Hosting site licence	2	$3,000	$6,000
Total Cost			$12,000
Contingency + 15 %			$1,800
Total Estimated Capital Cost			**$13,800**

7.3 CONSOLIDATED WHOLE OF LIFE COSTS

Table 7.10 Seven year whole of life ongoing costs for all systems

Technology item	Capital cost	Ongoing costs	Whole of life cost
Parking Equipment and Enforcement	$3,107,358	$3,557,879	$6,665,237
Vehicle Detection and Precinct Guidance (Inground Sensors)	$273,229	$182,031	$455,260
Vehicle Detection and Precinct Guidance (Cameras)	$442,693	$360,684	$803,376
Vehicle Occupancy Systems	$118,450	$88,151	$206,601
Phone Application	$36,800	$362,277	$399,077
Total	$3,978,529	$4,551,021	$8,529,550

Table 7.11 Whole of life costs for a seven-year period

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Total
PbP Meters and Enforcement	$260,130	$266,633	$273,299	$664,132	$680,735	$697,753	$715,197	$3,557,879
Vehicle Detection and Precinct Guidance (Inground Sensors)	$0	$28,497	$29,209	$29,940	$30,688	$31,455	$32,242	$182,031
Vehicle Detection and Precinct Guidance (Cameras)	$0	$56,465	$57,877	$59,324	$60,807	$62,327	$63,885	$360,684
Vehicle Occupancy Systems	$0	$13,800	$14,145	$14,499	$14,861	$15,233	$15,613	$88,151
Phone Application	$48,000	$49,200	$50,430	$51,691	$52,983	$54,308	$55,665	$362,277
Total Ongoing Costs	$308,130	$414,595	$424,960	$819,584	$840,074	$861,076	$882,602	$4,551,021

8   PROJECT PLAN

8.1   IMPLEMENTATION METHODOLOGY

8.1.1   STAKEHOLDER ENGAGEMENT

Areas where pay parking exists will have a level of acceptance from retail operators and the general public. Replacement or enhancement of existing systems will require little stakeholder engagement.

Public engagement with businesses and residents in new precincts could be conducted to detail Council's planned implementation of pay parking, the reasons for the implementation, the benefits to businesses and residents, receive their feedback and gauge the level of acceptance.

8.1.2   PUBLIC COMMUNICATIONS

Council's engagement team should be utilized to provide information to the businesses, rate payers and residents in each precinct. The information flow should begin when a contract is awarded, approximately three months before the project is completed. The information should include mailouts, advertising in a local newspaper and street and car park signage of impending *Changed Parking Conditions, Rates and Revenue Utilization.*

The information should include payment methods for the chosen machines with cash (if used) and credit/debit cards, the phone App chosen along with pictures, etc.

Customer Service staff and enforcement officers trained in the use of the new equipment should be available in the precinct to assist parkers in the methods of payment at the machines for the first four weeks following the rollout of the equipment.

A grace period of four weeks in new precincts with no infringements should be provided to parkers who have not paid for their parking following the rollout.

8.1.3   EQUIPMENT SUPPLY CONSTRAINTS

Generally, the supply and installation of parking equipment occurs ten to twelve weeks from the date of appointment of the successful tenderer regardless of the manufacturing origin.

Other constraints if the equipment is manufactured offshore are freight companies and Australian Customs which in some cases have caused delivery to be delayed and pushed the timelines out to over sixteen weeks.

The current COVID-19 virus and country and State lockdowns may also delay the receiving of parts for manufacture and delivery of finished equipment.

8.1.4   INSTALLATION METHODS

TfNSW (RMS) Regulation (1), Section 8.0 Ticket Parking Schemes describes the features and planning and sub section 8.3 – Operations, describes the distances for parkers to travel from their vehicle to the parking machine. It also refers to short term parking and long-term parking.

For short-term parking, the distance is no more than about 50 metres and 60 metres for long term parking.

PnD requires a driver to walk to a machine and back to their vehicle to display the ticket so the distance between the parking space and machine should not exceed 25 meters for short term parking.

PbB and PbP do not require the driver to return to their vehicle with a ticket so the distance from the bay to the machine can be 50 meters for short term parking.

Off-street car parks should have the machines positioned 50 to 60 metres from the furthest parking bay.

Another consideration is the side of the road the machines are located. TfNSW (RMS) Regulation (1) Section 8 also indicate drivers should not have to cross major traffic lanes or side streets to access parking machines.

The successful contractor should be supplied with a plan of the precincts with the general location of the machines and instructions on the position from the curb, orientation and foundations to be installed.

Prior to delivery of the machines from the manufacturer, the contractor should install concrete foundations in the machine locations, reinstate the ground and provide safety hoardings around the concrete pad if required.

The contractor should employ a software package such as **"Geojot"** to provide photographic evidence of the footings hole size and completed concrete pad with GPS coordinates for each machine and incorporate the photos into the commissioning documentation for each machine location.

Prior to installation of the equipment on site, all parking machines and equipment should be set up, pre-commissioned and witness tested in the contractor's premises. All controlling software should also be commissioned with access and training provided to Council staff.

When all pre-commissioning is complete the machines and equipment should be delivered to site, bolted down, initialized and tested for communications and full operation. They can then be covered with protective material until Council's launch dates where they should be uncovered, tested and put into operation.

8.1.5 TRAFFIC MANAGEMENT AND DISRUPTIONS

Disruption will be caused to vehicle and pedestrian traffic when foundation excavation and concrete pouring is carried out in each of the parking machine locations and when the supplier installs street surveillance cameras.

The submission of traffic management plans and the provision of traffic management personnel during the installation should be provided by the contractor as part of their tender costs.

8.2 TIMETABLE AND PROJECT ROLLOUT

The timetable for the tender process and project implementation is presented in Gantt chart format as Table 8.1 . Factors that may alter the timelines at the tender stage are the approval processes, proponent evaluations, recommendations and final Council approval.

The delivery stage is based on a 14-week period and assumes there will be no delays during the equipment manufacturing and shipping stages. COVID-19 country and industry lockdowns may delay this process.

Table 8.1 Tender process and project timelines

Year 1 Tasks	Weeks																
	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34
Request for Tender																	
Development of Draft Specifications	█																
Specifications Review		█															
Final Specifications			█														
Draft Tender Documentation				█													
Tender Documentation review				█													
Final Tender Documentation				█													
Issue Tender					█												
Industry Briefing						█											
Tenderer Questions							█										
Tender Close							█										
Preliminary Evaluation Report							█										
Preferred tenderers selected - Presentation & interview								█									
Final Tender review report with Recommendations								█	█								
Council Approval									█								
Awarding of Tender										█							
Project Preliminary Works																	
Puchase order from Council										█							
Execution of Contract documentation										█							
Equipment Order										█							
Confirmation of equipment locations and production of plans											█	█					
Equipment configuration and tariff documentation to Council's Requirements											█	█	█				
Delivery of equipment to contractor														█			
Equipment configuration, setup and pre-commissioning testing														█	█		
Pre-Installation - Field Works																	
Test machine communications at each location											█	█	█				
Install concrete footings in new locations											█	█					
Confirm Council street signage changes											█						
Confirm installation schedule with Council											█						
Provide final install report to Council													█				
Installation commissioning and training																	
Install equipment in new locations and commission														█			
install equipment in existing locations and commission														█	█	█	
Test all communications with back of house, LPR, phone App and enforcement equipment														█	█		
Train Council Admin, enforcement staff and cash collection																█	█
Provide final documentation and manuals																	█
Handover completed system																	█

It is recommended the project be implemented as a staged rollout in the following manner:

8.2.1 ENFORCEMENT SYSTEMS

The priority should be to change the enforcement method first. Fit out a minimum of two Council vehicles with mobile LPR systems with a third vehicle to be considered based on the efficiency achieved and area covered with two vehicles.

The LPR vehicles can patrol all time restricted on and off-street car parks to detect and infringe overstays whilst traditional patrols of pay parking metered areas can continue to be carried out to check for non-payment and expired tickets.

8.2.2 PBP MACHINES AND PHONE APP

The replacement of existing meters will take approximately 14 weeks, from the date of Council's letter of appointment. During this period, the development and launch of the phone App can be carried out to coincide with the first replacement of the meters. The existing number of meters will reduce as described in Section 8.1.4. The recommended order of replacement of existing meter locations is:

1. Newtown - 20 meters
2. Balmain - 95 meters
3. Rozelle - 60 meters
4. Leichhardt - 65 meters.

The replacement of the Newtown meters should be carried out first to gauge user acceptance and also allow for any site adjustments to the system and user instructions. The Newtown area can then be incorporated into the mobile LPR patrols to detect any vehicle parked that has not paid.

The replacement in the other areas should then be carried out as listed above along with expanded mobile LPR patrols.

8.2.3 BAY MONITORING, PRECINCT GUIDANCE AND CAR PARK OCCUPANCY

Bay monitoring, precinct guidance and car park occupancy trials can then be carried out. It is recommended the trials be conducted in the following order with Dulwich Hill being the initial priority:

1. Bay Monitoring and Precinct Guidance

Inground vehicle detector sensors with static and dynamic precinct guidance signage in Dulwich Hill, a total of 186 bays:

- 14 Seaview Street, Dulwich Hill, 46 bays.
- 26 Seaview Street, Dulwich Hill, 58 bays
- 1 Loftus Street, Dulwich Hill, 82 bays.

2. Bay Monitoring Only

Camera bay monitoring, a total of 500 bays:

- Hardie Ave car park Summer Hill, 125 bays.
- Ashfield Civic Centre Rooftop Car Park, 375 Bays with 3P time restriction.

3. Car Park Occupancy

Fixed LPR camera systems, a total of 440 bays:

- The rooftop car park of Ashfield Mall, 376 bays,
- Brown Street basement car park, 64 bays.

INNER WEST

CONTACT US

Michael Moses

Principal Technology Leader

Future Transport Technology

E: Michael.moses@arrb.com.au

Laurie Smith

Principal Professional

Future Transport Technology

E: Laurie.smith@arrb.com.au

ARRB.COM.AU