

SITE INVESTIGATION REPORT

FOR

WESTON CREEK RURAL PART BLOCK 1218

VERSION 1.0

OCTOBER 2014



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PROJECT TITLE: Weston Creek Rural Block 1218 Site Investigation Report

PROJECT NUMBER: 5621

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REVISION CONTROL

Document	Issue Date	Recipient	Details
Version 1		LDA - Katrina Lauc	Draft Report

Base Template:

Version: A May 2013

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EXECUTIVE SUMMARY

Indesco Pty Limited was engaged by Land Development Agency (LDA) in September 2014 to prepare a Site Investigation Report for part of Rural Block 1218, Weston Creek (the "subject site"). The boundary of the subject site refers to the proposed site boundary as illustrated in the drawings under attachment A for the purpose of this report.

The development proposal considered for the purpose of this report is the construction of a fuel station and a fast food premises to be located near the intersection of Cotter Road and Kirkpatrick Street.

The block terrain is undulating to steep and generally falls from north east to south west at an average grade of 9%. Vegetation on the site is limited to light grass cover. There are several small shrubs in the southern verge of Kirkpatrick Street. Bulk filling is recommended to provide a more level pad for construction of the service station site. This will also require batters or a retaining wall along the lower property boundary.

There are no existing sewer or water ties to the subject site. However, advice from Actew Water indicates the infrastructure in the surrounding verges has sufficient capacity to accommodate the proposed development. Concept service tie designs indicate that the 150mm diameter sewer main may need to be extended along the southern verge of Kirkpatrick Street to allow sufficient clearance under the 300mm diameter water main.

There is an existing stormwater outlet structure within the site that is recommended to be removed and rerouted to within the verge of Cotter Road. A stormwater tie is to be constructed to the verge of Cotter Road.

There is an existing gas distribution main in the adjacent verge of Cotter Road that is considered sufficient to service the development. Electrical and telecommunications services are also available in close proximity to the site.

Reconstruction of a section of Kirkpatrick Street will be necessary to accommodate the development proposal including:

- Widening and regrading the road;
- Construction of kerbs and vehicle crossings;
- Relocation of existing 300mm diameter water main;
- Minor reconfiguration of left turn lane from Cotter Road to Kirkpatrick Street; and
- Construction of stormwater infrastructure.

The construction of a new footpath and street lighting in the southern verge of Kirkpatrick Street is recommended for the extent of the subject site.

A Preliminary Geotechnical Investigation has been undertaken for the site noting variable stratum conditions across the site. Fill was identified in 5 of the 7 test pits. The fill material varied in depth from 0.3 to 1.8 m and varied in condition from controlled fill to uncontrolled fill with extensive debris.

A Short-term Environmental Management Plan that has been approved for the subject site. The EPA has endorsed the subject site as being suitable for residential use.

A Traffic Impact Assessment concluded that the proposed development would have minimal impact on the traffic network. It was recommended that an onsite parking be provided as part of the development.

An Opinion of Probable Costs has been prepared for the works recommended in this report. The works to be carried out by the LDA totalled approximately \$824,000. The works to be carried out by the developer for this development totalled approximately \$800,000.

SUMMARY OF RECOMMENDATIONS

The following key recommendations are presented in this report:

- Finalise block boundaries and amend the zoning of the site under the Territory Plan to facilitate the proposed development;
- Undertake infrastructure master planning including road alignments, service capacities and corridors and assessment of stormwater management requirements;
- Relocate the stormwater outlet structure within the subject site to within the verge of Cotter Road;
- Undertake design specific geotechnical investigations as part of bulk earthworks designs for the site;
- Seek approval for the internal lighting design with Mount Stromlo Observatory; and
- Progress site servicing designs in conjunction with detailed development proposals.

1. INTRODUCTION

Indesco Pty Limited was engaged by the Land Development Agency in September 2014 to prepare a Site Investigation Report for part of Weston Creek Rural Block 1218 (the "subject site"). The aim of the report is to identify the existing infrastructure and site conditions at the subject site.

This report has been prepared on behalf of the LDA for the purposes of the possible sale of a portion of Weston Creek Rural Block 1218.

The LDA has advised that the Buyer may choose to rely on this report. Indesco advises that this report is current for three months after date of issue as existing services and site conditions may be subject to change. It should be noted that information obtained from Dial Before You Dig enquiries and used for locating existing services is current for 30 days from 3/09/2014

The report further outlines the upgrades or augmentations schemes required to existing infrastructure to enable it to meet the demands of the proposed development on the site.

It is noted that in 2014 Indesco were engaged to carry out design work to upgrade surrounding infrastructure to suit operation of a fuel station and fast food outlet in this location. A Design Acceptance submission has been provided to Actew Water and Territory and Municipal Services (TaMS) at the time of writing this report and is expected to be approved in the near future. A copy of the associated site servicing report is attached to this report, and includes recommendations for enabling works on this site.

This report contains the following attachments:

Attachment A	Drawings
Attachment B	Site Photos
Attachment C	Agency Correspondence
Attachment D	Bushfire Assessment Report
Attachment E	Traffic Impact Assessment Report
Attachment F	Street Lighting Compliance Commentary
Attachment G	Geotechnical Report
Attachment H	Weston Creek Fuel Station Design Acceptance Site Servicing Report
Attachment I	Weston Creek Fuel Station Design Acceptance Drawing Set

2. LAND USE & PLANNING FRAMEWORK

The site is located within eastern part of Weston Creek Rural Block 1218. The site is situated on Unleased Territory Land that with a future urban area (FUA) overlay. Under the Territory Plan Rural Weston Creek Block 1218 has the following applicable zonings:

- RZ1: Suburban;
- TSZ1: Transport;
- RZ4: Medium Density Residential;
- PRZ1: Urban Open Space; and
- CZ5: Mixed Use.

The proposed development includes a fuel station and a fast food. This will require an amendment to existing boundaries within Rural Block 1218, and the creation of one commercially zoned block.

3. INVESTIGATION SCOPE

The following elements were investigated as part of this report:

Existing Configuration:

- Services;
- Easements;
- Traffic, Parking and Access Arrangements;
- Flooding and Overland Flows Characteristics
- Vegetation;
- Ground Conditions;
- Heritage;
- Contamination;
- Other Characteristics / Constraints.

Proposed Configuration (based on the proposed development):

- Services;
- Easements;
- Traffic, Parking and Access Impacts;
- Stormwater Management;
- Landscape Treatment;
- Street Lighting
- Bushfire Safety and Compliance
- Other Constraints.

4. SITE DESCRIPTION AND LOCATION

Weston Creek Rural Block 1218 has a total area of approximately 112,886m². The block is bounded by Cotter Road to the south-east, Kirkpatrick Street to the north and Coombs Pond to the west.

The subject site is located in the north eastern corner of Rural Block 1218. The proposed block will have a total area of 5,797m². The subject site is currently graded from north east to south west with an average slope of approximately 9%.

Vegetation on the site is generally limited to light grass cover only with several small shrubs existing in the southern verge of Kirkpatrick Street.

Beyond Cotter Road to the east is an area of low density suburban residential development. The blocks across Kirkpatrick Street to the north are currently being utilised by the RSPCA, these blocks also have FUA overlay. The Coombs Pond River corridor separates Rural Block 1218 from residential developments of Coombs.

5. EXISTING SITE SERVICING

5.1 GENERAL

The location and size of existing services are based on work as executed documentation and electronic files provided by TaMS, Telstra, ActewAGL, Actew Water, ACTPLA and other pertinent authorities, and are shown on Drawing 5621-03 in Attachment A.

Whilst every effort has been made to ensure the completeness and accuracy of this information, neither is guaranteed by Indesco. Consequently proposals regarding further servicing of the site, whilst based on sound engineering principles and judgement, are subject to the completeness and accuracy of the available information regarding the existing services.

The existing services in the vicinity of the site are represented in an indicative format and the drawings are prepared solely for the purposes of this report and for the use of the LDA.

5.2 BOUNDARIES AND EASEMENTS

There are no existing easements located within the subject site.

It is noted that a number of services encroach the existing boundary of Weston Creek Rural Block 1218 including the following:

- Icon communication cables;
- Water main (including pressure relief valves and air valves);
- Stormwater mains;
- Traffic light control hardware for the Cotter Road - Kirkpatrick Street intersection.

It is assumed that relocation of these services is not a reasonable option and a revised boundary for the subject site is to be created as part of the development. The boundary recommended is illustrated as the "Site Boundary" in the drawings under Attachment A. The proposed boundary is considered the subject site boundary for the purpose of this report.

5.3 STORMWATER DRAINAGE

5.3.1 Existing Stormwater Drainage

Stormwater infrastructure in close proximity to the site comprises the following:

There is a stormwater outlet headwall structure in the north eastern corner of the site. This structure drains two upstream stormwater lines which connect to kerb inlet sumps in the intersection of Cotter Road and Kirkpatrick Street. Both incoming lines are 300mm in diameter. The outlet structure discharges stormwater flows overland to Coombs Pond.

There are four other outlet headwall structures located within Rural Block 1218 to the south of the subject site (only the closest two shown in drawings for clarity) which drain stormwater lines from kerb inlet sumps in Cotter Road. All of these outlet structures discharge stormwater flows overland to Coombs Pond.

There is no underground stormwater infrastructure in the verges of Kirkpatrick Street beyond the intersection with Cotter Road. An open concrete invert exists along the southern edge of the carriageway for a section of the Kirkpatrick Street. The grading suggests that stormwater is directed east towards Coombs Pond.

Cotter Road features kerb inlet sumps on both sides of the street and within the median for the extent of the subject site. Underground stormwater mains exist in the median of Cotter Road between Dargie Street and the southern boundary of Rural Block 1218.

There is no existing stormwater tie to the subject site. It is understood stormwater currently drains overland from the subject site to Coombs Pond.

5.4 OVERLAND FLOW

It is expected that any incoming overland flows on the high side of the block (north) will be intercepted by Kirkpatrick Street and pass around the subject site to the west.

The only overland flows observed to enter the site are those piped directly from Cotter Road to outlet structures within Block 1218. These discharge to an overland flow swale running parallel to Cotter Road which flows south-west to Coombs Pond.

5.5 SEWER

5.5.1 Existing Sewer

Sewer infrastructure in close proximity to the site comprises the following:

A 150mm diameter main is located in the northern verge of Kirkpatrick Street past the subject site. There is a maintenance hole in this main directly west of the intersection with Brackenreg Road.

No other sewer infrastructure is located within the vicinity of the subject site. No sewer tie has been observed to the subject site.

5.6 WATER SUPPLY

Water supply infrastructure in close proximity to the site comprises the following:

A 300mm diameter water main is located in the southern verge of Kirkpatrick Street which then turns at the intersection with Cotter Road and continues along the western verge of Cotter Road. It is noted there are existing double air valve and pressure reducing valve housing structures located in the southern verge of Kirkpatrick Street near the intersection with Cotter Road. Two 100mm diameter mains extend perpendicularly to the north from the 300mm diameter main to either side of the eastern leg of Kirkpatrick Street.

There are four fire hydrants located in the southern verge of Kirkpatrick Street. One fire hydrant is located in the western verge of Cotter Road within the extent of the subject site.

A 100mm diameter main is located in the northern verge of Kirkpatrick Street.

A water tie has not been provided to the subject site.

5.7 ELECTRICITY SUPPLY

Electrical infrastructure in close proximity to the site comprises the following:

There is an underground street lighting electricity cable in the western verge of Cotter Road which extends onto Kirkpatrick Street. This line ends at a street light located approximately 30m along Kirkpatrick Street.

A low voltage overhead electricity line is located in the northern verge of Kirkpatrick Street extending beyond the eastern and western boundaries of the site. There is a single pole substation located on this line near the existing driveway to Weston Creek Rural Block 1173.

High voltage electricity runs from the northern verge of Kirkpatrick Street to the north eastern verge of the subject site. This line then crosses Cotter Road.

There is no existing electrical service to the subject site.

5.8 TELECOMMUNICATIONS SERVICES

Telecommunications plant comprises the following:

5.8.1 Telstra

Telstra cables are located as follows:

- Two parallel Telstra services (one fibre optic) exist in the northern verge of Kirkpatrick Street originating from the east and crossing to the southern verge near the intersection with Brackenreg Road. These services extend to the west of the subject site.

- Two Telstra lines are located within a shared communications trench with AAPT, Icon and Transact within the western verge of Cotter Road.
- No Telstra service is available to the subject site.

5.8.2 Optus

The DBYD indicated there are no known Optus services in or around the subject site. Furthermore, no Optus pits or infrastructure were identified on site. It is assumed that no Optus cables are located in or around the site.

5.8.3 ICON

ICON cables are located as follows:

- Cables are located in the southern verge of Kirkpatrick Street joining to Cotter Road
- Cables are located within a shared communications trench (Telstra, AAPT, Transact) within the western verge of Cotter Road
- No Icon service exists to the subject tie

5.8.4 TransACT

Transact telecommunication network cables are located as follows:

- Cables are located within a shared communications trench (Telstra, AAPT, Icon) within the western verge of Cotter Road
- No transact service exists to the subject tie

5.9 NATURAL GAS SUPPLY

Natural gas infrastructure in close proximity to the site comprises the following:

- A 110mm diameter 210 kPa gas main is located in the western verge of Cotter Road.
- No gas tie exists to the subject site.
- Records indicate an abandoned gas main underneath Cotter Road.

5.10 VERGEWORKS

The nature of adjacent road reserves and associated verges is outlined below.

Street	Verge	Verge width	Features
Kirkpatrick eastern end	Northern	7m to 12m	Trees along the boundary of Block 1212. Overhead power lines.
	Southern	Up to 54m	There is up to 54m between the edge of Kirkpatrick St and the kerb of Cotter Rd. Sections of this verge form a steep embankment. There are approximately 49 parking spaces (90° angle). There is a path from the car park to the bus stop and bike and ride facility. No trees and sparse vegetation.
Kirkpatrick western end	Northern	10	There are overhead power lines. Asphalt road without line marking. Several established trees. Dirt tracks exist. There are no paths.
	Southern	6	No trees and sparse vegetation. An informal car park with 90° angle parking.
Cotter Road	Eastern	8m to 20m	Sparse vegetation. Dual carriage way with central median
	Western	16 to 20	Sparse vegetation. Dual carriage way with central median.

5.10.1 Kirkpatrick Street West

Kirkpatrick Street West has a total road reserve width of 21.6m. The total carriageway width varies between 5.5-7.0m. The first 100m of Kirkpatrick Street has kerb and gutter, line marking, an on road cycle lane and pram crossings. A bike and ride facility and associated car park has also been constructed at this intersection. There is a section of open concrete invert approximately 150m long on the south side of the road spanning between Brackenreg Road and the driveway to Rural Block 1173. Both sides of Kirkpatrick Street West are otherwise unsealed.

There are no existing footpaths on either side of Kirkpatrick Street West and both verges are generally covered with light grass cover from the edge of the carriageway to the property boundary.

Street lighting is available in the southern verge to approximately the first 45m of Kirkpatrick Street from Cotter Road. No Street lighting exists on the northern side of the road.

5.10.2 Kirkpatrick Street East

Kirkpatrick Street East connects to Kirkpatrick Street West and extends north. The total road reserve width varies from 30m - 75m, the total carriageway width varies between 5m and 8.8m. Kirkpatrick Street East is unsealed on both sides of the road and is currently used primarily to provide access to the Defence College.

5.10.3 Cotter Road

Cotter Road has a total road reserve width of 51m. The road has a carriageway width of 24m of which the lanes are divided by a 6m wide raised median. The road features two vehicular throughout lanes and one cycle lane in each direction and additional turning lanes at intersections.

There is a 1200mm wide footpath leading to a bus stop and Park/Bike and Ride facility located in the eastern verge of Cotter Road. A footpath leads from the intersection of Cotter Road and Kirkpatrick Street in the western verge of Cotter Road to the Park/Bike and Ride facility north of the subject site. There is no existing footpath in the western verge of Cotter Road adjacent the subject site.

The verges of Cotter Road are generally covered with light grass between the edges of the carriageway and the property boundaries.

5.11 TRAFFIC & PARKING

5.11.1 Vehicle Access

There is an existing gravel vehicle access to the site from Kirkpatrick Street near the intersection with Brackenreg Road. A formal vehicle crossing has not been constructed. The road is bounded with open concrete invert in this location.

5.11.2 Pedestrian Access

A signalised crossing has been provided at the intersection of Cotter Road and Kirkpatrick Street. A zebra crossing and pram ramp exists at this intersection allowing pedestrians to the verge in the north eastern corner beyond the subject site. However, there is no path extending from the pram ramp.

Formal pedestrian access has generally not been provided in the verges surrounding the subject site and pedestrians must access the site over the grassed verge.

Pedestrian links are available from the intersection of Cotter Road and Kirkpatrick Street to the bus stops located on either side of Cotter Road.

5.11.3 Traffic

A traffic and parking assessment has been carried out which includes an assessment of the existing traffic conditions in the vicinity of the subject site. All intersections in the vicinity of the subject site were assessed in the AM and PM peak periods to determine levels of service. All intersections were noted to operate within 'level of service A' except for the intersection of Cotter Road and Kirkpatrick street which received a rating of 'level of service B' in the AM peak period.

These levels indicate general good operation with acceptable delays and spare capacity. A copy of the report is included under Attachment E.

5.11.4 Parking

The southern verge of Kirkpatrick Street features indented 90 degree parking bays. During site inspections these were observed to be generally underutilised.

There is an existing Park and Ride facility located approximately 140m to the north east of the subject site.

6. SPECIALIST INVESTIGATIONS

6.1 HERITAGE ASSESSMENT

A heritage assessment was not completed as part of this Site Investigation Report. However, reference was made to the ACT Heritage Register located on the ACT Government Environment and Sustainable Development website (http://www.environment.act.gov.au/heritage/heritage_register).

The register indicates that no current listings exist for the subject site.

6.2 GEOTECHNICAL INVESTIGATION

A Preliminary Geotechnical Investigation has been undertaken for the site noting variable stratum conditions across the site. Fill was identified in 5 of the 7 test pits. The fill material varied in depth from 0.3 to 1.8 m and varied in condition from controlled fill to uncontrolled fill with extensive debris.

The geotechnical investigation report was carried out by Douglas Partners on behalf of the LDA and was provided to Indesco. A copy of this report included in this report for information under Attachment G

6.3 CONTAMINATION ASSESSMENT

The Department of Environment, Climate Change, Energy & Water has approved Block 1204 (now Block 1218) for residential use, subject to compliance with the environmental management plan titled "Short-term Environmental Management Plan, Former Pine Plantation, Block 1204, Weston Creek" (ref.3002156) dated 5 November 2009 by SMEC Australia Pty Ltd.

A number of stockpiles exist that will require assessment and classification prior to disposal.

6.4 BUSHFIRE ASSESSMENT

A bushfire compliance assessment has been carried out for the development proposal of the subject site in September 2014 by Australian Bushfire Consultants Pty Ltd on behalf of Indesco Pty Ltd. The report concluded the following:

- An asset protection zone of 22m is to be maintained around the proposed buildings. This will be largely accommodated within the road reserve;
- Kirkpatrick Street and Cotter Road are expected to provide sufficient access for fire fighting given the nature of the development;
- Adjacent water supply is expected to be sufficient for fire fighting needs.

A copy of this report has been included under Attachment D of this report.

7. PROPOSED SITE SERVICING

7.1 GENERAL

It is noted that in October 2014 a design acceptance submission prepared by Indesco regarding infrastructure upgrades to enable the development of a Fuel Station and Fast Food Outlet. This submission has been approved by Territory and Municipal Services and by Actew Water and includes the following works:

- Construction of two new driveways to the development;
- Reinstatement of landscaping in the verge;
- Construction of new footpath in the verge;
- Reconstruction of approximately 150m of Kirkpatrick Street including road and kerbs;
- Adjustment to road width at the intersection of Kirkpatrick Street and Cotter Road;

- Relocation of existing 300mm diameter water main;
- Removal and rerouting of existing 300mm diameter stormwater from Kirkpatrick Street;
- Removal and rerouting of existing 300mm diameter stormwater from Cotter Road;
- Removal of stormwater outlet structure within proposed site;
- Construction of new stormwater outlet structure for rerouted services;
- Construction of traffic control devices on new road section;
- Construction of stormwater drainage in Kirkpatrick Street.

A copy of the site servicing report and drawings are attached to this report under attachment H and I respectively.

7.2 EARTHWORKS

The subject site currently has an average grade of 9% from the high point in the north eastern corner. This is not considered appropriate for use by fuel trucks and may cause nuisance to general users of the facility. Furthermore site servicing will be difficult to achieve as the only nearby sewer main is located in the northern verge of the site near the current high point. As such regrading of the subject site using fill material to create a flat platform is considered to be necessary to achieve the development proposal.

The final site grading is to be confirmed by the developer but it is expected that fill will generally reach an approximate depth of 2m along the southern boundary of the site (greater in the area of the stormwater swale). This will need to be battered to match into existing levels and grassed or treated with retaining walls. Clarification has not yet been made in regard to the ownership of the land required for battering, as this extends approximately 13m beyond the proposed site boundary. As such the cost estimate has allowed for retaining walls to represent the worst case in terms of cost to the developer.

7.3 STORMWATER DRAINAGE

Stormwater infrastructure will be required in Kirkpatrick Street. Four "KIS" type sumps have been proposed to avoid clashes with existing water and sewer infrastructure.

Removal of the existing stormwater outlet headwall structure within the subject site is recommended. The two stormwater lines draining to this structure are to be redirected around the site through the western verge of Cotter Road. Further details of this redirection are included in the Site servicing report under Attachment H.

Pending confirmation of the development proposal it is recommended that a stormwater tie be provided in the south eastern corner of the subject site with a connection to the new stormwater infrastructure to be provided in the verge Cotter Road. Development of a stormwater master plan has been recommended for the greater North Weston development and Rural Block 1218 should be considered in accordance with this master plan.

7.4 WATER SUPPLY

Actew Water have advised that servicing the site from the existing water infrastructure will be feasible, and that the bulk supply infrastructure contains sufficient capacity to service the proposed development. Actew have recommended that a servicing master plan be carried out in the North Weston are including the subject site. This correspondence is included under Attachment C.

It is noted, that as part of enabling works to the fuel station site, a section of Kirkpatrick Street will be widened. This will require relocation of the 300mm diameter water main in this area. Further details of this relocation are included in the design acceptance drawings for this site under Attachment I. An endorsement of this design proposal is expected to be received in October 2014.

7.5 SEWER

7.5.1 Sewer Capacity

Actew Water have advised that existing sewer infrastructure contains adequate capacity to service the site, and that they expect that [provision of a service tie to the existing sewer in the northern verge of Kirkpatrick Street will be feasible depending on the fill utilised on the block.

Actew Water have also noted that it may be worth considering future infrastructure to be installed in the surrounding area to ascertain if a more suitable servicing option will be available in the future. As planning has not been carried out in regard to this infrastructure it is considered unlikely that adequate provisions will be available at the time of developing the subject site. This correspondence is included under Attachment C.

It has been noted that there may be a need to extend the existing sewer main along the southern verge of Kirkpatrick Street to allow connection to a maintenance hole at a lower level. This is noted as option 2 in the drawings under Attachment A.

7.6 ELECTRICITY SUPPLY

The provision of an Actew AGL service to the site will be subject to the requirements of the development and negotiations with the service provider. The developer may be required to provide the space for a substation if the existing supply doesn't meet requirements.

The developer will be required to contact Actew AGL prior to the commencement of any development activity to negotiate all electrical connections or relocation of existing electricity assets.

The developer may be required to install a special earthing if any substations associated with this development are within 100 m of any special location, (e.g. child care, public pool, lake etc) to less than 1 ohm.

7.7 STREET LIGHTING

A Street lighting design and compliance commentary have been provided by Ahern Consulting Engineers on behalf of Indesco Pty Ltd regarding the development proposal. The commentary notes that additional measures are required in this case to comply with the light pollution requirements of Mount Stromlo Observatory. These measures include:

- Minimising external lighting;
- Signs to be lit from above rather than below;
- Limit reflectance of building materials;
- Avoid internal lights shining outside;
- Sodium lamps with full cut off recommended;
- Luminous intensities to be in accordance with AS4282.

A copy of this commentary is provided under Attachment F of this report.

7.8 TELECOMMUNICATIONS

There are existing Telstra services available in the southern verge of Kirkpatrick Street and AAPT, Telstra, and Transact services are available in the western verge of Cotter Road. As such provision of a telecommunications service to the site is not expected to cause significant challenges during development. Due to the preliminary nature of the development proposal connections have not been designed as part of this study.

The developer will be required to contact telecommunications providers prior to the commencement of any development activity to negotiate any telecommunication connections.

7.9 NATURAL GAS SUPPLY

An existing 110mm gas distribution main is available in the western verge of Cotter Road. While the demand of the development proposal has not yet been determined the available supply is anticipated to have sufficient capacity.

It is recommended that the developer seek confirmation from the preferred service provider to construct a gas tie to the adjacent main during detailed design.

7.10 BOUNDARIES & EASEMENTS

A subdivision is required within Weston Creek Rural Block 1218 to provide a lease boundary for the proposed development. A block boundary has been proposed for the purpose of the report, and is illustrated in the design drawings included in Attachment A.

7.11 ROADS AND VEHICULAR ACCESS

In order to allow the development proposal it is recommended that a section of Kirkpatrick Street be widened and regraded. These works will include construction of new kerb and gutter. The inner corner of the intersection of Cotter Road and Kirkpatrick Street will require reconfiguration to allow articulated vehicles to access the proposed fuel station site. These works are detailed further under Attachment H of this report.

Construction of two driveways will be necessary to allow vehicular access to the proposed blocks. It will be necessary to construct the driveway to the fuel station at a greater width than TaMS standard to allow articulated vehicle access. Final sizes and locations of driveways are to be confirmed once the detailed design of the proposed development has been completed. Proposed driveways have been shown as a conceptual check only.

7.12 TRAFFIC IMPACTS

The site will be accessed from Kirkpatrick Street via the existing signalised intersection at Kirkpatrick Street and Cotter Road.

A traffic impact assessment has been carried out for the development proposal. The report concludes the following:

- The proposed development will generate up to 440 vehicle trips in the PM peak hour;
- Key intersections in the vicinity of the subject site will continue to operate within LOS A & B;
- Pedestrian desire lines are expected to be created to the adjacent RSPCA, Defence College and Park and Ride facilities and may require guidance.

A copy of the traffic impact assessment is included in this report under Attachment E.

7.13 PARKING

A parking assessment has been carried out on the subject site estimating the impact of the development proposal. Estimates of parking requirements have been based on the ACTPLA Parking and Vehicular Access Code and practical information gathered regarding onsite parking provisions for development types in the ACT. The parking assessment concludes the following:

- The total parking demand for the proposed development based on the ACTPLA Parking and Vehicular Access General Code (May 2013) is approximately 58 spaces;
- It is recommended that onsite parking be increased to meet this demand.

A copy of the parking assessment is included in this report under Attachment E.

8. PROJECT FUNDING & COSTS

8.1 ALLOCATION OF FUNDING SOURCES

The responsibility for funding the works identified as necessary to service the site will be allocated between the LDA, relevant service and network providers and the Developer of the site.

8.1.1 Service Provider Funded Works

As there are no existing service ties supplied to the property boundary the construction of service ties for a number of services will be carried out by the service provider subject to the requirements of the development and negotiations with the service provider. Such services include:

- Gas service ties;
- Telecommunications service ties;
- Mains electrical supplies.

8.1.2 LDA Funded Works

It is recommended that the Land Development Agency undertake the following works:

- Reconstruction and widening of Kirkpatrick Street including provision for driveways;
- Reconfiguration of intersection between Cotter Road and Kirkpatrick Street (widening of left turn lane from Cotter Road);
- Remove existing driveway to Rural Block 1218 from Kirkpatrick Street;
- Construction of stormwater infrastructure in Kirkpatrick Street;
- Relocation of water main in Kirkpatrick Street;
- Removal of existing stormwater outlet structure from Rural Block 1218 and construction of associated stormwater diversion through the western verge of Cotter Road;
- Construction of street lighting in Kirkpatrick Street southern verge;
- Construction of footpaths in Kirkpatrick Street southern verge.

8.1.3 Developer Funded Works

It is recommended that the developer undertake the following works:

- Construction of a stormwater, sewer and water ties to the proposed blocks;
- Construction of driveways to the proposed blocks;
- Construction of trenches for services providers;
- Site earthworks including imported fill material and battering / retaining walls.

8.2 COST ESTIMATES

8.2.1 General

The following table represents estimated costs that will be required to provide the services recommended in this report. The cost estimate includes the professional consulting fees which involves design documentation and construction phase services. Construction costs include supply of all plant, labour and materials, payments of all authority fees necessary to complete the proposed works, inclusive of GST.

The costs are based on the following assumptions:

- Costs estimated to apply at October 2014;
- Servicing options are based on conceptual engineering design only;
- An allowance for incidental costs, at 10% of the value of the works;
- A 20% contingency has been allowed due to the preliminary nature of the estimate;
- A provision for GST has been applied to all costs;
- ACTPLA Budget Estimating Guide for Civil Engineering Works, April 2009;
- Australian Bureau of Statistics Price Index 3101: Roads and Bridges NSW; and
- Tendered rates received over the past 12 months for similar work;
- Fill material costs vary with availability at the time of construction \$25/m³ of fill is assumed;
- All items include OH&S, WAE and fees.

The probable costs outlined below do not represent a quotation or offer to undertake the work, but Indesco's estimation of the likely costs for the development. Should any aspect of the above or the qualifications not be understood please contact Indesco Pty Limited.

8.2.2 Service Provider Funded Works

Service Provided Funded Works	
Item	Estimated Costs (Incl. GST)
Gas	
- Provide connections to new development	Subject to negotiations with provider
Telecommunications	
- Provide connections to new development	Subject to negotiations with provider
Electrical Supply	
- Provide mains supply to the boundary or to new development	Subject to negotiations with provider

8.2.3 LDA Funded Works

LDA Funded Works	
Item	Estimated Costs (Incl. GST)
Preliminaries - Clearing of the site, site establishment, temporary fencing - Temporary traffic management - Survey set-out and control - Staging costs	\$119,000
Demolition and Site Preparation - Remove existing pavement and kerb - Removal and stockpiling of topsoil - Clearing and grubbing - Earthworks - Preparation of subgrade	\$125,000
Underground Services - Trenching for service authorities - Backfilling trenches under roads paths and driveways	\$58,000
Water Main Relocation - Relocation of 300mm Ø water main	\$47,000
Stormwater - Construction of new stormwater infrastructure in Kirkpatrick Street - Rerouting existing drainage outlet from site through Cotter Road verge	\$112,000
Roadworks - Construction of roads and kerbs - Linemarking - Base materials	\$237,000
Footpaths - Construct footpath in verge - Replace pram crossing in intersection	64,000
Incidental Works - Removal of existing stormwater outlet structure - Construction of new stormwater outlet structures	\$28,000
Street lighting - Supply and install new lighting columns - Supply and lay conduit and cabling	\$34,000
Total LDA Funded Works	\$824,000

8.2.4 Developer Funded Works

Developer Funded Works	
Item	Estimated Costs (Incl. GST)
Stormwater - Provide 225mm Ø stormwater tie	\$2,000
Sewer - Provide 100mm Ø sewer tie	\$7,000
Water Supply - Provide 150mm Ø water tie	\$8,000
Driveways - Provide 2 modified HD2 Driveways	\$33,000
Earthworks - Filling of site	\$750,000
Total Developer Funded Works	\$800,000

9. SUMMARY OF OPPORTUNITIES & CONSTRAINTS

Based on the investigations carried out the following opportunities and constraints have been identified:

Opportunities:	
	• The site is in a prominent location. • The site has good access to existing road, cycling and public transport networks. • Services are generally available in close proximity to the site. • The site is unencumbered by existing buildings or substantial site trees.
Constraints:	
	• There is existing contamination within the site due to former land uses. • The site is moderately steep in places and earthworks will be required as part of the development. • Master planning and coordination with the surrounding area may be required to most effectively service the site.

10. RECOMMENDATIONS

Based on the investigations carried out to date it is recommended that the lessee / developer carry out the following additional investigations:

- Finalise block boundaries and amend the zoning of the site under the Territory Plan to facilitate the proposed development;
- Infrastructure master planning including road alignments, service capacities and corridors and assessment of stormwater management requirements;
- Complete remediation activities and contamination investigation;
- Undertake design specific geotechnical investigation;
- Complete asbestos and hazardous materials survey;
- Seek approval of Street lighting design with Mount Stromlo Observatory

11. DRAWINGS

Drawings provided in Attachment A of this report include:

- Drawing 5621-01-001 Locality Plan;
- Drawing 5621-01-002 Aerial Overlay Plan;
- Drawing 5621-01-003 Existing Services Plan;
- Drawing 5621-01-004 Proposed Services Plan;

These drawings are to be read in conjunction with this report. The plans are based upon work as executed information and other information supplied by authorities. All services are to be confirmed on site. The existing services in the vicinity of the site are represented in an indicative format. The plans were prepared solely for the purposes of this report and for the use of the client.

Attachment A



CLIENT:



CONSULTANT:



CANBERRA
SA Theatre Court Centre, ACT 2600
Phone: (02) 6265 1022 Fax: 6265 2618

SYDNEY
Level 7, 80 George St Parramatta, NSW 2150
Phone: (02) 9633 2273 Fax: 6265 2618



PROJECT:

**WESTON CREEK
PART BLOCK 1218
SITE INVESTIGATION**

DRAWING TITLE:

LOCALITY PLAN

DRAWING NUMBER:

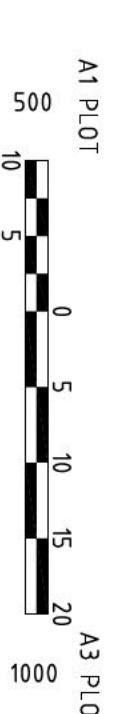
5621-01

SCALE:
AS SHOWN

DATE:
SEPT. 2014



- LEGEND:**
- SITE BOUNDARY
- CONTOURS
- 61 SECTION NUMBER
- 4 BLOCK NUMBER
- NOTE:**
1. CONTOUR DATA CAPTURED 2014, LAND DATA SURVEYS.
2. DRAWING TO BE READ CONJUNCTION WITH INDESCO REPORT.



NO.	AMENDMENT	APPROVED	DATE	APPROVED BY	DEVELOPMENT TEAM	CLIENT	PROJECT				DRAWING TITLE				
						 Land Development Agency CANBERRA FIRST	 INDESCO SUNSHINE Level 7, 60 George Street Parramatta, NSW 2150 Phone: (02) 8238 1022 Fax: (02) 8238 2819				 CONSULT AUSTRALIA Residential Engineering Design  ANZSAS ISO 9001 Data Engineering Certification Services				
							APPROVED	DATE			WESTON CREEK PART BLOCK 1218 SITE INVESTIGATION	AERIAL OVERLAY PLAN	PROJECT NO. 56621	DRAWING NO. 002	AUDIT A
						DESIGNED	DATE								
						DESIGNED BY	ANZSAS								
						DRAWN BY	CIA								
						CAD FILE	H:\561\Western Cr. B1 1218 SA-Main\Urban\Drawings\561-12 Aerial Overlay Planning								
						SCALE									
							AS SHOWN								

Attachment B - Photos



Kirkpatrick Street (Facing East)



Kirkpatrick Street (Facing West)



Block 1218 and Weston Creek Pond (Facing South)



Block 1218 Existing Stormwater Outlet and Channel



Block 1218 and Existing Driveway (Facing South East)

Attachment C

Karl Martin

From: Wansink, Michael [Michael.Wansink@actewagl.com.au]
Sent: Friday, 8 November 2013 1:46 PM
To: Anna Nagalingam
Subject: RE: Site Servicing Inquiry - North Weston

Anna,

Site A

This site needs to be considered in context with the Streeton Drive road works which are currently underway. Dixon Drive is being moved north to meet with Unwin Place. This may dictate the ultimate location and layout of the service station site.

Proximity to the adjacent 750mm diameter trunk sewer must also be considered. ACTEW Water requires a minimum setback of seven metres from the boundary of the site to the centreline of this sewer.

Servicing of this site appears feasible.

A water supply connection to the main in Dixon Drive is acceptable but please note that this main is currently being relocated.

Additional hydrants may be required to ensure fire coverage.

A sewer connection to the main in the adjacent depot should be possible. Note that there is no accurate WAE record of this main and it is recommended to survey the main to determine invert levels and confirm viability of the connection.

Site D

Provision of a water service should be relatively straight forward.

With the suggested fill on site (up to five metres?) the installation of a sewer tie across Kirkpatrick Street should be achievable but please note that the sewer is not particularly deep (approx 1.70m) and clashes with other services may occur. If a direct connection across the road is unachievable then you may have to "chase" the sewer down the hill a make a connection further to the west. Connection to a manhole is preferred.

Another option for the sewer would be to consider the site in the context of the master plan for this precinct. As a future residential area, the sewers would drain to west. This option could also reduce the amount of fill required to develop the site.

Site E

Block 1193 has an existing water service. This was installed in May 2000 to supply horse troughs. The connection and meter are near the entrance to the Joint Services Staff College. The service (privately owned beyond the meter) then proceeds along Kirkpatrick Street to the block. This service would require disconnection if development of the site goes ahead.

The installation of a new water main along Kirkpatrick Street to the site is possible however it should be noted that a long dead end main with only one service connected at the end could result in poor water quality. This may be alleviated if the main is "looped" in the future when the area is further developed.

Installation of a sewer within the Joint Services Staff College will not be accepted.

A sewer extension around the college would be required. This will be approximately 280m long. Connection will be to the sewer from the College just upstream of its connection with the 1050mm diameter Woden Valley Trunk Sewer.

Regards

Michael Wansink

Manager
Hydraulic Asset Acceptance
ACTEW Water
Telephone: 02 6242 1499
Facsimile: 02 6242 1459
12 Hoskins Street Mitchell ACT 2911
www.actew.com.au

From: Anna Nagalingam [<mailto:Anna.Nagalingam@indesco.com.au>]
Sent: Tuesday, 5 November 2013 5:20 PM
To: Wansink, Michael
Subject: Site Servicing Inquiry - North Weston

Hi Michael,

We have been engaged by the LDA to undertake a preliminary site selection study for a fuel station on or close to Cotter Road in North Weston. At this stage we have been tasked with looking at 3 possible sites as follows. Please find attached a sketch of the site locations. Could you please provide comment on the ability of the water and sewer networks to accommodate the proposed development.

The fuel station will occupy approx. 3,000m² and will include a recycling drop of centre and small convenience store.

Site A

Cnr Dixon & Streeton Drives, (Blocks 17,18 Section 45 Holder).

There is a 150Ø sewer main and maintenance hole within the TaMS Depot (Block 17), would it be possible to provide a tie from this point?

There is a 150Ø water main in the southern verge of Dixon Drive. Hydrants currently spaced 70-80m.

Site D

Kirkpatrick Street (Rural Block 1218, Weston Creek)

This area has been designated as a future residential area within the North Weston Concept Plan (RZ1). Service ties are a little conceptual as we have no road layouts at this point, although the site could possibly be serviced directly from Kirkpatrick St.

Re-grading will be required to meet on site drainage structures and some form of retaining wall would be included at the back of the block.

There is a 150Ø sewer main in the northern verge of Kirkpatrick St.

There is a 300Ø water main in the southern verge of Kirkpatrick St. Hydrants currently spaced 50-60m.

Site E

Kirkpatrick Street (Rural Block 1193, Weston Creek)

This area has been designated as a future residential area within the North Weston Concept Plan (RZ1). There is no nearby infrastructure. I have assumed the following:

Sewer main extension ~120m from within Joint Staff College (Rural Block 1212).

Water main extension ~350m along Kirkpatrick St.

Kind regards,

Anna Nagalingam

Project Manager

6A Thesiger Court
Deakin ACT 2600
Tel: (02) 6285 1022
Fax: (02) 6285 2618
www.indesco.com.au



Attachment D

BUSHFIRE SAFETY & COMPLIANCE ASSESSMENT

**PROPOSED FUEL STATION AND FAST FOOD OUTLET
CNR OF COTTER ROAD AND KIRKPATRICK STREET, WESTON CREEK
AUSTRALIAN CAPITAL TERRITORY**

14 October 2014

has been prepared by:
Australian Bushfire Consultants Pty Ltd
Corporate Member No. 26012 FPAA



Jason Murphy (Principal Consultant)

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TERM OF VALIDITY: Opinions and statements made within the following report will expire 2 years from the date of the report. Should the following report require re-examination with a view to the possible extension of its term of validity, please apply to Australian Bushfire Consultants Pty Ltd before the date of expiry. Australian Bushfire Consultants Pty Ltd reserves the right at any time to withdraw any opinions or statements in the light of new knowledge.

DISCLAIMER: Bushfire mitigation or protection measures as recommended or purported by the following report may not guarantee that the proposed building development will survive a bushfire event on every occasion. This is substantially due to the unpredictable nature and behaviour of fire and extreme weather conditions, and the behaviour of building occupants or fire fighters defending the building when exposed to severe or greater bushfire attack conditions.

BUSHFIRE SAFETY & COMPLIANCE ASSESSMENT

PROPOSED FUEL STATION AND FAST FOOD OUTLET CNR OF COTTER ROAD AND KIRKPATRICK STREET, WESTON AUSTRALIAN CAPITAL TERRITORY

14 October 2014

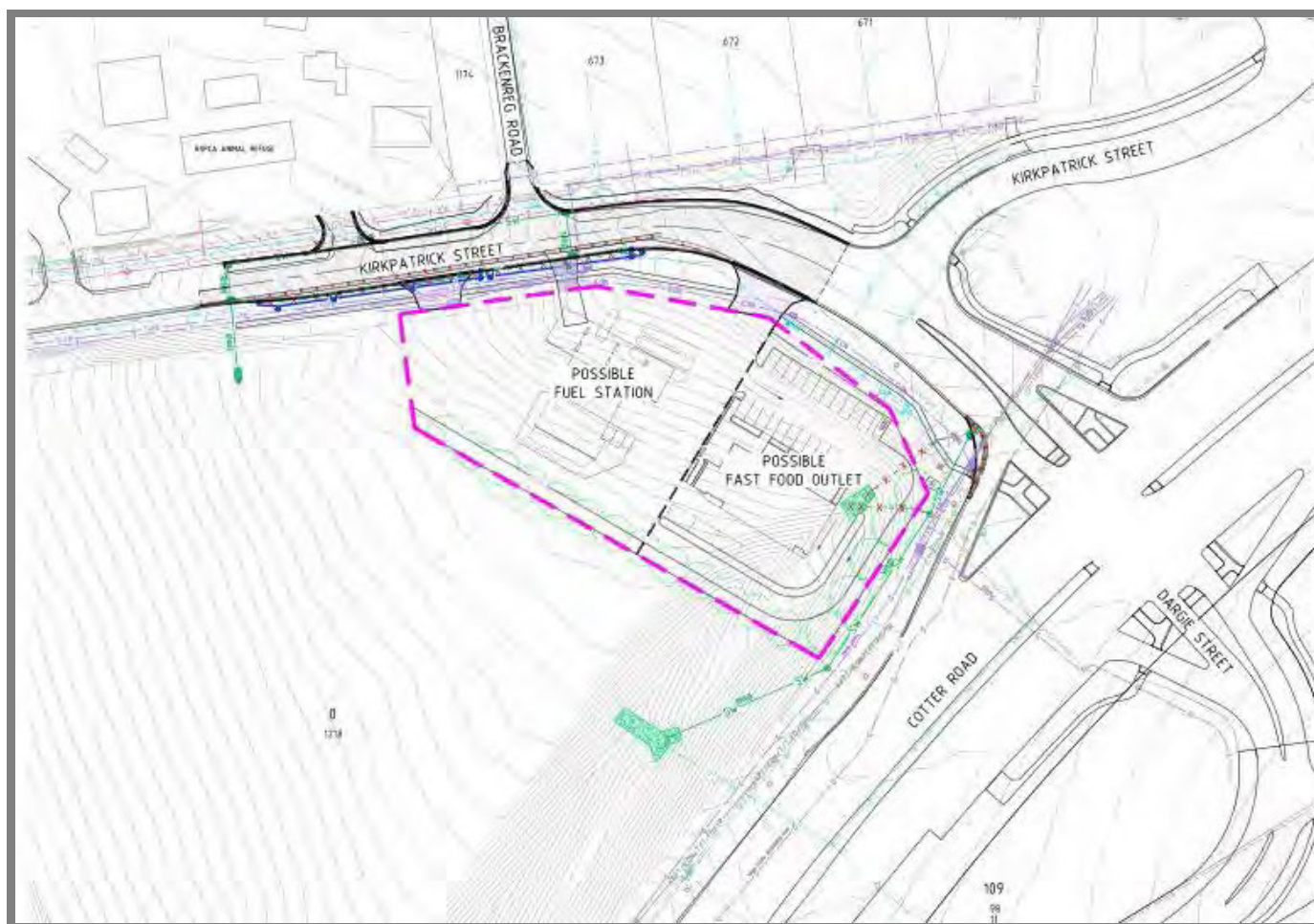


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1.0 Introduction

The following report has been commissioned by Indesco Consulting Engineers on behalf of the ACT Government, Land Development Agency, herein '*the proponent*'. The report provides a bushfire assessment and recommendations for bushfire safety and design compliance for the proposed construction of a Fuel Station and Fast Food Outlet (herein '*subject development*') within Rural Block No: 1218, Cnr Cotter Road and Kirkpatrick Street, Weston, Australian Capital Territory (herein '*the subject property*').

This assessment considers the subject development site on the basis of:

- site specific inspection undertaken on 7 September 2014;
- a plan of the proposed building development as provided by proponent on 16 August 2014; and
- online mapping analysis available at the time of this report.

This assessment includes an analysis of the potential and persisting bushfire hazard and its threat to the subject development and recommends standards and mitigation measures that should be incorporated to satisfy associated engineering and construction controls for bushfire safety.

For the purposes of this report, the matters to be considered for bushfire risk assessment as outlined within the ACT Planning & Land Authority (ACTPLA) *Planning for Bushfire Risk Mitigation General Code (2008)* are individually addressed (where relevant and reasonably practicable to do so).

This report also acknowledges the complementary nature of the ACTPLA *Planning for Bushfire Risk Mitigation General Code* to the ACT Emergency Services Authority's *Strategic Bushfire Management Plan Version 2, 2009* which identifies any requirements from that plan that are considered reasonably relevant to the subject development.

Bushfire safety outcomes or requirements as identified or recommended by this report are derived from Australian Standard 3959-2009 *Construction of buildings in bushfire-prone areas* (herein '*AS3959*'), ACT Emergency Services Authority's *Strategic Bushfire Management Plan* (herein '*SBMP*'), the NSW document *Planning for Bushfire Protection 2006* (herein '*PBP*'), and engineered judgment and/or expert opinion.

AS3959 and NSW Planning for Bushfire Protection are referred to by the ACTPLA Bushfire Risk Mitigation Code for the purposes of undertaking a bushfire risk assessment in the ACT.

2.0 Location and Description of the Site

The address of the subject development site is Rural Block No: 1218, Cnr Cotter Road and Kirkpatrick Street, Weston, Australian Capital Territory, located at approximately Lat 35°19'18.85"S Long 149°03'26.14"E and elevation 575 meters.

The subject property lies approximately 7.8 kilometres southwest of the Canberra City Centre and less than 3.7 kilometres northwest of the Woden Town Centre, with its primary roadway access point off Kirkpatrick Street (see Figure 1).

Figure 1.0 – Locality



2.1 Study Area

For the purposes of this report and assessment, an area of approximately 140 metres beyond the building line of the subject development is considered, herein *'the study area'*.

The subject property lies in the suburb of Weston within the district of Weston Creek. As depicted in Figure 2.0 – 3.0, land to the north of the subject property (Blocks 673, 672, 671, 1155 and 1212) is zoned as Rural. The two (2) parcels of land (Block 1155 and 1212) to the north are presently developed and are mostly cleared and managed. Block 1212 is presently used for Government Defence purposes (the Australian Command and Staff College).

Land located to the east is zoned as urban open space (Block 21, Section 83) and is presently undeveloped with open grasslands which appear managed. Section 106 is currently developed with residential buildings which appears cleared and managed. Neighbouring land to the south (Block 1, Section 109) is zoned as urban open space which appears to be maintained. A major urban arterial route known as Cotter Road runs from the south to the east of the subject property.

Land to the south west and west (Block 1218) on which the subject development is proposed, contains open grasslands which appear to be managed / reduced through fuel management. Land to the north west (Block 1173) is currently developed as an animal shelter known as the RSPCA ACT and is mostly cleared and managed.

Figures 2.0 – 3.0 illustrates the extent and arrangement of the subject development and immediate surrounds considered by this report.

It is understood from the advice provided by the proponent at the time of this report, that the subject property (Rural Block 1218) is also intended for future residential development.

Figure 2.0 – The Extent and Location of the Study Area.

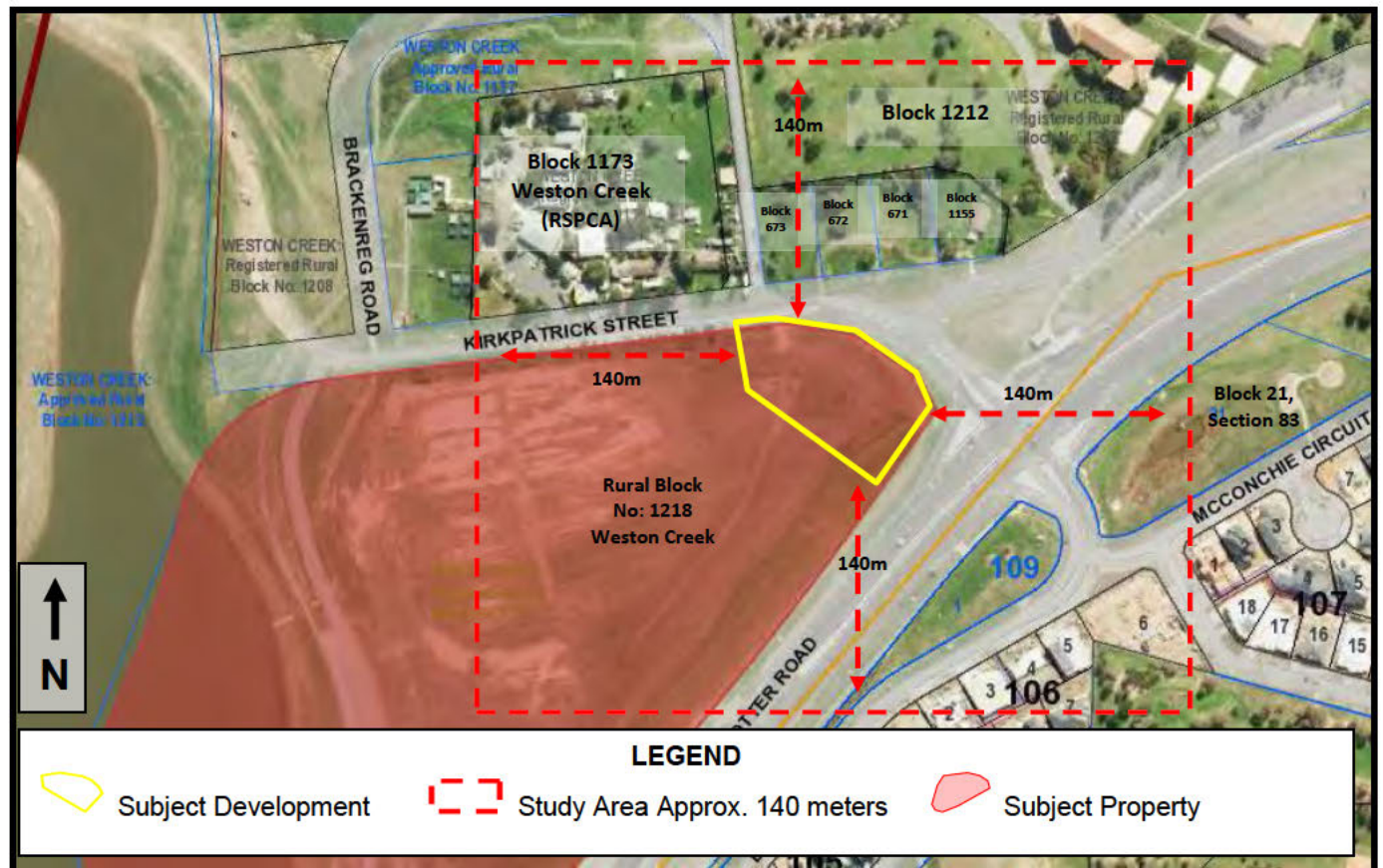
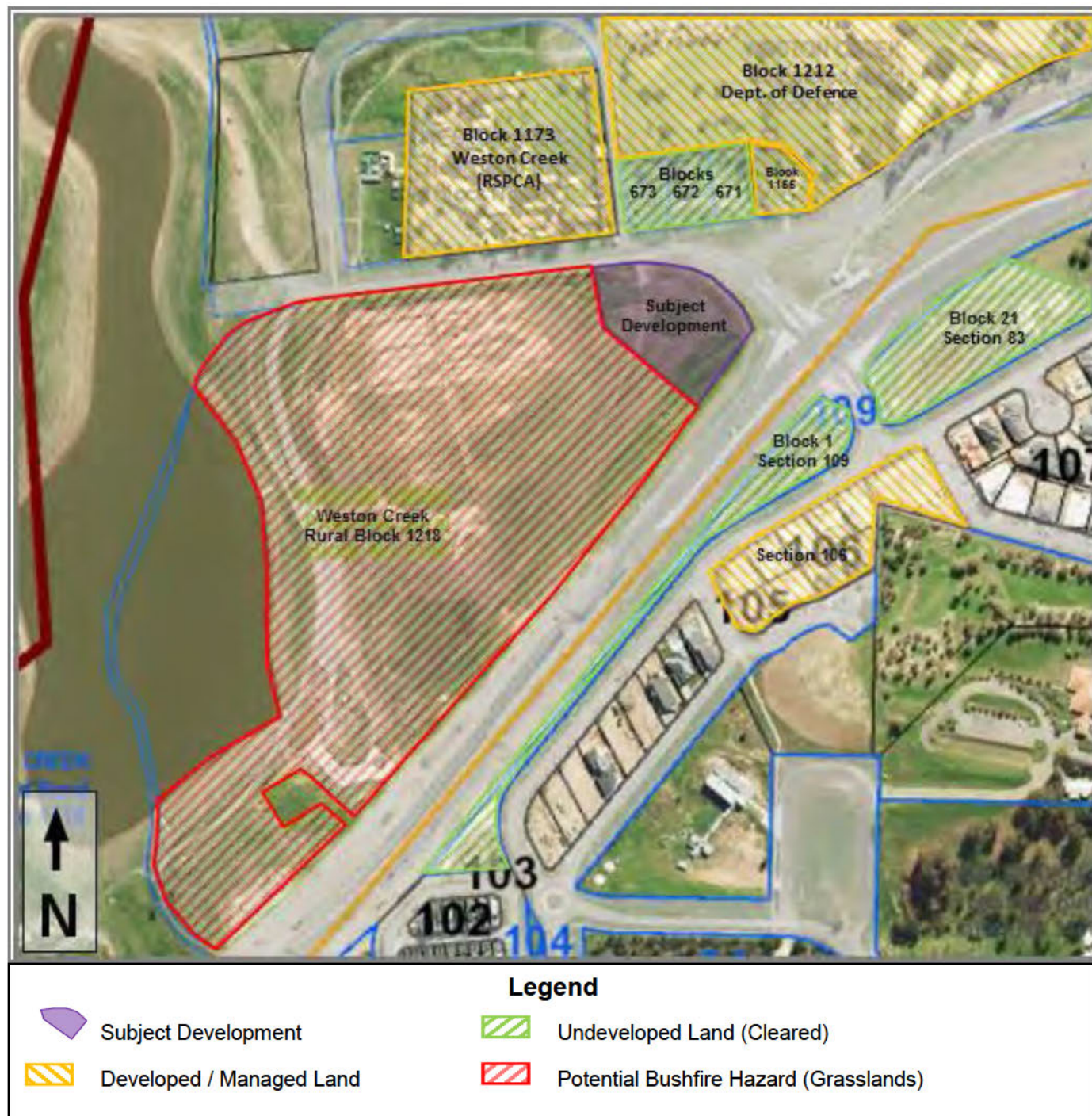


Figure 3.0 – Subject Development (Potential Grassland Hazard).

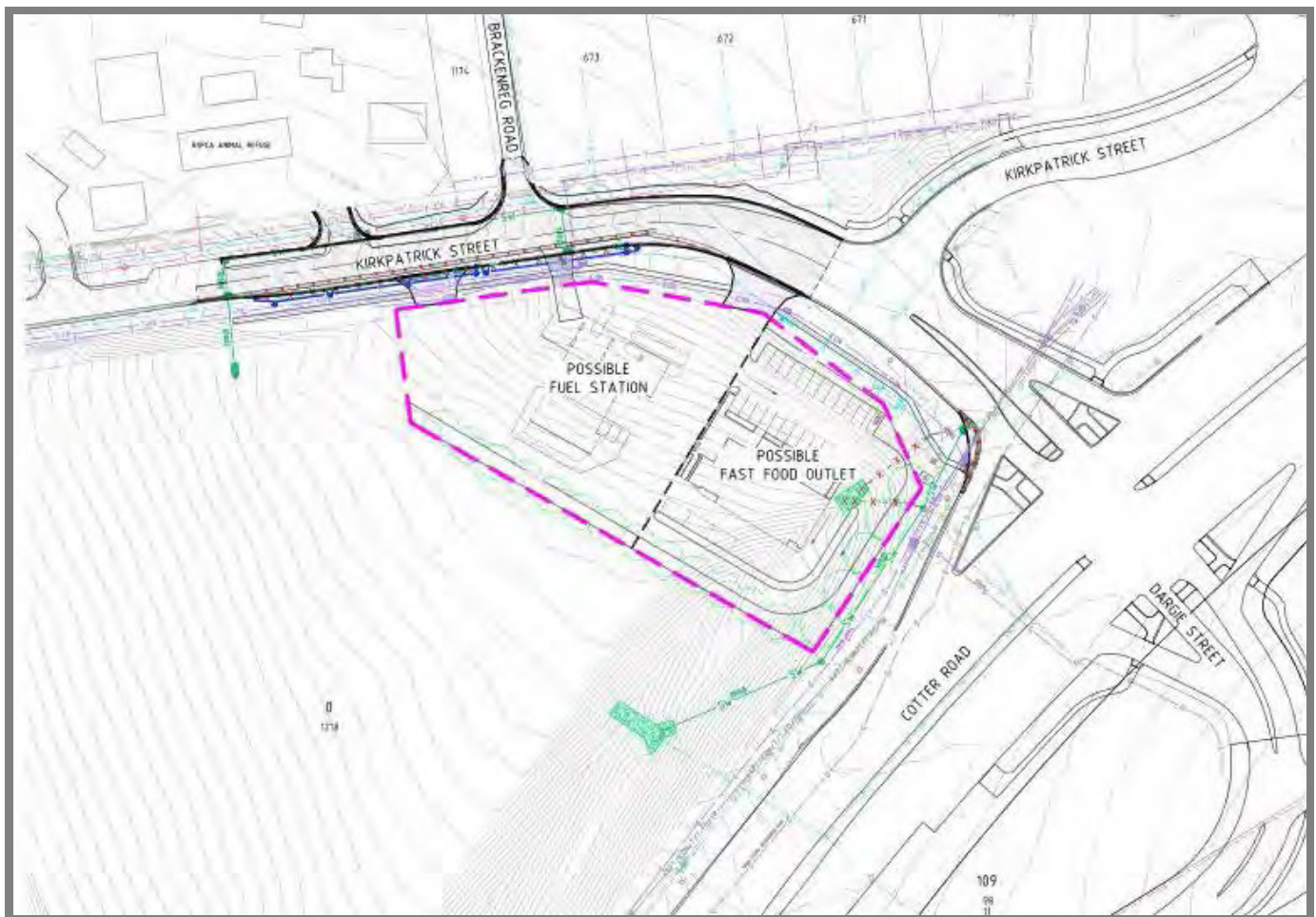


2.2 Subject Development

The proposed development is to construct a Fuel Station and Fast Food Outlet. The subject property is currently undeveloped with open grasslands over an area of approximately 112,886 sqm. The subject property is supplied by a reticulated water system and connected to an underground electrical supply grid and gas supply. Photographic evidence of the subject property and its surrounds is as displayed in Appendix 1.

Figures 4.0 - shows the extent and arrangement of the subject development considered by this assessment.

Figure 4.0 – Proposed Construction Development



3.0 The Strategic Bushfire Management Plan (SBMP) and Shared Responsibility

Based on a review of the SBMP, it is a considered opinion that the current plan does not describe any specific actions or outcomes that would have direct relevance to the subject development.

This report specifically notes Part 5 of the SBMP (Implementation Plan for the ACT Government) and the Strategy: *Reduce bushfire risk in areas subject to ember attack, radiant heat and flame contact through effective urban planning, design and construction*. There are elements of this strategy and actions which may arguably have some relevance to the subject development, which are aimed at the planning, design and construction of new urban areas.

Notwithstanding the above, this report addresses the associated requirements of AS3959 upon the subject development, which is an inclusion referred to as an element within the above strategy (No. 28).

Shared responsibility for the subject property will be comprised of an identified Asset Protection Zone (APZ) area and incorporate increased (or identified as proposed) building construction standards to mitigate any possible effects of uncontrolled fire event.

4.0 Site Specific Bushfire and Environmental Data

This report and assessment does not include a detailed analysis of site specific bushfire and environmental data (i.e. weather records or fire danger days) which may influence the effect or intensity of a bushfire upon the subject development.

Given the bushfire emergency which impacted upon Canberra in 2003 and the estimated upper fire danger index >100 (FDI) which prevailed during this time, it is reasonable to assume that there would always be a chance of prevailing climatic conditions for the Weston Creek area causing an uncontrolled bushfire event.

It is expected that an uncontrolled fire event could progress towards the subject property emanating from open grasslands to the west and south west of the subject development site.

5.0 Slope Terrain and Vegetation

5.1 Slope / Terrain

Slope analysis (used by this assessment) is derived from a general inspection of the subject property site and identified bushfire hazard (grasslands) within the study area.

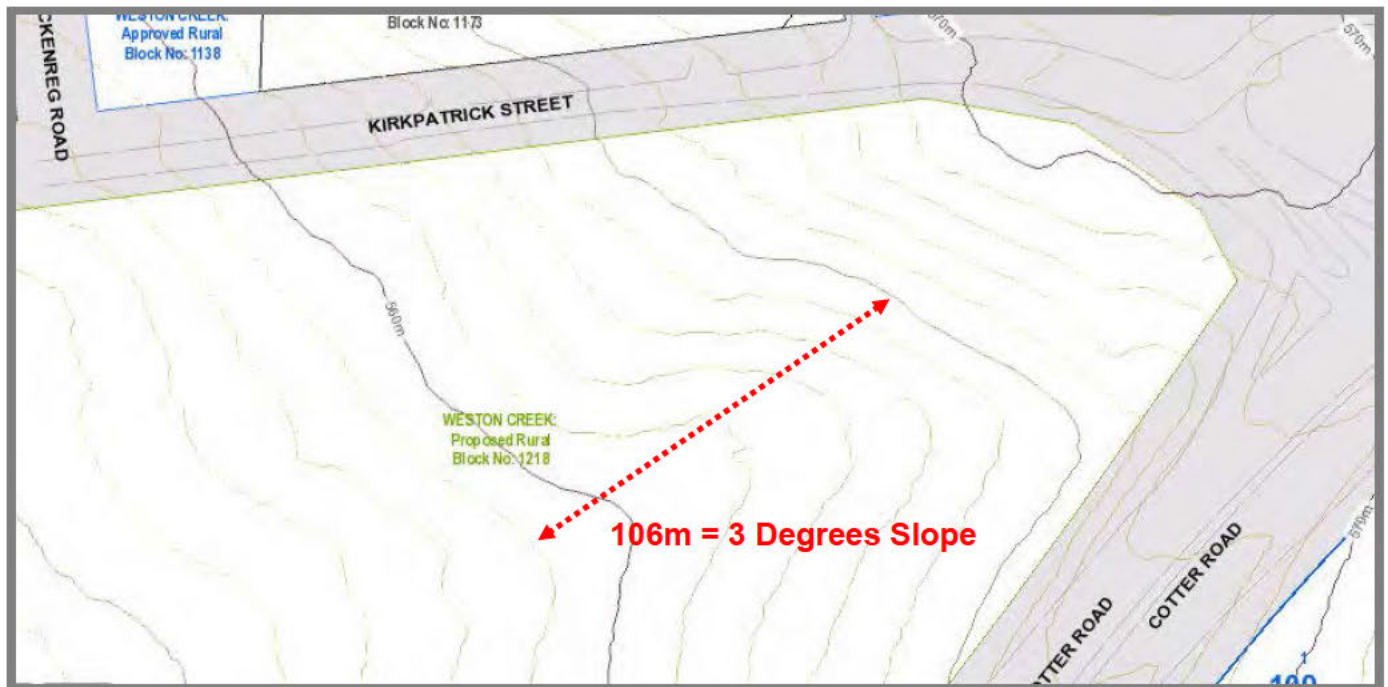
The effective slope was determined using one (1) metre contour maps obtained through the ACT Government, Environment and Planning Directorate (ACTMAPi).

Based on the location of the subject development, the effective slope* primarily influencing bushfire / grassfire behaviour, has been assessed as 'Downslope >0 – 5 degrees' (for the purposes of this report).

Contours for the subject property and development site are as shown in Figure 5.0.

* Effective 'slope' refers to the slope under the classified vegetation in relation to the building (AS3959-2009).

Figure 5.0 - Contour Map



5.2 Vegetation Classification Type

Vegetation extent (bushfire hazard) within the study area is derived from aerial photo interpretation and an inspection of the subject property on 7 September 2014.

On inspection, the subject property is more or less cleared and managed (see Appendix 1). The potential vegetation formation class associated with the undeveloped land within the study area includes 'Grassland' or more specifically 'Temperate Montane Grasslands' as described by Keith, D (2004).

For the purposes of the report and assessment the primary vegetation bushfire hazard affecting the subject property is considered **GRASSLAND** vegetation formation.

The vegetation class identified has been translated to Table 2.3 of Australian Standard 3959 – 2009 (Construction of buildings in bushfire prone areas) which describes 'Grassland' as all forms, including situations with shrubs and trees if the overstorey foliage cover is less than 10%. Section 2.2.3.2 of AS3959 indicates grassland as a hazard where it is >100mm in height.

The potential hazardous grassland areas affecting the proposed subject development is located within the subject property (to the west and south west) as shown in Figure 3.0.

All other adjacent lands to the north, east and south are currently considered to be 'managed land' for the purposes of this report, and it is also reasonable assumed that these areas will remain as managed lands for the life of the subject development.

6.0 Opportunities and Constraints Analysis of the Area

This report and assessment does not include a detailed analysis of site specific opportunities or constraints which may influence bushfire safety compliance for subject development.

It is acknowledged that the Weston Creek area was affected by the 2003 Canberra Bushfires. The continued maintenance of grassland vegetation on the subject property through fuel reduction activities (i.e. maintenance of the APZ as recommended by this report) should limit or even eliminate the chance of any potential spot fires occurring directly adjacent to the proposed building development.

For the purposes of this assessment, the proponent has not provided nor indicated that the subject property contains any significant environmental features.

7.0 Flora and Fauna Conservation Requirements

For the purposes of this assessment, the proponent has not provided nor indicated there to be any threatened flora and fauna which could potentially affect the subject development site.

This assessment and report does not identify or recommend the removal of any significant areas of vegetation for the purposes of Asset Protection Zoning (APZ) and vegetation separation. The extent of the APZ recommended or identified by this report will only affect areas within the subject property that are proposed to be developed.

8.0 Development Shape and Urban Interface Treatments

Development shape and urban interface treatments are not considered applicable to the subject development.

9.0 Edge Road and Access Network for Emergency Services Vehicles (Including Turning / Passing Areas for Fire Trails)

The subject property will be accessed by a two way public road way system via Kirkpatrick Street. The speed limit along Kirkpatrick Street is limited to 50 km/h. The property access road within the subject property will be sealed and will not exceed 15 degrees in slope at any point along its entire length.

Given that the property access roads are designed to facilitate large volumes of traffic and heavy vehicles, this would easily facilitate the safe passage of fire fighting vehicles.

10.0 Infrastructure (Water and Power Supply) with Adequacy at the Urban Interface for Peak Emergency Demand

Infrastructure (water and power supply) with adequacy at the urban interface for peak emergency demand is not necessarily considered applicable to the subject development.

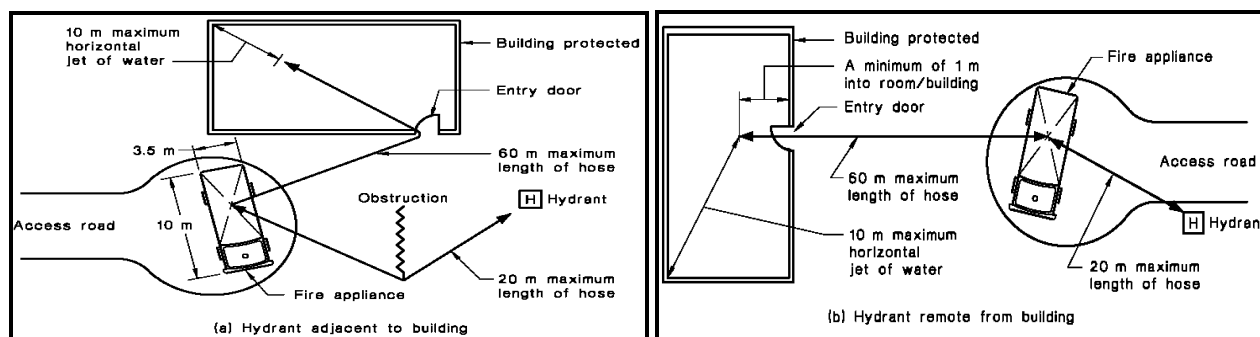
For the purposes of this assessment, this report notes that the study area is serviced by both overhead and underground electrical supply. New developments within the study area appear to be connected to underground supply lines. This report assumes that the subject property will be connected to underground supply lines which service the area. This is in line with the recommendations of the NSW

document Planning for Bushfire Protection 2006, which states '*where practicable, electrical transmission lines are underground*'.

It is also noted that the subject property will be connected to a reticulated town water supply and will be serviced by a hydrant system. The hydrant connection points were easily identified within close proximity to the subject development site. These hydrant points are not located on the road carriageway and are identified by reflective blue markers on the road and standard Fire Hydrant signage (FH) at the outlet points.

Australian Standard 2419 (Fire Hydrant Installations) states that external hydrants shall be accessible to fire brigade personnel and be located as follows:

- *In a position providing pedestrian access for fire personnel to the building.*
- *Where used as a feed hydrant, be within 20m of a fire authority pump appliance sited on a hardstand, road or the like to which the appliance has access.*
- *At least 10 m from the building.*



(Source: AS2419.1 – External Fire Hydrant Location).

This report notes numerous hydrant connection points located throughout the study area (reasonably within compliance with the above) and assumes that the pressure of water supply within the site (reticulated system) will meet the minimum requirements of AS2419.

Considering the above, the existing power and water supply facilities that will service the subject property should be reasonably adequate for the purposes of bushfire safety and associated compliance.

11.0 Cost and Effectiveness of Risk Management Options

This report and assessment does not include a detailed analysis of cost and effectiveness of risk management options for the subject development.

Considering the minor recommendations specified within this report to achieve or maintain reasonable bushfire safety compliance (i.e. Asset Protection Zone, water and power supplies, landscaping and bushfire emergency and evacuation plan) a detailed analysis of the cost and effectiveness of bushfire / grassfire risk management is not considered warranted at this time.

12.0 Land Management Regimes in the Area to Urban Development and its Suitability for Fuel Reduction

Surrounding land to the north, east and south of the subject property (or within 50 metres of the subject development area) is already fuel reduced / managed land or else only ever reasonably likely to be of a grassland hazard.

Land within the subject property is currently open grasslands, which appear to be managed / reduced through fuel management (i.e. slashing or similar activities).

In this regard, all surrounding land to the subject development is considered suitable for continued fuel reduction activities as is currently occurring.

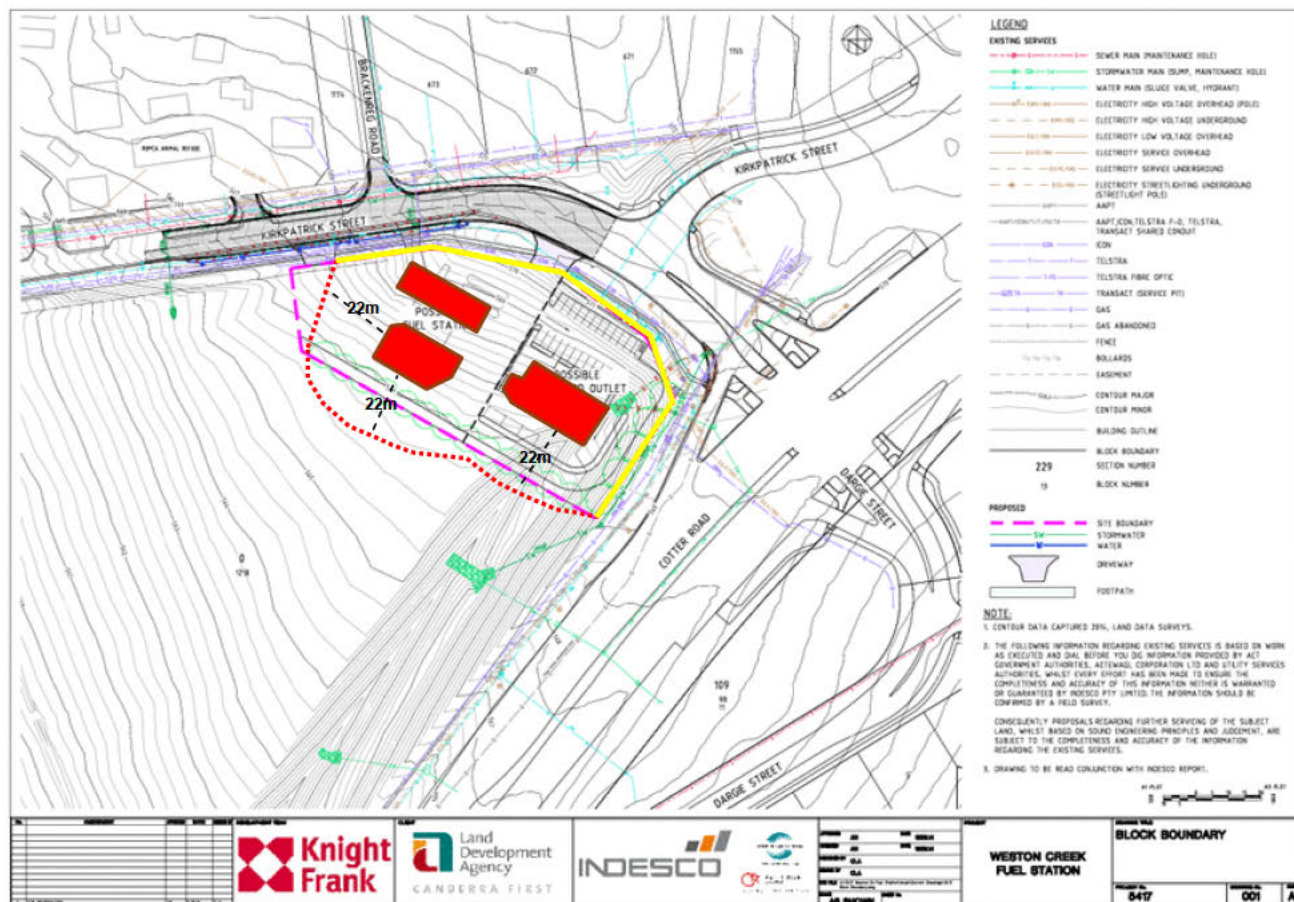
13.0 Asset Protection Zones (Inner, Outer and Home)

For the purpose of addressing this section, the ACTPLA Bushfire Risk Mitigation Code describes the location and aims for Asset Protection Zones (APZ). Specifically noted, the code describes the Inner Asset Protection Zone as *usually road reserve, parkland or nature reserve, and extends away from property boundaries. Fire fuels are to be maintained at low levels to reduce fire intensity so as to contribute to the defensible space for home-owners and emergency service efforts to minimise the ignition and ongoing combustion of homes and other structures during a bushfire.*

AS3959 indicates that grassland vegetation that is more than 50 metres from a building site may be excluded from an assessment to determine associated bushfire attack levels and construction standards.

In this regard, this report recommends that the identified APZ (Inner Protection Zone only) within the subject property shall be maintained for the life of the subject development as denoted in Figure 6.0. No easily combustible material, structures, available fuel / bushfire vegetation or other items be installed, stored or allowed to significantly accumulate or persist within the APZ.

Figure 6.0 – Recommended APZ Extent & Estimated AS3959 Requirements



Legend

- 22m APZ Area to Buildings
- Recommended APZ Area to Property Boundary
- BAL – 12.5 Recommended

14.0 Identification of Planning, Engineering and Construction Controls

AS3959 is the 'deemed to satisfy' (DTS) building solution for residential buildings of Classes 1, 2 & 3 in the ACT, constructed on bushfire prone land, under the general provisions of the General Provisions (Part A3) of the Building Code of Australia (BCA) 2010.

For buildings other than Classes 1-3, the BCA does not provide for any bushfire specific performance requirements and as such AS3959 does not apply as a set of DTS provisions. The general fire safety construction provisions within the BCA are taken as acceptable solutions.

The ACTPLA Bushfire Risk Mitigation Code identifies areas outside the defined urban area (non-urban) of the ACT as declared Bushfire Prone Land, which includes bush land and agricultural (rural) areas. The subject property (Block 1218) is presently zoned as rural land.

For the purposes of this assessment, the subject development is considered a Class 6 Building under the BCA. A Class 6 building is 'a shop or other building for the sale of goods by retail or the supply of services direct to the public', including:

- (a) an eating room, café, restaurant, milk or soft-drink bar; or*
- (b) a dining room, bar, shop or kiosk part of a hotel or motel; or*
- (c) a hairdresser's or barber's shop, public laundry, or undertaker's establishment; or*
- (d) market or sale room, showroom, or service station.*

Considering the above, the subject development technically does not require the application of AS3959 – the general fire safety construction provisions within the BCA only applicable.

As identified in the NSW document, PBP 'Service Stations' are classed as 'Controlling Developments'. Controlling Developments require the addressing of six (6) key Bush Fire Protection Measures. These measures are addressed in Section 18.0 – Bushfire Safety Compliance and Recommendations.

For the purpose of this assessment, the requirements of AS3959-2009 are considered to determine the suitability of the design and materials proposed to be used for the construction of the subject development.

14.1 AS3959 – Bushfire Attack Level (BAL)

AS3959 identifies six *Bushfire Attack Levels* (BAL) based on the potential heat flux exposure thresholds emanating from a bushfire hazard. They include in ascending order; *BAL-LOW*, *BAL-12.5*, *BAL-19*, *BAL-29*, *BAL-40* and *BAL-FZ* which are determined by the relative distance between a building and potential bushfire hazard.

Table 1.0 as outlined below describes the BALs and associated heat flux exposure thresholds.

Bushfire Attack Level	Heat Flux Exposure Threshold	Description of predicted bushfire attack and levels of exposure
BAL-LOW	N/A	There is insufficient risk to warrant specific construction requirements
BAL-12.5	$\leq 12.5 \text{ kW/m}^2$	Ember attack
BAL-19	$> 12.5 \text{ kW/m}^2$ $\leq 19 \text{ kW/m}^2$	Increasing levels of ember attack and burning debris ignited by windborne embers together with increasing heat flux
BAL-29	$> 19 \text{ kW/m}^2$ $\leq 29 \text{ kW/m}^2$	Increasing levels of ember attack and burning debris ignited by windborne embers together with increasing heat flux
BAL-40	$> 29 \text{ kW/m}^2$ $\leq 40 \text{ kW/m}^2$	Increasing levels of ember attack and burning debris ignited by windborne embers together with increasing heat flux with the increased likelihood of exposure to flames
BAL-FZ	$> 40 \text{ kW/m}^2$	Direct exposure to flames from fire front (Flame Zone) in addition to heat flux and ember attack

14.2 AS3959 – Determining the BAL

For the purposes of this assessment, the 'simplified procedure described in Section 2 – Determining the Bushfire Attack Level (BAL) - Clause 2.2 (Method 1)' of AS3959 is used to determine the BAL for each elevation of the subject development. Specific site conditions (bushfire vegetation and slope) are within the scope of the simplified procedure.

The simplified procedure (Method 1) includes:

- Step 1: Determine the relevant Fire Danger Index (FDI).
- Step 2: Determine the vegetation classification types within 100m from the site.
- Step 3: Determine the distance of the site from classified vegetation.
- Step 4: Determine the effective slope(s) under the classified vegetation type.
- Step 5: Determine the BAL (from the appropriate table in the standard).
- Step 6: Determine the appropriate construction requirements.

14.2.1 Determining the relevant Fire Danger Index (FDI)

Table 2.1 of AS3959-2009 sets the FDI for the ACT at 100.

14.2.2 Determining the Vegetation Classification Types

As determined section 5.2 of this report.

Vegetation within the subject property which extends to the west and south west is determined as **(Group G) Grassland** classification.

14.2.3 Determine the Distance of the Site from Classified Vegetation

The subject development will be reasonably separated from grassland vegetation by a minimum of 22 metres in all directions.

14.2.4 Determine the Effective Slope(s) Under the Classified Vegetation Type

As determined section 5.1 of this report.

The effective slope under the classified vegetation (Grassland) has been assessed '**Downslope >0 – 5 degrees**' to the west / south west.

14.2.5 Determine the BAL (from the appropriate table in the standard)

The appropriate table from AS3959-2009 is Table 2.4.2 Determination of Bushfire Attack Level (BAL) - FDI 100 (1090 K).

The relevant section of Table 2.4.2 is as shown below (Figure 7.0).

Figure 7.0

TABLE 2.4.2
DETERMINATION OF BUSHFIRE ATTACK LEVEL (BAL)—FDI 100 (1090 K)

Vegetation classification	Bushfire Attack Levels (BALs)				
	BAL—FZ	BAL—40	BAL—29	BAL—19	BAL—12.5
	Distance (m) of the site from the predominant vegetation class				
	All upslopes and flat land (0 degrees)				
A. Forest	<19	19—<25	25—<35	35—<48	48—<100
B. Woodland	<12	12—<16	16—<24	24—<33	33—<100
C. Shrubland	<7	7—<9	9—<13	13—<19	19—<100
D. Scrub	<10	10—<13	13—<19	19—<27	27—<100
E. Mallee/Mulga	<6	6—<8	8—<12	12—<17	17—<100
F. Rainforest	<8	8—<11	11—<16	16—<23	23—<100
G. Grassland	<6	6—<9	9—<13	13—<19	19—50
Downslope >0 to 5 degrees					
A. Forest	<24	24—<32	32—<43	43—<57	57—<100
B. Woodland	<15	15—<21	21—<29	29—<41	41—<100
C. Shrubland	<7	7—<10	10—<15	15—<22	22—<100
D. Scrub	<11	11—<15	15—<22	22—<31	31—<100
E. Mallee/Mulga	<7	7—<9	9—<13	13—<20	20—<100
F. Rainforest	<10	10—<14	14—<20	20—<29	29—<100
G. Grassland	<7	7—<10	10—<15	15—<22	22—<50

Based on the determination of BAL using AS3959-2009 Table 2.4.2, the BAL for all elevations of the subject development is **BAL 12.5**.

14.2.6 Determine the Appropriate Construction Requirements

Based on the determination of BAL described by this report, **Section 5 of AS3959** (Construction of Bushfire Attack Level 12.5) is considered the appropriate construction requirement for all elevations (including the roof area) of the subject development.

15.0 Staging of Development and the Incremental Urban Edge

Given any proposed new development that may occur within the subject property would not change the property boundary, staging of development and concerns of incremental urban edge expansion would not be applicable for the purposes of this assessment.

16.0 Interim Protection Measures / Land Management Before and During Development

Interim protection measures / land management before and during development is not considered necessarily applicable to the subject development.

17.0 Intended Public Realm (Landscape) Management Requirements Post Development

Intended public realm management requirements post development is not considered necessarily applicable to the subject development.

18.0 Bushfire Safety Compliance and Recommendations

The following recommendations are for bushfire safety and protection measures for the proposed construction a Fuel Station and Fast Food Outlet buildings. These recommendations are based upon the relevant requirements of AS3959-2009, ACTPLA Bushfire Risk Mitigation Code (2008) and NSW Planning for Bushfire Protection (2006) where considered applicable.

1. Asset Protection Zones (APZ).

The area as denoted in Figure 6.0 shall be maintained as an Asset Protection Zone.

All undeveloped or unmanaged land within 22 metres of the subject development (within the subject property) should be maintained as an Asset Protection Zone. This includes:

- maintaining a clear area of low cut grass or pavements adjacent to any building;
- ensuring any existing or future tree canopies do not exceed an average coverage of 15% of the APZ area and are separated >2 metres from any part of the roofline of a building;
- any future landscaping requires careful consideration of species selection and their location relative to their flammability. Flammable shrubs are not to be located under trees and are no closer than 10m from exposed windows or doors;
- keeping areas under fences, fence posts, gates and trees raked and cleared of fuel (i.e. fallen leaves, bark and twigs); and
- crown lifting (skirting) of any trees (removal of lowest branches), up to two (2) metres from the ground.

No easily combustible material, structures, available fuel / bushfire vegetation or other items be installed, stored or allowed to significantly accumulate or persist within the APZ. The APZ area shall be maintained for the life of the subject development.

This report notes that majority of the subject development site will be hardstand areas (bitumen and / or concrete). The Fuel Station and Fast Food Outlet will have sufficient space between the two buildings limiting the potential for a building to building structural fire transfer on site.

Isolated vegetation for landscaping purposes is permissible within the APZ area, provided it is installed and maintained as described above. A more detailed explanation of landscaping and property maintenance for bushfire safety is as described by PBP see Appendix 2.

It should be noted that the subject development is surrounded by mostly cleared lands (northern, eastern and southern elevations). Considering the location of the proposed buildings and proximity to potential bushfire vegetation, the proposed subject development can easily facilitate

the specified minimum APZ / setback (22 metres) from potentially unmanaged and persisting bushfire vegetation or else to the boundary of the subject property.

As noted above, it is understood from the advice provided by the proponent at the time of this report, that the subject property (Rural Block 1218) is also intended for future residential development.

If the proposed future residential development estate is approved and developed on Rural Block 1218, a subsequent bushfire assessment may be undertaken to either reduce or remove the previously determined APZ of this report.

Note: the current level and regime of vegetation and property maintenance which appears to occurring within the study area would reasonably facilitate the above requirements.

2. Australian Standard 3959 – 2009, Construction Standard.
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All new buildings within the subject development shall incorporate AS3959 **BAL-12.5** design / materials on all exposed elevations and entire roof area.

The vulnerable components of the development are the fuel stores and bowsers with emergency management planning able to offset the risk.

3. Adequacy of Access and Egress for Emergency Response.
--

This report notes that the subject property is accessed via a fully formed public road way system (via Kirkpatrick Street) affording appropriate access and egress from the site for firefighting operations. A perimeter public road access (Kirkpatrick Street and Cotter Road) is provided around majority of the development site.

As a considered opinion, the internal property access roads will easily facilitate the safe passage of larger fire fighting vehicles (i.e. Urban Pumpers). As noted previously, the property access roads are designed to facilitate large volumes of traffic and heavy vehicles, this would easily facilitate the safe passage of fire fighting vehicles.

Considering that the subject development is serviced by a reticulated water supply, the subject development site does not necessarily require any additional property / vehicle access design or standard (for bushfire safety) beyond normal government requirements.

For any proposed landscaping, it is recommended that a minimum vertical clearance of four (4) metres to any overhanging obstructions including tree branches is provided. This should ensure safe access or egress for emergency response vehicles within the subject property.

Due to the potential number of people onsite at any one time based on the proposed commercial activity, a full evacuation may lead to temporary congestion. It should be noted that the property access point is away from the identified bushfire vegetation.

4. Protection of electrical and gas services / utilities.

The subject property will be connected to an underground electrical and gas supplies. Within the subject development site, gas and/or electrical supply connections to service the proposed Fuel Station and Fast Food Outlet development should preferably be designed and located to ensure:

- any new or re-positioned electrical transmission line connections should be preferably located underground (as far as reasonably practicable)
- no part of a tree is closer to a power line than the distances set out in accordance with the relevant specifications as issued by ACTEWAGL:
<http://www.actewagl.com.au/~media/ActewAGL/ActewAGL-Files/About-us/Publications/Safety%20PDFs/Trees-Powerlines-Safety.ashx>
- reticulated or bottled gas is installed and maintained in accordance with AS1596 - 2008 and the requirements of relevant authorities
- all exposed / external gas service piping / plumbing should be metal
- all fixed * gas cylinders are kept clear of all flammable materials to a distance of 10 metres and shielded on the hazard side of the installation
- if gas cylinders need to be kept close to the building, the release valves are directed away from the building and at least two (2) metres away from any combustible material, so that they do not act as a catalyst to combustion.

* fixed cylinders being LPG storage containers (e.g. >45kg bottles) installed and connected to any building for internal gas heating and cooking purposes.

5. Adequate water supply for firefighting purposes.

As acknowledged in Section 12.0 of this report, the subject property is connected to a reticulated water supply and hydrant points are not located on the road carriageway identified by blue reflective markers.

Considering the existing water supply facilities that will service the subject property should be reasonable adequate for the purposes of bushfire safety and associated compliance.

6. Emergency and Evacuation Planning.

A bushfire emergency and evacuation plan should be developed in accordance with AS3745 – 2010 (Amendment 1) - Planning for emergencies in facilities to be submitted and approved by the ACT Fire Authorities prior to trading.

The bushfire emergency and evacuation plan should consist of preparedness, response and recovery activities and include the agreed emergency management roles, responsibilities, strategies and system arrangements for the site. To this end the plan needs to be a living document, and reviewed on a regular basis.

19.0 Conclusion

Provided that the subject development maintains the APZ area in accordance with the above recommendations as described by this report, it is a considered opinion that the subject development will be afforded a more than a reasonable level of protection from an uncontrolled bushfire or grassfire event.

Based on the identified extent of potential bushfire / grassfire hazard surrounding the subject property, this report has identified that the proposed building development within the site does not require any additional construction requirements for bushfire safety and design compliance.

This report also recommends the development of a specific emergency and evacuation plan that supports an emergency and evacuation planning in the event of a bushfire.

The subject development is reasonably separated away from the identified bushfire / grassfire hazard that may cause damaging ember attack during a bushfire event occurring up to a FDI of 100. The recommendations stated within this report are based on provisions and requirements as outlined within AS3959-2009, ACT Emergency Services Authority's *Strategic Bushfire Management Plan*, NSW Planning for Bushfire Protection 2006 and engineered judgment or expert opinion.

Whilst the recommended measures stated within this report should more than reasonably lessen the potential risk of ignition or damage from a bushfire, they are not a guarantee that the subject development will survive a passing bushfire / grassfire event. AS3959-2009 states, it should be borne in mind that the measures contained in this Standard cannot guarantee that a building will survive a bushfire event on every occasion. This is substantially due to the unpredictable nature and behaviour of fire and extreme weather conditions.

Based on the above assessment and six (6) recommendations for bushfire safety and fire protection compliance, the ACT Fire and Rescue & ACT Rural Fire Brigade should be satisfied that the proposed construction of a Fuel Station and Fast Food Outlet – Rural Block 1218 Kirkpatrick Street, Weston ACT will conform with the relevant requirements of AS3959 & NSW Planning for Bushfire Protection referred to by the ACTPLA Bushfire Risk Mitigation Code for the purposes of undertaking a bushfire risk assessment in the ACT.

20.0 References

- Australian Standard 3959 - 2009, Construction of buildings in bushfire-prone areas.
- ACT Government, Environment and Planning, ACTMAPi Version 4, <http://www.actmap.act.gov.au/home.html>
- Building Code of Australia (2010) – *Australian Building Codes Board, Canberra*.
- Planning for Bushfire Protection. A guide for councils, planners, fire authorities & developers (2006) – *NSW Rural Fire Service*.
- Planning for Bushfire Risk Mitigation General Code (2008) – *ACT Planning & Land Authority*.
- Strategic Bushfire Management Plan for the ACT, A Plan for the Government and community of the ACT to work together to more effectively suppress bushfires and reduce their consequences, Version 2 (October 2009) – *ACT Government, Emergency Services Agency*.
- For safety's sake, keep trees trimmed, ActewAGL - <http://www.actewagl.com.au/~media/ActewAGL/ActewAGL-Files/About-us/Publications/Safety%20PDFs/Trees-Powerlines-Safety.ashx>

21.0 APPENDIX 1 - Site Photos – 7 September 2014



Photo 1

Looking north from within the proposed development site facing towards Rural Block's 673, 672, 671 and 1155.



Photo 2

Looking east from within the proposed development site facing towards Cotter Road and Block 21, Section 83.



Photo 3

Looking south from within the proposed development site.



Photo 4

Looking west from within the proposed development site.



Photo 5

Looking north towards the proposed subject development site from within the subject property.



Photo 6

Looking west towards subject development from the corner of Cotter Road and Kirkpatrick Street.



Photo 7

Looking south from Kirkpatrick Street at the proposed development site.



Photo 8

Looking east towards the proposed subject development site from within the subject property.



Photo 9

Reticulated underground fire hydrants servicing the subject property.

Bush Fire Provisions - Landscaping and Property Maintenance

A5.1 Introduction

Bush fires are a natural and periodic event in the Australian landscape. Many Australian plants and animals have adapted to fire over thousands of years and require fire as part of their life cycle.

However, development adjacent to bushland areas has increased the risk of fire impacting on people and their assets. Fire management needs to strike a balance between the protection of life and property and the maintenance of ecological processes and systems.

In Australia, bush fires are inevitable and an essential aspect of the landscape.

However, the impact on property and life can be reduced with responsible preparation and management of bush fire hazards. This is the responsibility of all land managers, as well as communities and individuals taking responsibility for their own fire safety.

The level of protection for life or whether or not a house or other assets survive a bush fire ultimately depends on the landowner and their level of preparedness against bush fire attack.

The planning system can be used to better effect in protecting human life, property and environmental values from the impacts of bush fire events.

In some cases this will involve land use planning and development controls, construction standards, APZs and subdivision layout, siting, design and provision of services. It also involves careful and deliberate consideration of the environmental impacts of these and how we can recognise the need to protect our wetlands, rainforests, koala habitat and other biodiversity and cultural values.

However, the best planning can be undone by poor maintenance and lack of forethought when landscaping a development. Therefore house survival ultimately depends on the householder.

Some maintenance also depends upon adjoining neighbours and upon fuel management in adjacent bush land areas by the owners, occupiers or managers of that land. General housekeeping and maintenance of the grounds by the householder is equally important and, in some cases, may even be more so.

Experience from the Canberra 2003 fires suggests that house losses are greatest in the area up to 250 metres from the bush interface. Distances of

less than 100 metres are particularly vulnerable to flame contact, radiant heat and ember attack.

Hence it is within this distance that efforts should be made to prepare for the onslaught of major bush fire events.

While other legislation provides the impetus for planning objectives, the RF Act provides the legislative vehicle to achieve bush fire management objectives.

In this appendix consideration will be given to the principles for landscaping and management, and the role of property maintenance during the fire event.

A5.2 Principles of Protection

Bush fire attack takes essentially five forms;

- wind,
- smoke,
- ember,
- radiant heat and
- flame.

Evidence indicates ember attack is responsible for most bush fire related house fires. Strong winds resulting from severe bush fires will drive embers into vulnerable areas of a building, preheat and dry fuel ahead of a fire, lift roofing and extend flames along a more horizontal plane closer to building elements. Embers can also cause spotting in advance of the bush fire and provide piloted ignition to building elements. To effectively protect a building, strategies must be implemented that separate it from the hazard and reduce the intensity of bush fires to minimise the combined impact of ember, wind, flame and heat attack.

While smoke will cause minimal damage to property, it can severely affect the health of residents. Smoke is a significant factor in areas in which aged or disabled persons reside – hospitals and nursing homes - and more so where residents are susceptible to respiratory disorders.

Radiant heat (measured in kW/m²) can severely impair firefighting operations, the health of residents and the integrity of building elements. Radiant heat in excess of 10kW/m² can prevent emergency services personnel assisting residents of SFPP developments.

Flame attack will severely restrict firefighting operations, provide piloted ignition to building elements and threaten the health of residents and their capacity to evacuate the area.

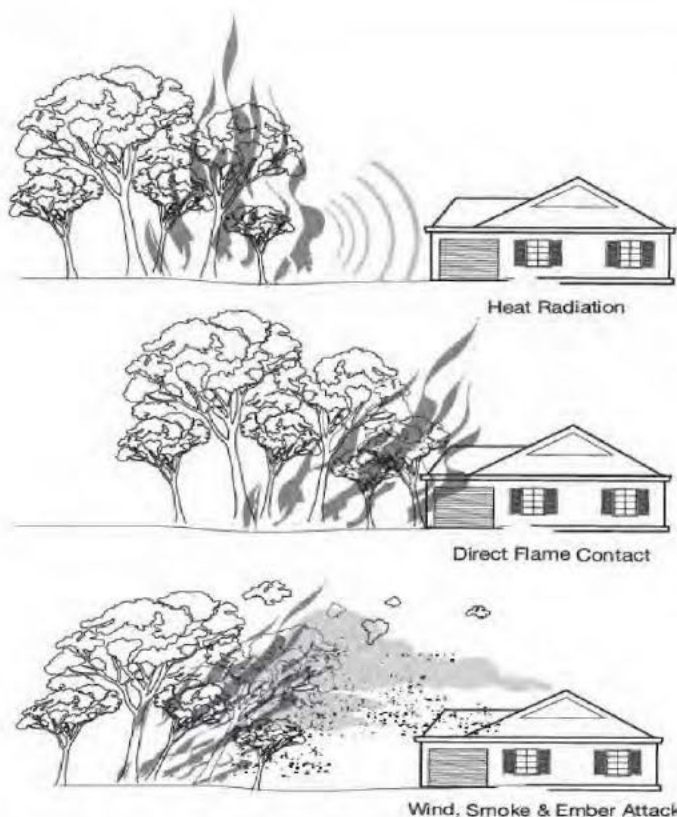


Figure A 5.1 Bush Fire Attack Mechanisms

Overall the intention of bush fire protection measures should be to prevent flame contact to a structure, reduce radiant heat to below the ignition thresholds for various elements of a building, to minimise the potential for wind driven embers to cause ignition and reduce the effects of smoke on residents and firefighters.

A5.3 Principles of Landscaping Properties for Bush Fire Protection

The principles of landscaping for bush fire protection aim to:

- Prevent flame impingement on the dwelling;
- Provide a defensible space for property protection;
- Reduce fire spread;
- Deflect and filter embers;
- Provide shelter from radiant heat; and
- Reduce wind speed.

(a) Vegetation choices

All vegetative material can burn under the influence of bush fire.

With this in mind, careful attention must be paid to species selection, their location relative to their flammability, avoidance of continuity of vegetation (horizontally and vertically), and ongoing maintenance to readily remove flammable fuels (leaf litter, twigs and debris).

In the paper *"Landscape and Building Design for Bushfire Areas"* G.C. Ramsay and L. Rudolph have provided 14 attributes of vegetation which affect bush fire attack. In summary these attributes are:

- Moisture content of leaves;
- Volatile oil content of leaves;
- Mineral content of leaves;
- Leaf fineness;
- Density of foliage;
- Continuity of plant form;
- Height of lowest foliage above ground;
- Size of plant;
- Dead foliage on the plant;
- Bark texture;
- Quantity of ground fuels;
- Fineness of ground fuels;
- Compaction ability of ground fuels; and
- Mineral content of ground fuel.

What is clear is that the higher moisture content of leaves (mesic), the less bark that will be available and the lower the leaf drop, all of which will assist with maintenance of the understorey and will also assist in reducing bush fire attack.

Work in the USA and elsewhere has also suggested that in addition to removal of understorey species, the trimming of lower limbs of trees also assists in reducing fire penetration into the canopy. Trees such as 'pencil pines' and African olive have been attributed with high fire propagation due to the high fine fuel and/or oil content captured within the canopy. This leads to significant flame height. Avoid such species in favour of rainforest species such as Figs and Syzygium.

When choosing plants, be sure not to introduce weed species into an area. Fire events may provide the opportunity for weed species to spread and may contribute fuel to an area of otherwise lower fuel loads.

Contact local councils, plant nurseries and plant societies to determine suitable species for your area.

(b) Trees as Windbreaks

The use of trees as windbreaks is a common practice but trees also provide a useful function, trapping embers and flying debris, which would otherwise reach the house. The tree crown will rarely carry fire unless there is a significant fuel loading on the ground.

By reducing the wind speed, a row of trees also slows the rate of spread of a bush fire and a dense foliage traps radiant heat, lowering bush fire radiant heat.

Because of the effect of turbulence, a balance has to be struck between a high density of trees (that

maximises the trapping of embers and radiant heat but also maximises turbulence] and a lower density [that allows more embers and radiant heat to pass through but minimises turbulence]. A windbreak that allows 30–60% of the wind to pass through is ideal as less than this becomes too solid with ember laden winds being carried over the top of the break.

To be effective a windbreak must:

- be located on the side of the lot from which fire weather normally approaches;
- be of sufficient length (generally 100 metres minimum length);
- be located at a distance of one to three times the height of fully grown trees but not within the IPA;
- use smooth barked eucalypts, rainforest trees or deciduous trees;
- make sure there are no breaks of sufficient size to allow winds to funnel through; and
- be separated by sufficient distance from the hazard so as not to be consumed and become a hazard itself.

A5.4 Vegetation Management

Where APZs have been incorporated as part of the development approval for subdivision or for dwelling construction, the environmental aspects of the development should have already been taken into account.

In general, it is expected that APZs will be maintained by the owner of the land including maintenance of any fire trail constructed as part of the development.

It is accepted practice that after construction of a dwelling, gardens will be established and landscaping of the grounds will be undertaken. It is essential that efforts to reduce fuels on adjoining properties are therefore not negated by actions within the immediate curtilage of the building.

In terms of priorities of addressing bush fire attack, priority should be given to preventing flame impingement by not allowing fine debris to accumulate close to the building. Secondly, removal of understorey fuels aids in the reduction of flame heights and likely canopy fire, thereby reducing overall radiant heat. Removal of loose bark and fine fuels reduces both heat output and ember generation, while the retention of taller trees with canopies will also assist in filtering out embers.

To maintain a garden that does not contribute to the spread of bush fires, it is necessary to plan the layout of the garden beds and take an active decision to minimise certain features in favour of other features. These should include:

- maintaining a clear area of low cut lawn or pavement adjacent to the house;
- keeping areas under fences, fence posts and

- gates and trees raked and cleared of fuel;
- utilising non-combustible fencing and retaining walls
- breaking up the canopy of trees and shrubs with defined garden beds;
- organic mulch should not be used in bush fire prone areas and non flammable material should be used as ground cover, eg Scoria, pebbles, recycled crushed bricks.
- planting trees and shrubs such that:
 - the branches will not overhang the roof;
 - the tree canopy is not continuous; and
 - there is a windbreak in the direction from which fires are likely to approach.

The RFS has developed its document "Standards for Asset Protection Zones" which should be consulted for APZ specifications. This is also available on the RFS web page at www.rfs.nsw.gov.au.

A5.5 Maintenance of Property

Sensible arrangements for landscaping and maintenance of the property are critical in the prevention of losses.

In considering property maintenance the following items should therefore be implemented in advance of the bush fire season:

- removal of material such as litter from the roof and gutters;
- ensure painted surfaces are in good condition with decaying timbers being given particular attention to prevent the lodging of embers within gaps;
- check pumps and water supplies are available and in working order;
- driveways are in good condition with trees not being too close and forming an obstacle during smoky conditions;
- check tiles and roof lines for broken tiles or dislodged roofing materials;
- screens on windows and doors are in good condition without breaks or holes in flyscreen material and frames are well fitting into sills and window frames;
- drenching or spray systems are regularly tested before the commencement of the fire season;
- hoses and hose reels are not perished and fittings are tight and in good order;
- doors are fitted with draught seals and well maintained;
- mats are of non combustible material or in areas of low potential exposure; and
- woodpiles, garden sheds and other combustible materials are located downslope and well away from the house.

Trees and other vegetation in the vicinity of power lines and tower lines should be managed and trimmed in accordance with the specifications in "Vegetation Safety Clearances" issued by Energy Australia (NS179, April 2002).

Attachment E



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TRAFFIC IMPACT ASSESSMENT

PREPARED FOR

INDESCO CONSULTING ENGINEERS

BLOCK 1218 KIRKPATRICK STREET, WESTON CREEK, ACT

TRAFFIC IMPACT ASSESSMENT

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Issue No.	Type	Date	Prepared By	Approved By
A	Draft	8/10/2014	B Hodges	W de Waard
B	Final	10/10/2014	B Hodges	W de Waard

OUR REF: G17691R-01

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EXECUTIVE SUMMARY

Traffix Group has been engaged by Indesco Consulting Engineers to prepare a traffic and parking assessment of a proposed commercial development at Block 1218 Kirkpatrick Street, Weston Creek.

The proposed commercial development includes a service station (6 fuel bowzers and 300m² convenience store) and a fast food restaurant (400m²).

The key intersections in the vicinity of the subject site (Cotter Road/Kirkpatrick Street/Dargie Street, Kirkpatrick Street/Kirkpatrick Street and Kirpatirck Street/Brackenreg Road) currently operate satisfactorily with LOS A and LOS B operating conditions.

The proposed development will generate up to 440 vehicle trips in the PM peak hour including 206 trips associated with 'passing trade' and 234 'stand alone' trips. All traffic associated with the proposed development will access the wider road network via the Cotter Road/Kirkpatrick Street/Dargie Street intersection and the existing traffic flows have been utilised to determine the traffic distribution. Intersection analysis for the post development conditions indicates that the key intersections of Cotter Road/Kirkpatrick Street/Dargie Street and Kirkpatrick Street/Kirkpatrick Street will continue to operate satisfactorily following full development of the subject site (LOS A and LOS B). The intersection of Kirpatirck Street/Brackenreg Road will continue to operate at LOS A.

The total parking demand for the proposed development based on the ACTPLA *Parking and Vehicular Access General Code* (May 2013) is approximately 58 spaces (18 spaces associated with the service station component and 40 spaces associated with the fast food restaurant component). A total of 33 parking spaces are proposed to support the development and therefore there is a shortfall of 25 parking spaces.

The proposed service station component includes a provision of 8 parking spaces (6 bowser spaces and 2 spaces adjacent to the convenience store). It is recommended that the provision adjacent to the convenience store is increased by 10 to meet the requirements of the ACTPLA Code.

Typically fast food restaurants generate lower parking demands compared to traditional 'sit down' restaurants and on this basis a review of existing fast food restaurants around Canberra was undertaken. The review indicates an average parking provision of approximately 8.1 spaces/100m² for existing fast food restaurants which when applied to the subject site results in a requirement for 32 parking spaces. Given that 25 spaces are proposed for the fast food component, it is recommended that an additional 7-15 parking spaces are provided to meet parking demands for the fast food.

The proposed development is likely to generate pedestrian demands for the local area including from the park and ride facility, the Australian Defence College, the RSPCA facility and the existing residential properties. To cater for the likely pedestrian demand footpaths in the vicinity of the subject site should be provided to improve the quality of the pedestrian conditions. Furthermore, it is recommended that pedestrian movements are guided to utilise the existing pedestrian crosswalk on the north-western leg of the Cotter Street signals. This approach may require the installation of pedestrian fencing to encourage movements to utilise the existing formal crossing.

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1. INTRODUCTION

Traffix Group has been engaged by Indesco to prepare a traffic impact assessment report of a proposed service station and fast food restaurant at the corner of Kirkpatrick Street and Cotter Road, Weston Creek, ACT.

The proposed development includes a service station (6 fuel bowzers and 300m² convenience store) and a fast food restaurant (400m²).

This report addresses the traffic and parking impacts of the proposal, including the following:

- Forecasted traffic and parking generation by the proposal,
- Traffic impacts to the Kirkpatrick Street / Cotter Road intersection,
- Parking requirement for the proposal,
- Parking impacts around the vicinity of the subject site, and
- Impacts to pedestrian and bicycle safety.

The traffic and parking impact assessments of the proposal have been based on the following documents:

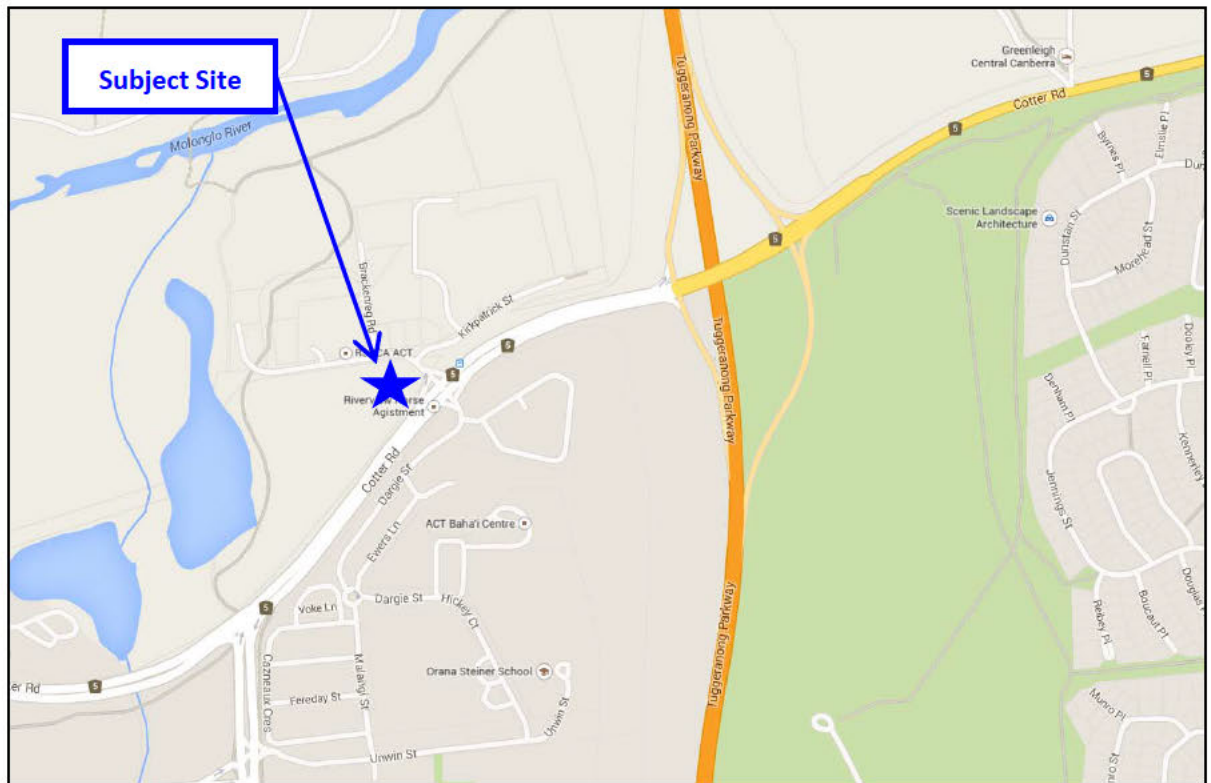
- NSW Roads and Maritime (RMS) *Guide to Traffic Generating Developments* (Version 2.2, October 2002),
- ACT Planning and Land Authority (ACTPLA) *Parking and Vehicular Access General Code* (May 2013), and

2. EXISTING CONDITIONS

The subject site is located at Block 1218, Weston Creek on the north western corner of the Cotter Road/Kirkpatrick Street/Dargie Street intersection as shown in the locality plan at Figure 1.

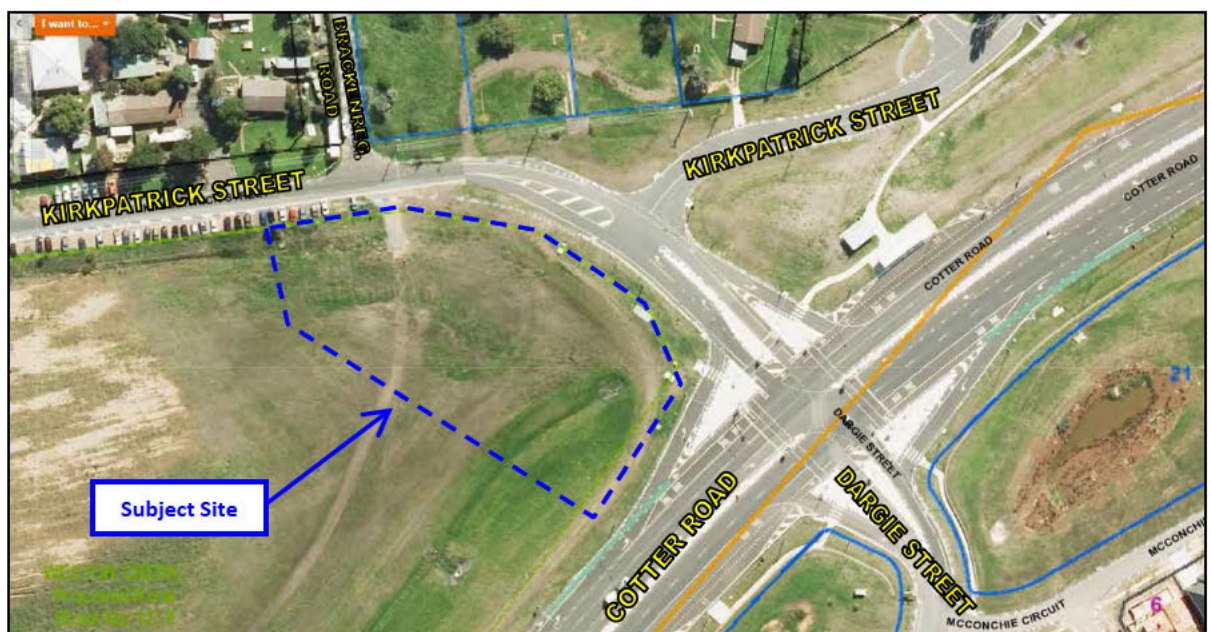
The subject site is bounded by Kirkpatrick Street to the north and east and Cotter Road to the south-east, as shown in the aerial photograph at Figure 2. Vehicle access to the subject site is currently provided via two (2) vehicle crossovers to Kirkpatrick Street.

Block 1218 comprises an area of approximately 112,000 sq m, however only the north-eastern corner of the site is proposed to be developed as part of this proposal.



Source: www.maps.google.com.au

Figure 1: Locality Plan



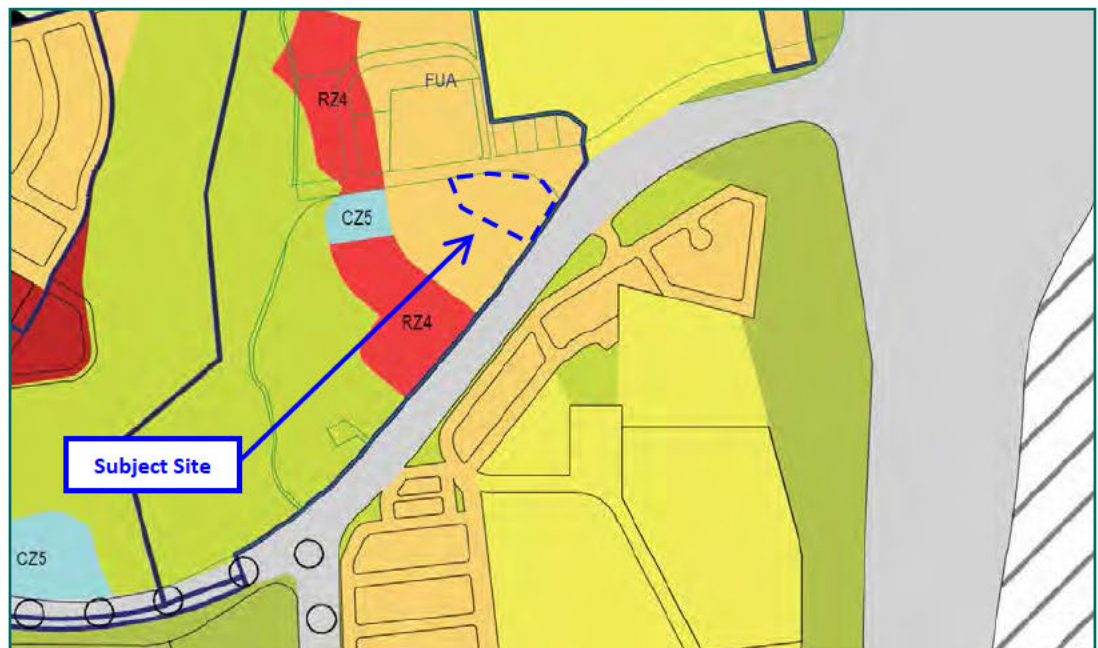
Source: ACTMAPI

Figure 2: Aerial Photograph

2.1. LAND USE

The subject site is zoned RZ1 – Suburban under the ACT Territory Plan as shown at Figure 3. The surrounding land uses on Kirkpatrick Street are predominantly residential, with the following non-residential land uses within close proximity:

- Australian Defence College located on the north side of Kirkpatrick Street (eastern section),
- RSPCA ACT facility located on the north side of Kirkpatrick Street (western section) to the west of Brackenreg Road, and
- Action Park and Ride Facility located on the eastern section of Kirkpatrick Street.



Source: ACT Territory Plan

Figure 3: Land Use Zoning

2.2. ROAD NETWORK

Kirkpatrick Street is a local road that extends east-west in parallel with Cotter Road. Kirkpatrick Street is broken up into two main sections, with the western section extending from Cotter Road to the west and the eastern section extending from the western section to the east (to the existing park and ride facility).

In the vicinity of the subject site, Kirkpatrick Street provides for a single carriageway with a single lane of traffic in each direction. A right turn lane is provided into the eastern section of Kirkpatrick Street in the vicinity of the Cotter Road intersection.

90 degree parking occurs on the south side of Kirkpatrick Street opposite the RSPCA facility and in the eastern section for the park and ride facility.

The default urban speed limit of 50km/h applies to Kirkpatrick Street.

Cotter Road is an arterial road that extends east-west between Yarra Glen to the east and the Cotter Dam to the west.

In the vicinity of the subject site, Cotter Road provides a dual carriageway with two traffic lanes in each direction. At the intersection with Kirkpatrick Street, left and right turn lanes are provided on Cotter Road along with kerbside bus lanes.

A posted speed limit of 80km/h applies to Cotter Road in the vicinity of the subject site.

Brackenreg Road is a local road that extends north-south between Kirkpatrick Street in the south and a 'dead end'.

In the vicinity of the subject site, Brackenreg Road consists of a single carriageway of approximately 6.5m wide.

The default urban speed limit of 50km/h applies to Brackenreg Street.

Dargie Street is a local road that extends north-south between Cotter Road in the north and Ewers Street in the south, where Dargie Street continues as Malangi Street.

In the vicinity of the subject site, Dargie Street provides for a single carriageway with a single lane of traffic in each direction.

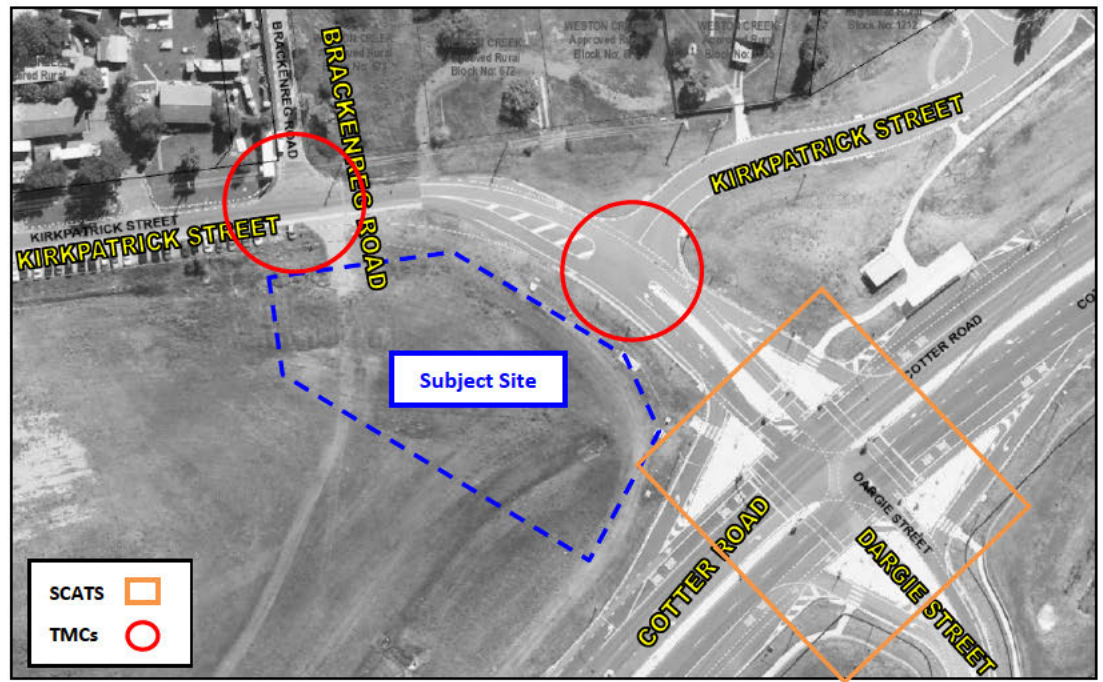
The default urban speed limit of 50km/h applies to Dargie Street.

2.3. EXISTING TRAFFIC CONDITIONS

Existing traffic conditions have been assessed based on traffic survey data collected by Indesco Consulting Engineers as detailed in Figure 4 below.

Intersection turning movement counts were undertaken on Tuesday, 16th September 2014 during the AM peak period (between 7am and 9am) and PM peak period (between 4pm and 6pm) at the intersection of Kirkpatrick Street / Kirkpatrick Street and Kirkpatrick Street / Brackenreg Road.

Traffic volumes at the signalised intersection of Kirkpatrick Street / Cotter Road were sourced from SCATS data provided by Roads ACT for the period between Monday, 1st September, 2014 and Sunday, 7th September, 2014.



Source: ACTMAPI

Figure 4: Traffic Data Collection Locations

Sample turning movement counts were also conducted at the Kirkpatrick Street / Cotter Road intersection to determine the proportion of through or turning movements in the shared lanes which could not be determined from the SCATS data.

The network peak hours were governed by the Kirkpatrick Street / Cotter Road intersection and which occurred between 8:00am and 9:00am for the AM peak hour and between 5:00pm and 6:00pm for the PM peak hour.

The AM and PM peak hour traffic volumes for the road network are shown at Figure 5 and Figure 6 below, whilst a full summary of the traffic survey information is provided at Appendix A.

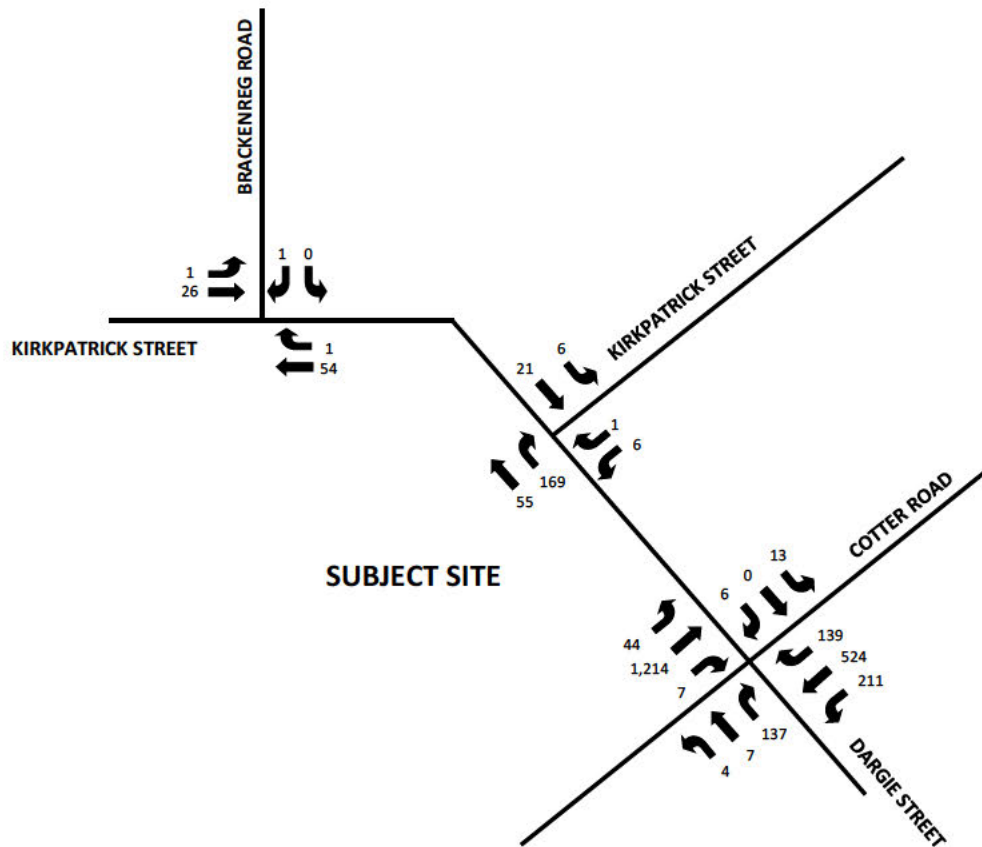


Figure 5: Existing Weekday AM Peak Hour (8am-9am) Traffic Volumes

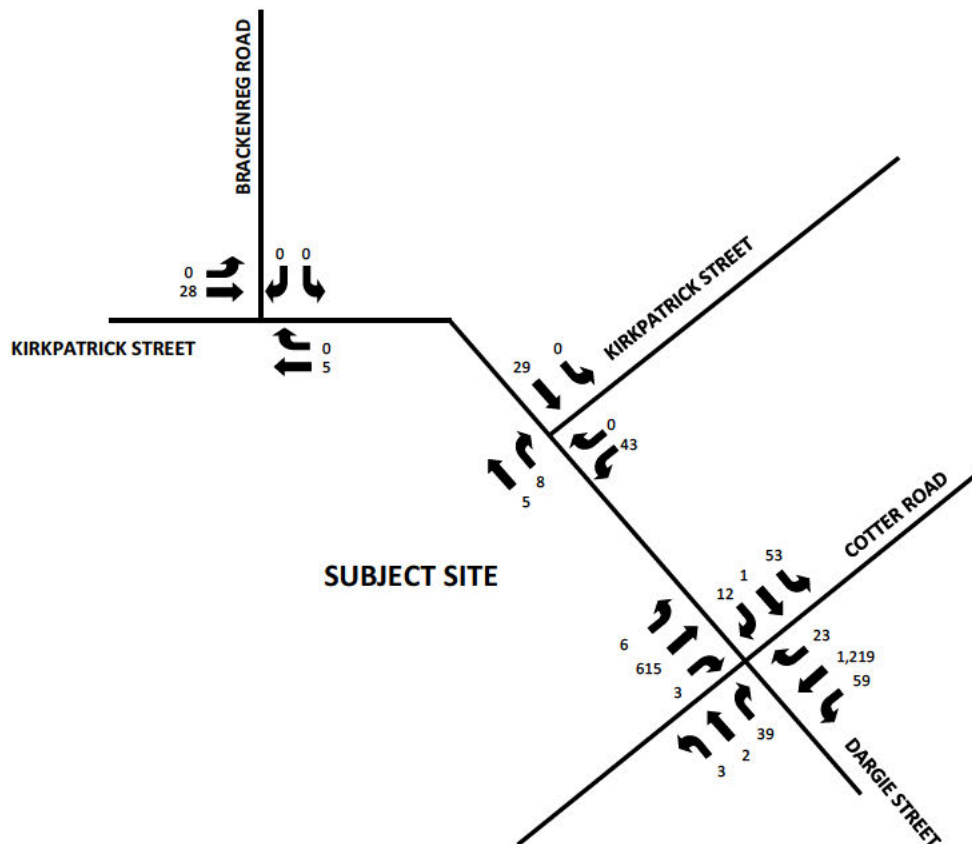


Figure 6: Existing Weekday PM Peak Hour (5pm-6pm) Traffic Volumes

2.3.1. Signal Phasing / Timing

The existing signal phasing and timing at the Cotter Road / Kirkpatrick Street / Dargie Street intersection has been recorded in order to allow for the development of a SIDRA intersection model.

The key parameters were recorded by Indesco Consulting Engineers from sample observations on Tuesday, 16th September, 2014 (to coincide with the turning movement counts).

A summary of the signal phasing and timing is provided below, with a full summary of the observations provided at Appendix B.

During the observation period, the intersection of Cotter Road / Kirkpatrick Street / Dargie Street utilised six signal phases as shown in Figure 7 below.

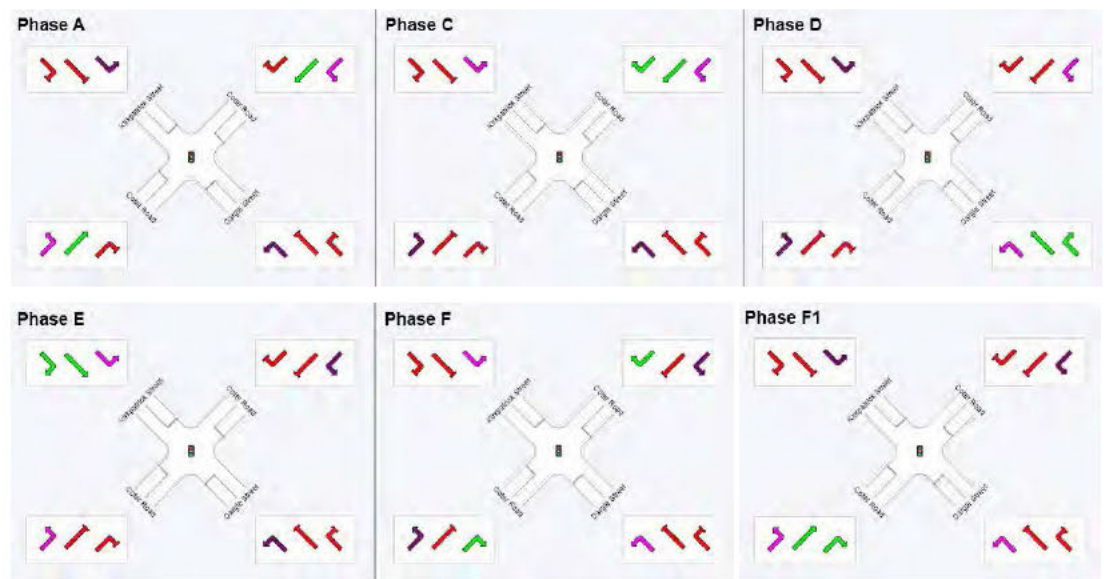


Figure 7: Cotter Road / Kirkpatrick Street / Dargie Street – Peak Signal Phasing Observations

In operation, the intersection typically utilised the following phase arrangements in the AM and PM peak periods:

- **AM Peak** - Phase A,C,D (with Phase E and Phase F operating on demand)
- **PM Peak** – Phase A,D (with Phase C, Phase E and Phase F1 operating on demand)

A summary of the phase times observed in each peak period are presented in Table 1 below.

Table 1: Cotter Road / Kirkpatrick Street / Dargie Street – Typical Peak Signal Timing

Time	Phase A	Phase C	Phase D	Phase E	Phase F	Phase F1
AM Peak Period						
Minimum Time (s)	58	0	11	0	0	-
Maximum Time (s)	84	23	22	14	19	-
Average Time (s)	75	14	16	2	3	-
PM Peak Period						
Minimum Time (s)	44	0	0	0	-	0

Time	Phase A	Phase C	Phase D	Phase E	Phase F	Phase F1
Maximum Time (s)	198	13	16	20	-	14
Average Time (s)	88	1	12	3	-	1

The average phase times have been adopted for analysis, which results in a cycle time of 110 seconds in the AM peak and 105 seconds in the PM peak.

2.3.2. Existing Intersection Performance

The existing intersection operation has been assessed utilising SIDRA Intersection 6.0. SIDRA provides outputs to assess intersection operation including degree of saturation (DOS), average delay and 95th percentile queue length.

The RMS 'Guide to Traffic Generating Developments' provides Level of Service (LOS) criteria for intersections based on average delay as shown at Table 2 below.

Table 2: RMS 'Guide to Traffic Generating Development' – LOS Criteria

Level of Service	Average Delay (s)	Traffic Signals / Roundabout	Give Way / Stop Control
A	< 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity: - At Signals incidents will cause excessive delays - Roundabouts require other control modes	At Capacity, requires other control mode
F	> 71	Unsatisfactory	Unsatisfactory

A summary of the key SIDRA intersection performance indicators and the resultant 'Level of Service' for the intersections in the vicinity of the subject site are shown in Table 3 below.

Table 3: Existing Intersection Performance (2014)

Intersection	Peak Hour	DOS	Average Delay (s)	95th Percentile Queue Length (m)	LOS
Cotter Road / Kirkpatrick Street / Dargie Street	AM	0.933	15.9	138.8	LOS B
	PM	0.709	4.8	54.2	LOS A
Kirkpatrick Street / Kirkpatrick Street	AM	0.101	3.9	3.4	LOS A
	PM	0.029	3.4	0.8	LOS A
Kirkpatrick Street / Brackenreg Road	AM	0.030	0.3	1.1	LOS A
	PM	0.016	0.6	0.1	LOS A

The results for the signalised intersection of Cotter Road / Kirkpatrick Street / Dargie Street indicate that the intersection has a high Degree of Saturation perspective in the AM peak period (DOS – 0.933). This high DOS is caused by the right turn movement on the Dargie Street approach. The model has been based on average phase times collected from 10 cycle samples in each peak period. It is noted that Phase D, which allows for the right turn movement from Dargie Street averaged 16 seconds in the AM peak, however it ranged from 11 seconds to 22 seconds across the 10 samples. Therefore, the actual DOS saturation is likely to be lower as the phase time varies to match arrival demand. In any event, the average delays incurred at the intersection represent LOS B in the AM peak period and LOS A in the PM peak period.

The unsignalised intersections of Kirkpatrick Street / Kirkpatrick Street and Kirkpatrick Street / Brackenreg Road operate under good conditions with LOS A in both the AM and PM peak periods.

A copy of the full SIDRA Intersection results is provided at Appendix C.

2.4. PUBLIC TRANSPORT

The subject site is well served by bus services operating within its vicinity. This includes the following weekday bus services operating on Cotter Road past the subject site:

- **Bus Route 705** operates between Belconnen and Tuggeranong via Cooleman Court from 6:40am to 6:30pm with a service frequency of approximately one service every 30-45 minutes during the AM and PM peak periods (for a total of three services in each direction in both the AM and PM peak periods),
- **Bus Route 725** operates between Cooleman Court and the City in the AM period from 6:40am to 8:26am with a service frequency of one service every 20-40 minutes (for a total of three services), and between the City and Cooleman Court in the PM period from 4:40pm to 5:52pm with a service frequency of one service every 20 minutes (for a total of two services),
- **Bus Route 726** operates between Weston Creek and the City in the AM period from 6:50am to 7:45am with a service frequency of one service every 20 minutes (for a total of two services), and between the City and Weston Creek in the PM period from 4:53pm to 6:24pm with a service frequency of one service every 10 minutes (for a total of two services), and

- **Bus Route 783** operates between Cooleman Court and the City in the AM period with one service operating from 7:13am to 7:50am, and between the City and Cooleman Court in the PM period with one service operating from 5:20pm to 6:06pm.

A map showing the current bus service operating in the vicinity of the subject site is shown at Figure 8.

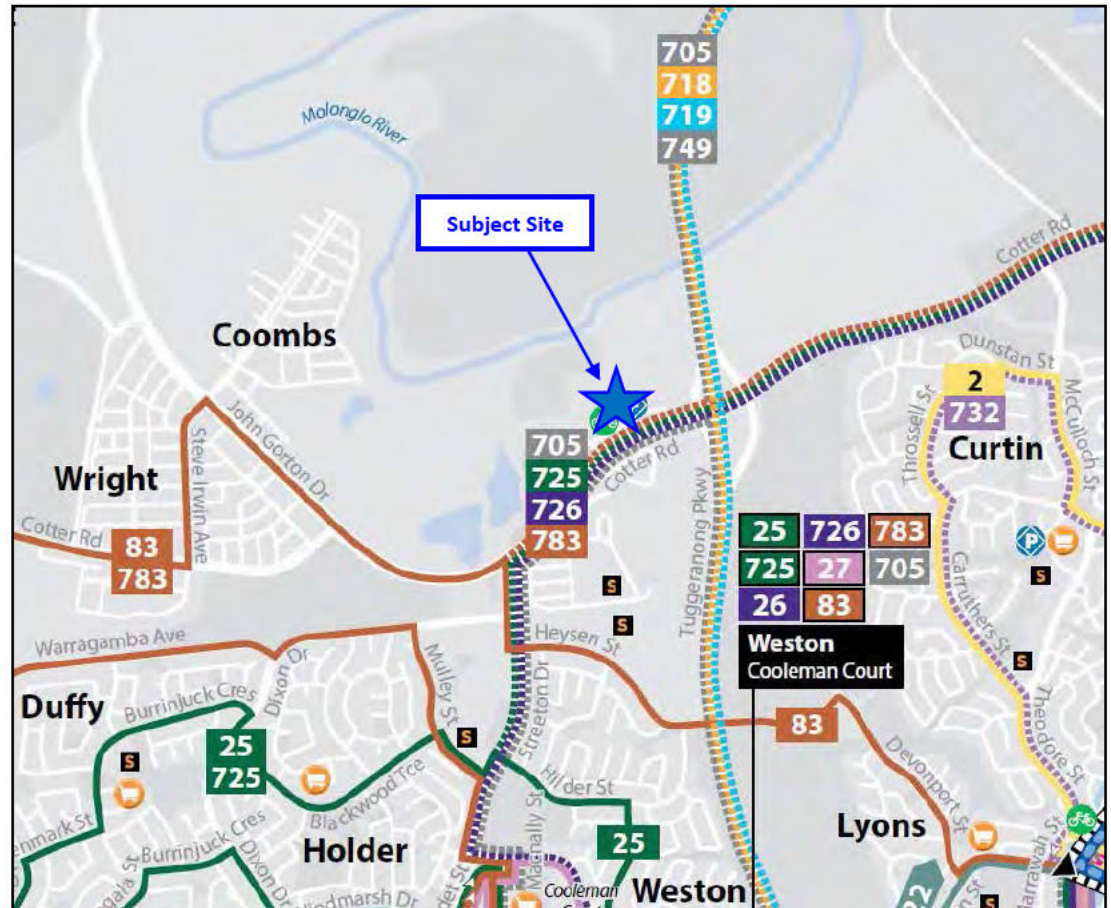


Figure 8: Bus Services in Vicinity of Subject Site

2.5. PEDESTRIAN AND CYCLIST FACILITIES

Pedestrian facilities in the vicinity of the subject site are provided as follows:

- Cotter Road / Kirkpatrick Street / Dargie Street – Signalised pedestrian crosswalks on each leg with zebra crossings provided on the left turn slip lanes.
- Footpath on the southern side of Kirkpatrick Street (eastern section) providing a connection between the 'park and ride' parking spaces and the Cotter Road bus stop
- Footpath on the southern side of Cotter Road linking the bus stop to the signalised intersection and the footpath on the northern side of Dargie Street.

Bicycle lanes are provided on Cotter Road through the Kirkpatrick Street / Dargie Street signalised intersection. Facilities for bicycle are also provided at the 'park and ride' facility located on the eastern end of Kirkpatrick Street.

3. PROPOSAL

The proposal is for a commercial development at Block 1218, Weston Creek, comprising of:

- A fuel service station incorporating 6 fuel bowsers and a convenience shop with an approximate 300m² floor area, and
- A fast food restaurant with a floor area of approximately 400m².

The proposed development is located on the south- west corner of the Cotter Road / Kirkpatrick Street / Dargie Street intersection.

Vehicle access to the subject site is proposed via two (2) vehicles crossovers to Kirkpatrick Street, with the eastern cross-over located to the west of the Kirkpatrick Street / Kirkpatrick Street intersection and the western cross-over located to the east of the Kirkpatrick Street / Brackenberrg Road intersection. Both access points will provide for all movements in and out of the subject site.

The current development plans shows an indicative provision of 25 parking spaces for the fast food restaurant and 8 parking spaces for the fuel service station (6 spaces at the pumps at 2 spaces for the convenience store component).

A copy of the preliminary development plan prepared by Indesco Consulting Engineers is provided in Appendix D.

4. TRAFFIC ASSESSMENT

4.1. TRAFFIC GENERATION

Traffic generation for the proposed development has been estimated based on the *RMS Guide to Traffic Generating Developments, Version 2.2* (October 2002). A summary of the traffic generation rates for each use are provided below.

Fuel Service Station:

The RMS Guide provides traffic generation rates for 'service stations and convenience stores' based on the area of the site and the gross floor area of the convenience store as shown below:

Evening Peak Hour Trips – $0.04 A(S) + 0.3 A(F)$ or $0.66 A(F)$

Where: $A(S)$ = area of the site (m^2)

$A(F)$ = gross floor area of convenience store (m^2)

Based on the development plan the site area for the service station is approximately $3,000m^2$ and the gross floor area for the convenience store is approximately $300m^2$. On this basis, the traffic generation equations for the service station component are shown in Table 4 below.

Table 4: Traffic Generation – Service Station

	Site Area – $3,000m^2$		Convenience Store Area - $300m^2$		TOTAL
Equation 1	$0.04 A(S)$	120 veh/hr	$0.3 A(F)$	90 veh/hr	210 veh/hr
Equation 2	-	-	$0.66 A(F)$	198 veh/hr	198 veh/hr

In view of the above the two equations provide a range of traffic generation for the service station component of between 198 and 210 trips/evening peak hour. For the purpose of this assessment, the higher value of 210 has been adopted.

In our experience, service station development generate a high proportion of 'passing trade' trips in commuter peak hours, whereby vehicles utilising the facility on their way home from work. For the purpose of this assessment, the level of passing trade has been adopted as 60%, as shown below:

- Passing Trade Trips (60%) – 126 veh/hr
- Stand Alone Trips (40%) – 84 veh/hr
- TOTAL – 210 veh/hr

Fast Food Restaurant:

The RMS Guide provides peak hour rates for fast food developments based on the type of restaurant as shown in Table 5 below.

Table 5: Traffic Generation – Fast Food Restaurant

Restaurant Type	Evening Peak Hour Traffic Generation	
	Average Development	Sensitivity Test
McDonalds	180 veh/hr	230 veh/hr
Kentucky Fried Chicken (KFC)	100 veh/hr	120 veh/hr

As the final restaurant occupant is unknown, the traffic generation rates for McDonalds (sensitivity test – 230 veh/hr) have been conservatively adopted for this assessment.

The RMS Guide also indicates that the proportion of passing trade is typically 35%. On this basis, the proposed fast food restaurant will generate the following traffic:

- Passing Trade Trips (35%) – 80 veh/hr
- Stand Alone Trips (65%) – 150 veh/hr
- TOTAL – 230 veh/hr

Summary:

The overall traffic generation for the proposed development is provided in Table 6 below.

Table 6: Traffic Generation – Total Proposed Development

Component	Evening Peak Hour Vehicle Trips		
	'Passing Trade' Trips	'Stand Alone' Trips	TOTAL
Fuel Service Station	126 veh/hr	84 veh/hr	210 veh/hr
Fast Food Restaurant	80 veh/hr	150 veh/hr	230 veh/hr
TOTAL	206 veh/hr	234 veh/hr	440 veh/hr

4.2. TRAFFIC DISTRIBUTION

All traffic generated by the subject site will access the wider road network via the intersection of Cotter Road / Kirkpatrick Street / Dargie Street.

Both of the proposed uses typically have very short durations of stay (i.e. to buy fast food and fuel) and therefore even directional splits have been adopted for the traffic distribution assessment as follows:

- Service Station – 50% 'In' / 50% 'Out' during the PM peak
- Fast Food Restaurant - 50% 'In' / 50% 'Out' during the PM peak

Table 7: Directional Split

'In' / 'Out'	Component	Evening Peak Hour Vehicle Trips		
		Passing Trade	Stand Alone Trips	TOTAL
'In' Trips – 50%	Fuel Service Station	63 veh/hr	42 veh/hr	105 veh/hr
	Fast Food Restaurant	40 veh/hr	75 veh/hr	115 veh/hr
	TOTAL 'IN'	103 veh/hr	117 veh/hr	220 veh/hr
'Out' Trips – 50%	Fuel Service Station	63 veh/hr	42 veh/hr	105 veh/hr
	Fast Food Restaurant	40 veh/hr	75 veh/hr	115 veh/hr
	TOTAL 'OUT'	103 veh/hr	117 veh/hr	220 veh/hr
TOTAL		206 veh/hr	234 veh/hr	440 veh/hr

The distribution of traffic to the wider road network has been undertaken based on the existing traffic flows observed at the Cotter Road / Kirkpatrick Street / Dargie Street intersection. The traffic distribution will vary for the 'passing trade' and 'stand alone' trips as detailed in the sections below.

4.2.1. 'Passing Trade' Trips

'Passing trade' trips generated by the subject site will result in current through trips on Cotter Road detouring to the subject site. On this basis, the level of traffic expected from each direction has been determined based on the existing PM peak hour traffic flows heading north-east and south-west on Cotter Road.

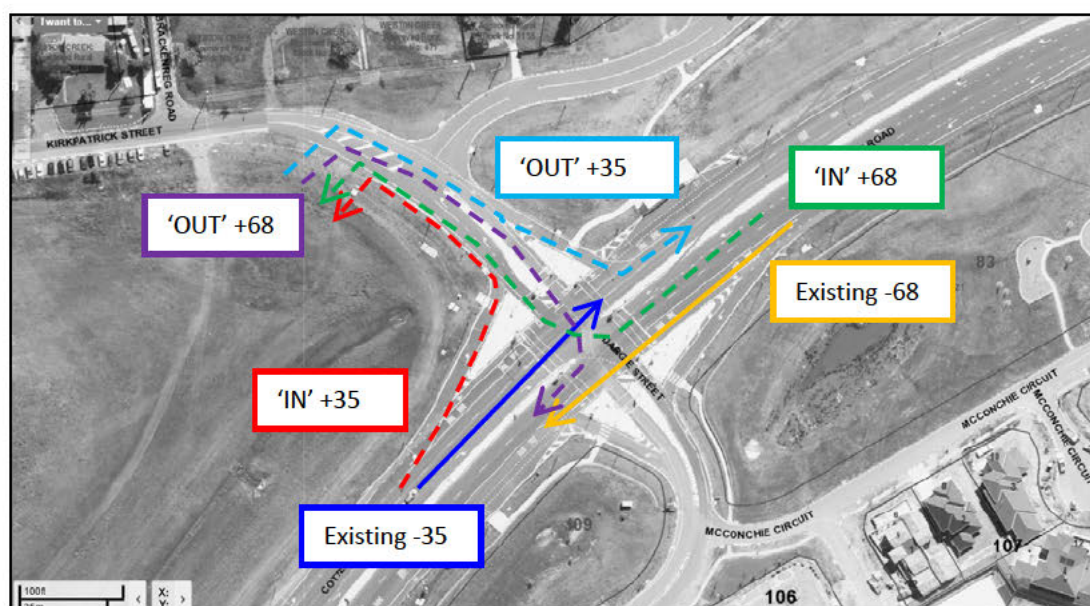
For vehicles heading north-east, the detour will involve turning left into Kirkpatrick Street for entry movements and left out onto Cotter Road for exit movements.

For vehicles heading south-west, the detour will involve turning right into Kirkpatrick Street for entry movements and right out onto Cotter Road for exit movements.

A summary of the traffic distribution for the 'passing trade' trips is presented in Table 8 below, with a visual summary of the predicted 'passing trade' trips is presented in Figure 9 below.

Table 8: 'Passing Trade' Trips - Traffic Distribution

Direction	Evening Peak Hour Vehicle Trips				
	Existing Traffic Volume		Predicted 'Passing Trade' Trips		
	No.	%	Service Station	Fast Food	Total
Cotter Road: North-East	615 veh/hr	34%	'In' - 21 'Out' - 21	'In' - 14 'Out' - 14	'In' - 35 'Out' - 35
Cotter Road: South-West	1,219 veh/hr	66%	'In' - 42 'Out' - 42	'In' - 26 'Out' - 26	'In' - 68 'Out' - 68
TOTAL	1,834 veh/hr	100%	'In' - 63 'Out' - 63 TOTAL - 126	'In' - 40 'Out' - 40 TOTAL - 80	'In' - 103 'Out' - 103 TOTAL - 206



Source: ACTMAPI

Figure 9: 'Passing Trade' PM Peak Traffic Distribution

4.2.2. 'Stand Alone' Trips

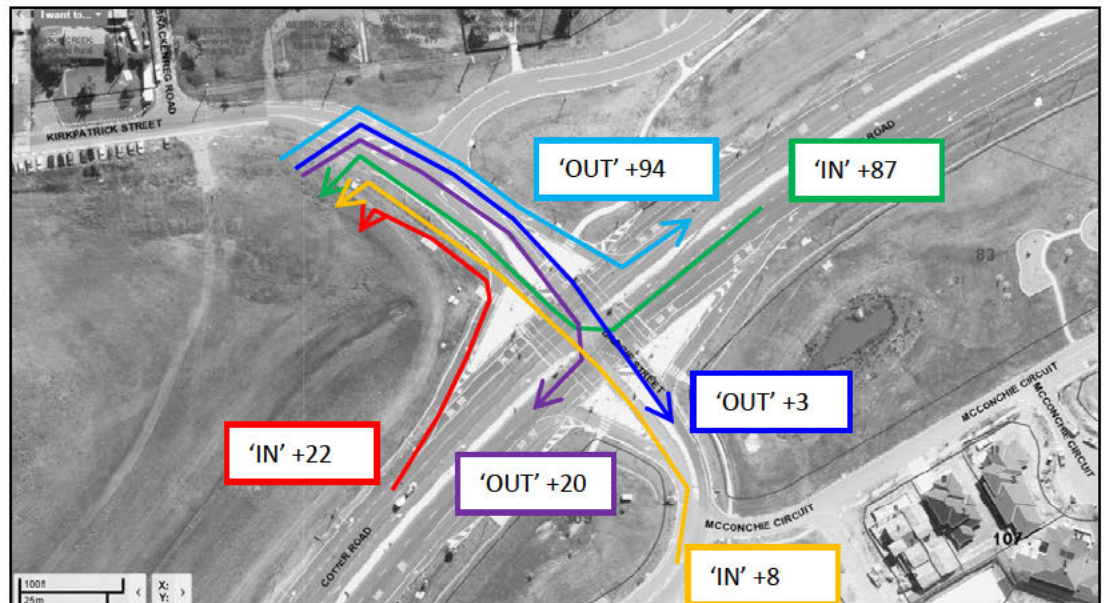
The 'stand alone' trips associated with the proposed development will attract new vehicle trips to the subject site.

The distribution of these arrivals and departures is based on the existing distributions in the PM peak for the Kirkpatrick Street leg of the Cotter Road / Kirkpatrick Street / Dargie Street intersection, as shown in Table 9 below.

Table 9: 'Stand Alone' Trips - Traffic Distribution

Direction	Evening Peak Hour Vehicle Trips				
	Existing Traffic Volume		Predicted 'Stand Alone' Trips		
	No.	%	Service Station	Fast Food	Total
'In' Trips					
Left In	6	19%	8	14	22
Through In	2	7%	3	5	8
Right In	23	74%	31	56	87
Total	31	100%	42	75	117
'Out' Trips					
Left Out	53	80%	34	60	94
Through Out	1	2%	1	2	3
Right Out	12	18%	7	13	20
Total	66	100%	42	75	117

A visual summary of the predicted 'stand alone' trips is presented in Figure 9 below.



Source: ACTMAPI

Figure 10: 'Passing Trade' PM Peak Traffic Distribution

4.2.3. Traffic Distribution Summary

A summary of the development traffic volumes and the post development traffic volumes in the PM peak period are provided at Figure 11 and Figure 12 below.

The usage of the proposed vehicle crossovers for the subject site has been adopted as follows:

- **Western Crossover** – 50% Service Station
- **Eastern Crossover** – 100% Fast Food, 50% Service Station

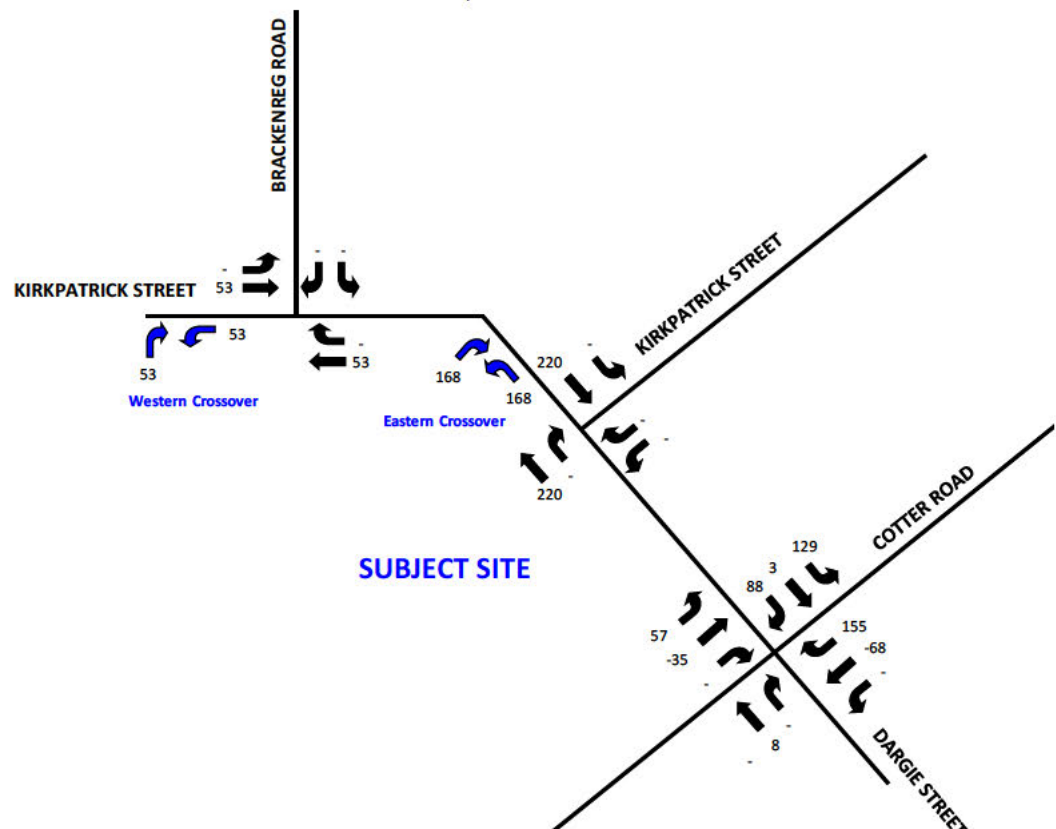


Figure 11: PM Peak Hour - Development Traffic Volumes

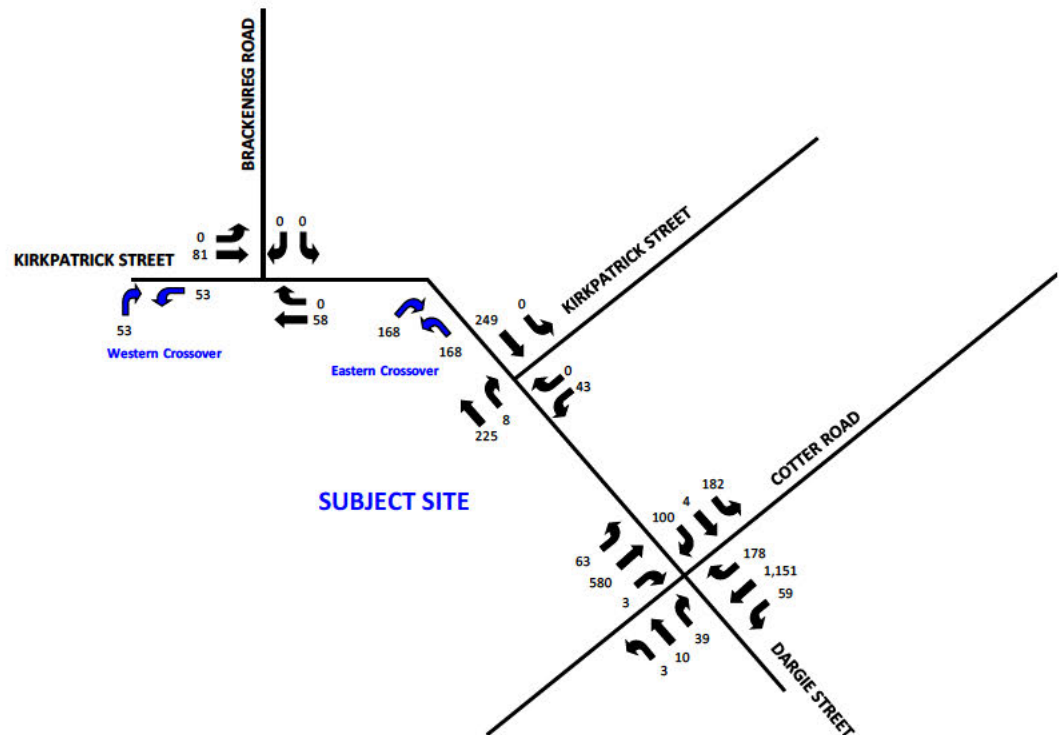


Figure 12: PM Peak Hour (5pm-6pm) - Post Development Traffic Volumes

4.3. TRAFFIC IMPACTS

4.3.1. Future Intersection Performance

The future intersection capacity has been assessed utilising SIDRA 6.0 and the post development traffic volumes presented in Figure 12 previously.

For the intersection of Cotter Road / Kirkpatrick Street / Dargie Street the signal phasing / timing has been adjusted to suit the additional traffic volumes. The cycle time has been maintained at 105 seconds as per the existing conditions, however the phase time have been adjusted to best replicate the existing conditions, whilst allowing sufficient phase time for the additional traffic volumes utilising Kirkpatrick Street.

A summary of the post development intersection performance is provided in Table 10 below, while a full summary of the SIDRA results is provided in Appendix E.

Table 10: Post Development Intersection Performance (2014) – PM Peak Hour

Intersection	DOS	Average Delay (s)	95th Percentile Queue Length (m)	LOS
Cotter Road / Kirkpatrick Street / Dargie Street	0.711	16.9	115.7	LOS B
Kirkpatrick Street / Kirkpatrick Street	0.135	0.7	1	LOS A
Kirkpatrick Street / Brackenreg Road	0.044	0.3	0.1	LOS A

The SIDRA analysis undertaken indicates that all intersections will operate well post development, with all intersections operating under LOS A (good conditions) or LOS B (good with acceptable delays and spare capacity).

The intersection of Cotter Road / Kirkpatrick Street / Dargie Street has changed from LOS A under the existing conditions to LOS B. This still represents good operating conditions with spare capacity. The degree of saturation has remained relatively unchanged overall, with minor changes to each movement at the intersection. The 95th percentile queue length has increased to 115m for through movements on the Cotter Street north-east approach.

The intersection of Kirkpatrick Street / Kirkpatrick Street will continue to operate under LOS A conditions in the post development scenario. The degree of saturation has increased to 0.135 however this still represents excellent operating conditions.

The intersection of Kirkpatrick Street / Brackenreg Road remains relatively unchanged from the existing conditions and will continue to operate at LOS A.

Overall, the surrounding road network has sufficient capacity to accommodate the proposed post development associated with the proposed development.

4.4. VEHICLE ACCESS

Vehicle access to the subject site is proposed via two (2) vehicles crossovers to Kirkpatrick Street, with the eastern cross-over located to the west of the Kirkpatrick Street / Kirkpatrick Street intersection and the western cross-over located to the east of the Kirkpatrick Street / Brackenreg Road intersection.

Both access points will provide for all movements in and out of the subject site.

The preliminary layout shows the proposed crossovers at 11.3m wide for the western crossover and 9.5m wide for the eastern crossover. These widths are more than sufficient to allow for simultaneous two-way traffic flow.

5. PARKING ASSESSMENT

5.1. PARKING GENERATION

The required parking provision of the proposed development has been based on the ACTPLA *Parking and Vehicular Access General Code* (May 2013).

Whilst it is acknowledged that the subject site currently falls within a residential zone, for the purposes of the parking generation assessment a commercial zoning has been adopted for the subject site given the required re-zoning of the land to accommodate a 'service station' use.

The ACTPLA Code provides a range of parking rates for both 'service station' and 'restaurant' depending on the location as shown at Table 11.

Table 11: Parking Provision Rates

Component	Commercial Zones CZ1, CZ2 and CZ3					CZ5 Mixed Use Zone
	City Centre	Town Centre	Group Centre	Local Centre	CZ2 Zone Outside Centre	
Service Station	4 spaces /service bay, plus 4 spaces/100m ² of shop area		4 spaces /service bay, plus 5 spaces/100 m ² of shop area	4 spaces /service bay, plus 6 spaces/100m ² of shop area		4 spaces /service bay, plus 5 spaces/100 m ² of shop area
Restaurant	CZ1 – No minimum requirement CZ2 and CZ3 – 5 spaces / 100m ² GFA	CZ1 – No minimum requirement CZ2 and CZ3 – 5 spaces / 100m ² GFA up to 500m ² plus 10 spaces/100m ² GFA over 500 m ²	10 spaces/100m ² GFA			

Given that the zoning of the subject site post development is unclear, the upper range parking requirements (i.e. in-line with a local centre) have been adopted for analysis. Table 12 summarises the parking demands for the various components of the development.

Table 12: Parking Demand Assessment

Component	Parking Rate	Size/Number	Parking Requirement
Service Station	4 spaces /service bay, plus 6 spaces/100m ² of shop area	No Service Bays 300m ² Shop Area	18 spaces
Restaurant	10 spaces / 100 m ² GFA	400m ² GFA	40 spaces
Total			58 spaces

The total parking requirement for the proposed development is approximately 58 spaces, including 18 spaces for the service station component and 40 spaces for the fast food restaurant component.

The current development plans show a total of 33 on-site parking spaces including:

- Service Station (Bowser) – 6 spaces
- Service Station (Carparks) – 2 spaces
- Fast Food Restaurant – 25 spaces
- **TOTAL – 33 spaces**

In view of the above, the current indicative parking provision falls short of the ACT Parking and Vehicular Access General Code requirements by 25 spaces as shown in Table 13 below.

Table 13: Parking Shortfall

Component	Parking Requirement	Parking Provision	Parking Shortfall
Service Station	18 spaces	8 spaces (6 bowser, 2 convenience shop)	10 spaces
Restaurant	40 spaces	25 spaces (22 standard, 3 waiting bays)	15 spaces
Total	58 spaces	33 spaces	25 spaces

5.1.1. Service Station Recommendations

The requirement for 18 parking spaces associated with the service station component is generally consistent with the potential parking demand (depending on the final occupant).

A total of 8 parking spaces are proposed in the indicative development plan including 6 bowser spaces and 2 spaces for the convenience store. It is recommended that an additional 10 spaces are constructed in close vicinity of the convenience store to provide for a total of 18 parking spaces for the service station component.

5.1.2. Fast Food Parking Recommendations

In our experience, fast food restaurant typically generate lesser parking demands than a standard 'sit down' restaurant due to the significant 'drive through' facilities provided.

On this basis, a review of other existing fast food restaurants throughout Canberra has been undertaken to determine a suitable parking provision for the fast food restaurant components as shown in Table 14 below.