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Feasibility Study into the Relocation of a Point-to-point Camera System

Project No: PRS16183

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for Justice and Community Safety Directorate

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for Justice and Community Safety Directorate

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FEASIBILITY STUDY INTO THE RELOCATION OF A POINT-TO-POINT CAMERA SYSTEM

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SUMMARY

The Justice and Community Safety Directorate sought advice on the practicalities of relocating an existing point-to-point speed system on Athllon Drive to one of three nominated routes – Tuggeranong Parkway, Parkes Way and Majura Parkway.

A two-step route/segment assessment process was developed from best practice installation and operation of point-to-point speed enforcement systems and applied to candidate routes.

The first step in the process identified the most suitable route from the nominated candidates, and the second step evaluated defined segments that might form the enforceable zone.

Of the three candidate routes, Majura Parkway was considered the most suitable. The segment-level assessment identified two options on this preferred route – Segment B and a longer combination length of Segment A+B (illustrated in the body of the report).

The longer Segment A+B is suggested as providing greater overall speed compliance and road safety benefits from the application of a point-to-point camera system.

The precise location for the cameras requires input from a technology supplier; however, this assessment has identified two configurations may be suitable solutions. The nominated camera location in the north of the segment could accommodate either a median or a roadside installation, however, the nominated camera location in the south will likely need to be installed in the roadside area, or potentially using an overhead gantry due to the presence of the narrow concrete median barrier at this location.

Other than these considerations there do not appear to be any significant installation challenges identified for these locations.

A feasibility analysis has compared the re-use of the recently decommissioned Athllon Drive site with purchasing new equipment.

Discussion with Gatso, the camera supplier for the Athllon Drive site, determined that the cameras used at Athllon Drive are at the end of their technical life and that recycling these for the new site was not feasible.

Point-to-point camera technology now available is considered superior to that currently installed; single cameras are available with the capacity to monitor multiple lanes, and considerably improved quality of the data and images captured.

Indicative costs provide an overview of the level of investment required if the ACT should seek to purchase equipment for a new site. However, alternative procurement and operating models are discussed that may provide a more affordable approach for new installations.

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Based on the route and site reviews, and an assessment of the nominated routes against best practice, it is recommended that the Justice and Community Safety Directorate:

1. Adopt Segment A+B along the Majura Parkway, a length of approximately 8 km, as the preferred location for a new point-to-point camera enforcement zone.
2. Explore the use of the latest generation camera and support equipment for all new systems.
3. Investigate the value of alternative procurement arrangements for the installation, operation and maintenance of new systems.
4. Discuss with the current supplier, Gatso, the suitability of the Athllon Drive system for supporting the maintenance of the Hindmarsh Drive installations.

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1 INTRODUCTION

Point-to-point camera technology is an enforcement measure used to manage driver compliance with signposted limits over longer sections of main roads and highways than is typically achieved with fixed speed camera installations. Utilising automatic number plate recognition (ANPR), point-to-point camera technology identifies a vehicle at two separate locations and then determines whether the average speed of the vehicle exceeds the posted speed limit while travelling through the enforcement zone.

As reported by Austroads (2012):

> There is considerable evidence indicating a positive influence of the approach on a number of speed measures including: average/mean speeds; 85th percentile speeds; the proportion of speeding vehicles; and speed variability. Evaluations of point-to-point systems have typically reported substantial reductions in mean and 85th percentile speeds associated with the introduction of the technology. Moreover, average (and often even 85th percentile) speeds are reduced to at or below the posted speed limit.

And further:

> Exceptional rates of compliance with posted speed limits are also noted, with offence rates typically reported to be less than 1%, even when daily traffic volume is high. Further, the proportion of vehicles exceeding the speed limit is often found to be drastically reduced (upwards of a 90% reduction) and the approach has been noted as particularly effective in reducing excessive speeding behaviour. Reductions in all crash types, particularly fatal and serious injury crashes, have been reported.

A recent study published by the RAC Foundation in the UK reported that point-to-point camera sites across the UK had realised reductions in fatal and serious injury crashes between 25 and 46%, with a reduction in personal injury crashes up to 22% (RAC Foundation 2016).

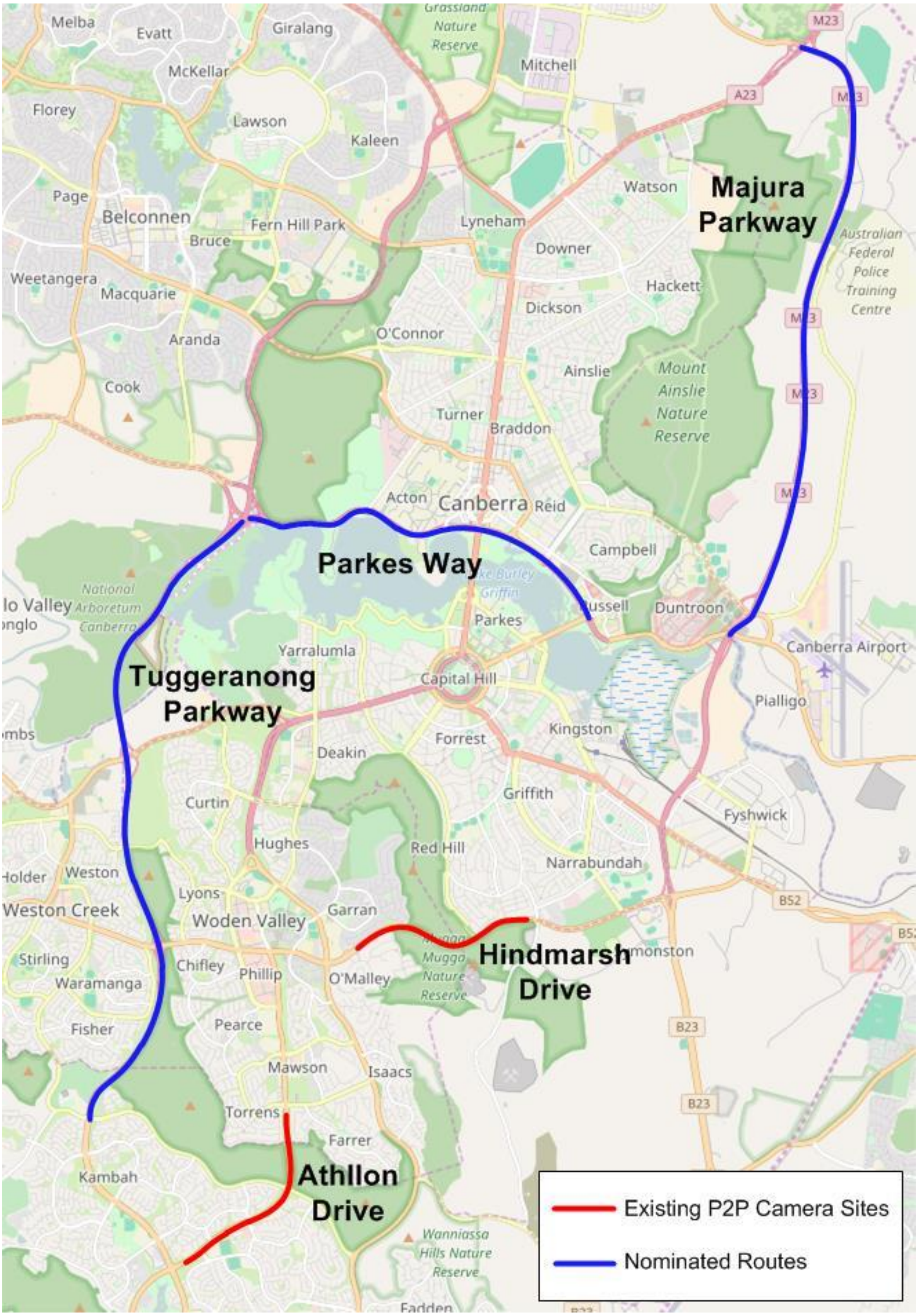
Point-to-point cameras have been applied by leading road safety nations around the world since the late 1990s, and were first adopted in Australia by Victoria in April 2007 (Austroads 2012).

The first point-to-point cameras installed in the ACT were on a 2.8 kilometre section of Hindmarsh Drive in early 2012. A second site, a 3.3 kilometre section on Athllon Drive, was installed in mid-2013. Recent evaluation of these sites found that the Hindmarsh Drive site was operating effectively while the Athllon Drive site was found to be unsuitable for continued point-to-point camera enforcement.

This report is one of a series of reports addressing point-to-point speed enforcement in the ACT. In May 2015, the *ACT Road Safety Camera Strategy* was published. This strategy outlined a forward plan for point-to-point cameras in the ACT. In November 2015, point-to-point camera siting criteria for the ACT (Martin Small Consulting 2015) and in consideration of this, the Justice and Community Safety Directorate nominated three routes for assessment of their suitability as new point-to-point enforcement zones.

The three nominated routes are Tuggeranong Parkway, Parkes Way and the recently opened Majura Parkway. The location of each is shown in blue in Figure 1.1, along with the location of the two existing point-to-point camera sites, which are indicated in red.

Figure 1.1: Locality map showing the two existing point-to-point camera sites and the three proposed routes



Source: OpenStreetMap (2016)

The main objectives of this project are to identify the most suitable new point-to-point camera site from the three nominated routes, and to investigate the feasibility of relocating the existing point-to-point camera infrastructure from Athllon Drive to a new site.

To assist in meeting the first of these objectives, a route assessment method was developed to guide the evaluation process. This drew on route/site assessment approaches applied by other Australian and overseas jurisdictions as well as considering key features of best practice point-to-point speed enforcement.

The resulting route assessment method is briefly discussed in Section 2.

The route assessment method was then applied to the three nominated routes, enabling the recommendation of a new point-to-point enforcement zone and preferred sites for the supporting camera infrastructure. This process is outlined in Section 3.

With regard to the second main objective of the project, a review of the feasibility of relocating the existing point-to-point camera infrastructure from Athllon Drive to the recommended new enforcement zone is presented in Section 4.

This review includes assessment against the purchase of new camera/detector technology, with indicative costs, sourced from industry suppliers, for camera installation, operation and maintenance options.

The recommendations for locating a new point-to-point enforcement zone, including re-use of the Athllon Drive infrastructure are presented in Section 5.

2 BEST PRACTICE POINT-TO-POINT SPEED ENFORCEMENT AND THE ASSESSMENT PROCESS

2.1 Key Elements and Site Evaluation

As a speed enforcement measure, point-to-point cameras are a relatively new technology in Australia and there is understandably limited published information regarding best practice for route selection and camera site installation.

Limited published information notwithstanding, best practice point-to-point speed enforcement is relatively intuitive and well understood by road safety and enforcement practitioners; evaluation studies for overseas and Australian installations can also assist to identify key elements for optimising the selection of enforcement zones and appropriately locating camera detection infrastructure.

The key elements for assessing routes nominated for point-to-point enforcement have been identified through a review of national and international practice and a first principles assessment, which includes matters such as adjacent land use; the number of traffic lanes and entry/exit points (e.g. on/off-ramps and side-road intersections along the planned enforcement zone); the horizontal and vertical alignment; potential stopping points; access to power supply and telecommunications; ground conditions and access arrangements for equipment installation and maintenance etc.

These factors, and others relating to the siting and operation of point-to-point camera enforcement, have been collated under the following headings:

- road features
- traffic data
- camera installation, operation and maintenance.

The nominated routes have each been assessed against the above considerations in a two-step evaluation process. The first step involves a route-level assessment, which seeks to rank each route based on its suitability for point-to-point enforcement.

The second step is a more detailed evaluation of defined sections within the preferred route to identify a recommended candidate point-to-point zone.

In each step, the evaluation applies a simple score against each key element. In this way, the process seeks to apply a level of descriptive or technically based objectivity in the route/segment assessment.

The key elements of assessment are briefly discussed in the following sections. The results of the route and segment assessment process described here are presented in Section 3.

2.2 Road Features

The primary objective of point-to-point speed enforcement is to gain the compliance of drivers with the signposted speed limit in the point-to-point zone.

The physical features of a road can significantly influence a driver’s speed over the course of their journey and for point-to-point systems, it is the average speed that determines a driver’s compliance or infringement (and level of infringement). Consequently, road features that cause traffic to slow below the speed limit on one part of the route, for example a roundabout or signalised intersection that stops traffic, will facilitate the opportunity to exceed the speed limit on another part of the route, while maintaining a compliant average journey speed.

Other features such as side entry/exit roads may create opportunities for motorists to avoid detection at one or both point-to-point cameras, meaning drivers who speed over a part of the point-to-point zone are not detected.

The key road feature elements of a candidate route to consider in a point-to-point assessment are described in Table 2.1. The route and segment-based point scores adopted for each key element applied in the assessment process for the three nominated routes are also presented in this table.

Table 2.1: Key road feature elements – assessment and scoring parameters

Key element	Description	Route assessment scores	Segment assessment scores
Route length (route assessment) Effective length (segment assessment)	Route length is the entire length of the assessed road. Effective length is the maximum enforceable length within a segment without compromising the effectiveness of the point-to-point cameras. This is typically the distance between the on/off ramps at each end of a segment.	1 – Shortest route 2 – Mid-length route 3 – Longest route	1 – < 2 km 2 – 2–3 km 3 – 3–4 km 4 – 4–5 km 5 – > 5 km
Speed limit	Higher speed limits are more suited to point-to-point cameras because there is a greater likelihood of speeding and speeding-related crashes in higher-speed areas.	1 – < 90 km/h 2 – 90 km/h 3 – > 90 km/h	1 – < 80 km/h 2 – 80 km/h 3 – 90 km/h 4 – 100 km/h 5 – > 100 km/h
Speed limit consistency	A single posted speed limit is more desirable for point-to-point speed enforcement.	1 – > 1 change 2 – 1 change 3 – Single speed limit	1 – > 1 change 3 – 1 change 5 – Single speed limit
Median and roadside conditions	There must be adequate space within the median or on the roadside to accommodate speed cameras and support equipment.	1 – No practical location for cameras 2 – Either wide median or wide roadsides 3 – Both wide median and wide roadsides	1 – No practical location for cameras 3 – Either wide median or wide roadsides 5 – Both wide median and wide roadsides
Horizontal alignment	Straighter road sections are more desirable as numerous, tight curves can reduce a vehicle's average speed.	1 – Frequent curves 2 – Curvilinear 3 – Mostly straight or large radius curves	1 – Frequent curves 3 – Curvilinear 5 – Mostly straight or large radius curves
Vertical alignment	Level and lower-gradient road sections are more desirable as steeper gradients can greatly increase or reduce a vehicle's average speed.	1 – High gradients or undulating 2 – Moderate gradients 3 – Level to low gradients	1 – High gradients or undulating 3 – Moderate gradients 5 – Level to low gradients
Number of entry/exit points	Entry and exit points allow for a proportion of vehicles to go undetected by a point-to-point camera system and should be avoided if possible.	1 – > 3 entry/exit points 2 – 1–3 entry/exit points 3 – 0 entry/exit points	1 – > 1 major 2 – 1 major intersection 3 – > 1 minor intersection, 0 major intersections 4 – 1 minor intersection, 0 major intersections 5 – No intersections

Key element	Description	Route assessment scores	Segment assessment scores
Controlled intersections	Intersections controlled by traffic signals or roundabouts can greatly reduce a vehicle's average speed as well as provide an entry/exit point.	1 – 1 or more controlled intersections 3 – 0 controlled intersections	1 – 1 or more controlled intersections 5 – 0 controlled intersections
Traffic management	Traffic management or speed management features can reduce a vehicle's average speed.	1 – Present 3 – None	1 – Present 5 – None
Stopping opportunities	Opportunities for a motorist to pull-over such as a lay-by or a commercial facility (e.g. shop, restaurant) should be avoided.	1 – Several opportunities 2 – Few opportunities 3 – No opportunities	1 – Several opportunities 3 – Few opportunities 5 – No opportunities
Pre-existing speed enforcement	Fixed speed cameras have a 'halo-effect' of a few hundred metres so point-to-point cameras will not want to be placed too close to existing fixed speed cameras or the treatments will overlap and be less cost-effective.	1 – >1 fixed speed camera 2 – 1 fixed speed camera 3 – None	1 – > 1 fixed speed camera within/near section 2 – 1 fixed speed camera within section 3 – 2 fixed speed camera < 500 m from section 4 – 1 fixed speed camera < 500 m from section 5 – None

2.3 Traffic Data

The traffic profile of a candidate route is an important component in determining the suitability for a point-to-point system. To be an effective road safety measure, speed enforcement systems need to be applied at locations where there is an identifiable speed compliance problem and an identified road safety risk profile. This may be in terms of crash frequency, but under the Safe System approach, it should also consider crash severity, which is often related to speed[1].

Cost-effectiveness improves when the speed enforcement system is applied to high-volume routes, not simply in terms of infringement revenue, but also from the potential for sustained compliance by a larger number of motorists.

The types of traffic data useful for assessing suitability include traffic volume surveys, with speed and vehicle type identified. For the assessment of the nominated routes and route segments, the traffic profile data is presented in a series of tables in Appendix C.

The key elements of the traffic profile of a candidate route to consider in a point-to-point assessment are described in Table 2.2. The route and segment-based point scores adopted for each key element applied in the assessment process for the three nominated routes are also presented in this table.

[1] Applying the methodology contained in the Martin Small Consulting (2015) report, crash data is the primary element for shortlisting routes as candidates for a point-to-point enforcement system. It has not been specifically applied in the assessment of the nominated routes.

Table 2.2: Key traffic profile elements – assessment and scoring parameters

Key element	Description	Route assessment scores	Segment assessment scores
Speeding issue	A speeding issue is defined in this assessment process when the 85th percentile speed exceeds the posted speed limit.	1 – 85th percentile speed > posted speed for no sections 2 – 85th percentile speed > posted speed for some sections 3 – 85th percentile speed > posted speed for all sections	1 – < 1% exceeding speed limit 2 – 1–20% exceeding speed limit 3 – 20–40% exceeding speed limit 4 – 40–60% exceeding speed limit 5 – > 60% exceeding speed limit
Traffic volume	A greater traffic volume is desirable because a greater number of vehicle will be affected by the point-to-point camera treatment.	1 – < 15 000 vehicles per day in each direction for majority of length 2 – 15 000–20 000 vehicles per day in each direction for majority of length 3 – >20 000 vehicles per day in each direction for majority of length	1 – < 10 000 vehicles per day in each direction 2 – 10 000–15 000 vehicles per day in each direction 3 – 15 000–20 000 vehicles per day in each direction 4 – 20 000–25 000 vehicles per day in each direction 5 – > 25 000 vehicles per day in each direction
Traffic churn extent	The likelihood of vehicles travelling the entire route or section will affect the effectiveness of a point-to-point camera treatment.	1 – High likelihood of significant traffic churn 2 – Moderate likelihood of significant traffic churn 3 – Low likelihood of significant traffic churn	1 – Very high likelihood of significant traffic churn 2 – High likelihood of significant traffic churn 3 – Moderate likelihood of significant traffic churn 4 – Low likelihood of significant traffic churn 5 – Traffic churn not possible
Heavy vehicle %	The point-to-point speed camera technology can be applied to monitor heavy vehicle movements – e.g. speed, vehicle mass, logbook compliance.	1 – < 5% heavy vehicles for majority of length 2 – 5–10% heavy vehicles for majority of length 3 – > 10% heavy vehicles for majority of length	1 – <3% heavy vehicles 2 – 3–6% heavy vehicles 3 – 6–9% heavy vehicles 4 – 9–12% heavy vehicles 5 – >12% heavy vehicles

2.4 Point-to-point Camera – Installation, Operation and Maintenance

There are numerous installation, operation and maintenance-related elements to consider with any point-to-point enforcement system and these are listed in Table 2.3.

Table 2.3: Installation, operation and maintenance considerations for point-to-point enforcement systems

Consideration	Description
Mounting	The cameras will need to be mounted on a suitable structure. Poles are typically used; however, existing structures such as gantries may be suitable. Using existing infrastructure can lead to both challenges (e.g. lack of access, poor visibility) and benefits (e.g. cost-reduction due to utilising existing infrastructure).
Housing for cameras and supporting equipment	The camera must have a housing to protect it from environmental damage. The housing is normally sold with the camera. Supporting equipment such as illuminators also needs to housed and mounted. Data servers need housing and may also be pole mounted or housed in a separate cabinet nearby.
Camera visibility	The sightlines of each camera should be free of obstructions. Nearby trees should be well clear of the camera locations.
Power supply	Cameras are typically powered by connecting to the local power supply. Presence of nearby powered devices such as street lighting suggests power supply for cameras should be available. The latest point-to-point camera technology includes using solar power.
Communications connectivity	ASECs collect significant amounts of data and some of these data must be transmitted to the back office from the camera. The scheme needs to be set up to facilitate this data transfer.
Lighting / illumination	Point-to-point cameras require lighting to allow the cameras to function correctly in low-light or dark conditions. Infra-red cameras are becoming more common and these require a specific non-visible illumination device.
Roadworks	Some point-to-point camera systems will require additional roadworks due to place loops under the road surface which act as a trigger for the cameras.
Access for installation / maintenance	Camera locations need to consider ease of access for installation and maintenance of cameras. It should be noted that ease of access might also increase the risk of vandalism.
Safety barrier	A safety barrier between the camera support and the roadway is recommended. The barrier reduces the risk of injury to motorists as well as the risk of damage to the camera in the event of an incident.
Direction of camera	Section 24C of the Road Transport (Safety and Traffic Management) Act 1999, requires that cameras only be used to take an image of the rear of the vehicle unless it would be dangerous or impracticable to do so. In this case, capturing an image of the front is allowed. The Act provides examples which may allow for capturing images of the front of cars, which include: ▪ the topography of the place where the camera is located ▪ the width of the road where the camera is located.
Field of vision of camera	Cameras have differing fields of vision based on the size of the image captured and the location/angle that the camera is mounted. The field of vision may determine how many lanes/directions each camera can capture effectively.
Road signage	Road signage notifying motorists that they are approaching or are within a point-to-point speed enforcement area is typically required. In the ACT, an 'average speed safety camera' sign is placed 100 m before each camera and is repeated periodically throughout the enforcement zone.
Maintenance	Maintenance can be undertaken in house, by the camera supplier or by a 3rd party. An advantage of using the camera supplier is ease of access to replacement parts, which should minimise the down time to any damaged cameras.
Back office	The responsibility for processing infringements must be allocated. The back office requirements for the cameras can be very labour intensive and adequate resources must be allocated for this process.
Infringement threshold	A level must be set to determine the allowed threshold above the posted speed limit (PSL) before an infringement is issued. Infringement thresholds are often the same or greater than for fixed speed cameras in the same jurisdiction. Examples of infringement thresholds include > 10 km above PSL, 10% above PSL or 10% above PSL + 3 km/h.

Consideration	Description
Public perception	Public perception is often overlooked but is very important. It is important the cameras are perceived as a safety device and are not considered to be 'revenue raising'. Transparent communication between the road authority and the public is critical.

3 ROUTE ASSESSMENT

Following application of the route assessment methodology outlined in the Martin Small Consulting (2015) report, the Justice and Community Safety Directorate nominated three routes for assessment of their suitability as potential point-to-point speed camera sites. These routes are:

- Tuggeranong Parkway
- Parkes Way
- Majura Parkway

The three routes are comparable in a number of key areas; for instance, they are all divided, multilane carriageways with signposted speed limits 80 km/h and higher; they each carry large daily traffic volumes and have multiple locations along their length where traffic may enter or exit the main carriageway.

The assessment method outlined in Section 2 has been applied to each of the three nominated routes to determine which is considered the most suitable candidate for a point-to-point system. Following identification of the preferred route, assessment of defined segments along this route has been undertaken to determine the most appropriate location for enforcement.

The results of the assessment are outlined in this section. The detailed scoring results are presented in Appendix A .

3.1 Route Assessment

This section provides an overview of the nominated routes and discusses the outcome of the route assessments (i.e. Step 1 of the assessment method) presented in Section 2.

The purpose of this assessment is to identify a preferred candidate route for a point-to-point system.

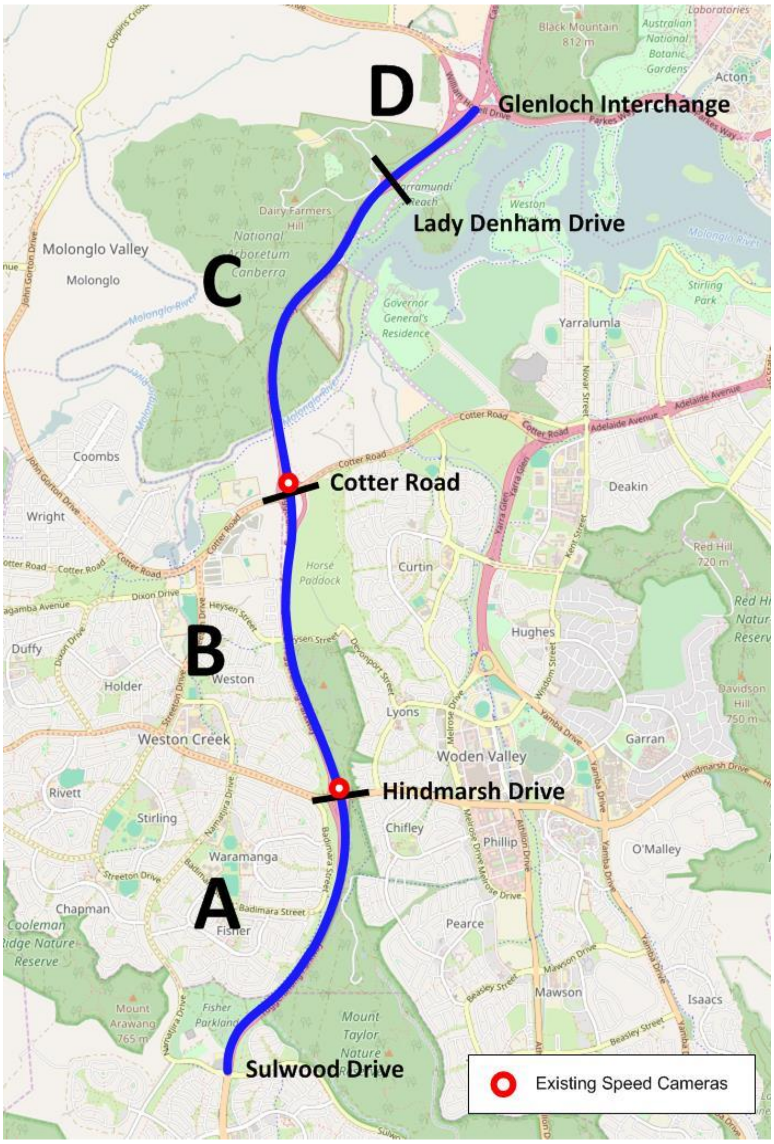
3.1.1 Route Overview

Tuggeranong Parkway

Tuggeranong Parkway is approximately 11 km in length and is located to the west and south of the Canberra city centre. It is a primary commuter route for the southern and western suburbs of Canberra and experiences peak traffic flow in the northbound direction during the morning and the southbound direction during the evening.

Tuggeranong Parkway has five interchanges and two fixed speed enforcement cameras located along its length. For the purposes of this assessment the route length has been divided into four sections (A to D), as illustrated in Figure 3.1.

Figure 3.1: Locality map of Tuggeranong Parkway



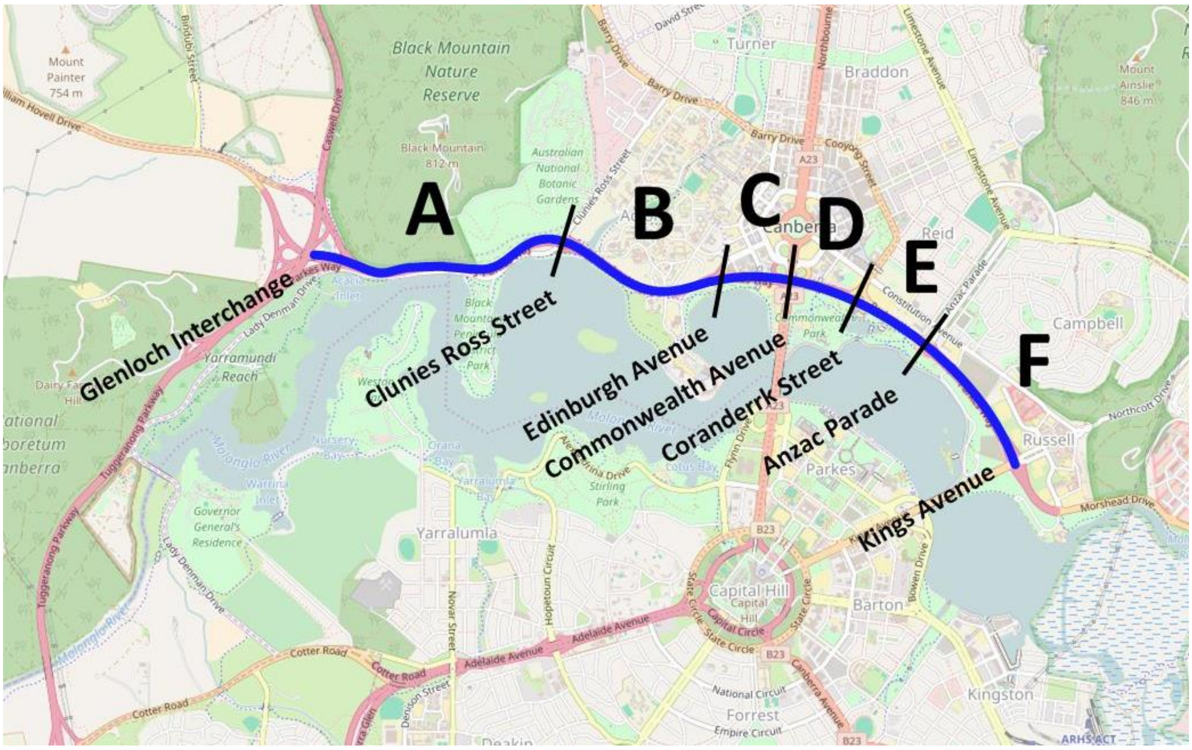
Source: OpenStreetMap (2016)

Parkes Way

Parkes Way is approximately 6 km in length and runs east-west along the edge of the Canberra city centre. It is a primary commuting route for the western suburbs of Canberra and experiences peak traffic flow in the eastbound direction during the morning and the westbound direction during the evening.

Parkes Way is a divided carriageway road with two large roundabouts and five road interchanges with long merge/diverge lanes along its length. For the purposes of this assessment, Parkes Way was divided into six sections (A to F) as illustrated in Figure 3.2.

Figure 3.2: Locality map of Parkes Way



Source: OpenStreetMap (2016)

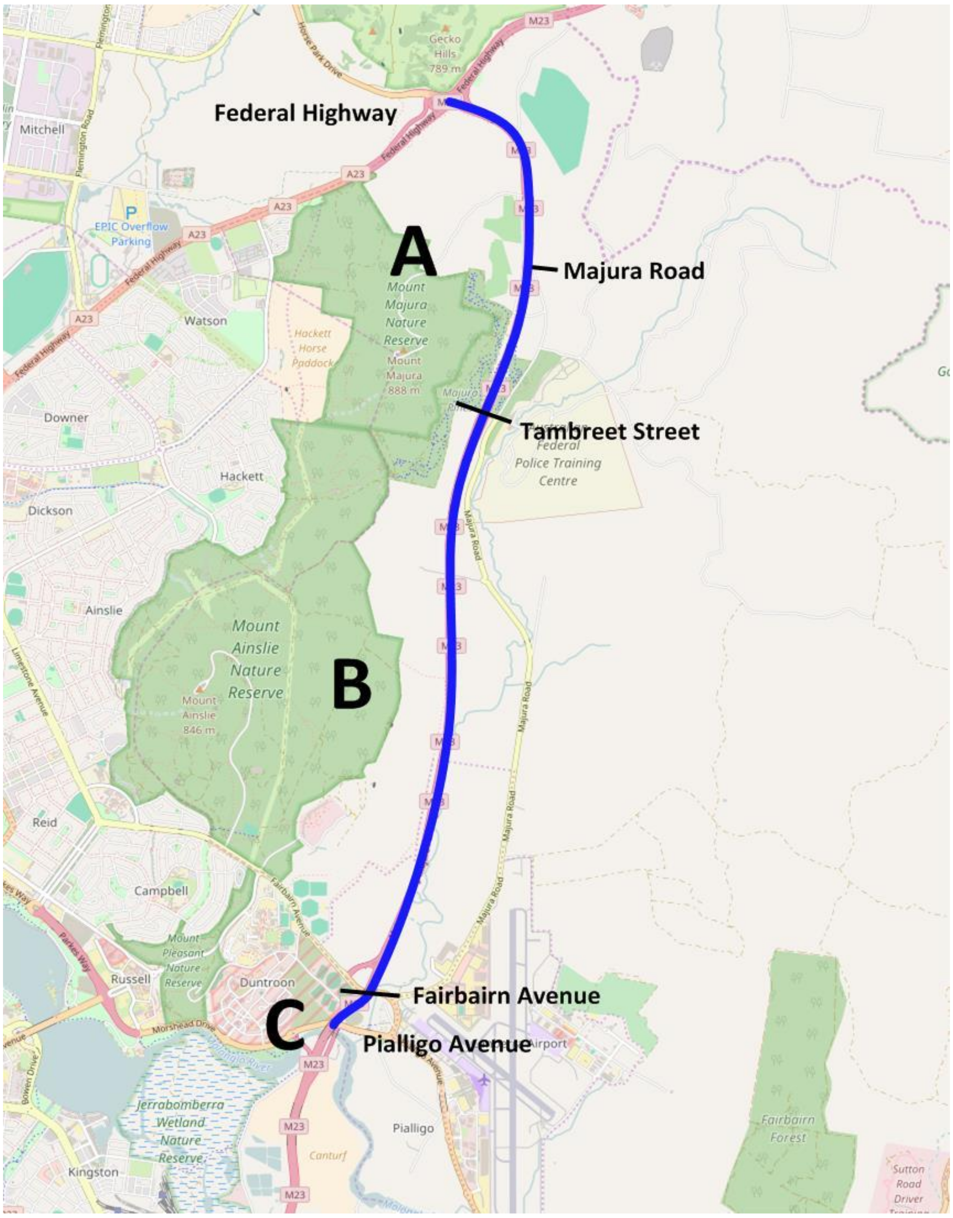
Majura Parkway

Majura Parkway is approximately 11 km in length and is located to the east and north of the Canberra city centre. It is a primary commuting route for the northern suburbs of Canberra and experiences peak traffic flow in the southbound direction during the morning and the northbound direction during the evening.

Majura Parkway was officially opened to traffic in April 2016; it is a divided carriageway with interchanges at the northern and southern ends and two minor access roads connect midblock along its length.

For the purposes of this assessment, Majura Parkway was divided into three sections (A to C) as illustrated in Figure 3.3.

Figure 3.3: Locality map of Majura Parkway



Source: OpenStreetMap (2016)

3.1.2 Point-to-point System Assessment

The detailed assessment scores for each route are presented in Appendix A.

From this assessment, Majura Parkway is considered the route most suitable for a point-to-point system, with a score of 41, followed by Tuggeranong Parkway (score of 37) and then Parkes Way (score of 30).

The key elements where Majura Parkway scored stronger than the other nominated routes include:

- Generally wide median and roadside verge areas, permitting improved flexibility for installation locations.
- No existing automatic speed enforcement on route.

- Considerably less likelihood of impact from traffic churn.
- Greater proportion of heavy vehicles in the traffic mix.
- Longer length of uniform high speed zone.

3.2 Candidate Route Segment Assessment

3.2.1 Segment Assessment

The second step in the assessment process evaluates potential point-to-point enforcement zones by defined segments along the preferred candidate route, Majura Parkway.

With reference to the segments indicated in Figure 3.3, potential point-to-point enforcement zones along Majura Parkway include:

- Segment A
- Segment B
- Segment A+B
- Segment A+B+C.

Note: Segment C is not considered a viable standalone enforcement zone as it is only 470 m in length and is comprised entirely of the merge/diverge lanes for the Pialligo Avenue interchange.

Each of the candidate segments was assessed against the key elements in Step 2 of the assessment process. The detailed assessment scores for each segment are presented in Appendix B.

From this assessment, Segment B scored the highest (71) and could be considered the most suited segment along Majura Parkway for a point-to-point enforcement zone. This was followed by Segment A and Segment A+B (each a score of 67), Segment B+C (score of 63) and then Segment A+B+C (score of 62).

The key elements where Segment B scored stronger than the other nominated segments include the number of entry/exit points along its length and the potential effect of traffic churn on the number of vehicles traversing the length of the segment.

However, Segment A+B may be a more appropriate segment as it presents a considerably longer length of the Majura Parkway to be covered by the enforcement system, up to 8.0 km compared to 5.1 km for Segment B.

The benefits of improved compliance over a longer length include a lower risk of crashes, in terms of both crash frequency and severity. This benefit is likely to outweigh the adverse effect of traffic churn. A turning and origin-destination survey could be undertaken to confirm the level of traffic churn that occurs, however a visual assessment indicates it is a relatively small proportion of the total traffic flow along Majura Parkway.

Additionally, depending on the camera technology employed, the point-to-point cameras to be used may be able to operate as fixed-point speed cameras, further reducing the adverse effect of traffic churn on speed compliance.

3.2.2 Proposed Point-to-point Camera Site Set-up

The proposed point-to-point camera locations were selected with the best practice installation considerations outlined in Section 2.

The point-to-point enforcement zone for Segment A+B on Majura Parkway is shown in Figure 3.4.

The indicative camera locations are illustrated in Figure 3.5 and Figure 3.6.

If Segment A+B is adopted, the precise location of the cameras will need to be evaluated by the technology supplier to ensure all technical requirements are met. It is noted that the northern camera site, if positioned at the 80/100 km change in speed limit, places the cameras in the median amongst a grove of trees. Options are available to manage this and include:

- Choose an alternative location just south, clear of any roadside vegetation.
- Mount the cameras on a gantry cantilevered from the median over each carriageway.
- Place the cameras in the roadside verge areas of each carriageway

There are cost implication for each option. The median has wire rope safety barrier along both shoulders, so protection for a median location will be relatively straightforward. However, the cantilevered gantry may be a higher cost item than standard mounting poles. The northbound carriageway does not have a road safety barrier installed along the road shoulder, so a roadside installation will involve additional cost for this protection. Additionally, two roadside installations will not be able to share support infrastructure, so again some additional cost will be required.

This assessment for Segment A+B places the cameras nominally after the end of the respective merge lanes for the on-ramps. This ensures that all vehicles passing along the Majura Parkway can be captured by the two point-to-point cameras at each end of the site.

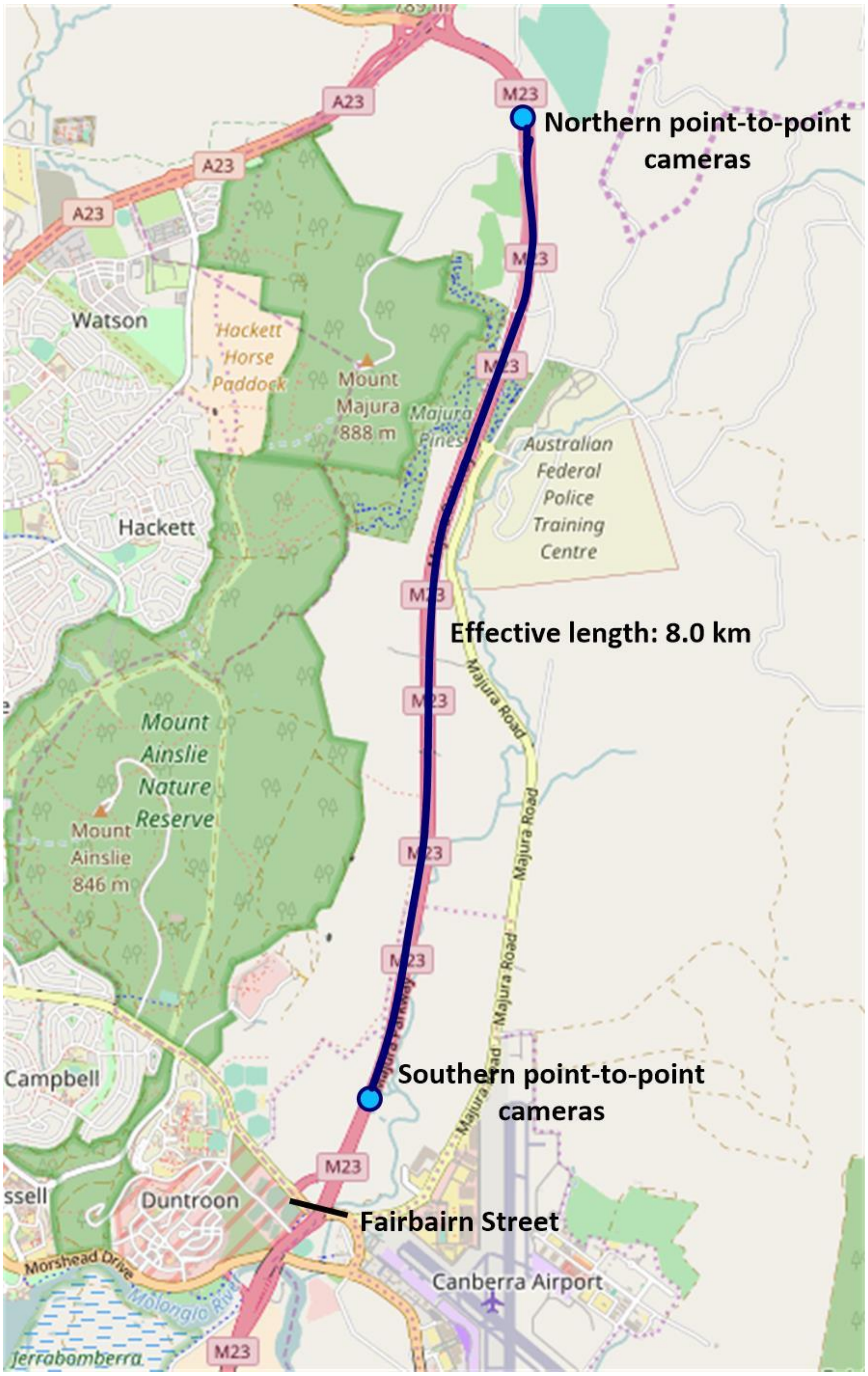
The measured distance between the two sets of cameras gives the point-to-point enforcement zone an effective length of up to 9.0 km, depending on the final positioning of the camera sites.

With reference to the installation operation and maintenance considerations listed in Table 2.3, the following observations are made:

- There is currently no existing road furniture at either location to mount the cameras on, so mounting poles will have to be purchased new, or possibly reused from the Athllon Drive site.
- Power supply and access to communications are not anticipated to be an issue; there is street lighting present near both the northern and southern camera locations, suggesting access to a suitable power supply is available, and mobile phone signals are available for a 4G installation.
- Access for installation and maintenance will be relatively straightforward for the northern camera location, where the median is very wide and a vehicle can park.

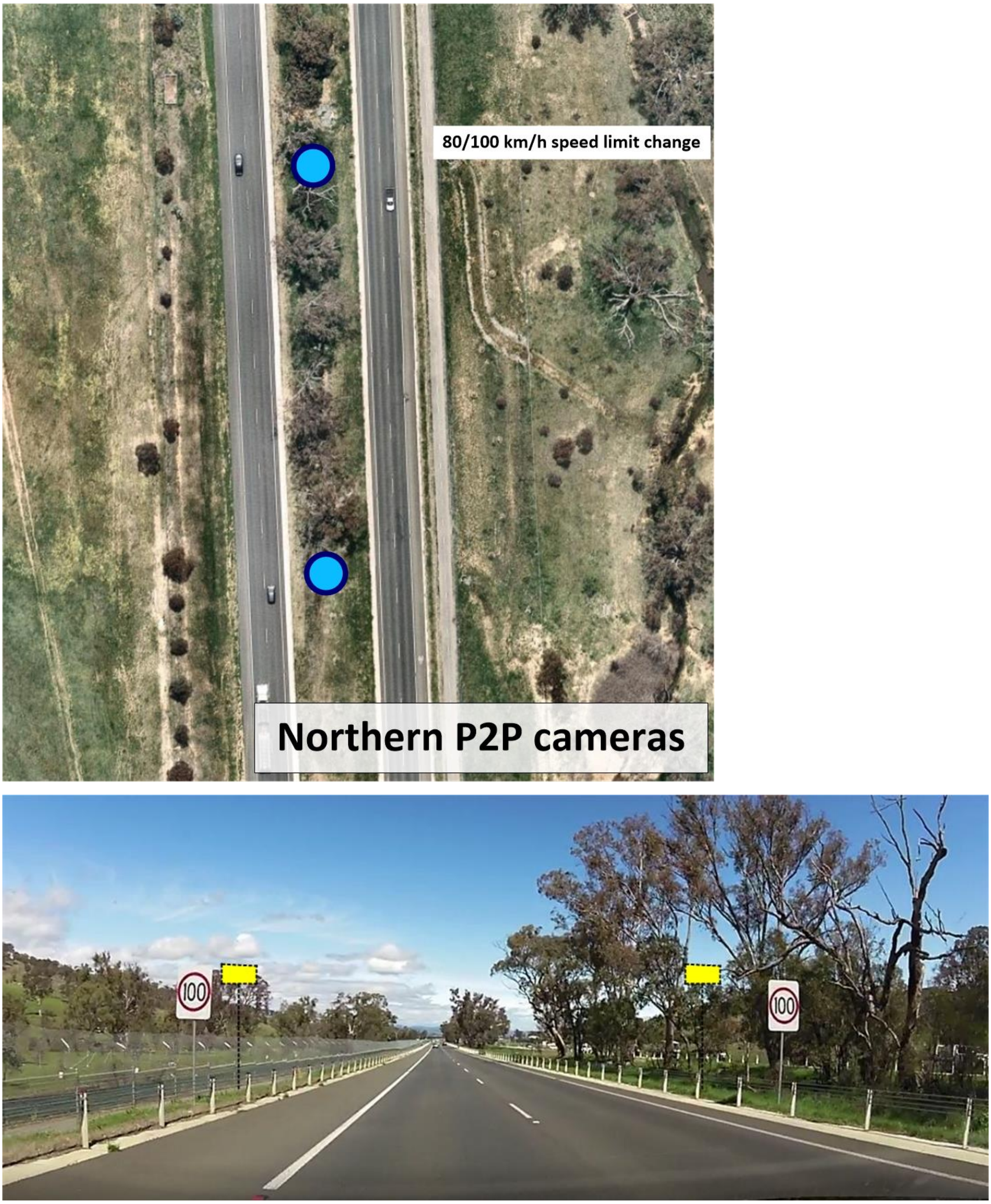
  Closer consideration of the form and location of this access will be necessary to preserve the integrity of the existing wire rope safety barrier; however, this is not an insurmountable issue involving excessive cost.
- Access will be more complex at the southern camera location where the median is a narrow concrete barrier and traffic control will likely be required as installation works are undertaken. A roadside verge installation will have less access issues.

Figure 3.4: Proposed point-to-point camera locations on Majura Parkway



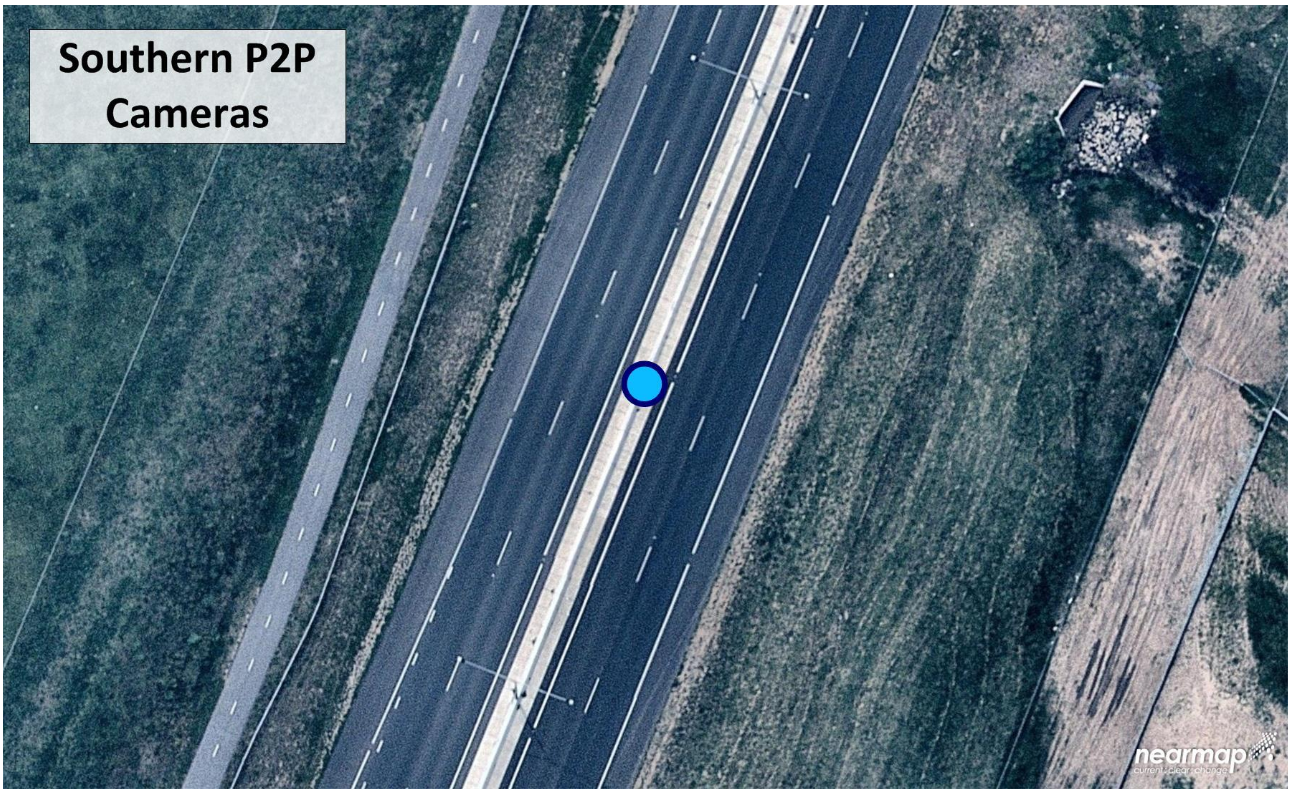
Source: OpenStreetMap (2016)

Figure 3.5: Proposed location of northern point-to-point cameras



Source: Nearmap (2016)

Figure 3.6: Proposed location of southern point-to-point cameras



Source: Nearmap (2016)

4 FEASIBILITY ANALYSIS

4.1 Introduction

This section outlines the scope and type of costs involved for installing a point-to-point camera system at the proposed new site on the Majura Parkway, in the context of re-using the equipment currently installed at the Athllon Drive point-to-point enforcement zone.

Contact was made with Australian-based suppliers of speed camera enforcement technology, including Gatso, to gain a better understanding of the range of costs, the technological feasibility of re-using existing equipment, and the advances in the technology that have been made since the acquisition of the Athllon Drive equipment, which may provide advantages to the ACT Government.

4.2 Point-to-point Enforcement System Technology

4.2.1 Existing Point-to-point Cameras at Athllon Drive

The point-to-point camera supplier for both the existing Hindmarsh Drive and recently decommissioned Athllon Drive sites (Gatso) was approached for guidance regarding the relocating of existing point-to-point camera equipment to the proposed Majura Parkway site.

Gatso informed that the model of camera used at Athllon Drive was a P482 manufactured by 3M (formerly PIPS Technology Ltd) in the UK. The P482 is considered by Gatso to be 'end of life' technology, i.e. the technology is now superseded and will no longer stock the cameras and there is a limited supply of spare parts available. They also advised that they would be unable to repair these cameras in the event that a hardware repair is required.

In terms of re-using existing equipment from the Athllon Drive site, Gatso stated that camera equipment and associated infrastructure are designed specifically for a site. Unless the new site is similarly configured in terms of road layout and target distances, then the performance of the current equipment will be adversely affected.

Additionally, the infra-red LED illuminators used on Athllon Drive are extremely heavy (~20 kg) and this would make it difficult to use existing street furniture for mounting purposes.

There appears to be little value in re-using the existing point-to-point cameras at another enforcement site. Considering the impending limited access to spare parts, it seems most feasible that, subject to their condition and compatibility, the Athllon Drive cameras may be most useful in supporting other existing point-to-point camera sites as spare/replacement parts.

Gatso did advise, however, that there is a possibility of re-using some of the additional equipment (e.g. infra-red LED illuminators, local servers, power supplies and network switches). However, they also advised this equipment represents a small proportion of the total cost of the point-to-point camera system and this practice was also discouraged.

4.2.2 Current-generation Point-to-point Cameras

Point-to-point camera technology has improved in recent years. Generally speaking, the current cameras are cheaper, lighter, more reliable and have a better detection rate than cameras installed just three to five years ago, such as is the case for the existing point-to-point cameras in the ACT.

The latest camera technology offered by Gatso is the GT20-S. This is custom manufactured for Gatso in the Netherlands and a single camera is able to cover up to four lanes of traffic and provides both IR and colour images. Additionally, this latest model requires no external triggers (e.g. loops) to achieve at least a 98% capture rate, removing this cost of infrastructure installation and enforcement system maintenance.

4.2.3 Relevance to the Monitoring of Heavy Vehicles

All other Australian jurisdictions operating point-to-point systems in an enforcement mode apply them to heavy vehicles for monitoring speed compliance[2].

Other potential applications in the ACT for point-to-point systems heavy vehicles may include:

- Weigh-in-motion (WIM) monitoring – it may be feasible to install a WIM detector under the pavement adjacent to the point-to-point cameras and link the technology to monitor heavy vehicle mass. In this way, overloaded vehicles could be detected and enforcement action implemented.

  Closer investigation of vehicle mass and legislative requirements would be required to ensure the method of detection was valid in law.
- Log-book/driver fatigue monitoring – NSW has the largest point-to-point camera network in Australia. It currently only applies to heavy vehicles, monitoring average speed and log-book/driver fatigue.

  The ACT road network is too small to be applied for this type of monitoring. However, it is feasible that the ACT network could be linked to the NSW network, especially for Majura Parkway, which offers a heavy vehicle route around Canberra and linking to NSW highways north and south.
- Discussions with NSW Roads and Maritime Services and the National Heavy Vehicle Regulator may assist with exploring the feasibility of this application of the ACT point-to-point network.

4.3 Point-to-point Enforcement System Procurement

Three suppliers of point-to-point cameras in Australia were contacted in order to ascertain cost estimates for the supply of new point-to-point enforcement systems. Advice received from those contacted identified a range of considerations that made it difficult to confidently provide an estimate. These included the level of competitiveness within the market, procurement model options – own outright, outsourcing maintenance, and pre-adjudication – jurisdiction approval costs (applicable to providers not currently operating in ACT) and other factors. Some of these considerations are discussed in more detail below and indicative costs are provided where information was made available.

4.3.1 Procurement Models

There are three main procurement models available regarding the sale, installation, operation and maintenance of point-to-point speed cameras. They are:

5. **Own devices** – Total safety camera system ownership and maintenance by the jurisdiction. This requires the largest implementation cost and investment of in-house expertise.

   All the risk is carried by the jurisdiction.
6. **Own devices and outsource maintenance** – Roadside hardware, back-office software and all other required ancillary equipment are owned by jurisdiction with maintenance outsourced to either the camera supplier or a third party.

[2] Western Australia is currently trialling their first point-to-point system. During this 6-month trial period, the average speed function is detecting all vehicles, but speed infringements are not being issued at this time.

This requires a similarly large implementation cost and an ongoing fee for maintenance.

7. **Pre-adjudication** – Camera hardware and back-office software and all other ancillary equipment are owned and maintained by the camera supplier. Infringements are still issued by the jurisdiction. This requires a smaller implementation cost but a larger on-going fee.
8. This is the most expensive option over the total camera life; however, the jurisdiction carries no cost risk. A performance-based contract (based on the % of operational hours) can be used to create an additional incentive for the supplier to ensure the highest quality outcome.

The ACT Government currently owns its point-to-point camera assets outright and outsources maintenance. This model is proven effective; however, the pre-adjudication model may be an alternative for new and upgraded sites.

The advantage of this model is that camera suppliers will typically upgrade the cameras to the newer technology for little or no additional fee, particularly when it becomes apparent there are savings on maintenance costs.

4.3.2 Indicative Installation and Operational Costs

Of the three suppliers contacted, only one provided a detailed itemised estimate of costs for a ‘typical’ point-to-point camera site (based on the information provided to them by ARRB). A breakdown of this is presented in Table 4.1.

It should be noted that these indicative costs exclude the following:

- safety barrier and other unique site requirements, such as a vehicle hard stand
- communications, preferred to be 4G
- centralised server hardware for all software
- centralised server SQL licence
- independent, jurisdiction-qualified surveyor to measure the baseline between the entry and exit locations
- independent testing/verification (i.e. drive through testing)
- power connections
- gazettal testing, depending on the jurisdiction.

Table 4.1: Indicative cost breakdown for installation and operation

Cost item	Quantity of items	Estimated cost	Cost occurrence
Camera equipment	4x	$240 000	Once off
Poles/cabinets	8x poles, 4x cabinets	$95 000	Once off
Flood lamps	4x	85 000	Once off
Installation/maintenance software	1x	$120 000	Once off (perpetual licence)
Installation, including a generic traffic management rate for 110 km/h road	1x	$400 000	Once off
Maintenance (estimate)	1x	$8 000	Per month

5 CONCLUSIONS AND RECOMMENDATIONS

A two-step route and segment assessment process was developed drawing from best practice install and operation experience of point-to-point speed enforcement systems. This process was applied to three nominated routes – Tuggeranong Parkway, Parkes Way and Majura Parkway – and formed the basis of a ranking of the suitability of the nominated routes and segments for the purpose of recommending to the Justice and Community Safety Directorate a new candidate point-to-point enforcement zone.

The route assessment identified Majura Parkway as the preferred new candidate enforcement route. Two segment options along this preferred route show potential for point-to-point enforcement, with the longer segment (Segment A+B) suggested as providing a greater overall speed compliance and road safety benefit to road users.

The precise location for the camera installation requires input from a technology supplier; however, this assessment has identified two configurations may be suitable solutions. The nominated camera location in the north of the segment could accommodate either a median or a roadside installation, however, the nominated camera location in the south will likely need to be installed in the roadside area, or potentially using a cantilevered or overhead gantry due to the presence of the narrow concrete median barrier at this location. Other than these considerations there do not appear to be any significant installation challenges identified for these locations.

A feasibility analysis compared the re-use of the equipment from the recently decommissioned Athllon Drive site compared with purchasing new equipment for the proposed Majura Parkway site.

Discussion with Gatso, the camera supplier for the Athllon Drive site, determined that the cameras used at Athllon Drive were at the end of their technical life and that recycling these for the new site was not feasible. However, these cameras could be used to support the ongoing operation of the Hindmarsh Drive site, subject to condition and compatibility.

Some support equipment could be re-used, however the cost saving would likely be minimal.

Point-to-point camera technology now available is considered superior to that currently installed; single camera units are available with the capacity to monitor multiple lanes, and provide considerably improved quality of the captured data and images.

Indicative unit costs provide an overview of the level of investment required if ACT should seek to purchase equipment for a new site. However, alternative procurement and operating models may provide a more affordable approach for new installations.

Based on the route and site reviews, and an assessment of the nominated routes against best practice, it is recommended that the Justice and Community Safety Directorate:

1. Adopt Segment A+B along the Majura Parkway, a length of approximately 8 km, as the preferred location for a new point-to-point camera enforcement zone.
2. Explore the use of the latest generation camera and support equipment for all new systems.
3. Investigate the value of alternative procurement arrangements for the installation, operation and maintenance of new systems.
4. Discuss with the current supplier, Gatso, the suitability of the Athllon Drive system for supporting the maintenance of the Hindmarsh Drive installations.

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APPENDIX A CANDIDATE ROUTE ASSESSMENT

Table A 1: Candidate route assessment scores

Feature	Tuggeranong Parkway		Parkes Way		Majura Parkway	
	Measure	Score	Measure	Score	Measure	Score
Start point	Sulwood Drive		Glenloch Interchange		Federal Highway	
Start point description	Signalised intersection		3-leg interchange		Grade-separated interchange	
End point	Glenloch Interchange		Kings Avenue		Pialligo Avenue	
End point description	3-leg interchange		Grade-separated interchange		Grade-separated interchange	
Number of traffic lanes	2 in each direction		3 lanes in each direction for western half, 2 in each direction for eastern half		2 in each direction	
Route length	11 km - equal longest route	3	6 km – shortest route	1	11 km – equal longest route	3
Speed limit	100 km/h for > 80% of length, 90 km/h at northern end	3	90 km/h for western 25% of length and 80 km/h for eastern 75% of route	1	100 km/h for >80% of length, 80 km/h at northern end, 90 km/h at southern end	3
Speed limit consistency	1 change in speed limit	2	1 change in speed limit	2	2 changes in speed limit	1
Median and roadside conditions	Narrow median unsuitable for camera but wide verges are typically available	2	Wide median and wide verges are typically available	3	Wide median and wide verges are typically available	3
Horizontal alignment	Mostly straight or large radius curves	3	Mostly straight or large radius curves	3	Mostly straight or large radius curves	3
Vertical alignment	Level to low gradients	3	Level to low gradients	3	Level to low gradients	3
Number of entry/exit points	There are three grade-separated interchanges where traffic churn could be significant	2	There are three grade-separated interchanges and two roundabouts where traffic churn could be significant	1	There are two grade-separated interchanges where traffic churn could be significant. There is also one minor intersection which affects the southbound direction only and is unlikely to experience significant traffic churn	2
Controlled intersections	No controlled intersections	3	There are two roundabouts on route, one at Coranderrk St and one at Anzac Parade	1	No controlled intersections	3
Traffic management	No traffic management devices	3	No traffic management devices	3	No traffic management devices	3
Stopping opportunities	No legal stopping opportunities	3	No legal stopping opportunities	3	No legal stopping opportunities	3
Pre-existing speed enforcement	There are two pre-existing fixed speed enforcement cameras. These are at Hindmarsh Drive and Cotter Road	1	None	3	None	3
Speeding	85th percentile speed > posted speed for all sections	3	85th percentile speed > posted speed for all sections	3	85th percentile speed > posted speed for all sections	3
Traffic volume	> 20 000 vehicles per day in each direction for majority of length	3	< 15 000 vehicles per day in each direction for majority of length	1	15 000–20 000 vehicles per day in each direction for majority of length	2
Traffic churn extent	> 10% traffic churn expected	1	> 10% traffic churn expected	1	< 5% traffic churn expected	3
Heavy vehicle %	5–10% heavy vehicles for majority of length	2	< 5% heavy vehicles for majority of length	1	> 10% heavy vehicles for majority of length	3
Route assessment score		**37**		**30**		**41**

APPENDIX B CANDIDATE SEGMENT ASSESSMENT

Table B 2: Candidate segment assessment scores

Feature	Majura Parkway Section A		Majura Parkway Section B		Majura Parkway Section A & B		Majura Parkway Section B & C		Majura Parkway Section A & B & C	
	Measure	Score	Measure	Score	Measure	Score	Measure	Score	Measure	Score
Start point	Federal Highway		Tambreet Street		Hindmarsh Drive		Tambreet Street		Federal Highway	
Start point description	Grade-separated interchange		Grade-separated interchange		Grade-separated interchange		Grade-separated interchange		Grade-separated interchange	
End point	Tambreet Street		Fairbairn Avenue		Lady Denham Drive		Pialligo Avenue		Pialligo Avenue	
End point description	Grade-separated interchange		Grade-separated interchange		Grade-separated interchange		Grade-separated interchange		Grade-separated interchange	
Number of Traffic lanes	2 in each direction		2 in each direction		2 in each direction		2 in each direction		2 in each direction	
Effective length	2.7 km	2	5.1 km	5	9.0 km	5	6.2 km	5	10.0 km	5
Speed limit	100 km/h	4	100 km/h	4	100 km/h	4	100 km/h for > 80% of length, 90 km/h at southern end	4	100 km/h for > 80% of length, 90 km/h at southern end	4
Speed limit consistency	Single speed limit	5	Single speed limit	5	Single speed limit	5	1 change in speed limit	3	1 change in speed limit	3
Median and road side conditions	Wide median and wide verges are typically available	5	Wide median and wide verges are typically available	5	Wide median and wide verges are typically available	5	Wide median and wide verges are typically available	5	Wide median and wide verges are typically available	5
Horizontal alignment	Mostly straight or large radius curves	5	Mostly straight or large radius curves	5	Mostly straight or large radius curves	5	Mostly straight or large radius curves	5	Mostly straight or large radius curves	5
Vertical alignment	Level to low gradients	5	Level to low gradients	5	Level to low gradients	5	Level to low gradients	5	Level to low gradients	5
Number of entry/exit points	1 minor intersection	4	No intersections	5	2 minor intersections	3	1 major intersection	2	2 major intersection	1
Controlled intersections	No controlled intersections	5	No controlled intersections	5	No controlled intersections	5	No controlled intersections	5	No controlled intersections	5
Traffic management	No traffic management devices	5	No traffic management devices	5	No traffic management devices	5	No traffic management devices	5	No traffic management devices	5
Stopping opportunities	No legal stopping opportunities	5	No legal stopping opportunities	5	No legal stopping opportunities	5	No legal stopping opportunities	5	No legal stopping opportunities	5
Pre-existing fixed speed enforcement	No fixed cameras nearby	5	No fixed cameras nearby	5	No fixed cameras nearby	5	No fixed cameras nearby	5	No fixed cameras nearby	5
Speeding	> 60% exceeding speed limit	5	40–60% exceeding speed limit	4	40–60% exceeding speed limit	4	40–60% exceeding speed limit	4	40–60% exceeding speed limit	4
Traffic volume	15 000–20 000 vehicles per day in each direction	3	15 000–20 000 vehicles per day in each direction	3	15 000–20 000 vehicles per day in each direction	3	15 000–20 000 vehicles per day in each direction	3	15000–20 000 vehicles per day in each direction	3
Traffic churn extent	Low likelihood of significant traffic churn	4	Traffic churn not possible	5	Moderate likelihood of significant traffic churn	3	High likelihood of significant traffic churn	2	High likelihood of significant traffic churn	2
Heavy vehicle %	> 12% heavy vehicles	5	> 12% heavy vehicles	5	> 12% heavy vehicles	5	> 12% heavy vehicles	5	> 12% heavy vehicles	5
Segment assessment score		**67**		**71**		**67**		**63**		**62**

APPENDIX C TRAFFIC AND SPEED DATA

Traffic volume and speed data applicable to the route and segment analysis is compiled for each of the three nominated routes and is shown in this appendix.

C.1 Traffic Volume Data

Table C 1: Traffic data for Tuggeranong Parkway

Section	Period	Direction	Lane	VPD	AM	PM	% HV
A	Weekday	North	All	14 938	1 977	1 164	13.2%
		South	All	16 857	969	2 295	5.6%
	Weekend	North	All	13 633			
		South	All	14 518			
B	Weekday	North	Kerb	15 340	1 579	1 322	3.8%
			Median	11 434	1 956	1 370	1.7%
		South	Kerb	17 962	1 694	1 571	5.5%
			Median	9 302	1 056	1 625	2.1%
	Weekend	North	Kerb	12 554			
			Median	6 224			
		South	Kerb	14 149			
			Median	4 739			
C	Weekday	North	All	27 325	2 920	2 676	6.7%
		South	All	27 808	2 876	2 846	10.5%
	Weekend	North	All	21 063			
		South	All	20 743			

Table C 2: Traffic data for Parkes Way

Section	Period	Direction	Lane	VPD	AM	PM	% HV
B	Weekday	East	Kerb	10 623	1 246	672	4.4%
			Median	4 625	1 331	165	1.8%
		West	Kerb	5 893	234	1 081	4.0%
			Median	7 080	361	1 394	4.0%
	Weekend	East	Kerb	4 708			
			Median	1 292			
		West	Kerb	3 199			
			Median	3 763			

Table C 3: Traffic data for Majura Parkway

Section	Period	Direction	Lane	VPD	AM	PM	% HV
A	Weekday	North	Kerb	10 955	621	1 232	19.0%
			Median	4 257	147	924	14.3%
		South	Kerb	9 013	1 174	507	21.4%
			Median	5 363	1 115	278	4.6%
	Weekend	North	Kerb	9 513			
			Median	2 623			
		South	Kerb	7 284			
			Median	2 900			

C.2 Speed Data

Table C 4: Speed data for Tuggeranong Parkway

Location details				Speed (km/h)				Vehicle speeding (%)					
Section	Period	Direction	Lane	Posted limit	Mean	85th %	Max	Total speeding	0–5 km/h over	5–10 km/h over	10–15 km/h over	15–20 km/h over	> 20 km/h over
A	Weekday	North	All	100	97.2	109.4	158.6	45.0 %	16.5 %	14.4 %	8.2 %	3.6 %	2.3 %
		South	All	100	85.2	91.8	150.5	1.5 %	1.2 %	0.2 %	0.1 %	0.0 %	0.0 %
	Weekend	North	All	100	98.8	110.2	160.0	48.4 %	17.4 %	15.3 %	9.1 %	3.8 %	2.8 %
		South	All	100	85.9	91.8	144.4	1.6 %	1.2 %	0.3 %	0.1 %	0.0 %	0.0 %
B	Weekday	North	Kerb	100	91.1	98.6	156.8	11.9 %	7.9 %	2.6 %	0.9 %	0.3 %	0.2 %
			Median	100	98.5	105.8	159.4	41.1 %	23.4 %	11.4 %	4.3 %	1.4 %	0.6 %
		South	Kerb	100	91.7	101.2	159.7	19.2 %	12.5 %	4.5 %	1.5 %	0.5 %	0.2 %
			Median	100	98.2	105.5	152.7	43.6 %	25.8 %	12.1 %	4.0 %	1.2 %	0.5 %
	Weekend	North	Kerb	100	92.0	99.4	146.5	13.6 %	9.2 %	3.0 %	0.9 %	0.3 %	0.2 %
			Median	100	100.1	106.9	159.4	48.9 %	26.5 %	13.8 %	5.5 %	2.0 %	1.1 %
		South	Kerb	100	95.6	103	158.1	28.6 %	18.5 %	6.9 %	2.2 %	0.6 %	0.4 %
			Median	100	100.9	106.9	147.5	53.7 %	29.8 %	15.7 %	5.6 %	1.7 %	0.9 %
C*	Weekday	North	All	90	95.1	104.4	159.3	70.5 %	21.4 %	11.5 %	4.7 %	1.6 %	0.9 %
		South	All	90	95.8	104.0	95.8	76.8 %	21.7 %	24.4 %	18.5 %	8.2 %	4.0 %
	Weekend	North	All	90	96.2	105.1	158.5	75.7 %	21.6 %	21.7 %	16.7 %	9.3 %	6.4 %
		South	All	90	96.7	104.4	109.4	80.1 %	21.4 %	25.3 %	19.8 %	8.9 %	4.7 %

* Location of speed data is at the northern end of the section, right on the spot of a speed change from 100 km/h down to 90 km/h in the northbound direction and from 90 km/h up to 100 km/h in the southbound direction. The lower speed limit of 90 km/h has been listed in the table and the % of vehicles speeding is based on a 90 km/h speed limit.

Table C 5: Speed data for Parkes Way

Location details				Speed (km/h)				Vehicle speeding (%)					
Section	Period	Direction	Lane	Posted limit	Mean	85th %	Max	Total speeding	0–5 km/h over	5–10 km/h over	10–15 km/h over	15–20 km/h over	> 20 km/h over
A	Weekday	East	Kerb	90	74.4	82.4	154.1	1.2 %	1.0 %	0.2 %	0.0 %	0.0 %	0.0 %
			Median	90	74.7	91.4	117.5	21.7 %	15.5 %	4.9 %	1.0 %	0.3 %	0.0 %
		West	Kerb	90	84.2	91.1	138.5	20.1 %	14.3 %	4.3 %	1.1 %	0.3 %	0.1 %
			Median	90	85.2	92.2	132.9	26.0 %	19.2 %	5.2 %	1.2 %	0.3 %	0.1 %
	Weekend	East	Kerb	90	76.5	82.8	131.1	1.4 %	1.1 %	0.2 %	0.1 %	0.0 %	0.0 %
			Median	90	85.4	91.8	132.4	24.4 %	17.1 %	5.3 %	1.5 %	0.4 %	0.1 %
		West	Kerb	90	84.4	91.4	122.7	20.8 %	14.5 %	4.5 %	1.4 %	0.3 %	0.1 %
			Median	90	87.8	93.6	131.9	35.9 %	25.5%	8.1 %	1.7 %	0.4 %	0.2 %

Table C 6: Speed data for Majura Parkway

Location details				Speed (km/h)					Vehicle speeding (%)				
Section	Period	Direction	Lane	Posted limit	Mean	85th %	Max	Total speeding	0–5 km/h over	5–10 km/h over	10–15 km/h over	15–20 km/h over	> 20 km/h over
A*	Weekday	North	Kerb	80	77.8	88.6	157.7	54.0 %	27.1%	14.3%	6.5%	3.4%	2.7%
			Median	80	80.3	96.5	142.0	71.4 %	17.2%	20.7%	15.3%	9.1%	9.1%
		South	Kerb	80	85.5	92.5	146.2	79.6 %	28.9%	26.1%	14.7%	6.4%	3.5%
			Median	80	87.8	94.7	150.7	87.9 %	23.9%	29.0%	20.3%	9.6%	5.1%
	Weekend	North	Kerb	80	81.5	87.8	133.1	55.8 %	31.3%	14.0%	5.9%	2.8%	1.8%
			Median	80	89.1	97.6	132.0	90.0 %	21.4%	27.3%	19.7%	11.5%	10.1%
		South	Kerb	80	86.0	93.2	132.0	82.2 %	28.0%	26.9%	15.9%	7.2%	4.2%
			Median	80	88.3	95.4	134.2	89.2 %	24.3%	29.0%	19.5%	9.8%	6.6%

Location details				Speed (km/h)					Vehicle speeding (%)				
Section	Period	Direction	Lane	Posted limit	Mean	85th %	Max	Total speeding	0–5 km/h over	5–10 km/h over	10–15 km/h over	15–20 km/h over	> 20 km/h over
B	Weekday	North	Kerb	100	97.1	105.1	158.5	39.4 %	23.9%	10.7%	3.3%	1.0%	0.5%
			Median	100	101.0	106.9	156.0	52.5 %	29.5%	14.4%	5.1%	1.9%	1.6%
		South	Kerb	100	84.5	95.4	157.9	6.6 %	4.7%	1.4%	0.4%	0.1%	0.0%
			Median	100	94.7	105.1	156.0	31.1 %	15.6%	8.2%	3.9%	1.9%	1.5%
	Weekend	North	Kerb	100	97.3	104.8	158.4	39.3 %	24.4%	10.4%	3.0%	1.0%	0.5%
			Median	100	101.2	107.6	158.5	53.5 %	29.1%	14.2%	5.4%	2.4%	2.4%
		South	Kerb	100	83.5	94.3	142.9	5.5 %	4.0%	1.0%	0.3%	0.1%	0.1%
			Median	100	93.2	103.7	141.8	27.1 %	15.8%	5.6%	2.7%	1.4%	1.6%

* Location of speed data is at the very northern end of the section, within the 80 km/h speed limited area.

C.3 Crash Data

ACT crash data does not specifically state whether speeding was thought to be involved in a crash. Therefore, the crash data analysis method presented in the Martin Small Consulting (2015) report is considered a serviceable measure for analysing the crash history on each route.

In this method, a 10-year period is considered which ensures that the crash history is consistent over a longer period and not simply a function of a poor-performing period. More importantly, the method uses a weighting for higher-severity crashes (x5 for fatal and serious injury crashes). This ensures crashes more likely to involve speeding are given a greater consideration.

Crash data was compiled for two of the selected routes – Tuggeranong Parkway and Parkes Way. No crash data is available for Majura Parkway due to it only recently being open to traffic.

Crash history has not been applied in this route and segment assessment process but is documented for completeness.

Table C 7: Crash data for Tuggeranong Parkway

Location details				Crashes (2006–2015)				
Route	Section	Direction	Length (km)	Fatal	Injury	PDO	Weighted crashes (10-year period)	Weighted crashes per km (10-year period)
Tuggeranong Parkway	A	North	2.2	0	15	125	200	90.9
		South	2.2	0	11	112	167	75.9
	B	North	2.0	0	4	109	129	64.5
		South	2.0	0	9	142	187	93.5
	C	North	2.6	0	17	92	177	68.1
		South	2.6	0	10	104	154	59.2

Table C 8: Crash data for Parkes Way

Location details				Crashes (2006–2015)				
Route	Section	Direction	Length (km)	Fatal	Injury	PDO	Weighted crashes (10-year period)	Weighted crashes per km (10-year period)
Parkes Way	A	East	1.6	0	9	132	177	110.6
		West	1.6	0	7	47	82	51.3