Appendix 2

Bushfire Protection Assessment

Australian Bushfire Protection Planners Pty Ltd

July 2014

BUSHFIRE PROTECTION ASSESSMENT

FOR THE PROPOSED REZONING

OF

LOTS A, B & C in DP 420575;
LOT 1 in DP 366614;
LOT 2 in DP 36929;
LOT A in DP 420575;
LOTS 11, 12 & 13 in DP 618324;
LOT 1 in DP 522099 and
LOT 3 in DP 550062

DEBENHAM ROAD & ACACIA ROAD, SOMERSBY

July 2014.

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BUSHFIRE PROTECTION ASSESSMENT

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DEBENHAM ROAD & ACACIA ROAD, SOMERSBY

Assessment Number	Document	Preparation Date	Issue Date	Directors Approval
B142213 - 2	Final	5.7.2014	28.7.2014	*G.L.Swain*

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EXECUTIVE SUMMARY

Australian Bushfire Protection Planners Pty Limited has undertaken the bushfire consultancy to inform the Planning Proposal to amend the Gosford Local Environment Plan [LEP] 2014 to rezone land within Lots A, B & C in DP 420575; Lot 1 in DP 366614; Lot 2 in DP 36929; Lot A in DP 420575; Lots 11, 12 & 13 in DP 618324; Lot 1 in DP 522099 and Lot 3 in DP 550062 Debenham Road & Acacia Road, Somersby from RU1 – Primary Production to General Industrial - IN1.

The Gosford Bushfire Prone Land Map records that the land on which it is proposed to undertake the rezoning contains bushfire prone vegetation or is impacted by the buffer zone to bushfire prone vegetation.

The Minister for Planning, under section 117(2) of the *Environmental Planning and Assessment Act 1979* (EP&A Act) issues directions that relevant planning authorities such as local councils must follow when preparing planning proposals for new LEPs.

Direction 4.4 – Planning for Bushfire Protection applies to rezoning of land which is deemed to be bushfire prone and states:

Objectives:

(1) The objectives of this direction are:

(a) To protect life, property and the environment from bush fire hazards, by discouraging the establishment of incompatible land uses in bush fire prone areas, and

(b) To encourage sound management of bush fire prone areas.

Where this direction applies:

(2) This direction applies to all local government areas in which the responsible Council is required to prepare a bush fire prone land map under section 146 of the *Environmental Planning and Assessment Act 1979* (the EP&A Act), or, until such a map has been certified by the Commissioner of the NSW Rural Fire Service, a map referred to in Schedule 6 of that Act.

When this direction applies:

(3) This direction applies when a relevant planning authority prepares a planning proposal that will affect, or is in proximity to land mapped as bushfire prone land.

What a relevant planning authority must do if this direction applies:

(4) In the preparation of a planning proposal the relevant planning authority must consult with the Commissioner of the NSW Rural Fire Service following receipt of a gateway determination under section 56 of the Act, and prior to undertaking community consultation in satisfaction of section 57 of the Act, and take into account any comments so made,

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(5) A planning proposal must:

(a) Have regard to *Planning for Bushfire Protection 2006*,

(b) Introduce controls that avoid placing inappropriate developments in hazardous areas, and

(c) Ensure that bushfire hazard reduction is not prohibited within the APZ.

(6) A planning proposal must, where development is proposed, comply with the following provisions, as appropriate:

(a) Provide an Asset Protection Zone (APZ) incorporating at a minimum:

(i) An Inner Protection Area bounded by a perimeter road or reserve which circumscribes the hazard side of the land intended for development and has a building line consistent with the incorporation of an APZ, within the property, and

(ii) An Outer Protection Area managed for hazard reduction and located on the bushland side of the perimeter road,

(b) For infill development (that is development within an already subdivided area), where an appropriate APZ cannot be achieved, provide for an appropriate performance standard, in consultation with the NSW Rural Fire Service. If the provisions of the planning proposal permit Special Fire Protection Purposes (as defined under section 100B of the *Rural Fires Act 1997*), the APZ provisions must be complied with,

(c) Contain provisions for two-way access roads which links to perimeter roads and/or to fire trail networks,

(d) Contain provisions for adequate water supply for firefighting purposes,

(e) Minimise the perimeter of the area of land interfacing the hazard which may be developed,

(f) Introduce controls on the placement of combustible materials in the Inner Protection Area.

Consistency:

(7) A planning proposal may be inconsistent with the terms of this direction only if the relevant planning authority can satisfy the Director-General of the Department of Planning (or an officer of the Department nominated by the Director-General) that the council has obtained written advice from the Commissioner of the NSW Rural Fire Service, to the effect that, notwithstanding the non-compliance, the NSW Rural Fire Service does not object to the progression of the planning proposal.

Consultation has occurred with the NSW Rural Fire Service and advice received that *"the plan submitted showing the delineation between the industrial and environmental zones does not present any issues to the RFS however does not preclude comments on the later subdivision design when submitted".*

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Therefore, this report examines the deemed-to-satisfy bushfire protection requirements in accordance with the provisions of *Planning for Bushfire Protection 2006,* and provides recommendations on the provision of Asset Protection Zones and Defendable Spaces to the future landuses within the proposed General Industrial - IN1 zoned land and the bushfire protection measures required to be implemented to protect the future buildings.

This report also assesses the adequacy of fire-fighting access and water supplies; construction standards of the future buildings, the management of the Asset Protection Zones and Defendable Spaces and evacuation protocols necessary to address the bushfire risk to the future development and to address the aim and objectives of *Planning for Bushfire Protection 2006.*

Graham Swain,
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Australian Bushfire Protection Planners Pty Limited.

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SECTION 1

INTRODUCTION

1.1 Aim of this Report.

The aim of this report is to provide advice on the bushfire protection measures to be included in the Project Plan Application for the future industrial development constructed on Lots A, B & C in DP 420575; Lot 1 in DP 366614; Lot 2 in DP 36929; Lot A in DP 420575; Lots 11, 12 & 13 in DP 618324; Lot 1 in DP 522099 and Lot 3 in DP 550062 in accordance with the aim and objectives of *Planning for Bushfire Protection 2006*.

1.2 Statutory Requirements.

This report has been prepared having regard to the following legislative and planning requirements:

1.2.1 Legislation.

Environmental Planning and Assessment Act - 1979 **(EPA Act)**

The Minister for Planning, under section 117(2) of the *Environmental Planning and Assessment Act 1979* (EP&A Act) issues directions that relevant planning authorities such as local councils must follow when preparing planning proposals for new LEPs.

Under Direction 4.4 – *'Planning for Bushfire Protection'* a planning proposal must, where development is proposed on bushfire prone land, comply with the following provisions, as appropriate:

(a) Provide an Asset Protection Zone (APZ) incorporating at a minimum:

  (i) an Inner Protection Area bounded by a perimeter road or reserve which circumscribes the hazard side of the land intended for development and has a building line consistent with the incorporation of an APZ, within the property, and

  (ii) an Outer Protection Area managed for hazard reduction and located on the bushland side of the perimeter road.

(b) For infill development (that is development within an already subdivided area), where an appropriate APZ cannot be achieved, provide for an appropriate performance standard, in consultation with the NSW Rural Fire Service. If the provisions of the planning proposal permit Special Fire Protection Purposes (as defined under section 100B of the *Rural Fires Act 1997*), the APZ provisions must be complied with;

(c) Contain provisions for two-way access roads which link to perimeter roads and/or to fire trail networks;

(d) Contain provisions for adequate water supply for firefighting purposes;

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(e) Minimise the perimeter of the area of land interfacing the hazard which may be developed; and

(f) Introduce controls on the placement of combustible materials in the Inner Protection Area.

1.2.2 Planning Policies.

Planning for Bushfire Protection – 2006. **[NSW Rural Fire Service]**
This document provides guidance on the planning and development control processes in relation to bushfire protection measures for rural residential and residential subdivision, *"Special Fire Protection Purpose Development"* and Class 5 – 8 and 10 buildings in bushfire prone areas.

The document provides deemed-to-satisfy specifications on the provision of Asset Protection Zones to residential and *"Special Fire Protection"* developments; defendable space requirements to Class 5 – 8 & 10 developments and access/water supply provisions for developments in bushfire prone areas.

Provision for the assessment of construction standards to buildings and management / maintenance of the Asset Protection Zones/defendable space to buildings is also provided.

1.3 Documentation reviewed in this Assessment.

To achieve the aim of this report, a review of information relevant to the rezoning precinct was undertaken. Information sources reviewed included the following documents:

- Constraints Plan prepared by Peter Andrews & Associates Pty Ltd;
- Plan of Vegetation Communities prepared by GHD;
- *Planning for Bushfire Protection 2006* – NSW Rural Fire Service;
- Australian Standard AS3959 *Construction of Buildings in Bushfire Prone Areas*;
- *Rural Fires Regulation 2014;*
- Gosford City Council *Certified Bushfire Prone Land Map.*

1.4 Site Inspection.

Graham Swain of ***Australian Bushfire Protection Planners Pty Limited*** inspected the rezoning precinct on the 11th April 2014 to assess the topography, gradients of the land within and external to the rezoning precinct and vegetation classification within and adjoining the precinct, existing bushfire mitigation measures and a visual assessment of bushfire threat.

The land adjoining the rezoning precinct was also inspected to determine the surrounding land use / land management practices and extent of bushfire prone vegetation.

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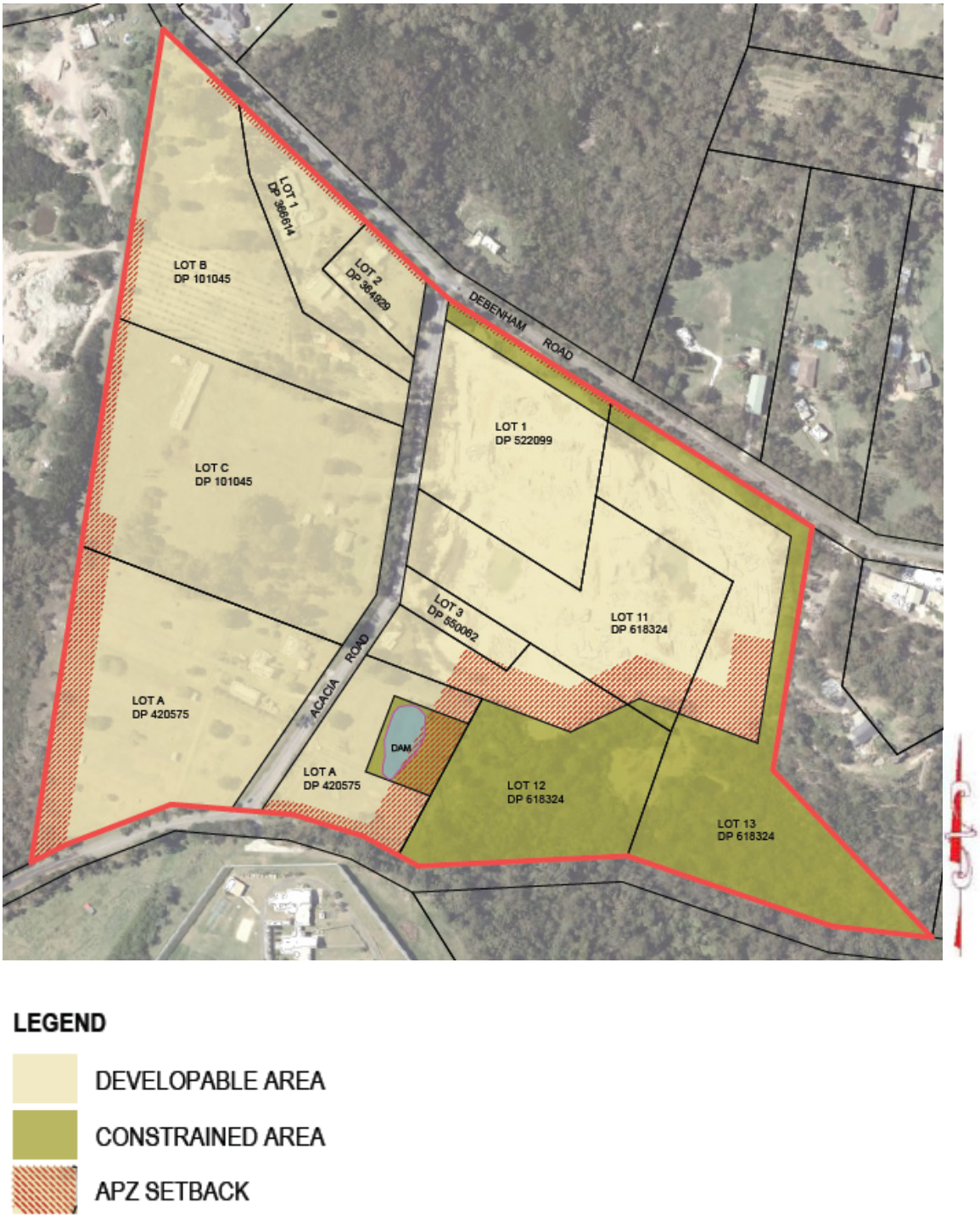
1.5 Rezoning Proposal.

The rezoning proposal involves the request to change the land zoning from RU1 Primary Production to General Industrial – IN1.

Figure 1 – Constraints Plan.



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SECTION 2
DESCRIPTION OF REZONING PRECINCT

2.1 Location.

Lots A, B & C in DP 420575; Lot 1 in DP 366614; Lot 2 in DP 36929; Lot A in DP 420575; Lots 11, 12 & 13 in DP 618324; Lot 1 in DP 522099 and Lot 3 in DP 550062 form the eastern precinct of the proposed expansion to the Somersby Business Park and consists of 23.60 hectares of land which is bound to the north by Debenham Road and extends to the west and east of Acacia Road in the suburb of Somersby.

Figure 2 below shows the location of the rezoning precinct.

Figure 2 – Location of Rezoning Precinct.

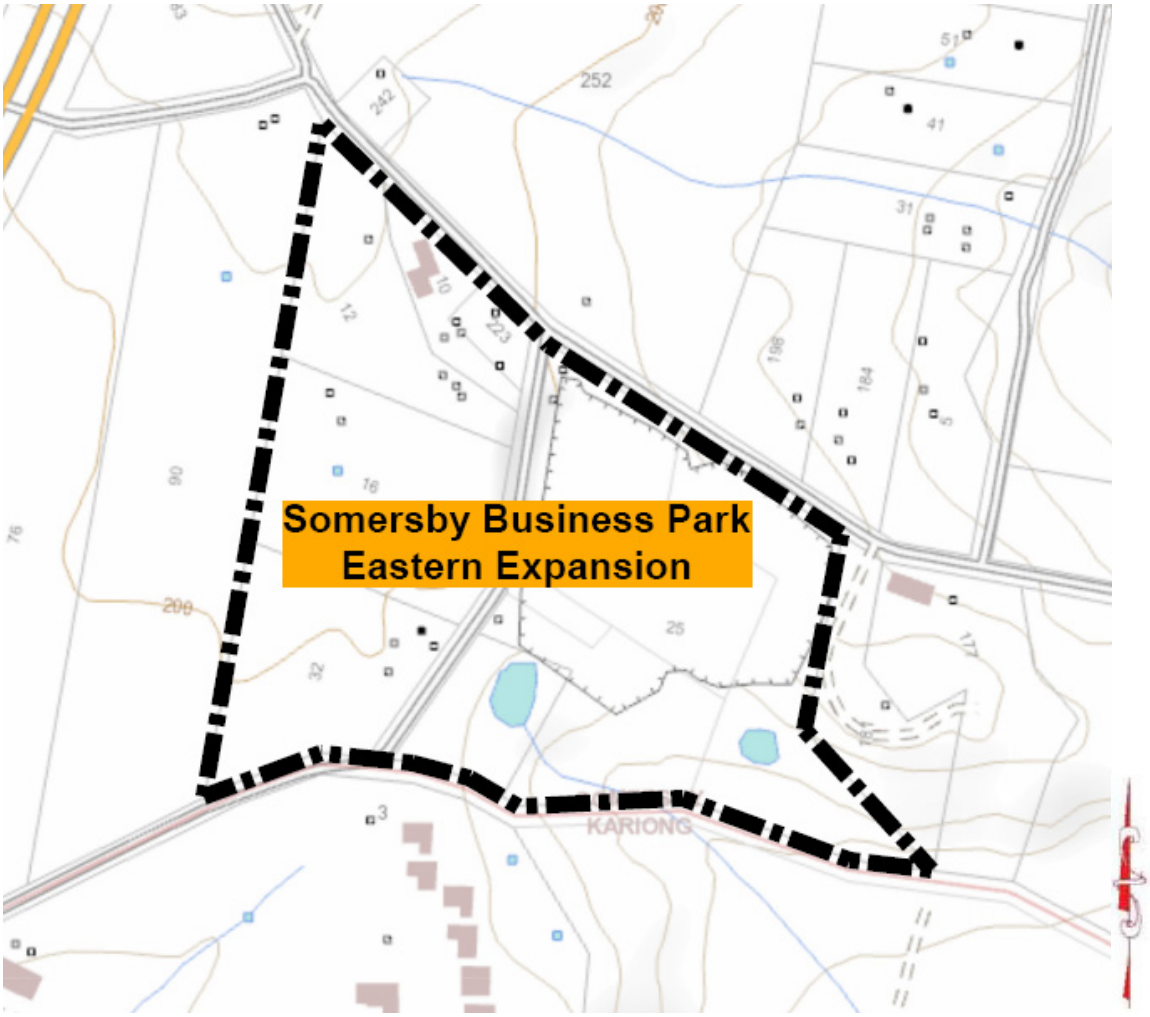

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Figure 3 – Aerial Photograph showing lots within and adjoining the rezoning precinct.

2.2 Existing Land Use.

The land to the west of Acacia Road, within Lots A, B & C in DP 420575; Lot 1 in DP 366614 and Lot 2 in DP 364929 contains rural residential development.

The land to the east of Acacia Road, within Lots 11, 12 & 13 in DP 618324; Lot 1 in DP 522099 and Lot 3 in DP 550062 is occupied by a Sandstone Quarry operated by Gosford Quarries.

Lot A in DP 420575 also extends to the east of Acacia Road and this land is vacant grazing land.

2.3 Surrounding Land Use.

The land to the north of the rezoning precinct, beyond Debenham Road, contains RU2 Rural Landscape zoned land which contains existing rural residential dwellings.

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The land to the west of the rezoning precinct contains a landscape supply business within the northern portion of the adjacent lot with vacant land occupying the southern portion of the lot.

The land to the south of the western portion of the rezoning precinct contains the Frank Baxter Correctional Centre whilst the land to the south of the eastern portion of the rezoning precinct [south of the Gosford Quarries land] consist of vacant land that contains unmanaged bushland.

The land to the east of the Gosford Quarries land contains rural residential development – refer to Figure 3 above.

2.4 Topography.

The land within the western portion of the rezoning precinct, to the west of Acacia Road forms the eastern edge of a broad plateau that extends to the west, rising at 1 – 2 degrees before falling at a similar gradient across the adjoining land to the west, falling at < 5 degrees to the southwest of the southern portion of the rezoning precinct.

The land to the east of Acacia Road generally falls to the southeast into a watercourse which flows across the adjoining vacant land to the south of the Gosford Quarries land. The land within the Quarry has been excavated in the extraction of the sandstone and falls from Acacia Road in a vertical sandstone face to the level of the current workings.

The land to the north falls at less than 5 degrees to the north into a watercourse on the properties to the north of Debenham Road and falls to the northeast at 5 degrees.

The rural residential development to the east of the Quarry rises to the east to a low knoll whilst the land to the south of the Quarry falls to the southeast at 5 – 10 degrees along the watercourse.

For the purpose of determining bushfire protection measures [Asset Protection Zones/Defendable Spaces] the 'effective slope' [the slope which will create the most significant fire behaviour] is:

1. West of Lots B & C in DP 101045 = Level;
2. West of Lot A in DP 101045 = 5 degrees downslope to the southwest;
3. North of Debenham Road = 5 degrees downslope to the north & northeast;
4. Southeast of the Quarry site = 5 – 10 degrees downslope to the southeast.

Refer to Topographic Plan on Page 13.

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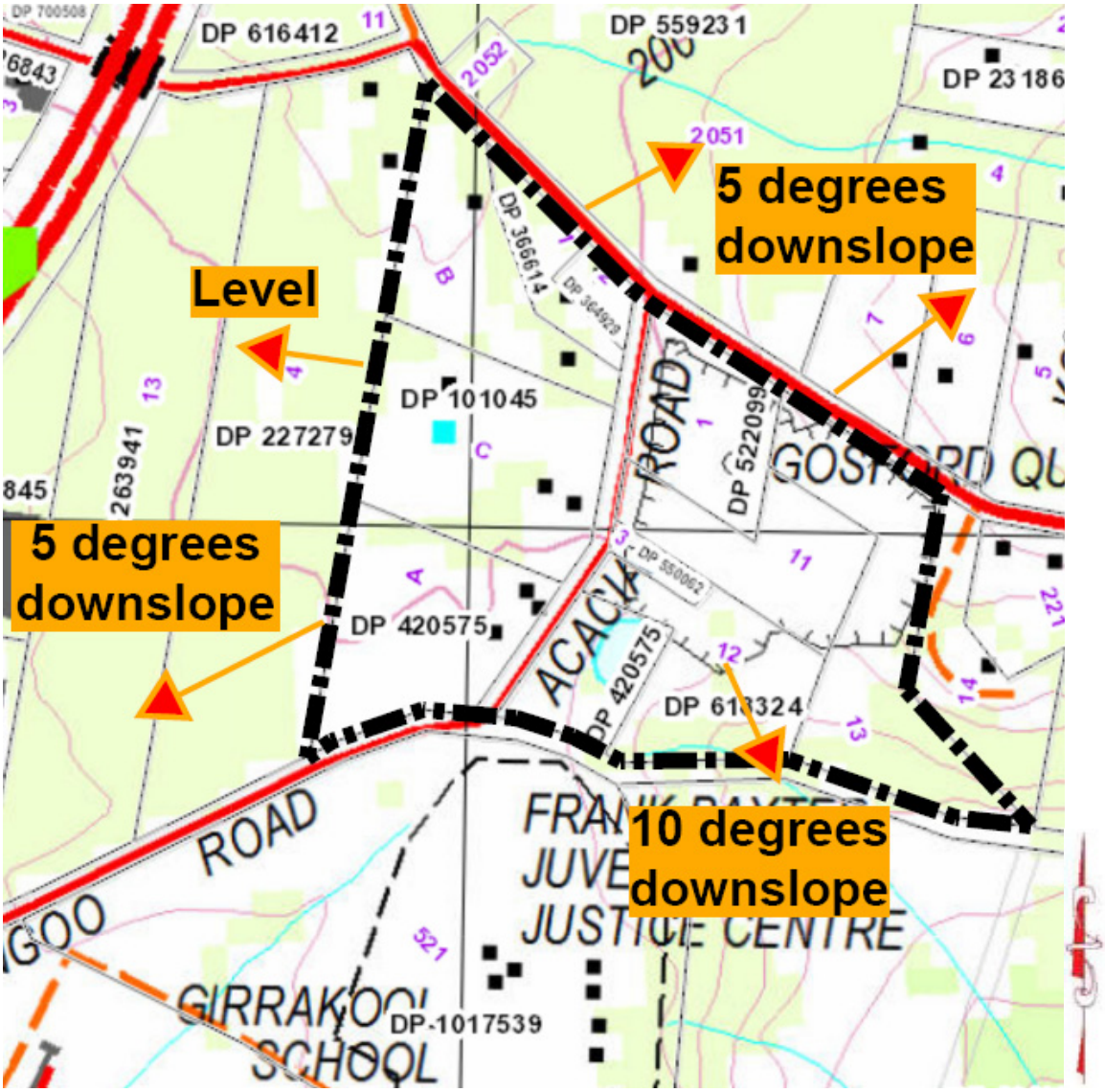
Figure 4 – Extract from 1:25,000 Topographic Map - Contour Interval 10m



2.5 Vegetation within the Rezoning precinct.

Appendix A2.3 of *Planning for Bushfire Protection 2006* provides a methodology for determining the predominant bushfire prone vegetation for at least 140 metres in all directions from the buildings. Vegetation is classified using Table A2.1 of *Planning for Bushfire Protection 2006,* which classifies vegetation types into the following groups:

(a) Forests [wet & dry sclerophyll forests];
(b) Woodlands;
(c) Plantations – being pine plantations not native plantations;
(d) Forested Wetlands;
(e) Tall Heaths;
(f) Freshwater Heaths;
(g) Short Heaths;

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(h) Alpine Complex;
(i) Semi – arid Woodlands;
(j) Arid Woodlands; and
(k) Rainforests.

The western portion of the rezoning precinct [west of Acacia Road] has been cleared of native vegetation and contains planted exotic vegetation – refer to Figure 5 – Plan of Vegetation Communities below.

The vegetation on the land to the west of the western portion of the rezoning precinct consists of areas of disturbed scrubland in the area occupied by the Landscape Supply business, extending into low open forest to the west of Lot A in DP 420575.

The eastern portion of the rezoning precinct [the Quarry land] contains small pockets of exposed Hawkesbury Woodland; Hawkesbury Banksia Woodland with Hawkesbury Peppermint Forest located in the undisturbed southern portion of the Quarry. This vegetation also extends beyond the Quarry land onto the vacant land to the south and southeast.

The vegetation on the land to the north of Debenham Road varies from managed remnant forest on the properties to the northeast to unmanaged Dry Sclerophyll Low Open Forest on the property to the north of the rezoning precinct – refer to Figure 3 - Aerial Photograph on Page 11.

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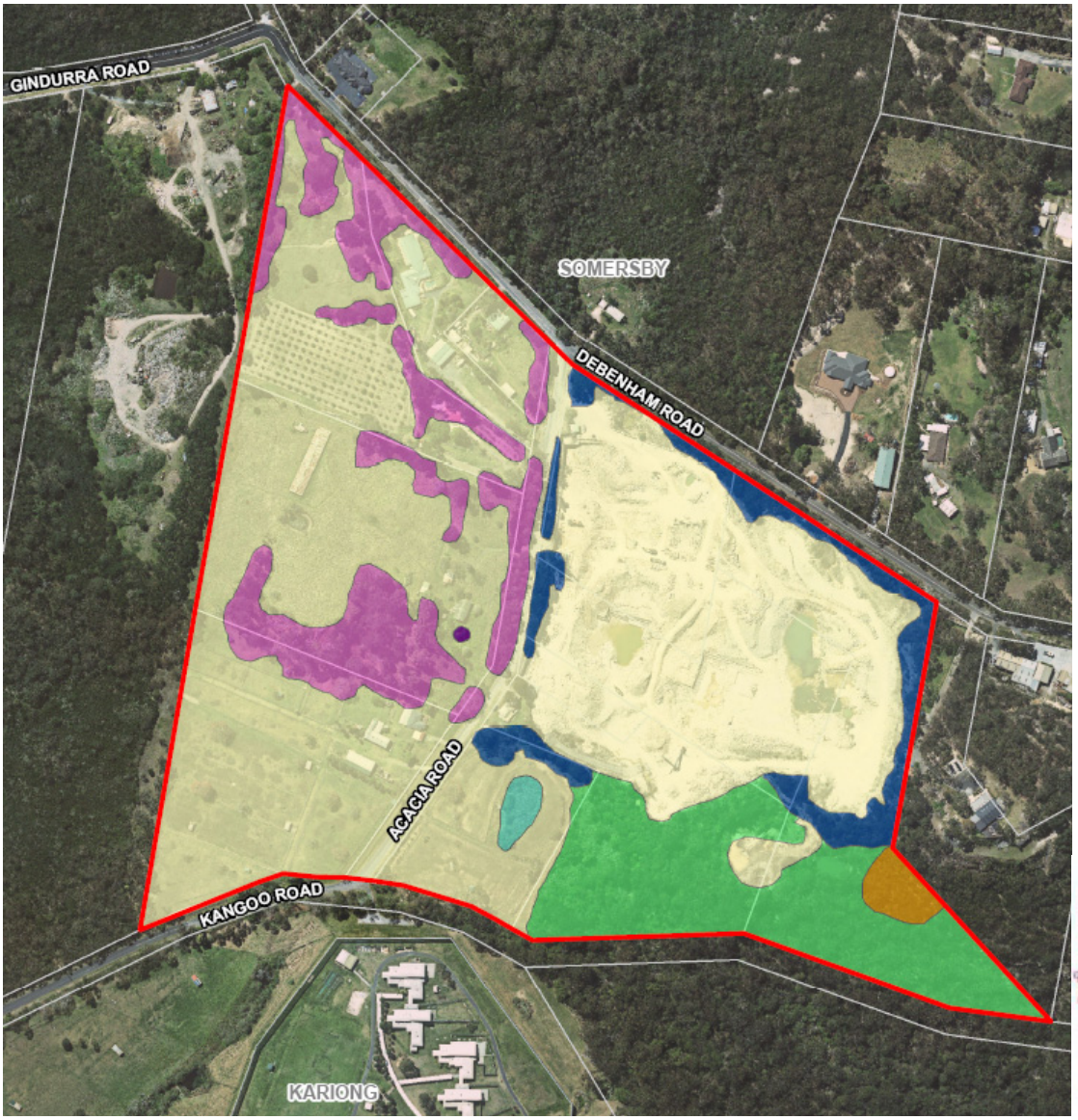
Figure 5 – Plan of Vegetation Communities within the Rezoning Precinct.



Source: GHD Flora & Fauna Assessment

Vegetation
- Disturbed Land
- Exposed Hawkesbury Woodland
- Farm Dam
- Hawkesbury Banksia Scrub Woodland
- Hawkesbury Peppermint Forest
- Planted and Exotic Vegetation
- One Planted and Exotic Vegetation

2.6 Significant Environmental Features within the Rezoning precinct.

The rezoning precinct does not contain significant environmental features such as SEPP 44 Koala Habitat; SEPP 14 Wetlands; SEPP 26 Littoral Rainforests; land slip areas or National Parks Estate or areas of geological interest. The southern portion of the Quarry site contains a riparian corridor to the watercourse which flows to the southeast across the adjoining vacant land.

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2.7 Known Threatened Species, Population or Ecological Community within the Rezoning Precinct.

The Flora & Fauna Assessment undertaken by GHD identified Hawkesbury Peppermint Forest; Exposed Hawkesbury Woodland; Hawkesbury Banksia Scrub Woodland and planted or exotic vegetation within the rezoning precinct.

The report identifies that none of the vegetation communities found within the rezoning precinct are listed under the TSC Act; the FM Act or the EPBC Act.

Threatened flora known or with potential to occur within the rezoning precinct include Netted Bottlebrush; Somersby Mintbush; Leafless Tongue Orchid and Spreading Guinea Flower.

The report identifies that there are no Threatened Ecological Communities listed on the EPBC Act or TSC Act recorded within the rezoning precinct or have the potential to occur.

There are sixteen threatened fauna known or with potential to occur within the rezoning precinct.

The report states that the majority of the rezoning precinct is mapped as containing low ecological constraints and is suitable for future development with minimal ecological impacts. The report recommends that areas mapped as Hawkesbury Banksia Scrub Woodland and Hawkesbury Peppermint Forest are excluded from any future development footprints.

Refer to Figure 6 – Ecological Constraints Plan provided on Page 17.

2.8 Details and location of Aboriginal Relics or Aboriginal Place.

The Aboriginal Heritage Impact Assessment undertaken by McCardle Cultural Heritage Pty Ltd states:

"It has been concluded that there are no archaeological or cultural constraints for the rezoning application.

It was recommended that the persons responsible for the management of the rezoning and any future an onsite works will ensure that all staff, contractors and others involved in construction and maintenance related activities are made aware of the statutory legislation protecting sites and places of significance. Of particular importance is the National Parks and Wildlife Amendment (Aboriginal Objects and Aboriginal Places) Regulation 2010, under the National Parks and Wildlife Act 1974".

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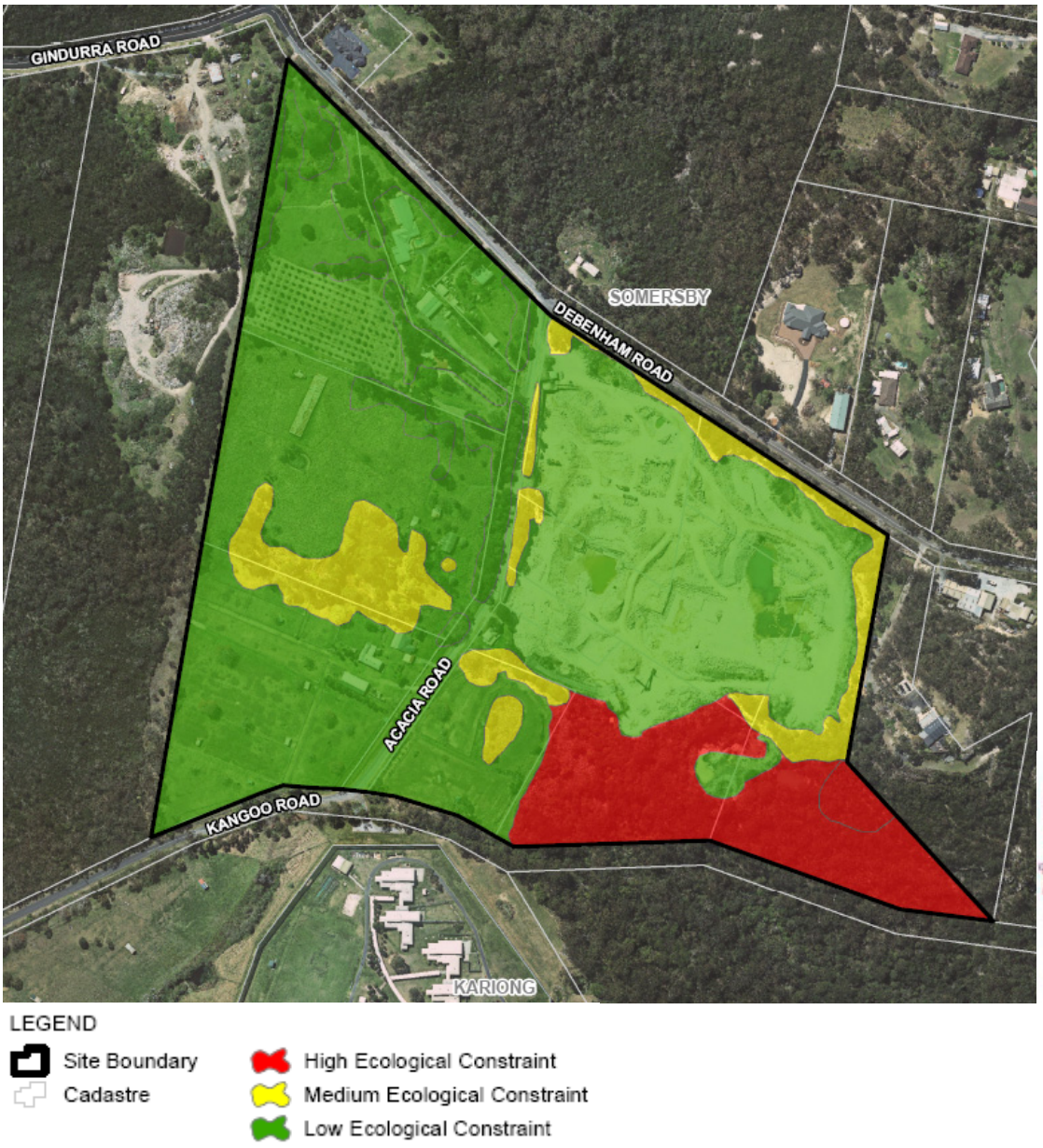
Figure 6 – Ecological Constraints Plan.



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SECTION 3
FIRE MANAGEMENT RESPONSIBILITIES

Fire management within the rezoning precinct is the responsibility of:

3.1 Gosford Council.

Gosford Council has responsibility, under Section 66 of the *Rural Fires Act*, to issue a notice in writing requiring an owner / occupier of any land within the LGA to carry out bushfire hazard reduction works on that land. Section 100E of the *Rural Fires Act* requires Council to issue bushfire hazard Reduction certificates for hazard reduction to be undertaken on private lands.

3.2 New South Wales Rural Fire Service.

The NSW Rural Fire Service (RFS) has the responsibility for undertaking fire suppression activities, hazard management activities and other functions relative to emergency management, within its areas of operation. *Section 73* of the *Rural Fires Act (1997)* enables the Commissioner to carry out bush fire hazard reduction works on any land as required by a bush fire risk management plan if the work has not been carried out satisfactorily. Incurred costs can be recovered as a debt owed to the Crown.

3.3 Fire & Rescue New South Wales.

Fire & Rescue NSW has the responsibility for undertaking fire suppression activities, and other functions relative to emergency management, within its area of operation and through Mutual Aid Agreements, provide assistance to the NSW Rural Fire Service, particularly for structural fire operations within the NSW Rural Fire Brigade Districts. Hazmat management within New South Wales is the responsibility of Fire & Rescue NSW.

3.4 Gosford Bush Fire Management Committee.

The Gosford Bushfire Management Committee has the responsibility for planning for co-ordinated fire fighting activities / hazard management activities on a local government level. It is not an operational organization, a fire fighting organization or a funding source for fire management activities.

3.5 Bushfire Hazard Management within the Rezoning precinct.

The management of the landscaped gardens and the vegetation within the rezoning precinct will remain the responsibility of the individual property owner/s. A Positive Covenant, created under the provisions of the *Conveyancing Act of 1919*, shall be placed on the title of the lots located adjacent to the bushfire hazard to ensure compliance with the management prescriptions for the Asset Protection Zones/Defendable Spaces detailed in this report - *[Refer to Section 5]*.

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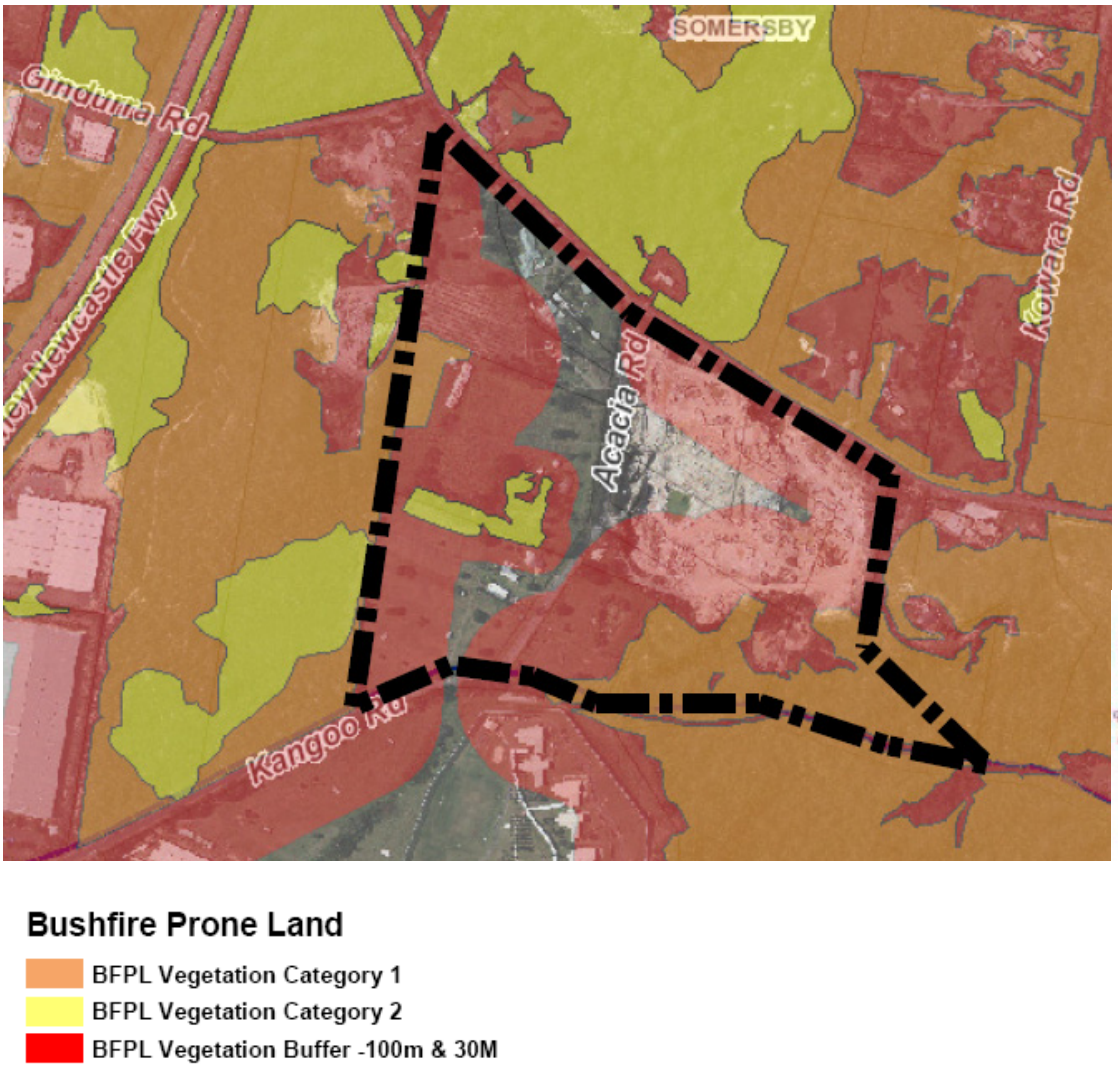
SECTION 4

PRECINCT LEVEL ASSESSMENT

4.1 Certified Bushfire Prone Land Map.

Section 146 of the *Environmental Planning & Assessment Act 1979* requires councils, where a Bushfire Risk Management Plan applies, to prepare a Bushfire Prone Land Map in consultation with the Commissioner of the NSW Rural Fire Service. The Commissioner will designate lands to be Bushfire Prone within an area and, when satisfied that the lands have been recorded on a map, will certify the map as a Bushfire Prone Land Map for the purposes of this or any other Act.

Figure 7 – Extract from the Gosford Bushfire Prone Land Maps.



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SECTION 5

BUSHFIRE PROTECTION ASSESSMENT

5.1 Introduction.

A planning proposal must, where development is proposed, comply with the following provisions, as appropriate:

(a) Provide an Asset Protection Zone [APZ] incorporating at a minimum:

- An Inner Protection Area bounded by a perimeter road or reserve which circumscribes the hazard side of the land intended for development and has a building line consistent with the incorporation of an APZ, within the property, and

- An Outer Protection Area managed for hazard reduction and located on the bushland side of the perimeter road.

(b) For infill development [that is development within an already subdivided area], where an appropriate APZ cannot be achieved, provide for an appropriate performance standard in consultation with the NSW Rural Fire Service. If the provisions of the draft LEP permit Special Fire Protection Purposes [as defined under Section 100B of the *Rural Fires Act 199],* the APZ provisions shall be complied with;

(c) Contain provisions for two-way access roads which link to perimeter roads and/or to fire trail networks;

(d) Contain provisions for adequate water supply for fire fighting purposes;

(e) Minimise the perimeter of the area of land interfacing the hazard which may be developed; and

(f) Introduce controls on the placement of combustible materials in the Inner Protection Area.

These requirements are examined in the following sections of this report.

5.2 Asset Protection Zones.

Planning for Bushfire Protection 2006 provides deemed-to-satisfy fire protection measures for rural residential; residential development [Class 1, 2 & 3 buildings] and *"Special Fire Protection Purpose Developments"* [Hospitals, Nursing Homes / Retirement Villages / Schools / Childcare Centres & Tourist Accommodation].

In reference to the proposed rezoning of the land to General Industrial - IN1, this zoning permits the erection of Class 5 – 8 and Class 10 type buildings.

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Chapter 1, Section 1.3 of *Planning for Bushfire Protection 2006* states that the construction of Class 5 – 8 and Class 10 buildings erected on bushfire prone land, or land impacted by bushfire prone vegetation, must meet the aim and objectives of the document.

Chapter 4, Section 4.3.6(f) discusses the bushfire protection to buildings of Class 5 to 8 and 10b of the Building Code of Australia and states:

"The Building Code of Australia does not provide for any bushfire specific performance requirements and as such AS 3959 -1999 does not apply as a set of "deemed-to-satisfy" provisions.

The general fire safety construction provisions [of the BCA] are taken as acceptable solutions, but the aim and objectives of Planning for Bushfire Protection 2006 apply in relation to other matters such as access, water and services, emergency planning and landscaping/vegetation management".

"Where the aim and objectives of PfPFP [Section 1.1] are not met, then the construction requirements for bushfire protection will need to be considered on a case-by-case basis".

"In many cases, these types of developments will require on-site parking and loading areas. In such cases, it is prudent to place these facilities in the most appropriate location in order to establish defendable space for fire-fighting purpose".

The objectives of *Planning for Bushfire Protection 2006* are:

(i) Afford occupants of any building adequate protection from exposure to a bushfire;

(ii) Provide for a defendable space to be located around buildings;

(iii) Provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent direct flame contact and material ignition;

(iv) Ensure that safe operational access and egress for emergency service personnel and residents is available;

(v) Provide for ongoing management and maintenance of bushfire protection measures, including fuel loads in the asset protection zones;

(vi) Ensure that utility services are adequate to meet the needs of fire-fighters and others assisting in bushfire fighting.

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5.2.1 Asset Protection Zones/Defendable Spaces to future Industrial Development.

Planning for Bushfire Protection 2006 provides a methodology to determine the Asset Protection Zones [defendable space] required for **habitable buildings** in development for **residential purposes** that are designated as bushfire prone.

The document does not provide deemed to satisfy bushfire protection measures for Class 5 – 8 and Class 10 buildings constructed in bushfire prone areas. However, one of the objectives of *Planning for Bushfire Protection 2006* is to provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent direct flame contact and material ignition.

Therefore it is recommended that Class 5 – 8 and Class 10 buildings should be located at a distance from the bushfire prone vegetation which prevents direct flame contact with the buildings.

The predominant bushfire prone vegetation which will create a hazard to future industrial development within the rezoning precinct has been determined to be 'forest' vegetation retained within the high conservation area on the Quarry site; the forest vegetation on the land to the west of the rezoning precinct and on the properties to the north of Debenham Road.

The width of defendable space required to prevent flame contact on the future industrial buildings is as follows:

1. Forest vegetation on land with an effective slope of 5 – 10 downslope = 31 metres;

2. Forest vegetation on land within an effective slope of less than 5 degrees downslope = 24 metres; and

3. Forest vegetation on level land = 19 metres.

Figure 8 on Page 23 provides a diagrammatic description of the location and recommended width of the Asset Protection Zone/Defendable Space provisions to future industrial development constructed within the rezoning precinct.

The full width of the Asset Protection Zone/ Defendable Space shall be maintained as an Inner Protection Area [IPA] in accordance with Appendix A5.4 & Appendix A5.5 of *Planning for Bushfire Protection 2006* and the NSW Rural Fire Service's document *'Standards for Asset Protection Zones'.*

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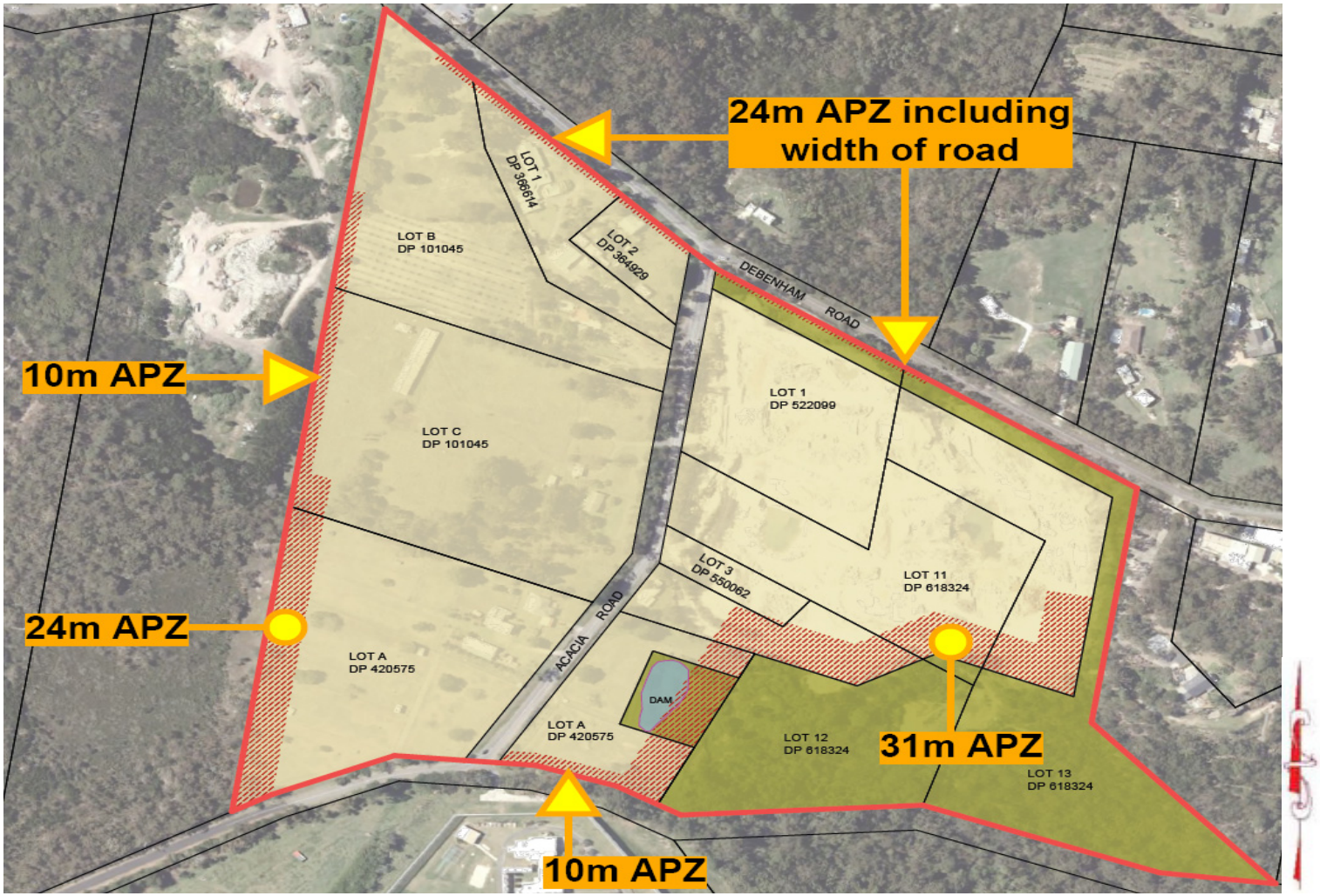
Figure 8 – Diagrammatic description of the location and recommended width of the Asset Protection Zone/Defendable Space provisions to future industrial development constructed within the rezoning precinct.



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Email. abpp@bigpond.net.au

5.3 Access for Fire-fighting Operations.

Public Road access for fire-fighting operations to the future industrial development shall comply with Section 4.1.3(1) of *Planning for Bushfire Protection 2006.*

This includes the provision of an 8.0 metre wide road to the perimeter of the General Industrial – IN1 development precinct that adjoins bushfire prone vegetation.

Internal roads shall have a minimum pavement width of 6.5 metres with 'No Parking' to one side and services [Hydrants] located on this side.

General access provisions of the NSW Rural Fire Service and Fire & Rescue NSW shall be applied including a minimum 6.3 metre inner radius and 12.0 metre outer radius to corners and pavement carrying capacity of 15 tonnes GVM for Category 1 Bushfire Tankers and Fire & Rescue Urban Pumper.

5.4 Water Supply for Fire-fighting operations.

Water supplies for fire-fighting operations shall be provided in accordance with the Building Code of Australia and A.S. 2419.1 – 2005.

5.5 Bushfire construction Standard to Industrial Buildings.

Bushfire construction standards shall apply to all buildings located within 100 metres of bushfire prone vegetation.

Should the minimum defendable space widths as recommended in Section 5.2.1 prevail, that portion of the Class 5 – 8 and Class 10 building exposed to the hazard shall be constructed to the specifications of BAL 40, as defined by A.S. 3959 – 2009.

In addition, there is the possibility that burning embers may impact upon the buildings therefore the following additional construction standards are recommended:

- Any operable windows shall be fitted with aluminium/stainless steel mesh flyscreens having a maximum mesh aperture size of 2mm;

- Access doors [PA and Vehicle] to the buildings shall be fitted with seals that seal the bottom, stiles and head of the door against the opening/frame to prevent the entry of embers into the building. Particular attention shall be paid to the gap at the head of the curtain of the roller doors, where mohair type seals can be used;

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- Any external vents, grilles and ventilation louvres shall have stainless steel mesh with a maximum aperture of 2mm square fitted to prevent the entry of embers into the building or be fitted with a louvre system which can be closed in order to maintain a maximum aperture or gap of no more than 2mm.

- Roof ventilators shall be fitted with stainless steel flymesh [2mm aperture] to prevent the entry of embers into the building or be fitted with a louvre system which can be closed in order to maintain a maximum aperture or gap of no more than 2mm.

5.6 Landscape Management.

The intention of landscape hazard management is to prevent flame contact with a structure, reduce radiant heat to below the ignition thresholds for various elements of a building, to minimize the potential for wind driven embers to cause ignition and to reduce the effects of smoke on occupants and fire-fighters.

The management of the Defendable Spaces to the future industrial development and the Asset Protection Zones to the rural residential dwellings [and the industrial sites within 100 metres of the bushfire prone vegetation] shall comply with the recommendations of Appendix A5.4 & Appendix A5.5 of *Planning for Bushfire Protection 2006* and the Rural Fire Service's document *'Standards for Asset Protection Zones'*.

Management of the Defendable Spaces shall comply with the following:

- Maintain a clear area of low cut lawn or pavement adjacent to the buildings; Utilise non-flammable materials such as Scoria, pebbles and recycled crushed bricks as ground cover to landscaped gardens in close proximity to the buildings;

- Keep areas under shrubs and trees raked and clear of combustible fuels;

- Trees and shrubs should be maintained in such a manner that tree canopies are separated by 2 metres and understorey vegetation is not continuous [retained as clumps].

5.7 Emergency Planning.

Bushfire emergency planning for Class 5 – 8 and Class 10 buildings located within 100 metres of bushfire prone vegetation shall be addressed in the preparation of a site specific Emergency Management Plan which includes protocols for the management of staff and visitors during bushfire and other emergencies.

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SECTION 6

CONCLUSION

A Planning Proposal is being prepared to amend the Gosford Local Environmental Plan [LEP] to rezone the RU1: Primary Production zoned land within Lots A, B & C in DP 420575; Lot 1 in DP 366614; Lot 2 in DP 36929; Lot A in DP 420575; Lots 11, 12 & 13 in DP 618324; Lot 1 in DP 522099 and Lot 3 in DP 550062, Debenham Road and Acacia Road Somersby to General Industrial - IN1.

The Gosford Bushfire Prone Land Map records the site as containing bushfire prone vegetation and therefore under the requirements of Section 117(2) of the *Environmental Planning & Assessment Act 1979* the Director General's directive is that the impact of natural hazards be considered.

Under Direction 4.4 – *'Planning for Bushfire Protection'* a planning proposal must, where development is proposed on bushfire prone land, comply with the following provisions, as appropriate:

(a) Provide an Asset Protection Zone (APZ) incorporating at a minimum:

  (i) an Inner Protection Area bounded by a perimeter road or reserve which circumscribes the hazard side of the land intended for development and has a building line consistent with the incorporation of an APZ, within the property, and

  (ii) an Outer Protection Area managed for hazard reduction and located on the bushland side of the perimeter road,

(b) For infill development (that is development within an already subdivided area), where an appropriate APZ cannot be achieved, provide for an appropriate performance standard, in consultation with the NSW Rural Fire Service. If the provisions of the planning proposal permit Special Fire Protection Purposes (as defined under section 100B of the *Rural Fires Act 1997*), the APZ provisions must be complied with,

(c) Contain provisions for two-way access roads which links to perimeter roads and/or to fire trail networks,

(d) Contain provisions for adequate water supply for firefighting purposes,

(e) Minimise the perimeter of the area of land interfacing the hazard which may be developed,

(f) Introduce controls on the placement of combustible materials in the Inner Protection Area.

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These matters have been reviewed and recommendations provided on the provision of Asset Protection Zones/Defendable Spaces; access and water supplies for fire-fighting operations; construction standards to buildings, management of bushfire hazards and emergency management to the development permitted with consent within a General Industrial - IN1 zone.

The recommendations provided in this report are derived from the deemed-to-satisfy provisions of *Planning for Bushfire Protection 2006* for Class 5 – 8 and Class 10 buildings.

Graham Swain,
Managing Director,
Australian Bushfire Protection Planners Pty Limited.

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REFERENCES:

- N.S.W Rural Fire Service – *Planning for Bushfire Protection 2006*;
- *Environmental Planning & Assessment Act – 1979;*
- *Rural Fires Act – 1997;*
- *Rural Fires Regulation 2014;*
- NSW Rural Fire Service – *Guideline for Bushfire Prone Land Mapping 2006;*
- *Bushfire Environmental Assessment Code 2006;*
- Building Code of Australia;
- Australian Standard A.S 3959-2009 "*Construction of Buildings in Bushfire Prone Areas";*
- *Gosford Council Bushfire Prone Land Map.*

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Appendix 3

Traffic and Parking Assessment Report

Varga Traffic Planning Pty Ltd

July 2014

Planning Proposal for Business Park Zoning

Acacia Road, Somersby

TRAFFIC AND PARKING ASSESSMENT REPORT

31 July 2014

Ref 14099

VARGA TRAFFIC PLANNING Pty Ltd
Transport, Traffic and Parking Consultants

Suite 6, 20 Young Street, Neutral Bay NSW 2089 - PO Box 1868, Neutral Bay NSW 2089
Ph: 9904 3224 Fax: 9904 3228

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

1. INTRODUCTION

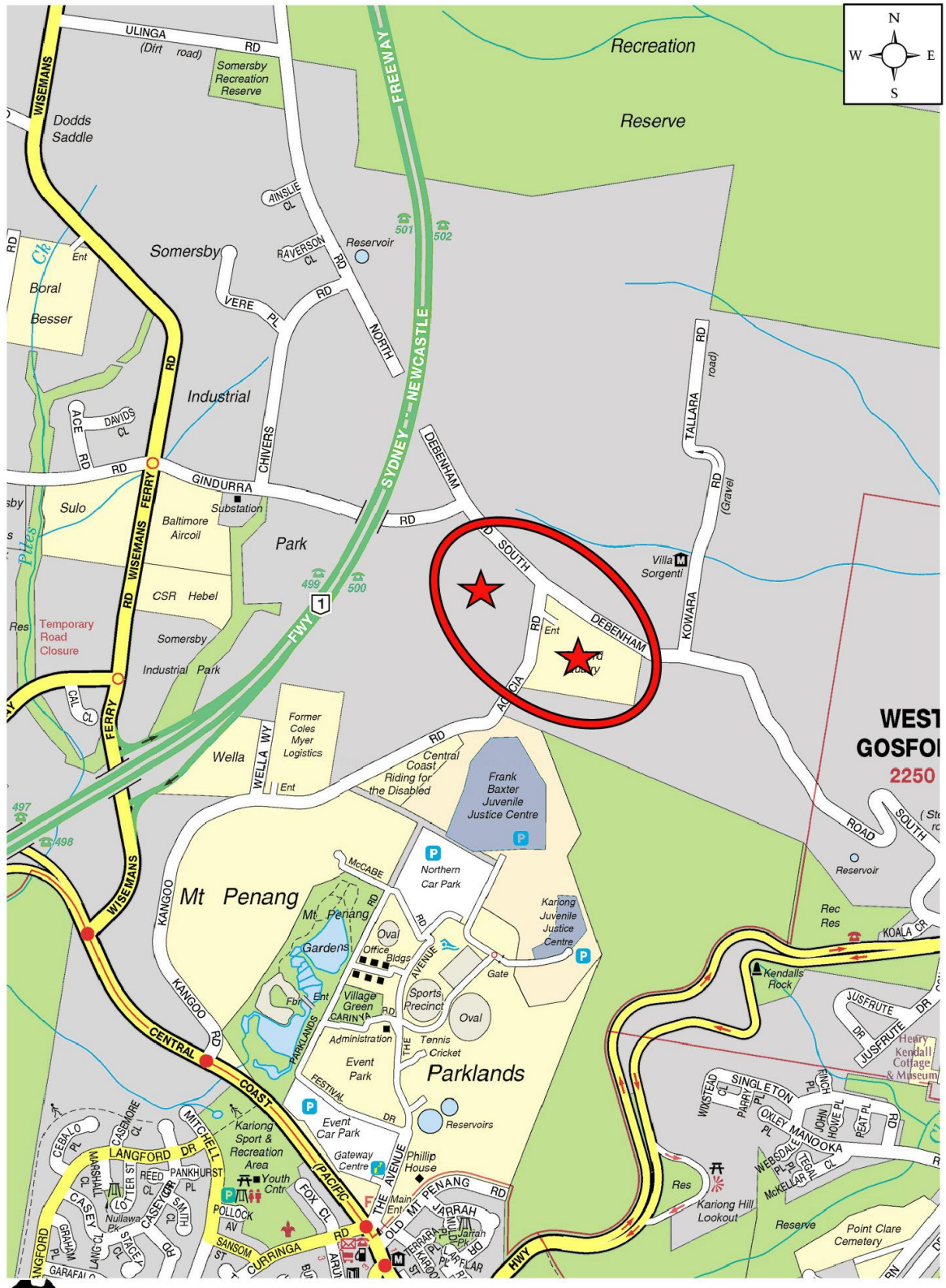
This report has been prepared on behalf of Gosford Council to review the traffic implications of a Planning Proposal for a business park development proposal to be located at Acacia Road, Somersby (Figures 1 and 2).

The development envisaged by the Planning Proposal involves the demolition of the existing buildings on the site to facilitate the staged construction of a new business park development, comprising industrial and warehouse uses.

Car parking and loading facilities will ultimately be provided on the site in accordance with Council's requirements.

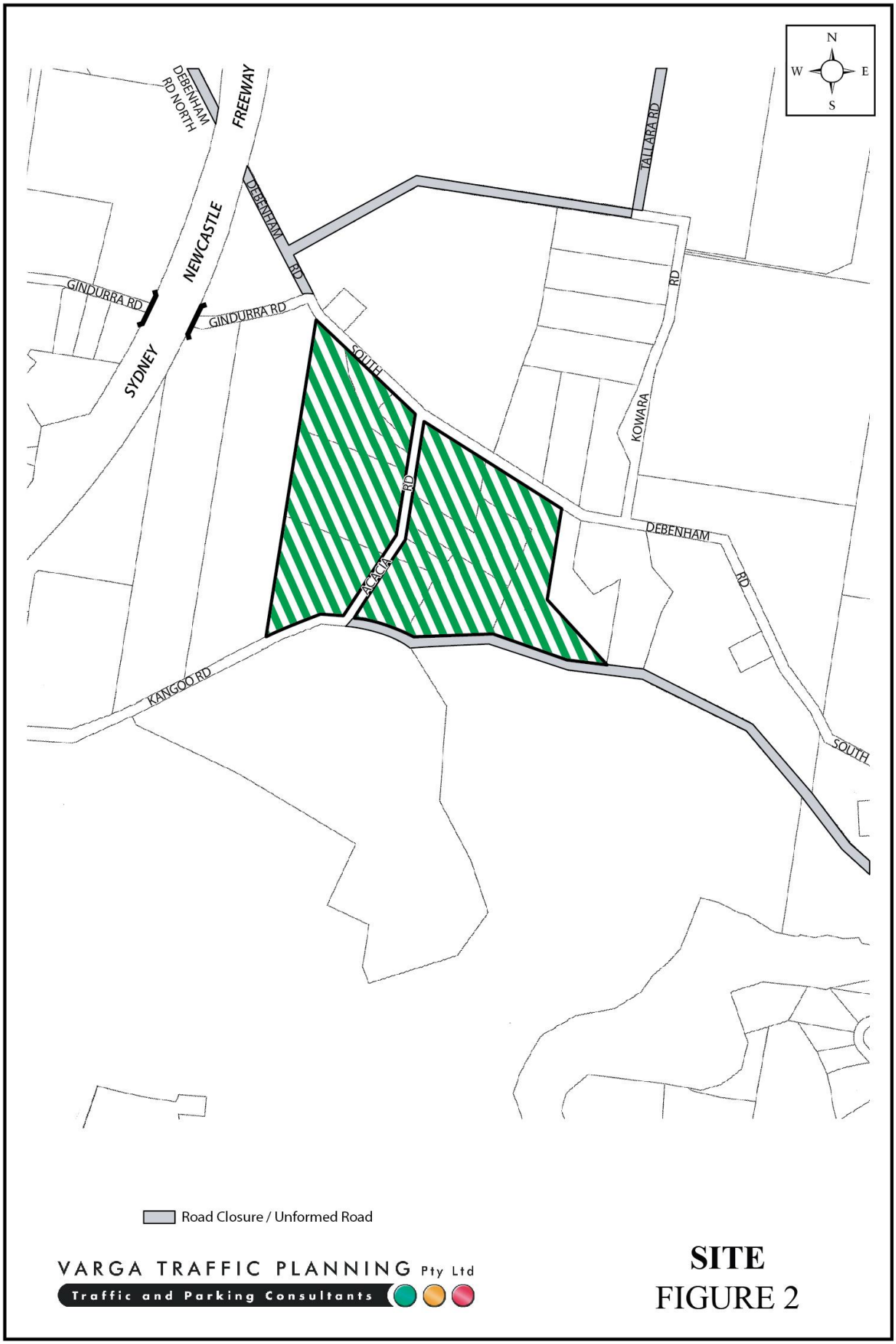
The purpose of this report is to assess the traffic and parking implications of the Planning Proposal and to that end this report:

- describes the site and provides details of the indicative Masterplan
- reviews the road network in the vicinity of the site, and the traffic conditions on that road network
- estimates the traffic generation potential of the indicative Masterplan, and assigns that traffic generation to the road network serving the site
- assesses the traffic implications of the indicative Masterplan in terms of road network capacity
- assesses the adequacy and suitability of the quantum of off-street car parking provided on the site.



VARGA TRAFFIC PLANNING Pty Ltd
Traffic and Parking Consultants

LOCATION
FIGURE 1


N
W
E
S
DEBENHAM RD NORTH
FREEWAY
NEWCASTLE
SYDNEY
DEBENHAM RD
TALLARA RD
GINDURRA RD
GINDURRA RD
SOUTH
KOWARA RD
ACACIA RD
DEBENHAM RD
KANGOO RD
SOUTH
Road Closure / Unformed Road
VARGA TRAFFIC PLANNING Pty Ltd
Traffic and Parking Consultants
SITE
FIGURE 2

2. PROPOSED DEVELOPMENT

Site

The area which is the subject of the Planning Proposal is located on both sides of Acacia Road near Debenham Road (South) and comprises a number of adjacent allotments. The site has street frontages approximately 650m in length to Debenham Road, approximately 450m in length to Acacia Road and approximately 160m in length to Kangoo Road. The site occupies an area of approximately 23.6ha of which 18.76ha is considered to be developable area.

The western portion of the subject site is currently occupied by several rural dwelling houses with a number of associated outbuildings. The eastern portion of the subject site is currently occupied by a sandstone quarry plus a large amount of undevelopable bushland. Vehicular access to the respective allotments is typically provided via Acacia Road.

Indicative Masterplan

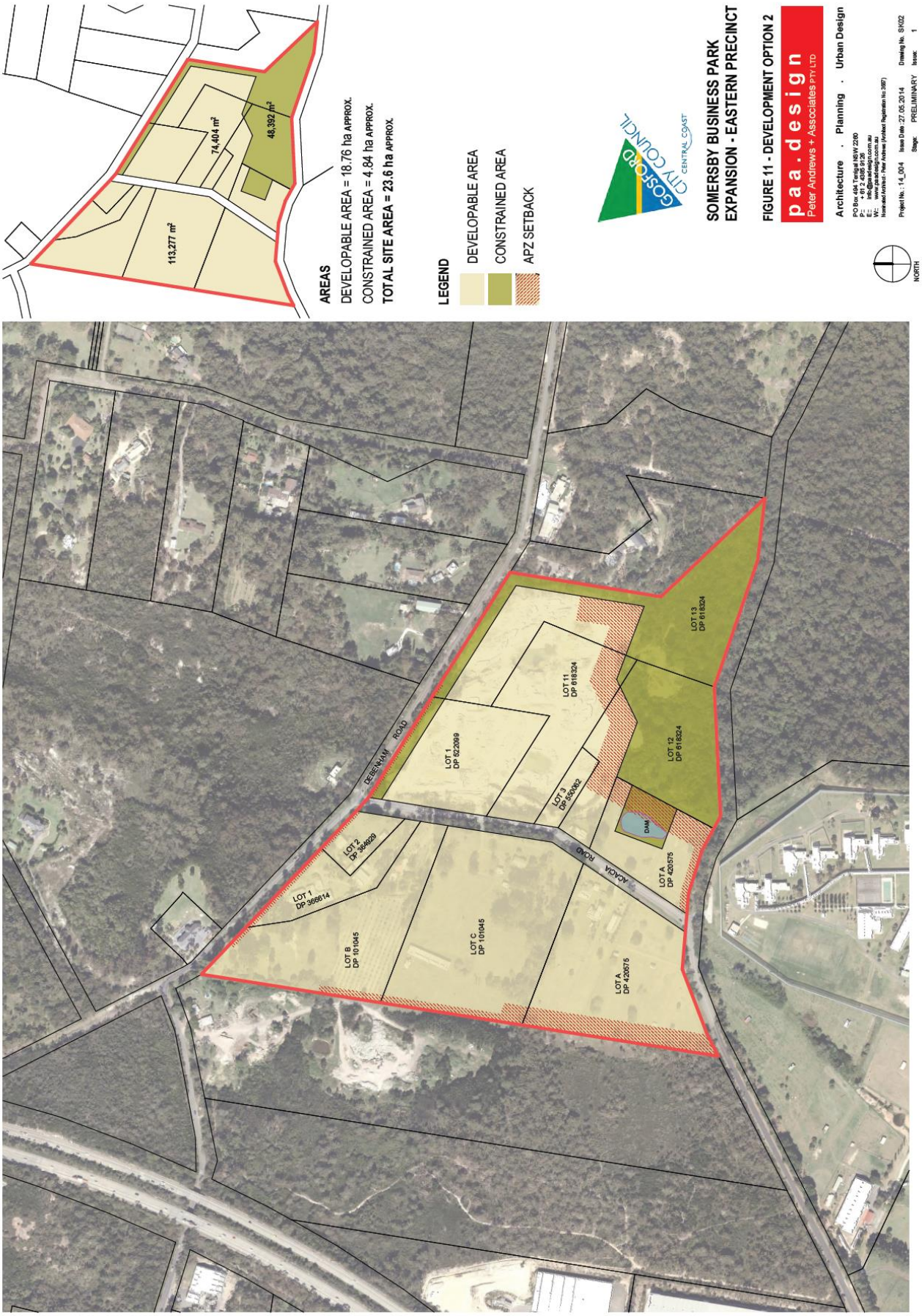
The indicative Masterplan, attached to the Planning Proposal, envisages the demolition of the existing buildings on the site to facilitate the staged construction of a new business park development, comprising commercial, industrial and warehouse uses. The indicative Masterplan proposes a density in the order of 1:1 FSR.

Redevelopment of individual sites will be subject to a future development application.

Off-street car parking and loading facilities will ultimately be provided for the future respective buildings, with vehicular access likely to be provided via Acacia Road.

A plan illustrating the indicative Masterplan, attached to the Planning Proposal, has been prepared by *Peter Andrews & Associates Pty Ltd* and is reproduced on the following page.

For the purposes of this assessment, it has been assumed that a large, single lane roundabout will be constructed at the Acacia Road/Debenham Road (South) intersection in a similar manner to the roundabouts which have been provided in the adjacent Somersby Industrial Precinct which is located on the western side of the F3 Freeway. In particular, it has been assumed that the roundabout will have similar dimensions to the existing roundabout which is located at the Wisemans Ferry Road/Gindurra Road intersection to enable large articulated vehicles such as 19m long semi-trailers and 25m long B-doubles to be accommodated at the intersection.


AREAS
DEVELOPABLE AREA = 18.76 ha APPROX.
CONSTRAINED AREA = 4.84 ha APPROX.
TOTAL SITE AREA = 23.6 ha APPROX.
LEGEND
DEVELOPABLE AREA
CONSTRAINED AREA
APZ SETBACK
GOSFORD CITY COUNCIL
CENTRAL COAST
SOMERSBY BUSINESS PARK
EXPANSION - EASTERN PRECINCT
FIGURE 11 - DEVELOPMENT OPTION 2
paa.design
Peter Andrews + Associates PTY LTD
Architecture . Planning . Urban Design
NORTH
48,392 m²
74,404 m²
113,277 m²
DEBENHAM ROAD
ACACIA ROAD
LOT 1 DP 522099
LOT 2 DP 364629
LOT 1 DP 366614
LOT 11 DP 618324
LOT 13 DP 618324
LOT 12 DP 618324
LOT 3 DP 530062
DAM
LOT A DP 420575
LOT B DP 101045
LOT C DP 101045
LOT A DP 420575

3. TRAFFIC ASSESSMENT

Road Hierarchy

The road hierarchy allocated to the road network in the vicinity of the site by the Roads and Maritime Services is illustrated on Figure 3.

The M1 Freeway is classified by the RMS as a *National Road* and provides the key north-south road link between Sydney and Newcastle. It typically carries two to three traffic lanes in each direction in the vicinity of the site, with opposing traffic flows separated by a large central median island. All intersections with the M1 Motorway are grade separated.

The Central Coast Highway is classified by the RMS as a *State Road* and provides the key east-west road link in the area, linking Kariong to Doyalson. It typically carries two traffic lanes in each direction in the vicinity of the site with turning bays provided at key locations.

Debenham Road, Acacia Road and Kangoo Road are local, unclassified roads which are primarily used to provide vehicular and pedestrian access to frontage properties.

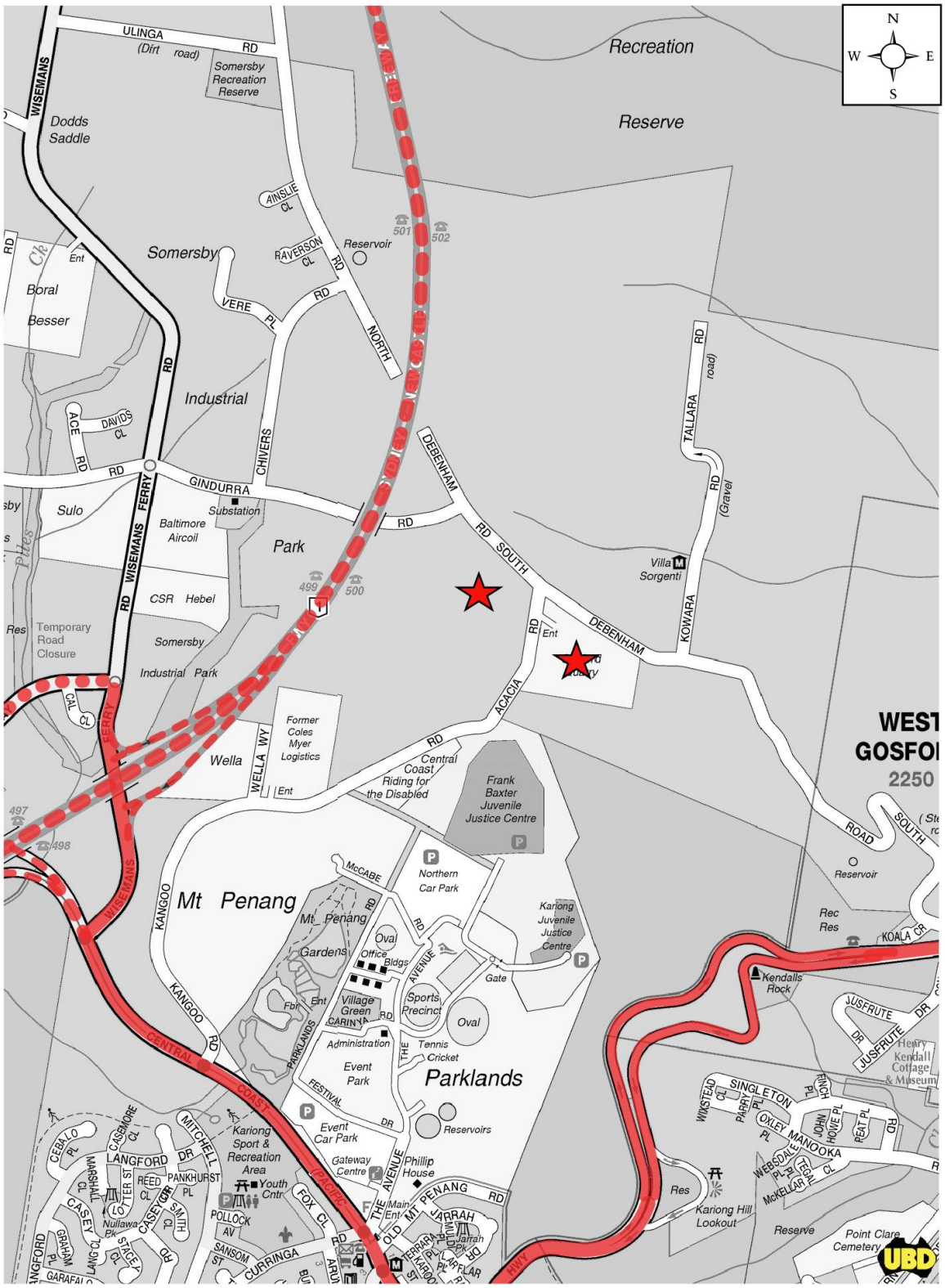
Existing Traffic Controls

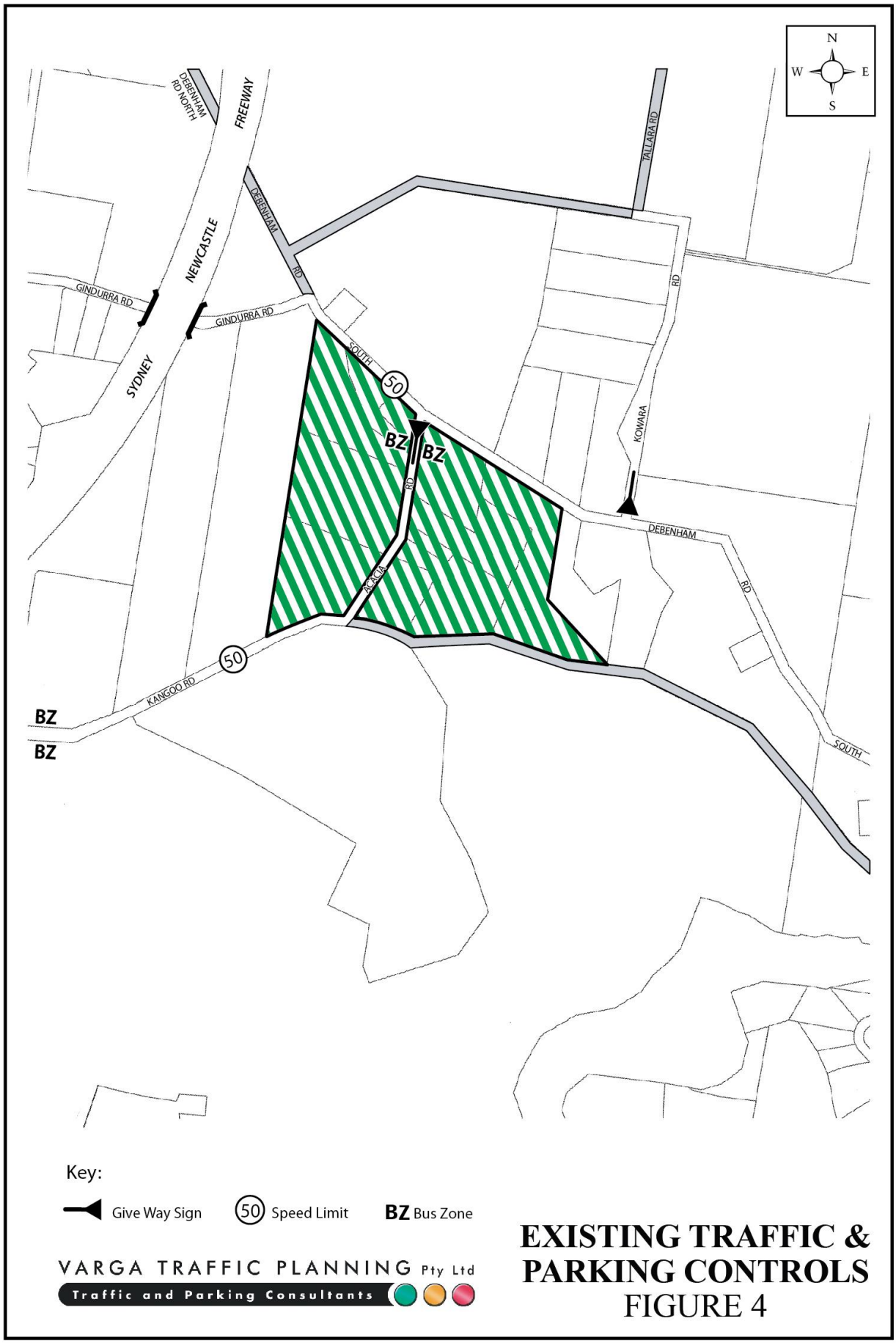
The existing traffic controls which apply to the road network in the vicinity of the site are illustrated on Figure 4. Key features of those traffic controls are:

- a 50 km/h SPEED LIMIT which applies to Debenham Road, Acacia Road, Kangoo Road and all other local roads in the area

- TRAFFIC SIGNALS in Kangoo Road where it intersects with the Central Coast Highway

- a ROUNDABOUT in Wisemans Ferry Road where it intersects with Gindurra Road


N
W
E
S
Recreation
Reserve
Somersby
Industrial
Park
Mt Penang
Parklands
Wella
Dodds Saddle
Boral
Besser
Sulo
Baltimore Aircoil
CSR Hebel
Temporary Road Closure
Somersby Industrial Park
Former Coles Myer Logistics
Central Coast Riding for the Disabled
Frank Baxter Juvenile Justice Centre
Northern Car Park
Karong Juvenile Justice Centre
Mt Penang Gardens
Oval
Office Bldgs
Village Green
Sports Precinct
Oval
Administration
Tennis
Cricket
Event Park
Event Car Park
Reservoirs
Gateway Centre
Phillip House
Karong Sport & Recreation Area
Youth Cntr
Main Ent
Villa Sorgenti
Reservoir
Kendalls Rock
Karong Hill Lookout
Point Clare Cemetery
Rec Res
Res
Substation
Gate
Ent
Fbl
WEST GOSFO
2250
ULINGA RD (Dirt road)
WISEMANS FERRY RD
GINDURRA RD
CHIVERS RD
DEBENHAM RD SOUTH
TALLARA RD (Gravel road)
KOWARA RD
ACACIA RD
KANGOO RD
CENTRAL COAST HWY
MT PENANG RD
KOALA CR
JUSFRUTE DR
SINGLETON RD
MANOOKA RD
LANGFORD DR
POLLOCK AV
FOX CL
CURRINGA
SANSOM ST
PARKLANDS
FESTIVAL
THE AVENUE
OLD MT PENANG RD
WELLA WY
RAVERSON CL
AINSLIE CL
VERE PL
NORTH RD
ACE RD
DAVIDS CL
CAL CL
McCABE
CASEMORE CL
MITCHELL
REED
PANKHURST
MARSHALL CL
CASEY CR
SMITH CL
GRAHAM PL
GARAFALO
CEBALO PL
STACEY CL
Nullawa Pk
JARRAH
WINSTEAD CL
PARRY PL
FINCH PL
JOHN HOWE PL
REAT PL
WEBSDALE PL
TEGAL PL
McKELLAR PL
Key:
State Road
National Road
Proposed Regional Road
VARGA TRAFFIC PLANNING Pty Ltd
Traffic and Parking Consultants
ROAD HIERARCHY
FIGURE 3


N
W
E
S
DEBENHAM RD NORTH
FREEWAY
NEWCASTLE
SYDNEY
GINDURRA RD
GINDURRA RD
DEBENHAM RD
SOUTH
50
BZ
BZ
ACACIA RD
TALLARA RD
KOWARA RD
DEBENHAM RD
KANGOO RD
50
BZ
BZ
SOUTH
Key:
Give Way Sign
50 Speed Limit
BZ Bus Zone
VARGA TRAFFIC PLANNING Pty Ltd
Traffic and Parking Consultants
EXISTING TRAFFIC & PARKING CONTROLS
FIGURE 4

- GIVE-WAY restrictions in Acacia Road where it intersects with Debenham Road.

Existing Traffic Conditions

An indication of the existing traffic conditions on the road network in the vicinity of the site is provided by peak period traffic surveys undertaken as part of this traffic study. The traffic surveys were undertaken at the following intersections:

- Central Coast Highway/Kangoo Road (traffic signals)
- Wisemans Ferry Road/Gindurra Road (roundabout)
- Debenham Road/Acacia Road (sign controlled)

The results of the traffic surveys are reproduced in Appendix A and summarised on Figure 5, revealing that:

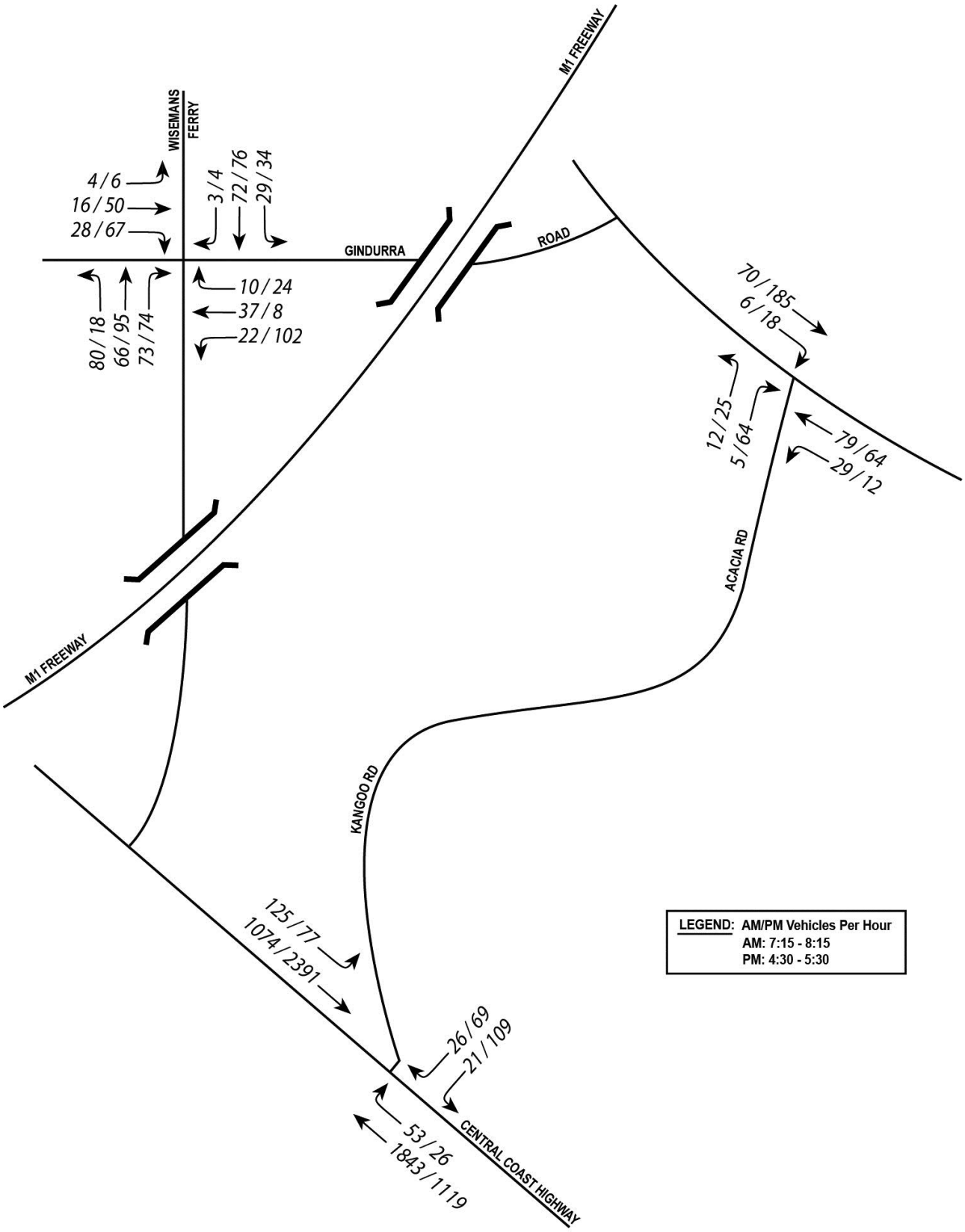
- two-way traffic flows in the Central Coast Highway are typically in the order of 3,000 vehicles per hour (vph) during the *morning* peak period, increasing to in the order of 3,600 vph during the *afternoon* peak period

- two-way traffic flows in Kangoo Road are significantly lower, typically in the order of 250 vph during peak periods

- two-way traffic flows in Wisemans Ferry Road, south of Gindurra Road, are typically in the order of 400 vph during peak periods, whilst two-way traffic flows in Wisemans Ferry Road, north of Gindurra Road, are typically in the order of 200 vph during peak periods

- two-way traffic flows in Gindurra Road are typically in the order of 200-300 vph during peak periods

- two-way traffic flows in Debenham Road are also typically in the order of 200-300 vph during peak periods



EXISTING TRAFFIC VOLUMES
FIGURE 5

- two-way traffic flows in Acacia Road are typically in the order of 50-120 vph during peak periods.

Projected Traffic Generation

An indication of the traffic generation potential of the Planning Proposal is provided by reference to the recent update to the RMS *Guidelines* which was published in the RMS's technical direction *TDT 2013/04A Guide to Traffic Generating Developments – Updated Traffic Survey (August 2013)* as follows:

Business Parks and Industrial Estates
Regional Average AM: 0.70 peak hour vehicle trips per 100m^2 GFA
Regional Average PM: 0.78 peak hour vehicle trips per 100m^2 GFA

Based on an average of *0.74 peak hour vehicle trips per 100m^2*, application of the above traffic generation rate to the potential yield of 187,600m^2 (based on an FSR of 1:1) as outlined in the Planning Proposal yields a traffic generation potential of approximately 1,388 vehicles per hour during commuter peak periods.

However in order to provide a more rigorous assessment, reference is also made to the Roads and Maritime Services publication *Guide to Traffic Generating Developments, Section 3 - Landuse Traffic Generation (October 2002).*

The RMS *Guidelines* are based on extensive surveys of a wide range of land uses and nominates the following traffic generation rates which are most applicable to the development proposal:

Industrial
1.0 peak hour vehicle trips per 100m^2 GFA

Warehouse
0.5 peak hour vehicle trips per 100m^2 GFA

As the precise uses of the site are not yet known, the abovementioned "industrial" traffic generation rate of *1.0 peak hour vehicle trip per 100m^2 GFA* has been adopted as it represents an *average* of the three potential land uses.

Application of the above "industrial" traffic generation rate to the potential yield of 187,600m^2 (based on an FSR of 1:1) as outlined in the Planning Proposal yields a traffic generation potential of approximately 1,876 vehicles per hour during commuter peak periods.

That projected increase in traffic activity as a consequence of the development proposal will not have any unacceptable traffic implications in terms of road network capacity, as is demonstrated by the following section of this report.

Traffic Implications - Road Network Capacity

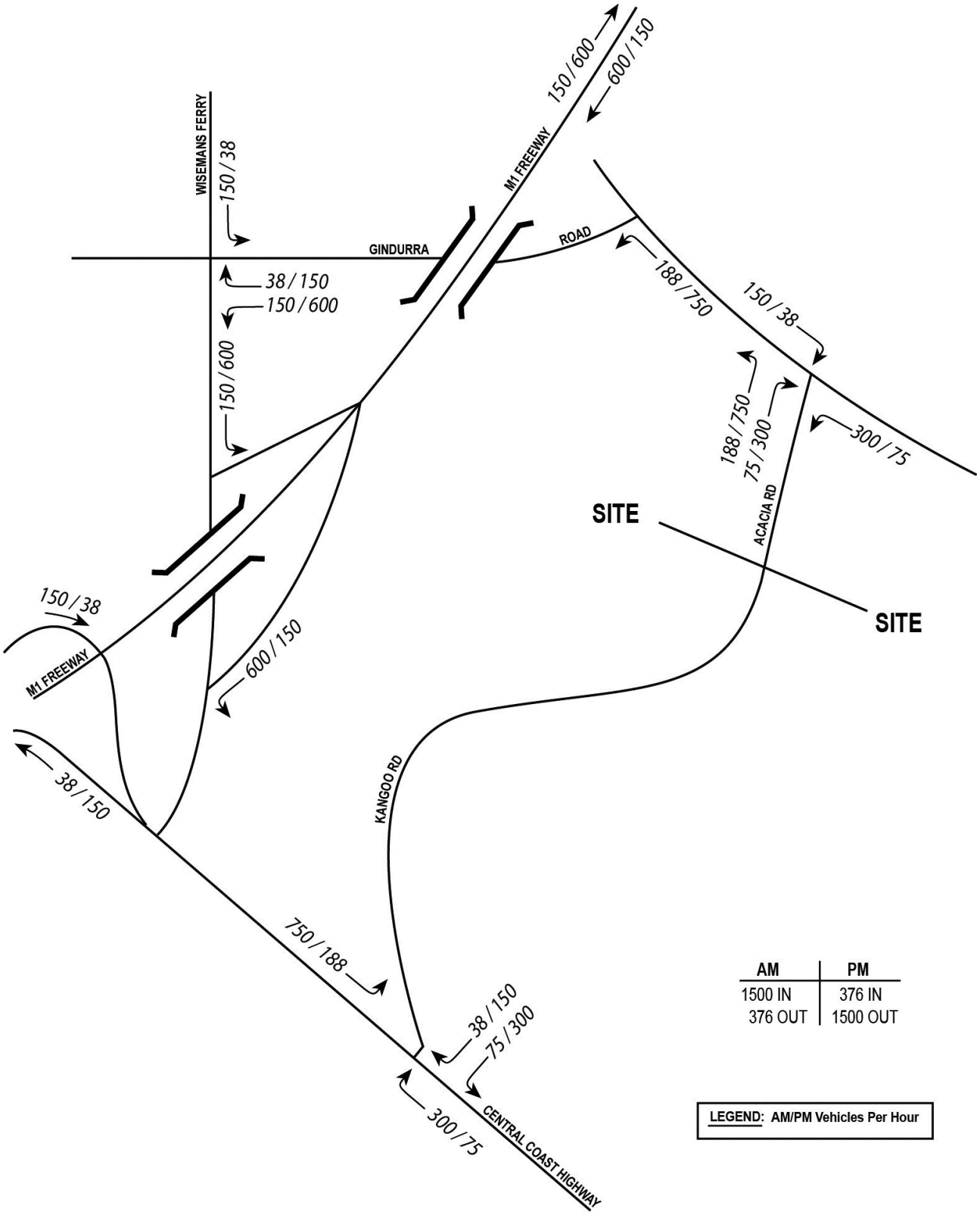
The traffic implications of development proposals primarily concern the effects that any *additional* traffic flows may have on the operational performance of the nearby road network. Those effects can be assessed using the SIDRA program which is widely used by the RMS and many LGA's for this purpose. Criteria for evaluating the results of SIDRA analysis are reproduced in the following pages, and the detailed results are reproduced in Appendix B.

As noted in the foregoing, this assessment assumes that a large single lane roundabout capable of accommodating articulated vehicles of all sizes has been constructed at the Debenham Road (South)/Acacia Road intersection.

The results of the SIDRA analysis of the Central Coast Highway & Kangoo Road intersection are summarised on Table 3.1 below, revealing that:

- the Central Coast Highway & Kangoo Road intersection currently operates at *Level of Service "B"* under the existing AM traffic demands with total average vehicle delays in the order of 15 seconds/vehicle and at *Level of Service "F"* under the existing PM traffic demands with total average vehicle delays in the order of 182 seconds/vehicle

- under the projected future traffic demands expected to be generated by the development proposal, the Central Coast Highway & Kangoo Road intersection will continue to operate at current *Levels of Service "B"* during peak periods, with increases in average vehicle delays in the order of 7-13 seconds/vehicle.



PROJECTED ADDITIONAL TRAFFIC VOLUMES
FIGURE 6

The results of the SIDRA analysis of the Wisemans Ferry Road & Gindurra Road intersection are summarised on Table 3.2 below, revealing that:

- the Wisemans Ferry Road & Gindurra Road intersection currently operates at *Level of Service "A"* under the existing traffic demands with total average vehicle delays in the order of 6 seconds/vehicle

- under the projected future traffic demands expected to be generated by the development proposal, the Wisemans Ferry Road & Gindurra Road intersection will continue to operate at *Level of Service "A",* with ***zero*** increases in average vehicle delays.

The results of the SIDRA analysis of the Debenham Road & Acacia Road intersection are summarised on Table 3.2 below, revealing that:

- the Debenham Road & Acacia Road intersection currently operates at *Level of Service "A"* under the existing traffic demands with total average vehicle delays in the order of 2 seconds/vehicle

- under the projected future traffic demands expected to be generated by the development proposal, the Debenham Road & Acacia Road intersection will continue to operate at *Level of Service "A",* with increases in average vehicle delays in the order of 3 seconds/vehicle.

In the circumstances, it is clear that the proposed development will not have any unacceptable traffic implications in terms of road network capacity, and that no road improvements or intersection upgrades would be required as a consequence of the development proposal.

Whilst it is acknowledged that the Central Coast Highway & Kangoo Road intersection is expected to operate at *Level of Service "F"* during the PM peak period, it is pertinent to note that the intersection already operates at *Level of Service "F"* during the existing PM peak period, with the "critical" movement being eastbound through traffic on the Central Coast Highway. The additional traffic which could be generated by the Planning Proposal would have relatively little impact on the overall performance of this intersection.

It is noted however, that the provision of a full length eastbound lane on both the approach and departure sides of sides of the intersection would substantially improve the intersection performance to *Level of Service "B"* during the PM peak period. This arrangement could be explored by Council as part of an overall strategy to improve existing traffic conditions in the area.

TABLE 3.1 - RESULTS OF SIDRA ANALYSIS OF CENTRAL COAST HIGHWAY & KANGOO ROAD

Key Indicators	Existing Traffic Demand		Projected Development Traffic Demand	
	AM	PM	AM	PM
Level of Service	B	F	B	F
Degree of Saturation	0.660	1.244	0.920	1.310
Average Vehicle Delay (secs/veh)	15.3	182.5	28.0	189.5
	CEN_KANX		CEN_KANP	

TABLE 3.2 - RESULTS OF SIDRA ANALYSIS OF WISEMANS FERRY ROAD & GINDURRA ROAD

Key Indicators	Existing Traffic Demand		Projected Development Traffic Demand	
	AM	PM	AM	PM
Level of Service	A	A	A	A
Degree of Saturation	0.155	0.130	0.194	0.646
Average Vehicle Delay (secs/veh)	6.1	6.2	5.5	5.6
	WIS_GINX		WIS_GINP	

TABLE 3.3 - RESULTS OF SIDRA ANALYSIS OF DEBENHAM ROAD & ACACIA ROAD

Key Indicators	Existing Traffic Demand		Projected Development Traffic Demand	
	AM	PM	AM	PM
Level of Service	A	A	A	A
Degree of Saturation	0.056	0.105	0.218	0.711
Average Vehicle Delay (secs/veh)	1.3	1.7	4.2	4.8
	DEB_ACAX		DEB_ACAP	

Criteria for Interpreting Results of Sidra Analysis

1. Level of Service (LOS)

LOS	Traffic Signals and Roundabouts	Give Way and Stop Signs
'A'	Good operation.	Good operation.
'B'	Good with acceptable delays and spare capacity.	Acceptable delays and spare capacity.
'C'	Satisfactory.	Satisfactory but accident study required.
'D'	Operating near capacity.	Near capacity and accident study required.
'E'	At capacity; at signals incidents will cause excessive delays. Roundabouts require other control mode.	At capacity and requires other control mode.
'F'	Unsatisfactory and requires additional capacity.	Unsatisfactory and requires other control mode.

2. Average Vehicle Delay (AVD)

The AVD provides a measure of the operational performance of an intersection as indicated on the table below which relates AVD to LOS. The AVD's listed in the table should be taken as a guide only as longer delays could be tolerated in some locations (ie inner city conditions) and on some roads (ie minor side street intersecting with a major arterial route).

Level of Service	Average Delay per Vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way and Stop Signs
A	less than 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 mode.	At capacity and requires other control mode.

3. Degree of Saturation (DS)

The DS is another measure of the operational performance of individual intersections.

For intersections controlled by traffic signals[1] both queue length and delay increase rapidly as DS approaches 1, and it is usual to attempt to keep DS to less than 0.9. Values of DS in the order of 0.7 generally represent satisfactory intersection operation. When DS exceeds 0.9 queues can be anticipated.

For intersections controlled by a roundabout or GIVE WAY or STOP signs, satisfactory intersection operation is indicated by a DS of 0.8 or less.

1 *The values of DS for intersections under traffic signal control are only valid for cycle length of 120 secs.*

4. PARKING ASSESSMENT

Existing Kerbside Parking Restrictions

The existing kerbside parking restrictions which apply to the road network in the vicinity of the site comprise:

- generally UNRESTRICTED kerbside parking along both sides of Debenham Road, Acacia Road and also Kangoo Road where shoulder width permits

- BUS STOPS located towards the northern end of Acacia Road and also in Kangoo Road.

Off-Street Parking Provisions

The off-street car parking requirements applicable to the Planning Proposal are specified in Council's *Development Control Plan 2013, Chapter 7.1 – Car Parking* document in the following terms:

Commercial Premises
1 space per 40m^2 GFA

Industrial – Factory
1 space per 100m^2 GFA

Industrial – Warehouse
1 space per 300m^2 GFA

At this stage the precise number of off-street car parking spaces and loading bays to be provided on each site is not yet known however it is understood that the future Development Applications for individual sites will be required to comply with Council's car parking and loading requirements.

In addition, the geometric design layout of the car parking and loading facilities proposed by any future Development Applications will be required to comply with the relevant requirements specified in the Standards Australia publication *Parking Facilities Part 1 - Off-Street Car Parking AS2890.1* in respect of parking bay dimensions, ramp gradients and aisle widths.

In summary, the proposed parking facilities will ultimately satisfy the relevant requirements specified in both Council's Parking Code as well as the Australian Standards and it is therefore concluded that the Planning Proposal will not have any unacceptable parking implications.

APPENDIX A

TRAFFIC SURVEY DATA

R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849.

Mobile.0418239019

Client : Varga Traffic Plar

Job No/Name : 5213 SOMERSBY & KARIONG Counts

Day/Date : Monday 16th June 2014

PEDS	WEST	NORTH	EAST	
Time Per	*Central Coast Hwy*	*Kangoo Rd*	*Central Coast Hwy*	TOT
0630 - 0645	0	0	0	**0**
0645 - 0700	0	0	0	**0**
0700 - 0715	0	0	0	**0**
0715 - 0730	0	0	0	**0**
0730 - 0745	0	0	0	**0**
0745 - 0800	0	0	0	**0**
0800 - 0815	0	0	0	**0**
0815 - 0830	0	0	0	**0**
0830 - 0845	0	0	0	**0**
0845 - 0900	0	0	0	**0**
0900 - 0915	0	0	0	**0**
0915 - 0930	0	0	0	**0**
Per End	**0**	**0**	**0**	**0**

PEDS	WEST	NORTH	EAST	
Peak Per	*Central Coast Hwy*	*Kangoo Rd*	*Central Coast Hwy*	TOT
0630 - 0730	0	0	0	**0**
0645 - 0745	0	0	0	**0**
0700 - 0800	0	0	0	**0**
0715 - 0815	0	0	0	**0**
0730 - 0830	0	0	0	**0**
0745 - 0845	0	0	0	**0**
0800 - 0900	0	0	0	**0**
0815 - 0915	0	0	0	**0**
0830 - 0930	0	0	0	**0**
PEAK HR	**0**	**0**	**0**	**0**

Lights	WEST		NORTH		EAST		
	Central Coast Hwy		*Kangoo Rd*		*Central Coast Hwy*		
Time Per	T	L	R	L	R	T	TOT
0630 - 0645	122	14	2	3	5	389	**535**
0645 - 0700	146	21	3	2	16	438	**626**
0700 - 0715	190	33	5	6	18	556	**808**
0715 - 0730	189	21	5	5	11	534	**765**
0730 - 0745	268	28	8	3	7	505	**819**
0745 - 0800	275	38	5	6	12	368	**704**
0800 - 0815	297	32	5	5	19	410	**768**
0815 - 0830	248	19	3	9	16	377	**672**
0830 - 0845	260	23	5	7	23	420	**738**
0845 - 0900	242	17	5	6	28	328	**626**
0900 - 0915	193	14	1	6	19	312	**545**
0915 - 0930	176	14	5	9	8	293	**505**
Per End	**2606**	**274**	**52**	**67**	**182**	**4930**	**8111**

Heavies	WEST		NORTH		EAST		
	Central Coast Hwy		*Kangoo Rd*		*Central Coast Hwy*		
Time Per	T	L	R	L	R	T	TOT
0630 - 0645	11	1	0	0	0	10	**22**
0645 - 0700	10	1	1	0	1	11	**24**
0700 - 0715	11	0	0	0	0	5	**16**
0715 - 0730	9	0	0	0	1	7	**17**
0730 - 0745	11	1	1	0	0	8	**21**
0745 - 0800	10	4	0	2	1	6	**23**
0800 - 0815	15	1	2	0	2	5	**25**
0815 - 0830	9	0	1	1	0	5	**16**
0830 - 0845	5	0	1	0	0	7	**13**
0845 - 0900	9	0	0	0	1	7	**17**
0900 - 0915	11	2	2	0	0	9	**24**
0915 - 0930	12	0	0	0	0	7	**19**
Per End	**123**	**10**	**8**	**3**	**6**	**87**	**237**

Combined	WEST		NORTH		EAST		
	Central Coast Hwy		*Kangoo Rd*		*Central Coast Hwy*		
Time Per	T	L	R	L	R	T	TOT
0630 - 0645	133	15	2	3	5	399	**557**
0645 - 0700	156	22	4	2	17	449	**650**
0700 - 0715	201	33	5	6	18	561	**824**
0715 - 0730	198	21	5	5	12	541	**782**
0730 - 0745	279	29	9	3	7	513	**840**
0745 - 0800	285	42	5	8	13	374	**727**
0800 - 0815	312	33	7	5	21	415	**793**
0815 - 0830	257	19	4	10	16	382	**688**
0830 - 0845	265	23	6	7	23	427	**751**
0845 - 0900	251	17	5	6	29	335	**643**
0900 - 0915	204	16	3	6	19	321	**569**
0915 - 0930	188	14	5	9	8	300	**524**
Per End	**2729**	**284**	**60**	**70**	**188**	**5017**	**8348**

Lights	WEST		NORTH		EAST		
	Central Coast Hwy		*Kangoo Rd*		*Central Coast Hwy*		
Peak Per	T	L	R	L	R	T	TOT
0630 - 0730	647	89	15	16	50	1917	**2734**
0645 - 0745	793	103	21	16	52	2033	**3018**
0700 - 0800	922	120	23	20	48	1963	**3096**
0715 - 0815	1029	119	23	19	49	1817	**3056**
0730 - 0830	1088	117	21	23	54	1660	**2963**
0745 - 0845	1080	112	18	27	70	1575	**2882**
0800 - 0900	1047	91	18	27	86	1535	**2804**
0815 - 0915	943	73	14	28	86	1437	**2581**
0830 - 0930	871	68	16	28	78	1353	**2414**
PEAK HR	**922**	**120**	**23**	**20**	**48**	**1963**	**3096**

Heavies	WEST		NORTH		EAST		
	Central Coast Hwy		*Kangoo Rd*		*Central Coast Hwy*		
Peak Per	T	L	R	L	R	T	TOT
0630 - 0730	41	2	1	0	2	33	**79**
0645 - 0745	41	2	2	0	2	31	**78**
0700 - 0800	41	5	1	2	2	26	**77**
0715 - 0815	45	6	3	2	4	26	**86**
0730 - 0830	45	6	4	3	3	24	**85**
0745 - 0845	39	5	4	3	3	23	**77**
0800 - 0900	38	1	4	1	3	24	**71**
0815 - 0915	34	2	4	1	1	28	**70**
0830 - 0930	37	2	3	0	1	30	**73**
PEAK HR	**41**	**5**	**1**	**2**	**2**	**26**	**77**

Combined	WEST		NORTH		EAST		
	Central Coast Hwy		*Kangoo Rd*		*Central Coast Hwy*		
Peak Per	T	L	R	L	R	T	TOT
0630 - 0730	688	91	16	16	52	1950	**2813**
0645 - 0745	834	105	23	16	54	2064	**3096**
0700 - 0800	963	125	24	22	50	1989	**3173**
0715 - 0815	1074	125	26	21	53	1843	**3142**
0730 - 0830	1133	123	25	26	57	1684	**3048**
0745 - 0845	1119	117	22	30	73	1598	**2959**
0800 - 0900	1085	92	22	28	89	1559	**2875**
0815 - 0915	977	75	18	29	87	1465	**2651**
0830 - 0930	908	70	19	28	79	1383	**2487**
PEAK HR	**963**	**125**	**24**	**22**	**50**	**1989**	**3173**

R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849.

Mobile.0418239019

Client : Varga Traffic Pla

Job No/Name : 5213 SOMERSBY & KARIONG Cour

Day/Date : Monday 16th June 2014

PEDS	WEST	NORTH	EAST	
Time Per	*Central Coast Hwy*	*Kangoo Rd*	*Central Coast Hwy*	TOT
1530 - 1545	0	0	1	**1**
1545 - 1600	0	0	0	**0**
1600 - 1615	0	0	0	**0**
1615 - 1630	0	0	0	**0**
1630 - 1645	0	0	0	**0**
1645 - 1700	0	0	0	**0**
1700 - 1715	0	0	0	**0**
1715 - 1730	0	0	0	**0**
1730 - 1745	0	0	0	**0**
1745 - 1800	0	0	0	**0**
1800 - 1815	0	0	0	**0**
1815 - 1830	0	0	0	**0**
Per End	**0**	**0**	**1**	**1**

PEDS	WEST	NORTH	EAST	
Peak Per	*Central Coast Hwy*	*Kangoo Rd*	*Central Coast Hwy*	TOT
1530 - 1630	0	0	1	**1**
1545 - 1645	0	0	0	**0**
1600 - 1700	0	0	0	**0**
1615 - 1715	0	0	0	**0**
1630 - 1730	0	0	0	**0**
1645 - 1745	0	0	0	**0**
1700 - 1800	0	0	0	**0**
1715 - 1815	0	0	0	**0**
1730 - 1830	0	0	0	**0**
PEAK HR	**0**	**0**	**0**	**0**

Lights	WEST		NORTH		EAST		
	Central Coast Hwy		*Kangoo Rd*		*Central Coast Hwy*		
Time Per	T	L	R	L	R	T	TOT
1530 - 1545	353	14	38	42	15	238	**700**
1545 - 1600	458	19	17	29	6	269	**798**
1600 - 1615	544	20	23	27	8	264	**886**
1615 - 1630	484	23	26	41	12	293	**879**
1630 - 1645	526	16	25	23	2	268	**860**
1645 - 1700	652	20	12	24	7	295	**1010**
1700 - 1715	595	18	25	36	11	288	**973**
1715 - 1730	595	23	6	24	6	253	**907**
1730 - 1745	541	7	11	18	4	265	**846**
1745 - 1800	536	6	6	7	5	191	**751**
1800 - 1815	587	12	9	18	5	184	**815**
1815 - 1830	522	5	5	7	2	128	**669**
Per End	**6393**	**183**	**203**	**296**	**83**	**2936**	**10094**

Heavies	WEST		NORTH		EAST		
	Central Coast Hwy		*Kangoo Rd*		*Central Coast Hwy*		
Time Per	T	L	R	L	R	T	TOT
1530 - 1545	1	1	1	1	0	8	**12**
1545 - 1600	6	1	1	1	0	7	**16**
1600 - 1615	6	0	1	0	0	5	**12**
1615 - 1630	10	0	0	2	0	5	**17**
1630 - 1645	6	0	0	1	0	4	**11**
1645 - 1700	6	0	0	0	0	6	**12**
1700 - 1715	5	0	1	1	0	2	**9**
1715 - 1730	6	0	0	0	0	3	**9**
1730 - 1745	2	0	0	1	0	1	**4**
1745 - 1800	5	0	0	0	0	1	**6**
1800 - 1815	1	1	0	0	0	1	**3**
1815 - 1830	0	0	0	0	0	2	**2**
Per End	**54**	**3**	**4**	**7**	**0**	**45**	**113**

Combined	WEST		NORTH		EAST		
	Central Coast Hwy		*Kangoo Rd*		*Central Coast Hwy*		
Time Per	T	L	R	L	R	T	TOT
1530 - 1545	354	15	39	43	15	246	**712**
1545 - 1600	464	20	18	30	6	276	**814**
1600 - 1615	550	20	24	27	8	269	**898**
1615 - 1630	494	23	26	43	12	298	**896**
1630 - 1645	532	16	25	24	2	272	**871**
1645 - 1700	658	20	12	24	7	301	**1022**
1700 - 1715	600	18	26	37	11	290	**982**
1715 - 1730	601	23	6	24	6	256	**916**
1730 - 1745	543	7	11	19	4	266	**850**
1745 - 1800	541	6	6	7	5	192	**757**
1800 - 1815	588	13	9	18	5	185	**818**
1815 - 1830	522	5	5	7	2	130	**671**
Per End	**6447**	**186**	**207**	**303**	**83**	**2981**	**10207**

Lights	WEST		NORTH		EAST		
	Central Coast Hwy		*Kangoo Rd*		*Central Coast Hwy*		
Peak Per	T	L	R	L	R	T	TOT
1530 - 1630	1839	76	104	139	41	1064	**3263**
1545 - 1645	2012	78	91	120	28	1094	**3423**
1600 - 1700	2206	79	86	115	29	1120	**3635**
1615 - 1715	2257	77	88	124	32	1144	**3722**
1630 - 1730	2368	77	68	107	26	1104	**3750**
1645 - 1745	2383	68	54	102	28	1101	**3736**
1700 - 1800	2267	54	48	85	26	997	**3477**
1715 - 1815	2259	48	32	67	20	893	**3319**
1730 - 1830	2186	30	31	50	16	768	**3081**
PEAK HR	**2368**	**77**	**68**	**107**	**26**	**1104**	**3750**

Heavies	WEST		NORTH		EAST		
	Central Coast Hwy		*Kangoo Rd*		*Central Coast Hwy*		
Peak Per	T	L	R	L	R	T	TOT
1530 - 1630	23	2	3	4	0	25	**57**
1545 - 1645	28	1	2	4	0	21	**56**
1600 - 1700	28	0	1	3	0	20	**52**
1615 - 1715	27	0	1	4	0	17	**49**
1630 - 1730	23	0	1	2	0	15	**41**
1645 - 1745	19	0	1	2	0	12	**34**
1700 - 1800	18	0	1	2	0	7	**28**
1715 - 1815	14	1	0	1	0	6	**22**
1730 - 1830	8	1	0	1	0	5	**15**
PEAK HR	**23**	**0**	**1**	**2**	**0**	**15**	**41**

Combined	WEST		NORTH		EAST		
	Central Coast Hwy		*Kangoo Rd*		*Central Coast Hwy*		
Peak Per	T	L	R	L	R	T	TOT
1530 - 1630	1862	78	107	143	41	1089	**3320**
1545 - 1645	2040	79	93	124	28	1115	**3479**
1600 - 1700	2234	79	87	118	29	1140	**3687**
1615 - 1715	2284	77	89	128	32	1161	**3771**
1630 - 1730	2391	77	69	109	26	1119	**3791**
1645 - 1745	2402	68	55	104	28	1113	**3770**
1700 - 1800	2285	54	49	87	26	1004	**3505**
1715 - 1815	2273	49	32	68	20	899	**3341**
1730 - 1830	2194	31	31	51	16	773	**3096**
PEAK HR	**2391**	**77**	**69**	**109**	**26**	**1119**	**3791**

R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849, Mob.0418-239019

Client	: Varga Traffic Planning
Job No/Name	: 5213 SOMERSBY & KARIONG Counts
Day/Date	: Monday 16th June 2014

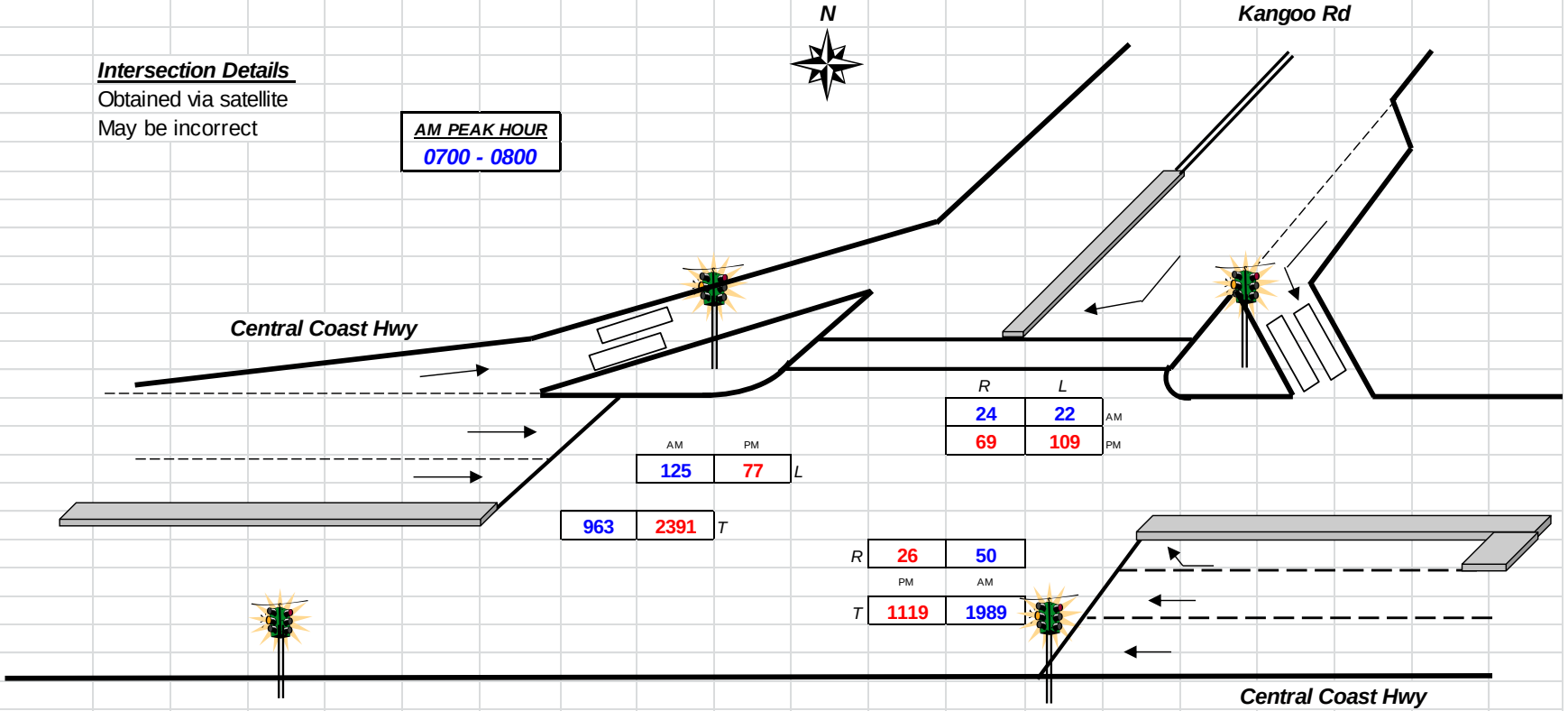
Intersection Details

Obtained via satellite

May be incorrect

AM PEAK HOUR

0700 - 0800



Combined figures only

PM PEAK HOUR

1630 - 1730

Weather >>>

R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849, Mob.0418-239019

Client : Varga Traffic Planning
Job No/Name : 5213 SOMERSBY & KARIONG Counts
Day/Date : Monday 16th June 2014

Lights	NORTH			WEST			SOUTH			EAST			
	Wisemans Ferry Rd			*Somersby Falls Rd*			*Wisemans Ferry Rd*			*Gindurra Rd*			
Time Per	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**TOT**
0630 - 0645	3	11	2	0	2	4	20	11	21	7	3	5	**89**
0645 - 0700	6	13	1	1	3	2	15	13	29	13	14	5	**115**
0700 - 0715	6	9	2	0	0	6	14	12	17	7	7	3	**83**
0715 - 0730	6	11	2	1	4	7	19	17	10	6	12	0	**95**
0730 - 0745	5	15	0	1	1	5	19	15	15	6	7	1	**90**
0745 - 0800	8	23	1	2	4	4	18	13	22	5	10	4	**114**
0800 - 0815	10	13	0	0	7	9	18	15	23	2	5	4	**106**
0815 - 0830	6	16	2	3	4	5	26	15	38	6	12	5	**138**
0830 - 0845	5	15	1	4	9	7	17	21	29	4	3	1	**116**
0845 - 0900	9	13	3	0	6	6	8	14	27	5	8	4	**103**
0900 - 0915	2	15	3	1	4	2	16	26	23	10	6	4	**112**
0915 - 0930	2	9	0	0	3	3	6	15	16	9	4	3	**70**
Period End	**68**	**163**	**17**	**13**	**47**	**60**	**196**	**187**	**270**	**80**	**91**	**39**	**1231**

Lights	NORTH			WEST			SOUTH			EAST			
	Wisemans Ferry			*Somersby Falls Rd*			*Wisemans Ferry*			*Gindurra Rd*			
Peak Time	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**TOT**
0630 - 0730	21	44	7	2	9	19	68	53	77	33	36	13	**382**
0645 - 0745	23	48	5	3	8	20	67	57	71	32	40	9	**383**
0700 - 0800	25	58	5	4	9	22	70	57	64	24	36	8	**382**
0715 - 0815	29	62	3	4	16	25	74	60	70	19	34	9	**405**
0730 - 0830	29	67	3	6	16	23	81	58	98	19	34	14	**448**
0745 - 0845	29	67	4	9	24	25	79	64	112	17	30	14	**474**
0800 - 0900	30	57	6	7	26	27	69	65	117	17	28	14	**463**
0815 - 0915	22	59	9	8	23	20	67	76	117	25	29	14	**469**
0830 - 0930	18	52	7	5	22	18	47	76	95	28	21	12	**401**
PEAK HOUR	**22**	**59**	**9**	**8**	**23**	**20**	**67**	**76**	**117**	**25**	**29**	**14**	**469**

Heavies	NORTH			WEST			SOUTH			EAST			
	Wisemans Ferry Rd			*Somersby Falls Rd*			*Wisemans Ferry Rd*			*Gindurra Rd*			
Time Per	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**TOT**
0630 - 0645	0	2	0	0	0	4	2	0	0	1	0	0	**9**
0645 - 0700	0	3	1	0	0	0	1	0	0	0	1	0	**6**
0700 - 0715	0	1	0	1	1	2	0	2	1	1	0	1	**10**
0715 - 0730	0	1	0	0	0	1	0	1	1	0	1	1	**6**
0730 - 0745	0	2	0	0	0	0	2	1	1	1	0	0	**7**
0745 - 0800	0	5	0	0	0	1	2	1	1	1	2	0	**13**
0800 - 0815	0	2	0	0	0	1	2	3	0	1	0	0	**9**
0815 - 0830	0	1	0	0	0	4	1	2	0	1	0	0	**9**
0830 - 0845	0	1	1	0	0	1	1	2	1	0	0	0	**7**
0845 - 0900	0	3	0	0	0	3	5	2	0	3	1	0	**17**
0900 - 0915	0	4	0	1	0	3	7	3	0	1	0	0	**19**
0915 - 0930	0	4	0	0	0	6	0	2	1	2	0	0	**15**
Period End	**0**	**29**	**2**	**2**	**1**	**26**	**23**	**19**	**6**	**12**	**5**	**2**	**127**

Heavies	NORTH			WEST			SOUTH			EAST			
	Wisemans Ferry			*Somersby Falls Rd*			*Wisemans Ferry*			*Gindurra Rd*			
Peak Per	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**TOT**
0630 - 0730	0	7	1	1	1	7	3	3	2	2	2	2	**31**
0645 - 0745	0	7	1	1	1	3	3	4	3	2	2	2	**29**
0700 - 0800	0	9	0	1	1	4	4	5	4	3	3	2	**36**
0715 - 0815	0	10	0	0	0	3	6	6	3	3	3	1	**35**
0730 - 0830	0	10	0	0	0	6	7	7	2	4	2	0	**38**
0745 - 0845	0	9	1	0	0	7	6	8	2	3	2	0	**38**
0800 - 0900	0	7	1	0	0	9	9	9	1	5	1	0	**42**
0815 - 0915	0	9	1	1	0	11	14	9	1	5	1	0	**52**
0830 - 0930	0	12	1	1	0	13	13	9	2	6	1	0	**58**
PEAK HOUR	**0**	**9**	**1**	**1**	**0**	**11**	**14**	**9**	**1**	**5**	**1**	**0**	**52**

Combined	NORTH			WEST			SOUTH			EAST			
	Wisemans Ferry Rd			*Somersby Falls Rd*			*Wisemans Ferry Rd*			*Gindurra Rd*			
Time Per	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**TOT**
0630 - 0645	3	13	2	0	2	8	22	11	21	8	3	5	**98**
0645 - 0700	6	16	2	1	3	2	16	13	29	13	15	5	**121**
0700 - 0715	6	10	2	1	1	8	14	14	18	8	7	4	**93**
0715 - 0730	6	12	2	1	4	8	19	18	11	6	13	1	**101**
0730 - 0745	5	17	0	1	1	5	21	16	16	7	7	1	**97**
0745 - 0800	8	28	1	2	4	5	20	14	23	6	12	4	**127**
0800 - 0815	10	15	0	0	7	10	20	18	23	3	5	4	**115**
0815 - 0830	6	17	2	3	4	9	27	17	38	7	12	5	**147**
0830 - 0845	5	16	2	4	9	8	18	23	30	4	3	1	**123**
0845 - 0900	9	16	3	0	6	9	13	16	27	8	9	4	**120**
0900 - 0915	2	19	3	2	4	5	23	29	23	11	6	4	**131**
0915 - 0930	2	13	0	0	3	9	6	17	17	11	4	3	**85**
Period End	**68**	**192**	**19**	**15**	**48**	**86**	**219**	**206**	**276**	**92**	**96**	**41**	**1358**

Combined	NORTH			WEST			SOUTH			EAST			
	Wisemans Ferry			*Somersby Falls Rd*			*Wisemans Ferry*			*Gindurra Rd*			
Peak Per	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**TOT**
0630 - 0730	21	51	8	3	10	26	71	56	79	35	38	15	**413**
0645 - 0745	23	55	6	4	9	23	70	61	74	34	42	11	**412**
0700 - 0800	25	67	5	5	10	26	74	62	68	27	39	10	**418**
0715 - 0815	29	72	3	4	16	28	80	66	73	22	37	10	**440**
0730 - 0830	29	77	3	6	16	29	88	65	100	23	36	14	**486**
0745 - 0845	29	76	5	9	24	32	85	72	114	20	32	14	**512**
0800 - 0900	30	64	7	7	26	36	78	74	118	22	29	14	**505**
0815 - 0915	22	68	10	9	23	31	81	85	118	30	30	14	**521**
0830 - 0930	18	64	8	6	22	31	60	85	97	34	22	12	**459**
PEAK HOUR	**22**	**68**	**10**	**9**	**23**	**31**	**81**	**85**	**118**	**30**	**30**	**14**	**521**

R.O.A.R DATA

Reliable, Original & Authentic Results

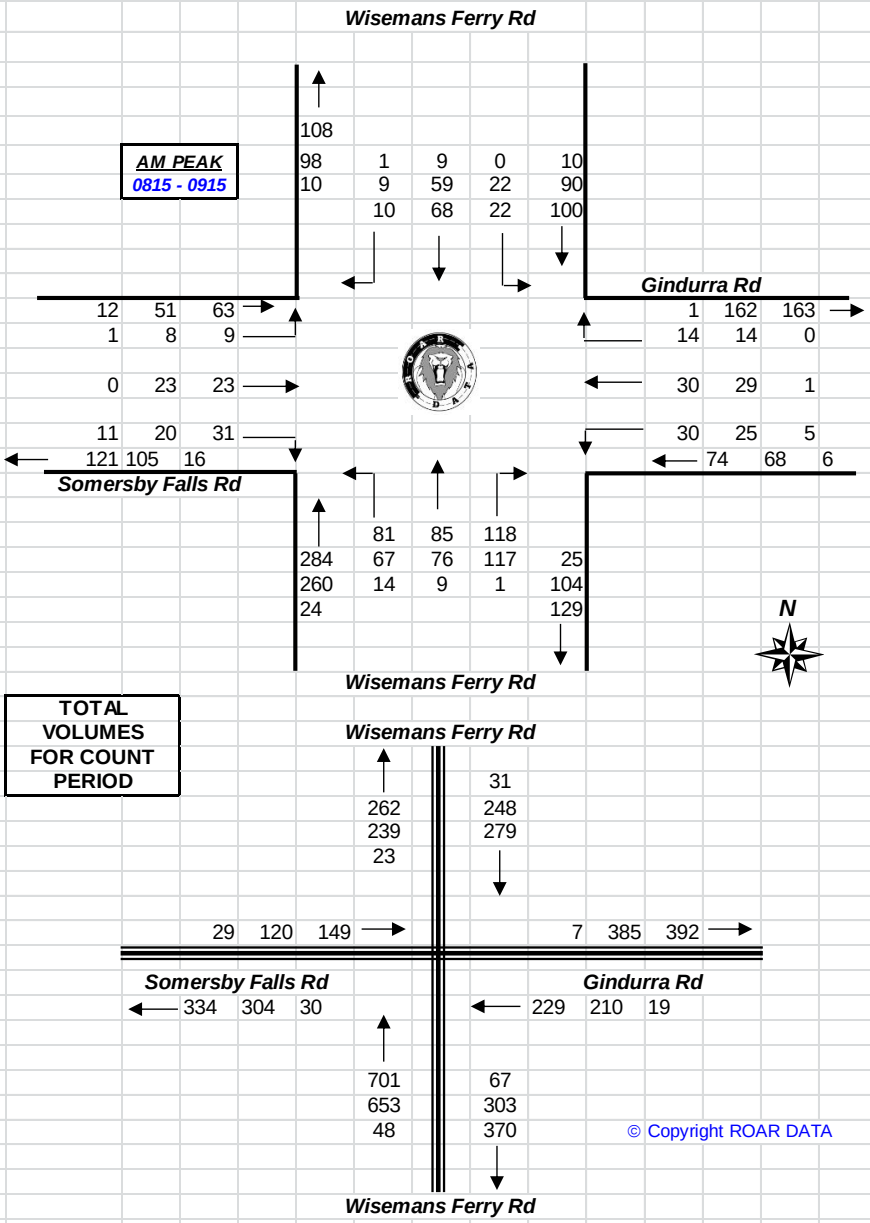
Ph.88196847, Fax 88196849, Mob.0418-239019

Client : Varga Traffic Planning
Job No/Name : 5213 SOMERSBY & KARIONG Counts
Day/Date : Monday 16th June 2014

Peds	NORTH	WEST	SOUTH	EAST	
	Wisemans Ferry Rd	*Somersby Falls Rd*	*Wisemans Ferry Rd*	*Gindurra Rd*	
Time Per	**UNCLASSIFIED**	**UNCLASSIFIED**	**UNCLASSIFIED**	**UNCLASSIFIED**	**TOT**
0630 - 0645	0	0	0	0	**0**
0645 - 0700	0	0	0	0	**0**
0700 - 0715	0	0	0	0	**0**
0715 - 0730	0	0	0	0	**0**
0730 - 0745	0	0	0	0	**0**
0745 - 0800	0	0	0	0	**0**
0800 - 0815	0	0	1	0	**1**
0815 - 0830	0	0	0	0	**0**
0830 - 0845	0	0	0	0	**0**
0845 - 0900	0	0	0	0	**0**
0900 - 0915	0	0	0	0	**0**
0915 - 0930	0	0	0	0	**0**
Period End	**0**	**0**	**1**	**0**	**1**

Peds	NORTH	WEST	SOUTH	EAST	
	Wisemans Ferry Rd	*Somersby Falls Rd*	*Wisemans Ferry Rd*	*Gindurra Rd*	
Peak Per	**UNCLASSIFIED**	**UNCLASSIFIED**	**UNCLASSIFIED**	**UNCLASSIFIED**	**TOT**
0630 - 0730	0	0	0	0	**0**
0645 - 0745	0	0	0	0	**0**
0700 - 0800	0	0	0	0	**0**
0715 - 0815	0	0	1	0	**1**
0730 - 0830	0	0	1	0	**1**
0745 - 0845	0	0	1	0	**1**
0800 - 0900	0	0	1	0	**1**
0815 - 0915	0	0	0	0	**0**
0830 - 0930	0	0	0	0	**0**
PEAK HR	**0**	**0**	**0**	**0**	**0**

1 2 3



TOTAL VOLUMES FOR COUNT PERIOD

R.O.A.R. DATA

Reliable, Original & Authentic Results

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Client : Varga Traffic Planning
Job No/Name : 5213 SOMERSBY & KARIONG Counts
Day/Date : Monday 16th June 2014

Lights

	NORTH			WEST			SOUTH			EAST			
	Wisemans Ferry Rd			*Somersby Falls Rd*			*Wisemans Ferry Rd*			*Gindurra Rd*			
Time Per	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**TOT**
1530 - 1545	4	19	1	3	16	32	5	30	17	50	3	12	**192**
1545 - 1600	6	12	1	3	9	17	3	17	8	19	5	0	**100**
1600 - 1615	5	19	1	3	15	23	5	28	9	27	3	3	**141**
1615 - 1630	6	19	0	0	11	22	4	21	12	19	2	1	**117**
1630 - 1645	11	15	1	0	19	27	5	16	18	29	2	7	**150**
1645 - 1700	7	20	1	2	6	12	5	18	14	23	3	6	**117**
1700 - 1715	11	16	1	3	13	14	2	16	21	25	3	5	**130**
1715 - 1730	5	19	1	1	9	14	2	38	17	24	0	6	**136**
1730 - 1745	5	12	1	0	4	7	3	21	23	25	3	8	**112**
1745 - 1800	5	10	0	1	4	8	1	16	8	7	1	7	**68**
1800 - 1815	5	6	1	1	2	9	3	9	10	20	1	2	**69**
1815 - 1830	5	8	0	1	5	4	4	8	5	5	2	5	**52**
Period End	**75**	**175**	**9**	**18**	**113**	**189**	**42**	**238**	**162**	**273**	**28**	**62**	**1384**

Lights

	NORTH			WEST			SOUTH			EAST			
	Wisemans Ferry Rd			*Somersby Falls Rd*			*Wisemans Ferry Rd*			*Gindurra Rd*			
Peak Time	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**TOT**
1530 - 1630	21	69	3	9	51	94	17	96	46	115	13	16	**550**
1545 - 1645	28	65	3	6	54	89	17	82	47	94	12	11	**508**
1600 - 1700	29	73	3	5	51	84	19	83	53	98	10	17	**525**
1615 - 1715	35	70	3	5	49	75	16	71	65	96	10	19	**514**
1630 - 1730	34	70	4	6	47	67	14	88	70	101	8	24	**533**
1645 - 1745	28	67	4	6	32	47	12	93	75	97	9	25	**495**
1700 - 1800	26	57	3	5	30	43	8	91	69	81	7	26	**446**
1715 - 1815	20	47	3	3	19	38	9	84	58	76	5	23	**385**
1730 - 1830	20	36	2	3	15	28	11	54	46	57	7	22	**301**
PEAK HOUR	**21**	**69**	**3**	**9**	**51**	**94**	**17**	**96**	**46**	**115**	**13**	**16**	**550**

Heavies

	NORTH			WEST			SOUTH			EAST			
	Wisemans Ferry Rd			*Somersby Falls Rd*			*Wisemans Ferry Rd*			*Gindurra Rd*			
Time Per	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**TOT**
1530 - 1545	0	2	0	0	0	1	4	2	3	0	0	0	**12**
1545 - 1600	0	0	1	0	1	1	3	4	1	0	0	0	**11**
1600 - 1615	0	1	0	0	1	0	4	2	1	0	0	0	**9**
1615 - 1630	0	1	0	0	0	1	2	3	1	0	0	0	**8**
1630 - 1645	0	0	0	0	1	0	0	4	3	1	0	0	**9**
1645 - 1700	0	1	0	0	1	0	1	1	0	0	0	0	**4**
1700 - 1715	0	4	0	0	0	0	1	2	1	0	0	0	**8**
1715 - 1730	0	1	0	0	1	0	2	0	0	0	0	0	**4**
1730 - 1745	1	1	0	0	0	0	2	2	0	2	0	0	**8**
1745 - 1800	0	1	0	0	0	0	0	1	0	1	0	0	**3**
1800 - 1815	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1815 - 1830	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Period End	**1**	**12**	**1**	**0**	**5**	**3**	**19**	**21**	**10**	**4**	**0**	**0**	**76**

Heavies

	NORTH			WEST			SOUTH			EAST			
	Wisemans Ferry Rd			*Somersby Falls Rd*			*Wisemans Ferry Rd*			*Gindurra Rd*			
Peak Per	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**TOT**
1530 - 1630	0	4	1	0	2	3	13	11	6	0	0	0	**40**
1545 - 1645	0	2	1	0	3	2	9	13	6	1	0	0	**37**
1600 - 1700	0	3	0	0	3	1	7	10	5	1	0	0	**30**
1615 - 1715	0	6	0	0	2	1	4	10	5	1	0	0	**29**
1630 - 1730	0	6	0	0	3	0	4	7	4	1	0	0	**25**
1645 - 1745	1	7	0	0	2	0	6	5	1	2	0	0	**24**
1700 - 1800	1	7	0	0	1	0	5	5	1	3	0	0	**23**
1715 - 1815	1	3	0	0	1	0	4	3	0	3	0	0	**15**
1730 - 1830	1	2	0	0	0	0	2	3	0	3	0	0	**11**
PEAK HOUR	**0**	**4**	**1**	**0**	**2**	**3**	**13**	**11**	**6**	**0**	**0**	**0**	**40**

Combined

	NORTH			WEST			SOUTH			EAST			
	Wisemans Ferry Rd			*Somersby Falls Rd*			*Wisemans Ferry Rd*			*Gindurra Rd*			
Time Per	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**TOT**
1530 - 1545	4	21	1	3	16	33	9	32	20	50	3	12	**204**
1545 - 1600	6	12	2	3	10	18	6	21	9	19	5	0	**111**
1600 - 1615	5	20	1	3	16	23	9	30	10	27	3	3	**150**
1615 - 1630	6	20	0	0	11	23	6	24	13	19	2	1	**125**
1630 - 1645	11	15	1	0	20	27	5	20	21	30	2	7	**159**
1645 - 1700	7	21	1	2	7	12	6	19	14	23	3	6	**121**
1700 - 1715	11	20	1	3	13	14	3	18	22	25	3	5	**138**
1715 - 1730	5	20	1	1	10	14	4	38	17	24	0	6	**140**
1730 - 1745	6	13	1	0	4	7	5	23	23	27	3	8	**120**
1745 - 1800	5	11	0	1	4	8	1	17	8	8	1	7	**71**
1800 - 1815	5	6	1	1	2	9	3	9	10	20	1	2	**69**
1815 - 1830	5	8	0	1	5	4	4	8	5	5	2	5	**52**
Period End	**76**	**187**	**10**	**18**	**118**	**192**	**61**	**259**	**172**	**277**	**28**	**62**	**1460**

Combined

	NORTH			WEST			SOUTH			EAST			
	Wisemans Ferry Rd			*Somersby Falls Rd*			*Wisemans Ferry Rd*			*Gindurra Rd*			
Peak Per	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**TOT**
1530 - 1630	21	73	4	9	53	97	30	107	52	115	13	16	**590**
1545 - 1645	28	67	4	6	57	91	26	95	53	95	12	11	**545**
1600 - 1700	29	76	3	5	54	85	26	93	58	99	10	17	**555**
1615 - 1715	35	76	3	5	51	76	20	81	70	97	10	19	**543**
1630 - 1730	34	76	4	6	50	67	18	95	74	102	8	24	**558**
1645 - 1745	29	74	4	6	34	47	18	98	76	99	9	25	**519**
1700 - 1800	27	64	3	5	31	43	13	96	70	84	7	26	**469**
1715 - 1815	21	50	3	3	20	38	13	87	58	79	5	23	**400**
1730 - 1830	21	38	2	3	15	28	13	57	46	60	7	22	**312**
PEAK HOUR	**21**	**73**	**4**	**9**	**53**	**97**	**30**	**107**	**52**	**115**	**13**	**16**	**590**

R.O.A.R DATA

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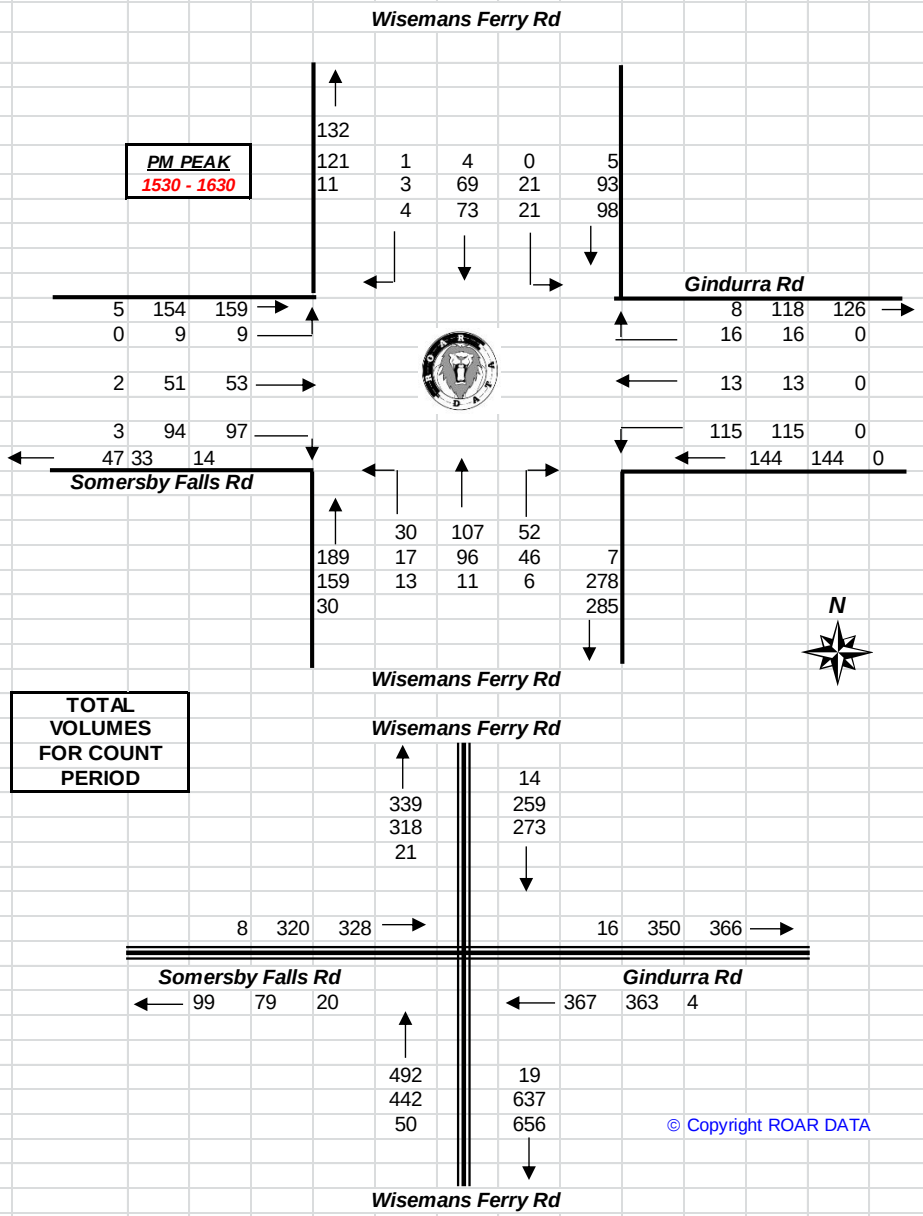
Client : Varga Traffic Planning
Job No/Name : 5213 SOMERSBY & KARIONG Counts
Day/Date : Monday 16th June 2014

Peds	NORTH	WEST	SOUTH	EAST	
	Wisemans Ferry Rd	*Somersby Falls Rd*	*Wisemans Ferry Rd*	*Gindurra Rd*	
Time Per	**UNCLASSIFIED**	**UNCLASSIFIED**	**UNCLASSIFIED**	**UNCLASSIFIED**	**TOT**
1530 - 1545	1	0	0	0	**1**
1545 - 1600	0	0	0	0	**0**
1600 - 1615	0	0	0	0	**0**
1615 - 1630	0	0	0	0	**0**
1630 - 1645	0	0	0	0	**0**
1645 - 1700	0	0	0	0	**0**
1700 - 1715	0	0	0	0	**0**
1715 - 1730	0	0	0	0	**0**
1730 - 1745	0	0	0	0	**0**
1745 - 1800	0	0	0	0	**0**
1800 - 1815	0	0	0	0	**0**
1815 - 1830	0	0	0	0	**0**
Period End	**1**	**0**	**0**	**0**	**1**

Peds	NORTH	WEST	SOUTH	EAST	
	Wisemans Ferry Rd	*Somersby Falls Rd*	*Wisemans Ferry Rd*	*Gindurra Rd*	
Peak Per	**UNCLASSIFIED**	**UNCLASSIFIED**	**UNCLASSIFIED**	**UNCLASSIFIED**	**TOT**
1530 - 1630	1	0	0	0	**1**
1545 - 1645	0	0	0	0	**0**
1600 - 1700	0	0	0	0	**0**
1615 - 1715	0	0	0	0	**0**
1630 - 1730	0	0	0	0	**0**
1645 - 1745	0	0	0	0	**0**
1700 - 1800	0	0	0	0	**0**
1715 - 1815	0	0	0	0	**0**
1730 - 1830	0	0	0	0	**0**
PEAK HR	**1**	**0**	**0**	**0**	**1**



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R.O.A.R. DATA
Reliable, Original & Authentic Results
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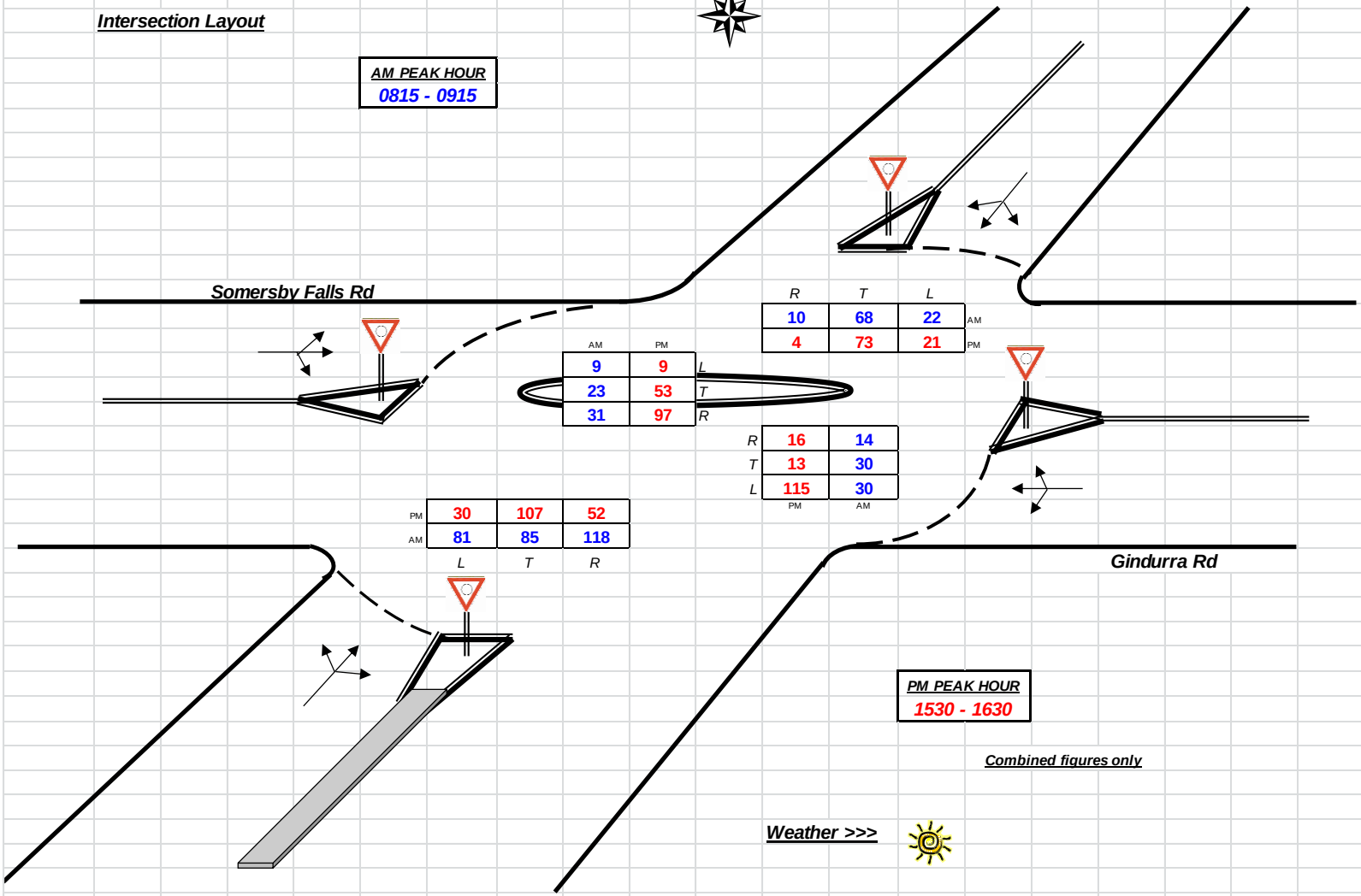
Client	: Varga Traffic Planning
Job No/Name	: 5213 SOMERSBY & KARIONG Counts
Day/Date	: Monday 16th June 2014

Intersection Layout

AM PEAK HOUR
0815 - 0915



	AM	PM	
	9	9	L
	23	53	T
	31	97	R

	R	T	L	
	10	68	22	AM
	4	73	21	PM

R	16	14	
T	13	30	
L	115	30	
	PM	AM	

PM	30	107	52
AM	81	85	118
	L	T	R

PM PEAK HOUR
1530 - 1630

Combined figures only

Weather >>>

R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849.

Mobile.0418239019

Client : Varga Traffic Planning

Job No/Name : 5213 SOMERSBY & KARIONG Counts

Day/Date : Monday 16th June 2014

PEDS	WEST	SOUTH	EAST	
Time Per	*Debenham Rd South*	*Acacia Rd*	*Debenham Rd South*	TOT
0630 - 0645	0	0	0	**0**
0645 - 0700	0	0	0	**0**
0700 - 0715	0	0	0	**0**
0715 - 0730	0	0	0	**0**
0730 - 0745	0	0	0	**0**
0745 - 0800	0	0	0	**0**
0800 - 0815	0	0	0	**0**
0815 - 0830	0	0	0	**0**
0830 - 0845	0	0	0	**0**
0845 - 0900	0	0	0	**0**
0900 - 0915	0	0	0	**0**
0915 - 0930	0	0	0	**0**
Per End	**0**	**0**	**0**	**0**

PEDS	WEST	SOUTH	EAST	
Peak Per	*Debenham Rd South*	*Acacia Rd*	*Debenham Rd South*	TOT
0630 - 0730	0	0	0	**0**
0645 - 0745	0	0	0	**0**
0700 - 0800	0	0	0	**0**
0715 - 0815	0	0	0	**0**
0730 - 0830	0	0	0	**0**
0745 - 0845	0	0	0	**0**
0800 - 0900	0	0	0	**0**
0815 - 0915	0	0	0	**0**
0830 - 0930	0	0	0	**0**
PEAK HR	**0**	**0**	**0**	**0**

Lights	WEST		SOUTH		EAST		
	Debenham Rd South		*Acacia Rd*		*Debenham Rd South*		
Time Per	T	R	L	R	L	T	TOT
0630 - 0645	8	2	1	1	4	13	**29**
0645 - 0700	13	2	1	2	19	38	**75**
0700 - 0715	9	1	1	0	7	18	**36**
0715 - 0730	15	0	2	0	8	18	**43**
0730 - 0745	16	3	1	0	7	23	**50**
0745 - 0800	17	1	2	1	6	25	**52**
0800 - 0815	22	2	3	4	8	13	**52**
0815 - 0830	27	2	3	1	6	26	**65**
0830 - 0845	25	7	5	5	4	14	**60**
0845 - 0900	16	2	3	5	5	9	**40**
0900 - 0915	16	1	4	6	3	12	**42**
0915 - 0930	8	3	6	1	4	14	**36**
Per End	**192**	**26**	**32**	**26**	**81**	**223**	**580**

Heavies	WEST		SOUTH		EAST		
	Debenham Rd South		*Acacia Rd*		*Debenham Rd South*		
Time Per	T	R	L	R	L	T	TOT
0630 - 0645	0	0	0	0	0	0	**0**
0645 - 0700	0	0	1	0	0	0	**1**
0700 - 0715	0	0	0	0	0	0	**0**
0715 - 0730	0	0	1	0	0	0	**1**
0730 - 0745	0	0	0	0	0	0	**0**
0745 - 0800	0	0	2	0	0	0	**2**
0800 - 0815	0	0	1	0	0	0	**1**
0815 - 0830	0	0	0	0	0	0	**0**
0830 - 0845	0	0	0	0	0	0	**0**
0845 - 0900	0	0	1	0	0	0	**1**
0900 - 0915	0	0	2	0	0	0	**2**
0915 - 0930	0	0	0	0	0	0	**0**
Per End	**0**	**0**	**8**	**0**	**0**	**0**	**8**

Combined	WEST		SOUTH		EAST		
	Debenham Rd South		*Acacia Rd*		*Debenham Rd South*		
Time Per	T	R	L	R	L	T	TOT
0630 - 0645	8	2	1	1	4	13	**29**
0645 - 0700	13	2	2	2	19	38	**76**
0700 - 0715	9	1	1	0	7	18	**36**
0715 - 0730	15	0	3	0	8	18	**44**
0730 - 0745	16	3	1	0	7	23	**50**
0745 - 0800	17	1	4	1	6	25	**54**
0800 - 0815	22	2	4	4	8	13	**53**
0815 - 0830	27	2	3	1	6	26	**65**
0830 - 0845	25	7	5	5	4	14	**60**
0845 - 0900	16	2	4	5	5	9	**41**
0900 - 0915	16	1	6	6	3	12	**44**
0915 - 0930	8	3	6	1	4	14	**36**
Per End	**192**	**26**	**40**	**26**	**81**	**223**	**588**

Lights	WEST		SOUTH		EAST		
	Debenham Rd South		*Acacia Rd*		*Debenham Rd South*		
Peak Per	T	R	L	R	L	T	TOT
0630 - 0730	45	5	5	3	38	87	**183**
0645 - 0745	53	6	5	2	41	97	**204**
0700 - 0800	57	5	6	1	28	84	**181**
0715 - 0815	70	6	8	5	29	79	**197**
0730 - 0830	82	8	9	6	27	87	**219**
0745 - 0845	91	12	13	11	24	78	**229**
0800 - 0900	90	13	14	15	23	62	**217**
0815 - 0915	84	12	15	17	18	61	**207**
0830 - 0930	65	13	18	17	16	49	**178**
PEAK HR	**91**	**12**	**13**	**11**	**24**	**78**	**229**

Heavies	WEST		SOUTH		EAST		
	Debenham Rd South		*Acacia Rd*		*Debenham Rd South*		
Peak Per	T	R	L	R	L	T	TOT
0630 - 0730	0	0	2	0	0	0	**2**
0645 - 0745	0	0	2	0	0	0	**2**
0700 - 0800	0	0	3	0	0	0	**3**
0715 - 0815	0	0	4	0	0	0	**4**
0730 - 0830	0	0	3	0	0	0	**3**
0745 - 0845	0	0	3	0	0	0	**3**
0800 - 0900	0	0	2	0	0	0	**2**
0815 - 0915	0	0	3	0	0	0	**3**
0830 - 0930	0	0	3	0	0	0	**3**
PEAK HR	**0**	**0**	**3**	**0**	**0**	**0**	**3**

Combined	WEST		SOUTH		EAST		
	Debenham Rd South		*Acacia Rd*		*Debenham Rd South*		
Peak Per	T	R	L	R	L	T	TOT
0630 - 0730	45	5	7	3	38	87	**185**
0645 - 0745	53	6	7	2	41	97	**206**
0700 - 0800	57	5	9	1	28	84	**184**
0715 - 0815	70	6	12	5	29	79	**201**
0730 - 0830	82	8	12	6	27	87	**222**
0745 - 0845	91	12	16	11	24	78	**232**
0800 - 0900	90	13	16	15	23	62	**219**
0815 - 0915	84	12	18	17	18	61	**210**
0830 - 0930	65	13	21	17	16	49	**181**
PEAK HR	**91**	**12**	**16**	**11**	**24**	**78**	**232**

R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849.

Mobile.0418239019

Client : Varga Traffic Planning

Job No/Name : 5213 SOMERSBY & KARIONG Cour

Day/Date : Monday 16th June 2014

PEDS	WEST	SOUTH	EAST	
Time Per	*Debenham Rd South*	*Acacia Rd*	*Debenham Rd South*	TOT
1530 - 1545	0	0	0	**0**
1545 - 1600	0	0	0	**0**
1600 - 1615	0	0	0	**0**
1615 - 1630	0	0	0	**0**
1630 - 1645	0	0	0	**0**
1645 - 1700	0	0	0	**0**
1700 - 1715	0	0	0	**0**
1715 - 1730	0	0	0	**0**
1730 - 1745	0	0	0	**0**
1745 - 1800	0	0	0	**0**
1800 - 1815	0	0	0	**0**
1815 - 1830	0	0	0	**0**
Per End	**0**	**0**	**0**	0

PEDS	WEST	SOUTH	EAST	
Peak Per	*Debenham Rd South*	*Acacia Rd*	*Debenham Rd South*	TOT
1530 - 1630	0	0	0	**0**
1545 - 1645	0	0	0	**0**
1600 - 1700	0	0	0	**0**
1615 - 1715	0	0	0	**0**
1630 - 1730	0	0	0	**0**
1645 - 1745	0	0	0	**0**
1700 - 1800	0	0	0	**0**
1715 - 1815	0	0	0	**0**
1730 - 1830	0	0	0	**0**
PEAK HR	**0**	**0**	**0**	**0**

Lights	WEST		SOUTH		EAST		
	Debenham Rd South		*Acacia Rd*		*Debenham Rd South*		
Time Per	T	R	L	R	L	T	TOT
1530 - 1545	41	3	22	18	5	19	**108**
1545 - 1600	38	1	5	8	2	8	**62**
1600 - 1615	34	0	10	16	1	16	**77**
1615 - 1630	36	1	6	13	1	12	**69**
1630 - 1645	58	4	6	10	3	16	**97**
1645 - 1700	47	2	7	13	2	18	**89**
1700 - 1715	43	5	7	21	3	16	**95**
1715 - 1730	37	4	5	20	4	14	**84**
1730 - 1745	32	1	7	16	0	20	**76**
1745 - 1800	31	2	3	7	1	11	**55**
1800 - 1815	19	0	1	4	0	1	**25**
1815 - 1830	19	2	1	6	1	10	**39**
Per End	**435**	**25**	**80**	**152**	**23**	**161**	**876**

Heavies	WEST		SOUTH		EAST		
	Debenham Rd South		*Acacia Rd*		*Debenham Rd South*		
Time Per	T	R	L	R	L	T	TOT
1530 - 1545	0	0	0	0	0	0	**0**
1545 - 1600	0	1	0	0	0	0	**1**
1600 - 1615	0	1	0	0	0	0	**1**
1615 - 1630	0	0	0	0	0	0	**0**
1630 - 1645	0	1	0	0	0	0	**1**
1645 - 1700	0	0	0	0	0	0	**0**
1700 - 1715	0	1	0	0	0	0	**1**
1715 - 1730	0	1	0	0	0	0	**1**
1730 - 1745	0	0	0	0	0	0	**0**
1745 - 1800	0	0	0	0	0	0	**0**
1800 - 1815	0	0	0	0	0	0	**0**
1815 - 1830	0	0	1	0	1	0	**2**
Per End	**0**	**5**	**1**	**0**	**1**	**0**	**7**

Combined	WEST		SOUTH		EAST		
	Debenham Rd South		*Acacia Rd*		*Debenham Rd South*		
Time Per	T	R	L	R	L	T	TOT
1530 - 1545	41	3	22	18	5	19	**108**
1545 - 1600	38	2	5	8	2	8	**63**
1600 - 1615	34	1	10	16	1	16	**78**
1615 - 1630	36	1	6	13	1	12	**69**
1630 - 1645	58	5	6	10	3	16	**98**
1645 - 1700	47	2	7	13	2	18	**89**
1700 - 1715	43	6	7	21	3	16	**96**
1715 - 1730	37	5	5	20	4	14	**85**
1730 - 1745	32	1	7	16	0	20	**76**
1745 - 1800	31	2	3	7	1	11	**55**
1800 - 1815	19	0	1	4	0	1	**25**
1815 - 1830	19	2	2	6	2	10	**41**
Per End	**435**	**30**	**81**	**152**	**24**	**161**	**883**

Lights	WEST		SOUTH		EAST		
	Debenham Rd South		*Acacia Rd*		*Debenham Rd South*		
Peak Per	T	R	L	R	L	T	TOT
1530 - 1630	149	5	43	55	9	55	**316**
1545 - 1645	166	6	27	47	7	52	**305**
1600 - 1700	175	7	29	52	7	62	**332**
1615 - 1715	184	12	26	57	9	62	**350**
1630 - 1730	185	15	25	64	12	64	**365**
1645 - 1745	159	12	26	70	9	68	**344**
1700 - 1800	143	12	22	64	8	61	**310**
1715 - 1815	119	7	16	47	5	46	**240**
1730 - 1830	101	5	12	33	2	42	**195**
PEAK HR	**185**	**15**	**25**	**64**	**12**	**64**	**365**

Heavies	WEST		SOUTH		EAST		
	Debenham Rd South		*Acacia Rd*		*Debenham Rd South*		
Peak Per	T	R	L	R	L	T	TOT
1530 - 1630	0	2	0	0	0	0	**2**
1545 - 1645	0	3	0	0	0	0	**3**
1600 - 1700	0	2	0	0	0	0	**2**
1615 - 1715	0	2	0	0	0	0	**2**
1630 - 1730	0	3	0	0	0	0	**3**
1645 - 1745	0	2	0	0	0	0	**2**
1700 - 1800	0	2	0	0	0	0	**2**
1715 - 1815	0	1	0	0	0	0	**1**
1730 - 1830	0	0	1	0	1	0	**2**
PEAK HR	**0**	**3**	**0**	**0**	**0**	**0**	**3**

Combined	WEST		SOUTH		EAST		
	Debenham Rd South		*Acacia Rd*		*Debenham Rd South*		
Peak Per	T	R	L	R	L	T	TOT
1530 - 1630	149	7	43	55	9	55	**318**
1545 - 1645	166	9	27	47	7	52	**308**
1600 - 1700	175	9	29	52	7	62	**334**
1615 - 1715	184	14	26	57	9	62	**352**
1630 - 1730	185	18	25	64	12	64	**368**
1645 - 1745	159	14	26	70	9	68	**346**
1700 - 1800	143	14	22	64	8	61	**312**
1715 - 1815	119	8	16	47	5	46	**241**
1730 - 1830	101	5	13	33	3	42	**197**
PEAK HR	**185**	**18**	**25**	**64**	**12**	**64**	**368**

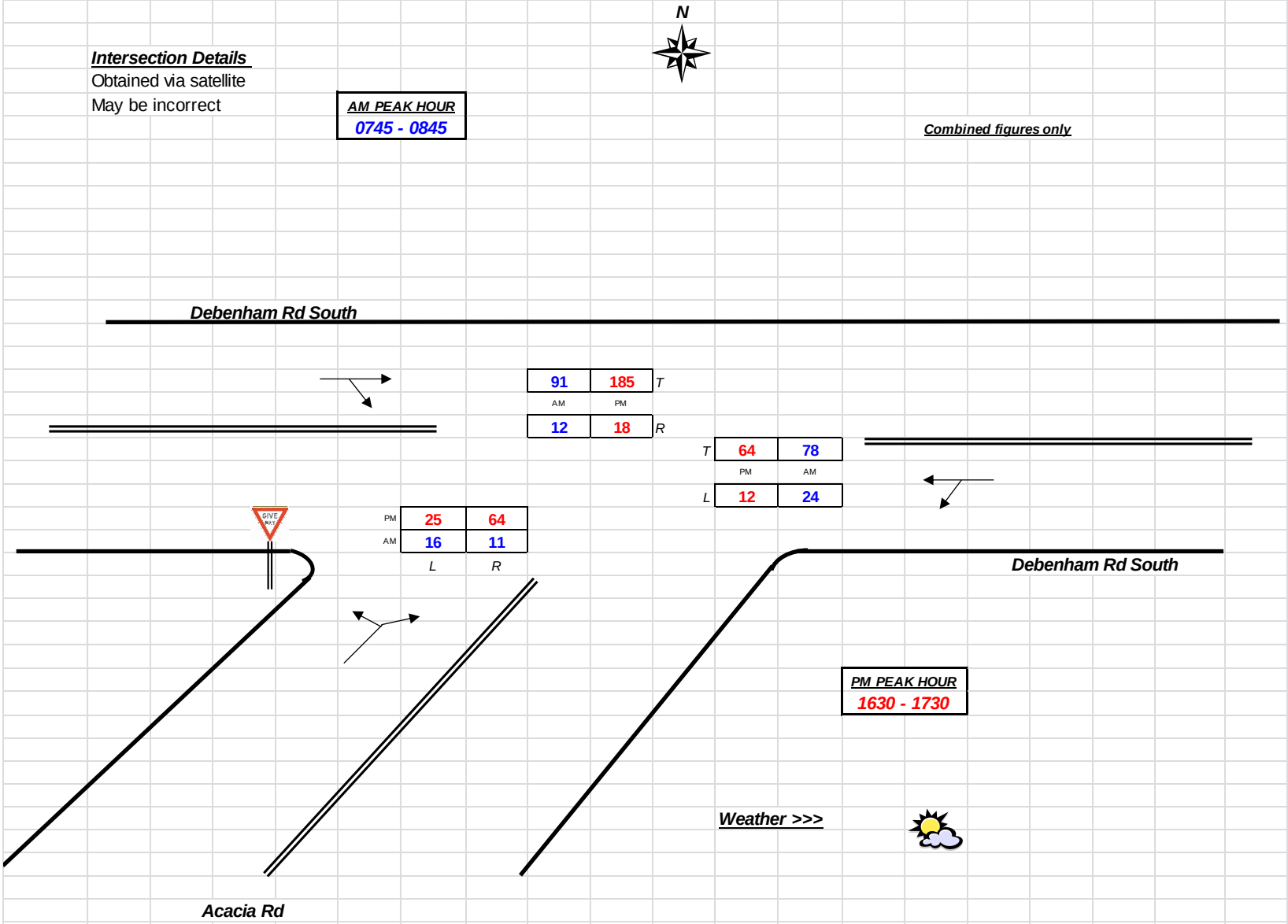
R.O.A.R. DATA
Reliable, Original & Authentic Results
Ph.88196847, Fax 88196849, Mob.0418-239019

Client	: Varga Traffic Planning
Job No/Name	: 5213 SOMERSBY & KARIONG Counts
Day/Date	: Monday 16th June 2014

Intersection Details
Obtained via satellite
May be incorrect

AM PEAK HOUR
0745 - 0845

Combined figures only



APPENDIX B

SIDRA ANALYSIS RESULTS

MOVEMENT SUMMARY

Site: Existing - AM

Intersection of Central Coast Highway & Kangoo Road
Signals - Fixed Time Cycle Time = 130 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Central Coast Highway (E)											
5	T1	1843	1.4	0.660	10.0	LOS A	30.3	214.3	0.58	0.54	51.5
6	R2	53	7.5	0.244	39.1	LOS C	2.2	16.5	0.94	0.74	34.4
Approach		1896	1.6	0.660	10.8	LOS A	30.3	214.3	0.59	0.54	50.8
North: Kangoo Road (N)											
7	L2	21	9.5	0.013	4.7	LOS A	0.1	0.5	0.10	0.49	50.4
9	R2	26	11.5	0.082	52.0	LOS D	1.4	10.5	0.86	0.71	30.2
Approach		47	10.6	0.082	30.9	LOS C	1.4	10.5	0.52	0.61	36.8
West: Central Coast Highway (W)											
10	L2	125	4.8	0.101	9.2	LOS A	1.3	9.7	0.35	0.64	48.2
11	T1	1074	4.2	0.575	23.3	LOS B	24.1	174.5	0.74	0.66	43.4
Approach		1199	4.3	0.575	21.8	LOS B	24.1	174.5	0.70	0.66	43.8
All Vehicles		3142	2.7	0.660	15.3	LOS B	30.3	214.3	0.63	0.59	47.6

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	53	59.3	LOS E	0.2	0.2	0.96	0.96
P3	North Full Crossing	53	18.9	LOS B	0.1	0.1	0.54	0.54
P4S	West Slip/Bypass Lane Crossing	53	30.2	LOS D	0.1	0.1	0.91	0.91
All Pedestrians		158	36.1	LOS D			0.80	0.80

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: Existing - PM

Intersection of Central Coast Highway & Kangoo Road
Signals - Fixed Time Cycle Time = 130 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Central Coast Highway (E)											
5	T1	1119	1.3	0.400	7.4	LOS A	13.5	95.5	0.42	0.38	53.5
6	R2	26	0.0	0.114	38.1	LOS C	1.1	7.4	0.92	0.70	34.7
Approach		1145	1.3	0.400	8.1	LOS A	13.5	95.5	0.43	0.39	52.9
North: Kangoo Road (N)											
7	L2	109	1.8	0.066	4.7	LOS A	0.3	2.4	0.10	0.50	50.6
9	R2	69	1.4	0.203	53.2	LOS D	3.7	26.4	0.89	0.75	30.0
Approach		178	1.7	0.203	23.5	LOS B	3.7	26.4	0.41	0.60	40.0
West: Central Coast Highway (W)											
10	L2	77	0.0	0.060	9.0	LOS A	0.8	5.5	0.34	0.63	48.3
11	T1	2391	1.0	1.244	283.4	LOS F	195.0	1376.3	1.00	2.15	10.6
Approach		2468	0.9	1.244	274.9	LOS F	195.0	1376.3	0.98	2.10	10.9
All Vehicles		3791	1.1	1.244	182.5	LOS F	195.0	1376.3	0.79	1.51	15.0

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	53	59.3	LOS E	0.2	0.2	0.96	0.96
P3	North Full Crossing	53	18.9	LOS B	0.1	0.1	0.54	0.54
P4S	West Slip/Bypass Lane Crossing	53	30.2	LOS D	0.1	0.1	0.91	0.91
All Pedestrians		158	36.1	LOS D			0.80	0.80

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: Proposed - PM

Intersection of Central Coast Highway & Kangoo Road
Signals - Fixed Time Cycle Time = 130 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Central Coast Highway (E)											
5	T1	1119	1.3	0.400	7.4	LOS A	13.5	95.5	0.42	0.38	53.5
6	R2	101	0.0	0.442	40.0	LOS C	4.3	30.3	0.97	0.77	34.1
Approach		1220	1.2	0.442	10.1	LOS A	13.5	95.5	0.47	0.41	51.1
North: Kangoo Road (N)											
7	L2	409	0.5	0.243	4.8	LOS A	1.5	10.7	0.13	0.51	50.6
9	R2	219	0.5	0.641	58.1	LOS E	13.0	91.6	0.98	0.83	28.8
Approach		628	0.5	0.641	23.4	LOS B	13.0	91.6	0.42	0.62	40.1
West: Central Coast Highway (W)											
10	L2	265	0.0	0.206	9.5	LOS A	3.1	21.5	0.38	0.66	48.1
11	T1	2391	1.0	1.310	344.7	LOS F	225.3	1590.4	1.00	2.36	9.0
Approach		2656	0.9	1.310	311.2	LOS F	225.3	1590.4	0.94	2.19	9.8
All Vehicles		4504	0.9	1.310	189.5	LOS F	225.3	1590.4	0.74	1.49	14.5

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	53	59.3	LOS E	0.2	0.2	0.96	0.96
P3	North Full Crossing	53	18.9	LOS B	0.1	0.1	0.54	0.54
P4S	West Slip/Bypass Lane Crossing	53	30.2	LOS D	0.1	0.1	0.91	0.91
All Pedestrians		158	36.1	LOS D			0.80	0.80

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: Proposed - PM

Intersection of Central Coast Highway & Kangoo Road
Signals - Fixed Time Cycle Time = 130 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Central Coast Highway (E)											
5	T1	1119	1.3	0.400	7.4	LOS A	13.5	95.5	0.42	0.38	53.5
6	R2	101	0.0	0.442	40.0	LOS C	4.3	30.3	0.97	0.77	34.1
Approach		1220	1.2	0.442	10.1	LOS A	13.5	95.5	0.47	0.41	51.1
North: Kangoo Road (N)											
7	L2	409	0.5	0.243	4.8	LOS A	1.5	10.7	0.13	0.51	50.6
9	R2	219	0.5	0.641	58.1	LOS E	13.0	91.6	0.98	0.83	28.8
Approach		628	0.5	0.641	23.4	LOS B	13.0	91.6	0.42	0.62	40.1
West: Central Coast Highway (W)											
10	L2	265	0.0	0.206	9.5	LOS A	3.1	21.5	0.38	0.66	48.1
11	T1	2391	1.0	1.310	344.7	LOS F	225.3	1590.4	1.00	2.36	9.0
Approach		2656	0.9	1.310	311.2	LOS F	225.3	1590.4	0.94	2.19	9.8
All Vehicles		4504	0.9	1.310	189.5	LOS F	225.3	1590.4	0.74	1.49	14.5

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	53	59.3	LOS E	0.2	0.2	0.96	0.96
P3	North Full Crossing	53	18.9	LOS B	0.1	0.1	0.54	0.54
P4S	West Slip/Bypass Lane Crossing	53	30.2	LOS D	0.1	0.1	0.91	0.91
All Pedestrians		158	36.1	LOS D			0.80	0.80

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: Existing - AM

Intersection of Wisemans Ferry Road & Somersby Falls Road & Gindurra ROad
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Wisemans Ferry Road (S)											
1	L2	80	7.5	0.155	4.9	LOS A	0.8	6.3	0.18	0.53	56.8
2	T1	66	9.1	0.155	5.2	LOS A	0.8	6.3	0.18	0.53	61.3
3	R2	73	4.1	0.155	10.6	LOS A	0.8	6.3	0.18	0.53	54.9
Approach		219	6.8	0.155	6.9	LOS A	0.8	6.3	0.18	0.53	57.4
East: Gindurra Road (E)											
4	L2	22	13.6	0.056	3.1	LOS A	0.3	2.1	0.26	0.38	52.5
5	T1	37	8.1	0.056	2.8	LOS A	0.3	2.1	0.26	0.38	51.9
6	R2	10	10.0	0.056	8.0	LOS A	0.3	2.1	0.26	0.38	49.0
Approach		69	10.1	0.056	3.6	LOS A	0.3	2.1	0.26	0.38	51.6
North: Wisemans Ferry Road (N)											
7	L2	29	0.0	0.084	5.1	LOS A	0.4	3.1	0.27	0.47	53.5
8	T1	72	13.9	0.084	5.6	LOS A	0.4	3.1	0.27	0.47	62.0
9	R2	3	0.0	0.084	10.8	LOS A	0.4	3.1	0.27	0.47	59.7
Approach		104	9.6	0.084	5.6	LOS A	0.4	3.1	0.27	0.47	59.3
West: Somersby Falls Road (W)											
10	L2	4	0.0	0.039	4.2	LOS A	0.2	1.4	0.30	0.54	55.5
11	T1	16	0.0	0.039	4.3	LOS A	0.2	1.4	0.30	0.54	50.7
12	R2	28	10.7	0.039	9.8	LOS A	0.2	1.4	0.30	0.54	54.3
Approach		48	6.3	0.039	7.5	LOS A	0.2	1.4	0.30	0.54	53.1
All Vehicles		440	8.0	0.155	6.1	LOS A	0.8	6.3	0.23	0.50	56.3

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Existing - PM

Intersection of Wisemans Ferry Road & Somersby Falls Road & Gindurra ROad
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Wisemans Ferry Road (S)											
1	L2	18	22.2	0.130	4.9	LOS A	0.7	5.3	0.15	0.53	56.1
2	T1	95	7.4	0.130	5.1	LOS A	0.7	5.3	0.15	0.53	61.1
3	R2	74	5.4	0.130	10.5	LOS A	0.7	5.3	0.15	0.53	54.7
Approach		187	8.0	0.130	7.2	LOS A	0.7	5.3	0.15	0.53	57.9
East: Gindurra Road (E)											
4	L2	102	1.0	0.106	3.2	LOS A	0.5	3.8	0.31	0.45	53.0
5	T1	8	0.0	0.106	2.9	LOS A	0.5	3.8	0.31	0.45	51.9
6	R2	24	0.0	0.106	8.1	LOS A	0.5	3.8	0.31	0.45	48.9
Approach		134	0.7	0.106	4.0	LOS A	0.5	3.8	0.31	0.45	52.2
North: Wisemans Ferry Road (N)											
7	L2	34	0.0	0.096	5.4	LOS A	0.5	3.6	0.36	0.51	53.1
8	T1	76	7.9	0.096	5.8	LOS A	0.5	3.6	0.36	0.51	61.8
9	R2	4	0.0	0.096	11.2	LOS A	0.5	3.6	0.36	0.51	59.2
Approach		114	5.3	0.096	5.9	LOS A	0.5	3.6	0.36	0.51	58.9
West: Somersby Falls Road (W)											
10	L2	6	0.0	0.102	4.5	LOS A	0.5	3.7	0.35	0.57	55.3
11	T1	50	6.0	0.102	4.6	LOS A	0.5	3.7	0.35	0.57	50.5
12	R2	67	0.0	0.102	9.9	LOS A	0.5	3.7	0.35	0.57	56.7
Approach		123	2.4	0.102	7.5	LOS A	0.5	3.7	0.35	0.57	53.9
All Vehicles		558	4.5	0.130	6.2	LOS A	0.7	5.3	0.28	0.52	55.7

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Proposed - AM

Intersection of Wisemans Ferry Road & Somersby Falls Road & Gindurra ROad
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Wisemans Ferry Road (S)											
1	L2	80	7.5	0.165	5.1	LOS A	0.9	6.7	0.26	0.54	56.5
2	T1	66	9.1	0.165	5.4	LOS A	0.9	6.7	0.26	0.54	61.0
3	R2	73	4.1	0.165	10.8	LOS A	0.9	6.7	0.26	0.54	54.6
Approach		219	6.8	0.165	7.1	LOS A	0.9	6.7	0.26	0.54	57.1
East: Gindurra Road (E)											
4	L2	172	1.7	0.192	3.0	LOS A	1.1	7.7	0.28	0.43	53.0
5	T1	37	8.1	0.192	2.8	LOS A	1.1	7.7	0.28	0.43	51.8
6	R2	48	2.1	0.192	7.9	LOS A	1.1	7.7	0.28	0.43	49.0
Approach		257	2.7	0.192	3.9	LOS A	1.1	7.7	0.28	0.43	52.0
North: Wisemans Ferry Road (N)											
7	L2	179	0.0	0.194	5.1	LOS A	1.1	7.7	0.30	0.50	53.6
8	T1	72	13.9	0.194	5.6	LOS A	1.1	7.7	0.30	0.50	62.3
9	R2	3	0.0	0.194	10.9	LOS A	1.1	7.7	0.30	0.50	59.9
Approach		254	3.9	0.194	5.3	LOS A	1.1	7.7	0.30	0.50	55.9
West: Somersby Falls Road (W)											
10	L2	4	0.0	0.041	4.4	LOS A	0.2	1.5	0.34	0.55	55.4
11	T1	16	0.0	0.041	4.5	LOS A	0.2	1.5	0.34	0.55	50.6
12	R2	28	10.7	0.041	9.9	LOS A	0.2	1.5	0.34	0.55	54.2
Approach		48	6.3	0.041	7.7	LOS A	0.2	1.5	0.34	0.55	53.0
All Vehicles		778	4.5	0.194	5.5	LOS A	1.1	7.7	0.28	0.49	54.7

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Proposed - PM

Intersection of Wisemans Ferry Road & Somersby Falls Road & Gindurra ROad
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Wisemans Ferry Road (S)											
1	L2	18	22.2	0.162	5.7	LOS A	0.9	7.0	0.40	0.58	55.1
2	T1	95	7.4	0.162	5.9	LOS A	0.9	7.0	0.40	0.58	60.0
3	R2	74	5.4	0.162	11.3	LOS A	0.9	7.0	0.40	0.58	53.8
Approach		187	8.0	0.162	8.0	LOS A	0.9	7.0	0.40	0.58	56.9
East: Gindurra Road (E)											
4	L2	702	0.1	0.646	3.8	LOS A	6.2	43.8	0.55	0.53	52.2
5	T1	8	0.0	0.646	3.5	LOS A	6.2	43.8	0.55	0.53	51.1
6	R2	174	0.0	0.646	8.7	LOS A	6.2	43.8	0.55	0.53	48.3
Approach		884	0.1	0.646	4.7	LOS A	6.2	43.8	0.55	0.53	51.4
North: Wisemans Ferry Road (N)											
7	L2	72	0.0	0.128	5.5	LOS A	0.7	4.9	0.37	0.52	53.2
8	T1	76	7.9	0.128	5.9	LOS A	0.7	4.9	0.37	0.52	61.9
9	R2	4	0.0	0.128	11.2	LOS A	0.7	4.9	0.37	0.52	59.3
Approach		152	3.9	0.128	5.8	LOS A	0.7	4.9	0.37	0.52	57.4
West: Somersby Falls Road (W)											
10	L2	6	0.0	0.115	5.2	LOS A	0.6	4.4	0.49	0.62	54.9
11	T1	50	6.0	0.115	5.4	LOS A	0.6	4.4	0.49	0.62	50.1
12	R2	67	0.0	0.115	10.6	LOS A	0.6	4.4	0.49	0.62	56.2
Approach		123	2.4	0.115	8.2	LOS A	0.6	4.4	0.49	0.62	53.5
All Vehicles		1346	1.9	0.646	5.6	LOS A	6.2	43.8	0.50	0.54	52.9

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽ Site: Existing - AM

Intersection of Debenham Road South & Acacia Road
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Acacia Road (S)											
1	L2	12	33.3	0.012	5.1	LOS A	0.0	0.4	0.16	0.50	45.8
3	R2	5	0.0	0.012	4.8	LOS A	0.0	0.4	0.16	0.50	45.8
Approach		17	23.5	0.012	5.0	LOS A	0.0	0.4	0.16	0.50	45.8
East: Debenham Road (E)											
4	L2	29	0.0	0.056	4.6	LOS A	0.0	0.0	0.00	0.15	48.7
5	T1	79	0.0	0.056	0.0	LOS A	0.0	0.0	0.00	0.15	49.2
Approach		108	0.0	0.056	1.2	NA	0.0	0.0	0.00	0.15	49.0
West: Debenham Road (W)											
11	T1	70	0.0	0.039	0.2	LOS A	0.2	1.3	0.22	0.04	49.1
12	R2	6	0.0	0.039	4.8	LOS A	0.2	1.3	0.22	0.04	48.2
Approach		76	0.0	0.039	0.6	NA	0.2	1.3	0.22	0.04	49.1
All Vehicles		201	2.0	0.056	1.3	NA	0.2	1.3	0.10	0.14	48.8

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽ Site: Existing - PM

Intersection of Debenham Road South & Acacia Road
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Acacia Road (S)											
1	L2	25	0.0	0.052	4.8	LOS A	0.2	1.1	0.14	0.54	46.3
3	R2	64	0.0	0.052	4.8	LOS A	0.2	1.1	0.14	0.54	45.9
Approach		89	0.0	0.052	4.8	LOS A	0.2	1.1	0.14	0.54	46.0
East: Debenham Road (E)											
4	L2	12	0.0	0.039	4.6	LOS A	0.0	0.0	0.00	0.09	49.0
5	T1	64	0.0	0.039	0.0	LOS A	0.0	0.0	0.00	0.09	49.5
Approach		76	0.0	0.039	0.7	NA	0.0	0.0	0.00	0.09	49.4
West: Debenham Road (W)											
11	T1	185	0.0	0.105	0.2	LOS A	0.6	4.1	0.20	0.05	49.2
12	R2	18	16.7	0.105	4.9	LOS A	0.6	4.1	0.20	0.05	48.0
Approach		203	1.5	0.105	0.6	NA	0.6	4.1	0.20	0.05	49.1
All Vehicles		368	0.8	0.105	1.7	NA	0.6	4.1	0.14	0.17	48.4

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽ Site: Proposed - AM

Intersection of Debenham Road South & Acacia Road
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Acacia Road (S)											
1	L2	200	2.0	0.181	4.9	LOS A	0.7	5.2	0.16	0.53	46.2
3	R2	80	0.0	0.181	4.9	LOS A	0.7	5.2	0.16	0.53	45.8
Approach		280	1.4	0.181	4.9	LOS A	0.7	5.2	0.16	0.53	46.1
East: Debenham Road (E)											
4	L2	329	0.0	0.218	4.6	LOS A	0.0	0.0	0.00	0.43	47.1
5	T1	79	0.0	0.218	0.0	LOS A	0.0	0.0	0.00	0.43	47.6
Approach		408	0.0	0.218	3.7	NA	0.0	0.0	0.00	0.43	47.2
West: Debenham Road (W)											
11	T1	70	0.0	0.130	1.2	LOS A	0.7	5.1	0.49	0.43	46.8
12	R2	156	0.0	0.130	5.8	LOS A	0.7	5.1	0.49	0.43	45.9
Approach		226	0.0	0.130	4.4	NA	0.7	5.1	0.49	0.43	46.2
All Vehicles		914	0.4	0.218	4.2	NA	0.7	5.2	0.17	0.46	46.6

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽ Site: Proposed - PM

Intersection of Debenham Road South & Acacia Road
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Acacia Road (S)											
1	L2	775	0.0	0.711	5.8	LOS A	8.4	58.6	0.28	0.56	45.9
3	R2	364	0.0	0.711	5.8	LOS A	8.4	58.6	0.28	0.56	45.5
Approach		1139	0.0	0.711	5.8	LOS A	8.4	58.6	0.28	0.56	45.7
East: Debenham Road (E)											
4	L2	87	0.0	0.080	4.6	LOS A	0.0	0.0	0.00	0.31	47.8
5	T1	64	0.0	0.080	0.0	LOS A	0.0	0.0	0.00	0.31	48.3
Approach		151	0.0	0.080	2.6	NA	0.0	0.0	0.00	0.31	48.0
West: Debenham Road (W)											
11	T1	185	0.0	0.124	0.4	LOS A	0.7	4.8	0.29	0.12	48.5
12	R2	56	5.4	0.124	5.0	LOS A	0.7	4.8	0.29	0.12	47.5
Approach		241	1.2	0.124	1.5	NA	0.7	4.8	0.29	0.12	48.3
All Vehicles		1531	0.2	0.711	4.8	NA	8.4	58.6	0.25	0.47	46.3

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Appendix 4

Visual Impact Assessment

Peter Andrews + Associates Pty Ltd

October 2014

Visual Impact Assessment

Somersby Business Park Expansion
Eastern Precinct

October 2014

paa DESIGN
architecture
planning
urban design

Peter Andrews + Associates
PTY LTD

Table of contents

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job no: 14_004
date: 1 October 2014
version: B
purpose: Visual Impact Assessment

1.0 Introduction

This Visual Impact Assessment has been undertaken to determine the potential visual impacts and identify mitigation measures if required for possible future employment lands. The subject site is located at Somersby and adjoins the Somersby Business Park to the east. Refer Figure 1. The site includes ten (10) lots zoned RU1 Primary Production under the Gosford Local Environmental Plan 2014. Gosford Quarries is situated on five (5) of the lots to the east of Acacia Road. The site is to the east of the Somersby Business Park, north of the Mount Penang Parklands and Detention Centre and rural residential lands are located to the north and east. Refer Figure 2.

Figure 1 – Locality plan
Source: Whereis.com

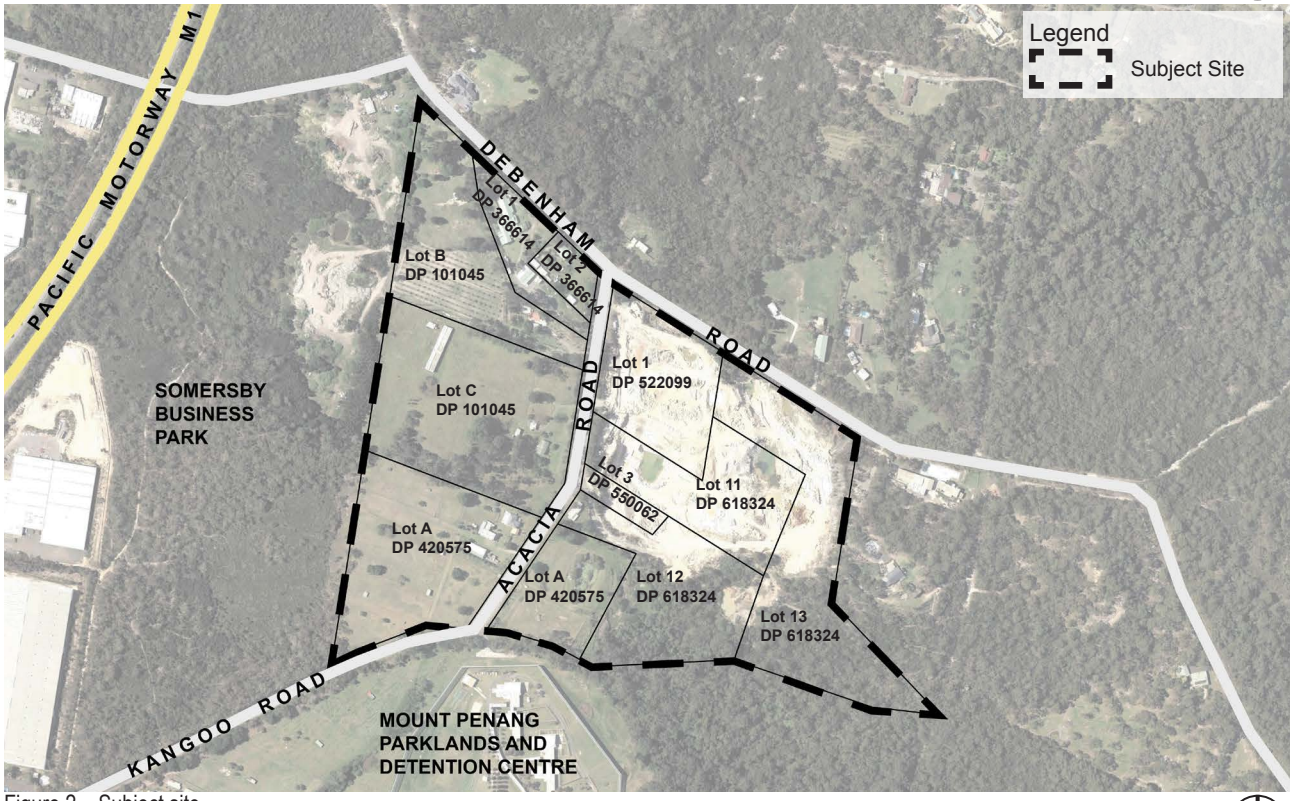


Figure 2 – Subject site
Source: Base - Google Earth Pro 2014

2.0 The Proposal

Opportunities and constraints were determined for the site from the environmental investigations (Figure 3). It is proposed to rezone the subject site for employment lands and conservation lands as shown on Figure 4 and outlined below:

- Rezoning of approximately 19.95ha of land to IN1 General Industrial.
- Approximately 3.75ha of land in the south eastern section of the subject site identified as a high ecological to be rezoned as E2 Environmental Conservation.
- Asset protection zones of varying widths on the various boundaries of the subject site.

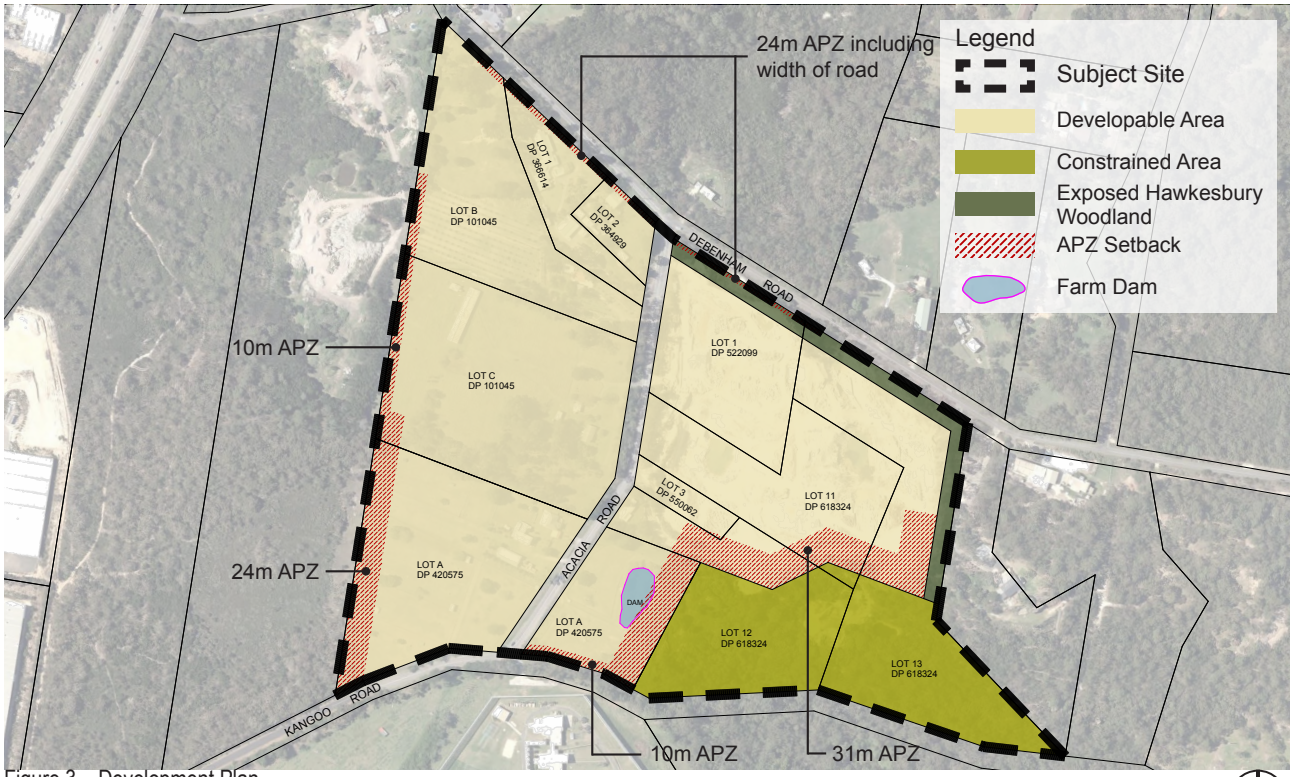


Figure 3 – Development Plan
Source: Base - Google Earth Pro 2014

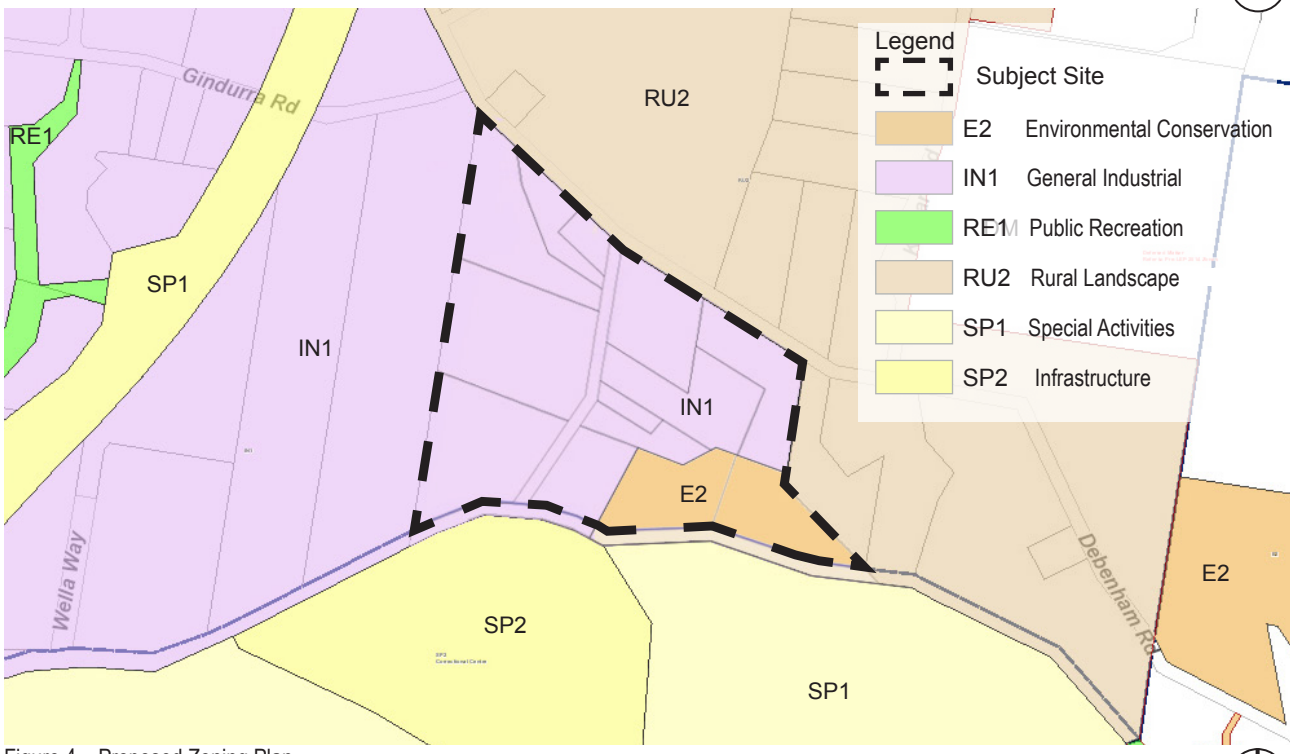


Figure 4 – Proposed Zoning Plan
Source: Base - Gosford City Council

3.0 Contextual Analysis

The subject site adjoins the Somersby Business Park to the east. The site is bordered to the north and east by rural residential properties and to the south by Mount Penang Parklands and Detention Centre.

Acacia Road runs north-south through the subject site, Debenham Road adjoins the site to the north and Kangoo Road to the south west. The part of the site to the west of Acacia Road is generally cleared and used mostly as pastoral land. The landholdings to the east of Acacia Road are largely occupied by the sandstone quarry, which is operated by Gosford Quarry Holdings Limited. The area to the south east is significantly vegetated. Refer Figures 5 and 6.

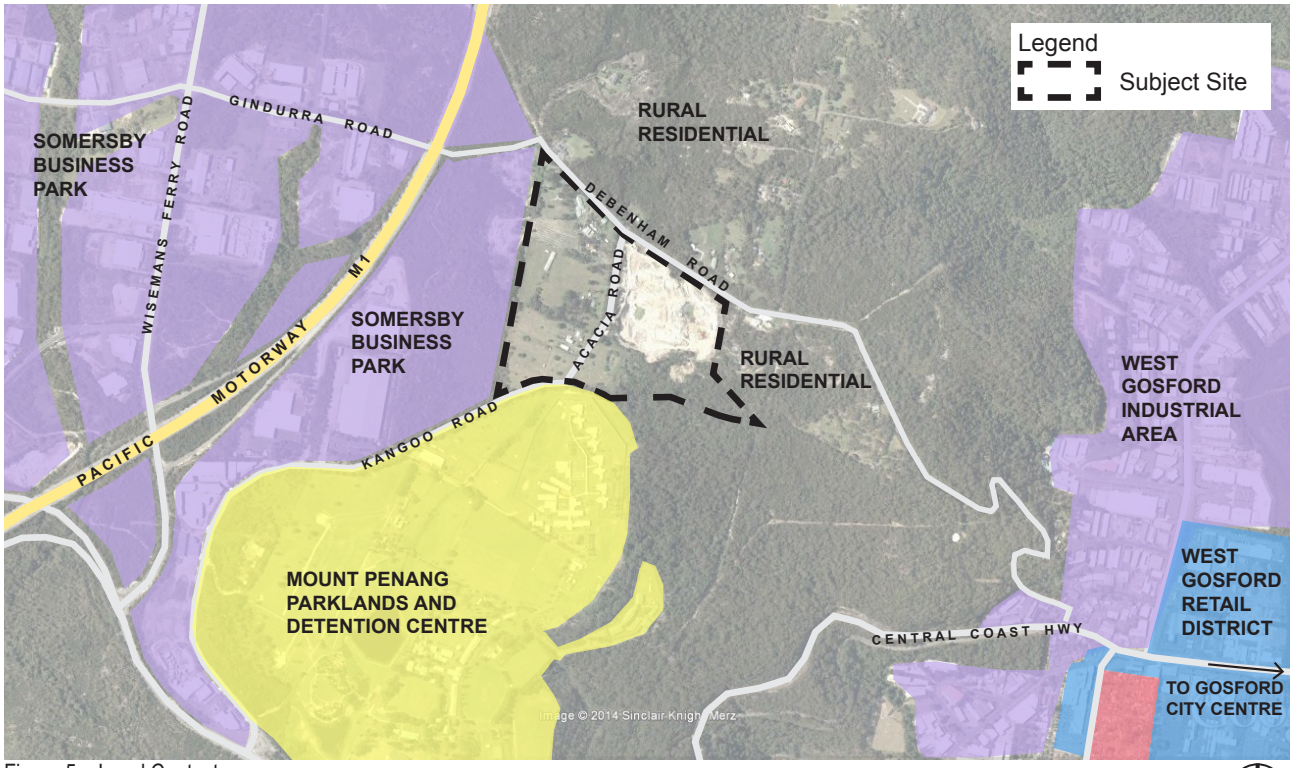


Figure 5 – Local Context
Source: Base Google Earth Pro 2014

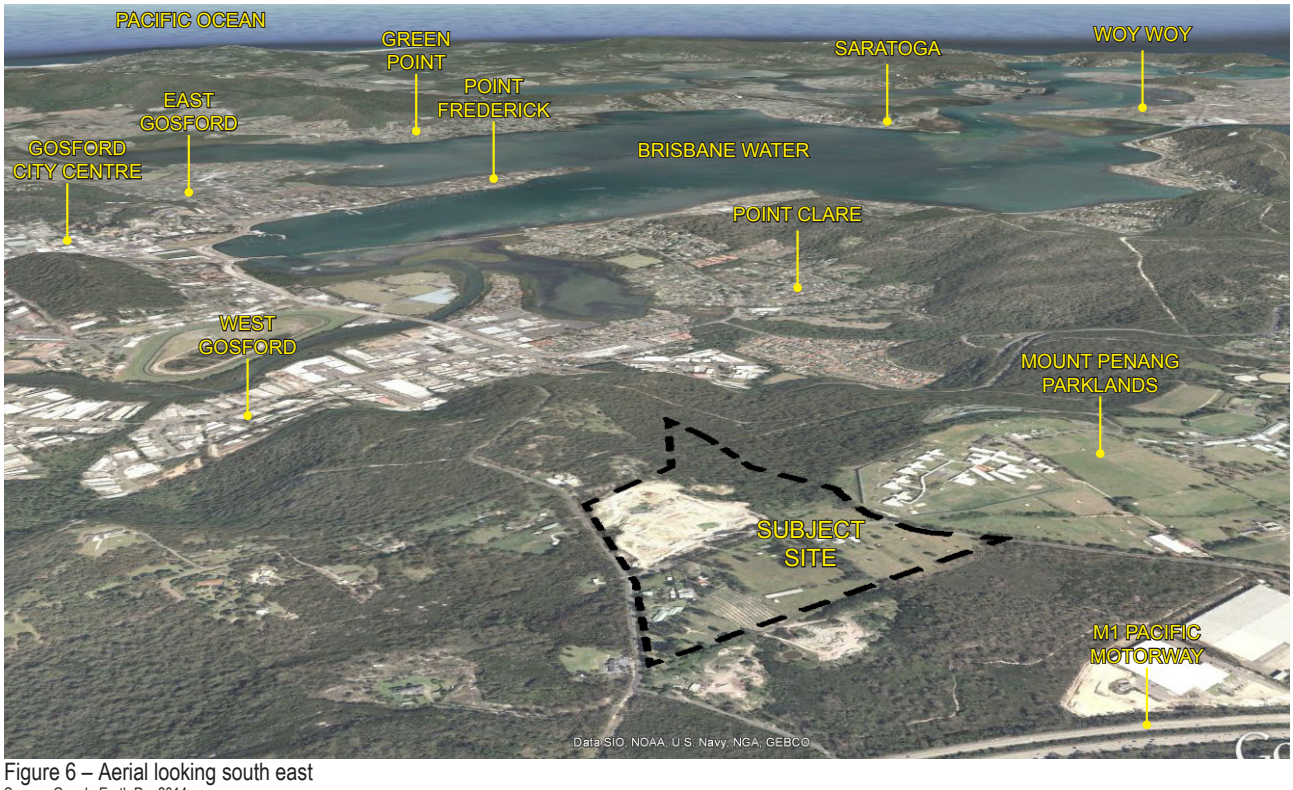


Figure 6 – Aerial looking south east
Source: Google Earth Pro 2014

Contextual Analysis (cont.)

The site generally falls to the south east. The highpoint of the site is in the north western corner. Another highpoint adjoins the subject site to the east. The south eastern corner is the lowest point of the site. Refer Figure 7.

Due to the topography, there are distant views to the south east towards Brisbane Water and the suburbs of Point Clare, Point Frederick, East Gosford and Green Point. The site also has partial and intermittent distant views to the north east and south southeast. Existing vegetation in the south eastern area and the periphery of the subject site, existing vegetation on adjacent properties and adjoining high points to the east provides screening and filtering of any views. Refer Figure 8.

The Somersby Business Park is identified as a key site under the Gosford Local Environmental Plan 2014. The lots to the west of the subject site are identified as being constrained by ecologically significant and Aboriginal heritage lands (Figure 9). Objectives of clause 7.4 of the Gosford LEP are to protect ecologically significant land and land with Aboriginal heritage characteristics in the Somersby Business Park.

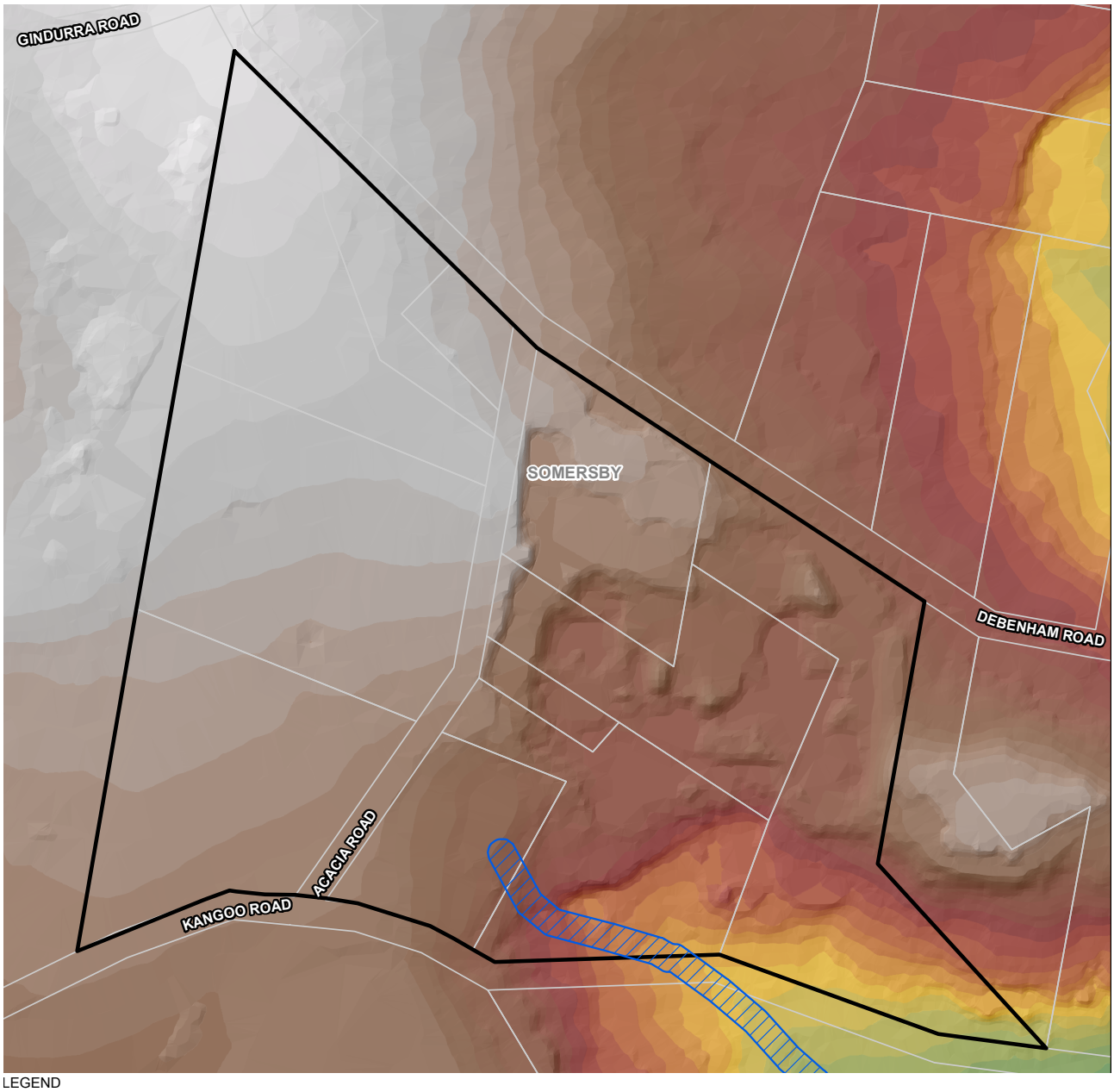


Figure 7 – Topography
Source: GHD

Contextual Analysis (cont.)

Figure 8 – Distant views
Source: Base Whereis.com

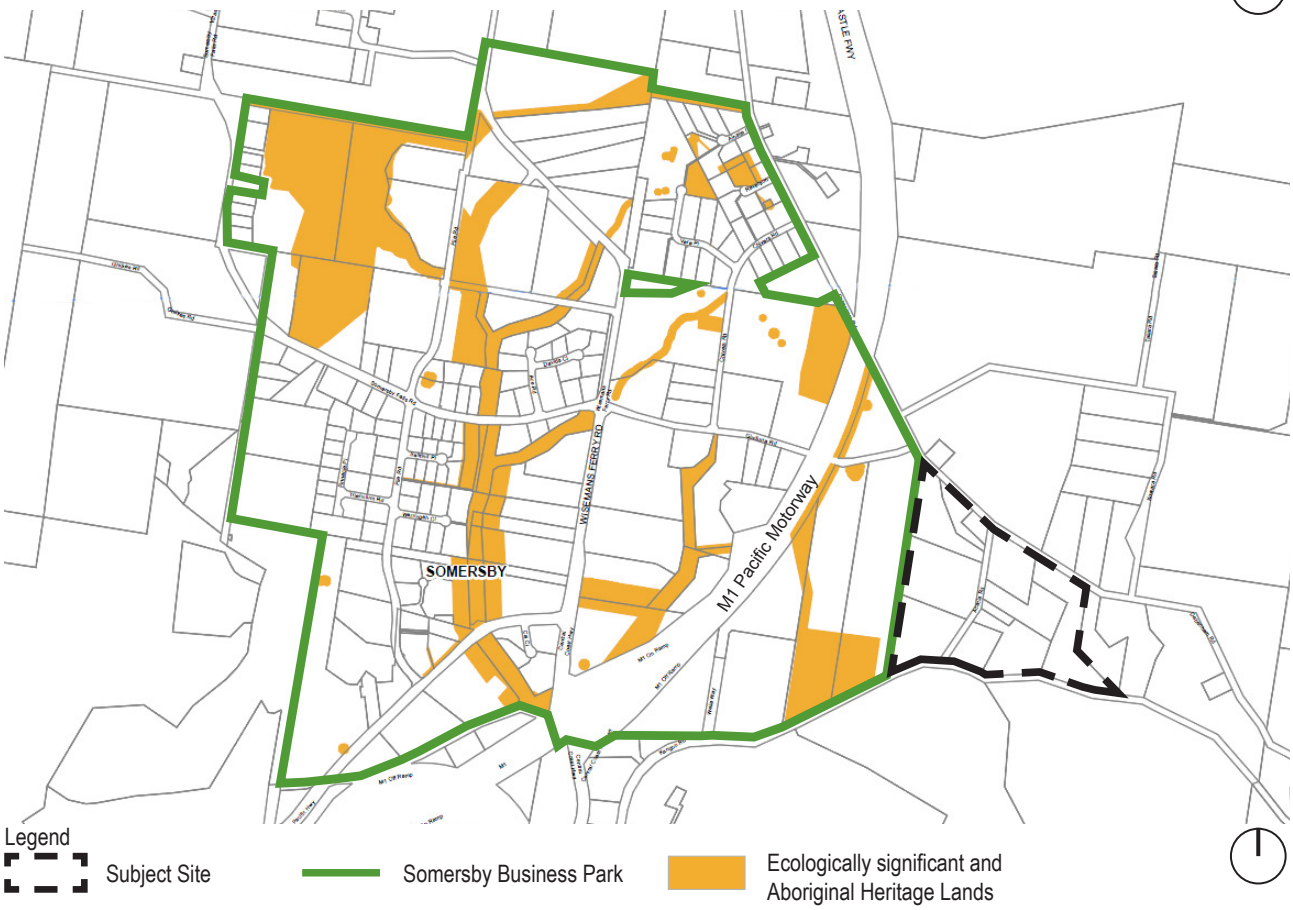


Figure 9 – Key Sites
Source: Gosford City Council

4.0 Character Analysis

The subject site has been identified as having two distinct characters in the Gosford City Council Development Control Plan 2013 as shown on Figures 10 and 11 and outlined below:

- 2: Employment Estate and Land (to the east of Acacia Road)
  This area will remain a masterplanned estate for medium and higher impact employment activities, where development conserves the scenic value of surrounding bushland backdrops, protects Aboriginal cultural values, maintains the amenity of nearby residential properties, and achieves high standards of streetscape quality. Future development will conform to detailed planning controls that have been prepared and adopted for this area.
- 3: Agricultural Plateau and Hillsides (to the west of Acacia Road)
  These areas should remain productive rural landscapes that accommodate broad hectare agricultural or livestock activities, together with a scattering of residential and small scale tourist activities that do not interfere with the preferred primary productive uses. Future development and land management, including major developments such as extractive industries, should not compromise scenically distinctive qualities of backdrops to Gosford City's major tourist routes.

The areas surrounding the subject site have been determined as the following:

- Land to the west is the Somersby Business Park and is identified as 2: Employment Estate and Land.
- Land to the north and east is identified as 4. Scenic Buffers (Private Properties)
  This area will remain as a conservation area with scattered low impact private residential accommodation. This area will maintain the natural and scenic qualities of the surrounding bushland.
- Land to the south is identified in the Mount Penang Parklands DCP, which aims to retain views to Brisbane Water whilst respecting the visual sensitivity of the escarpment and the historic setting.

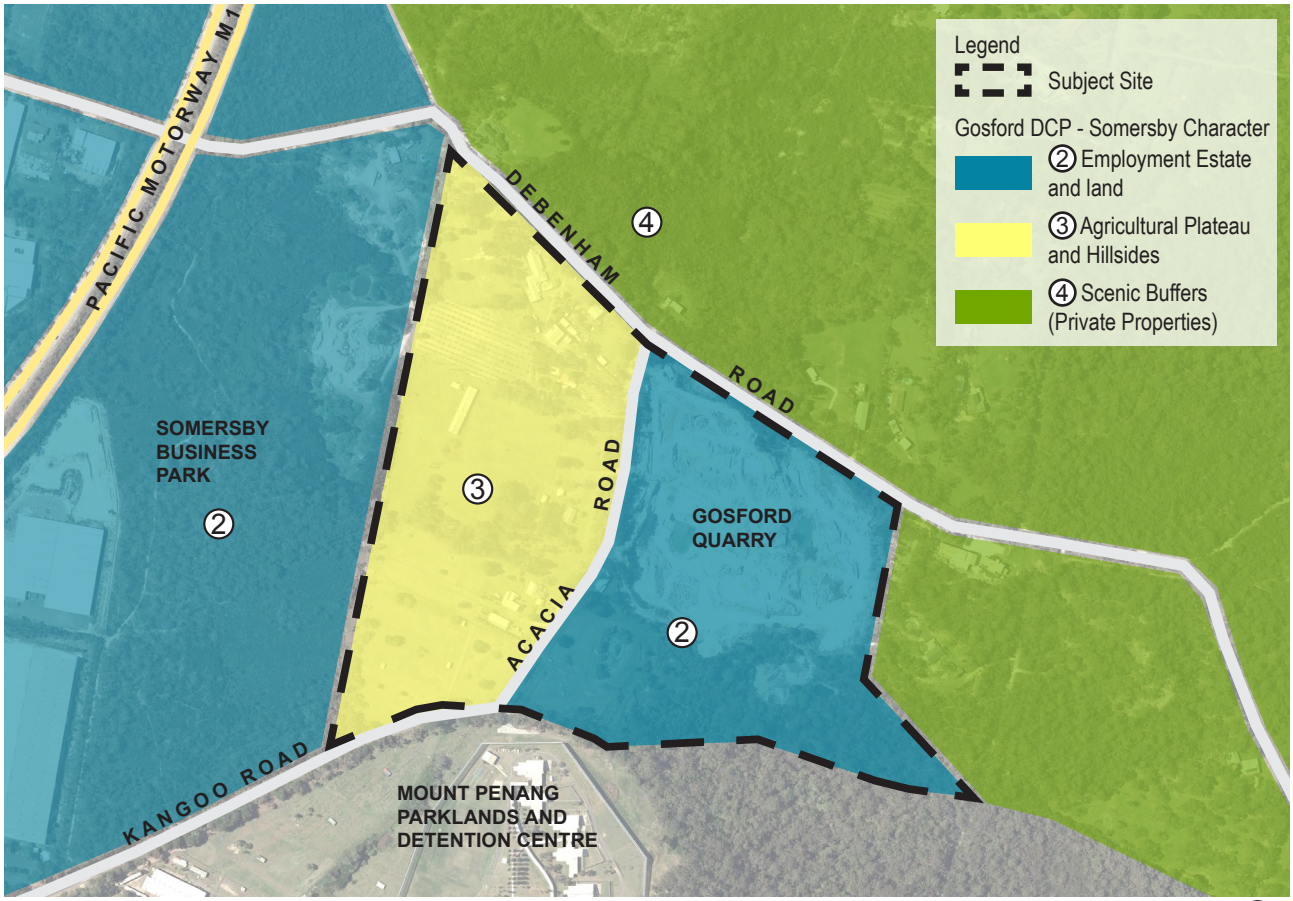


Figure 10 – Extract Character Zones Gosford City Council Development Control Plan 2013
Source: Base Google Earth Pro 2014

Character Analysis (cont.)

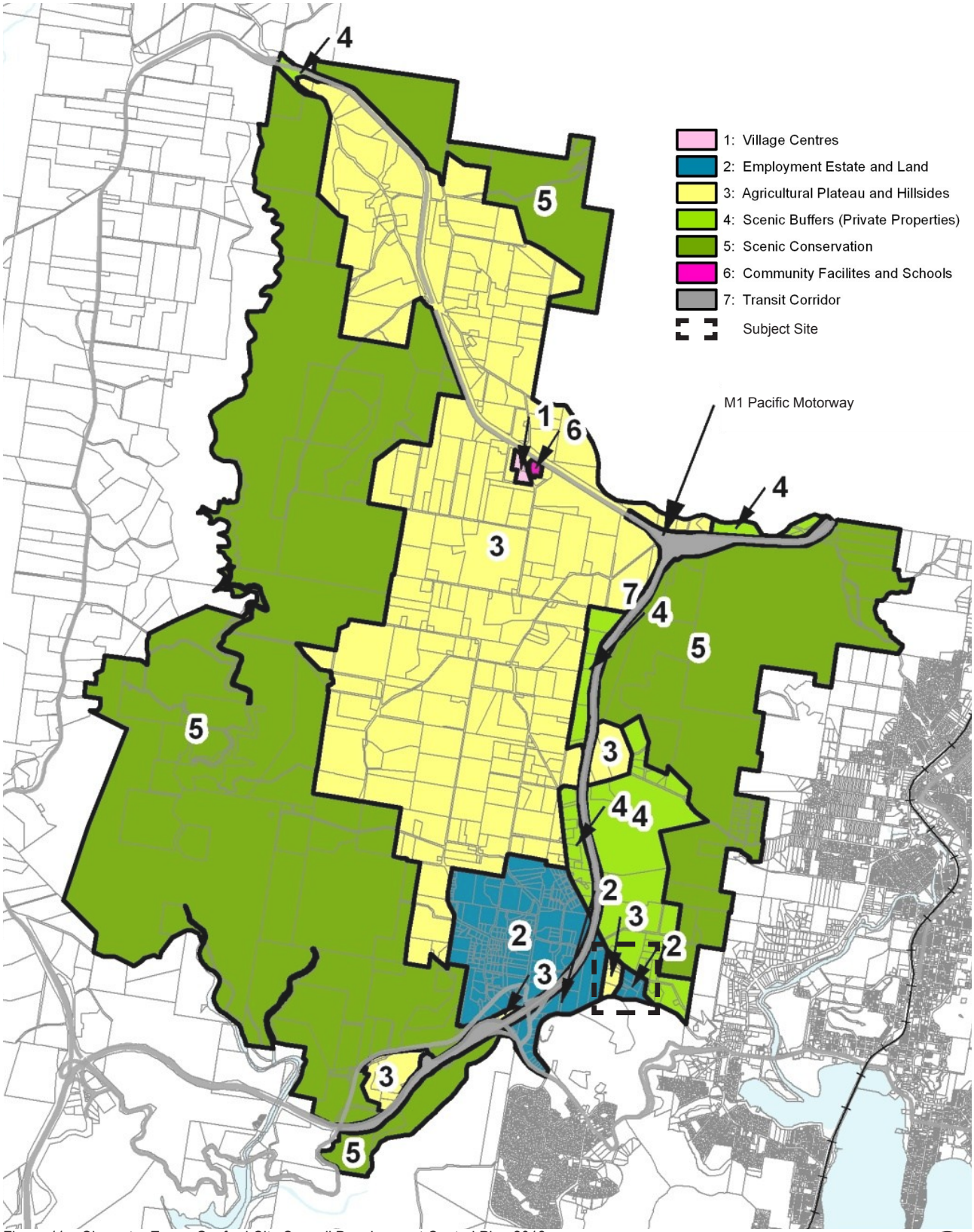


Figure 11 – Character Zones Gosford City Council Development Control Plan 2013
Source: Gosford City Council Development Control Plan 2013

5.0 Visual Impact Assessment

5.1 Methodology

The potential visual impact of the proposal for employment lands has been assessed in relation to key viewpoints. The levels of significance of potential visual impacts have been assessed through consideration of the combination of magnitude of visual change in the landscape and its proximity to the viewer and the sensitivity in relation to the quality of the view and how sensitive it is to the proposed change.

The magnitude of visual change is strongly influenced by the level of visibility of the new works resulting from the combination of scale, extent, distance and duration of the views. Visual sensitivity depends on the nature of the existing environment and on the likely response from people viewing the scene. People driving on a busy road and/or at high speeds are likely to be less sensitive to a change in the environment since they are focused on changes in traffic conditions and driving, compared to someone who is enjoying a recreational experience or someone who is viewing the scene from their living room.

A rating as outlined in Table 1 was given to each view point based on the magnitude of visual change in the landscape and the sensitivity in relation to the quality of the view and how sensitive it is to the proposed change to determine the visual impact from the proposed future development of the land as employments lands.

Table 1 - Visual impact grading matrix

		MAGNITUDE			
		High	Moderate	Low	Negligible
SENSITIVITY	High	High Impact	High-Moderate	Moderate	Negligible
	Moderate	High-Moderate	Moderate	Moderate-Low	Negligible
	Low	Moderate	Moderate-Low	Low Impact	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

(Roads and Maritime Services 2013)

5.2 Key view points

Key viewpoints from the surrounding area have been identified during site inspections and are shown on Figure 12.

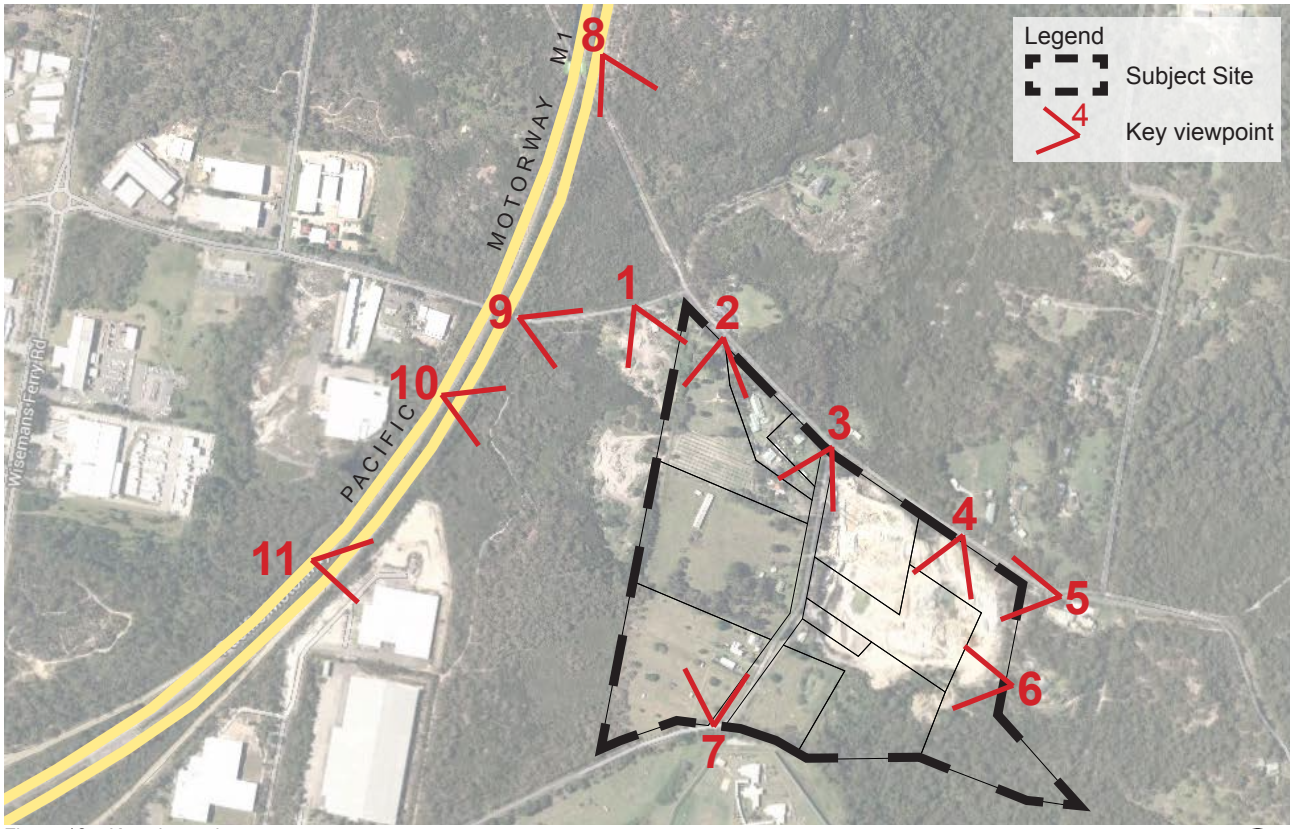


Figure 12 – Key view points
Source: Base Google Earth Pro

Visual Impact Assessment (cont.)

5.3 Initial analysis

The following provides an initial analysis of the sensitivity of the key viewpoints.

Table 2 - Initial analysis - Key viewpoints

View	Description of setting	Sensitivity of view	
1	Looking south-southeast from Gindurra Road	L	Sensitivity of view is determined by existing industrial land uses
2	Looking south from Debenham Road	H	Sensitivity of view is determined by the grassed mound and significant vegetation
3	Looking south from the intersection of Debenham Road and Acacia Road	M	Sensitivity of view determined by the range of land uses and varying levels of vegetation
4	Looking south-southwest from Debenham Road	L	Sensitivity of view determined by the existing land uses
5	Looking west along Debenham Road	H	Sensitivity of view determined by the extent of the roadside vegetation
6	Looking west from the adjoining property boundary	L	Sensitivity of view determined by the adjoining quarry site, other land uses and vegetation
7	Looking north from Kangoo Road	H	Sensitivity of view determined by the rural nature of the area, however it is noted land is zoned industrial to the west
8	Looking southeast from the southbound travel lane on the M1 Pacific Motorway	N	Roadside batter and dense vegetation restrict views to the site
9	Looking east from the southbound travel lane on the M1 Pacific Motorway overpass with Gindurra Road	L	Dense vegetation adjoining motorway and therefore potential views limited
10	Looking east from the northbound travel lane on the M1 Pacific Motorway	L	Dense vegetation adjoining motorway and therefore potential views limited
11	Looking east from the northbound travel lane on the M1 Pacific Motorway	L	Existing industrial land uses restrict views further to the east

Note:
L - Low
M - Moderate
H - High
N - Negligible

Visual Impact Assessment (cont.)

Key viewpoint 1 - Looking south-southeast from Gindurra Road

Key viewpoint 2 - Looking south from Debenham Road

Visual Impact Assessment (cont.)

Key viewpoint 3 - Looking south from the intersection of Debenham Road and Acacia Road

Key viewpoint 4 - Looking south-southwest from Debenham Road

Visual Impact Assessment (cont.)

Key viewpoint 5 - Looking west along Debenham Road

Key viewpoint 6 - Looking west from the adjoining property boundary

Visual Impact Assessment (cont.)

Key viewpoint 7 - Looking north from Kangoo Road

Key viewpoint 8 - Looking southeast from the southbound travel lane on the M1 Pacific Motorway

Source: Google Earth Pro 2014

Visual Impact Assessment (cont.)

Key viewpoint 9 - Looking east from the southbound travel lane on the M1 Pacific Motorway overpass with Gindurra Road

Source: Google Earth Pro 2014

Key viewpoint 10 - Looking east from the northbound travel lane on the M1 Pacific Motorway

Source: Google Earth Pro 2014

Visual Impact Assessment (cont.)

Key viewpoint 11 - Looking east from the northbound travel lane on the M1 Pacific Motorway

Source: Google Earth Pro 2014

Table 3 - Visual impact assessment

View	Visual Sensitivity	Magnitude of Visual Effect	Overall Rating of Visual Impact	Summary
1	L	L	Low impact	
2	H	M	High-Moderate	The removal of vegetation will increase views of the proposal.
3	M	M	Moderate	The removal of vegetation will increase views of the proposal.
4	L	L	Low impact	The quarry site is already visible.
5	H	L	Moderate	The removal of vegetation will increase views of the proposal.
6	L	M	Moderate-Low	
7	H	M	High-Moderate	The land use will change and therefore impact on views.
8	N	N	Negligible	No impact. Views are not available.
9	L	N	Negligible	No impact. Views are not available.
10	L	N	Negligible	No impact. Views are not available.
11	L	N	Negligible	Views would be very limited due to the extent of the vegetation, buildings and distance.

6.0 Discussion

The subject site is generally enclosed from the surrounding land uses to the east, west, north and south east due to the topography, land uses and vegetation on the site. Land to the west of the subject site is zoned for industrial land uses and the Mount Penang Detention Centre adjoins the subject site to the south. Land to the east and north of the subject site is zone for rural residential land uses. The subject site is mostly screened from the rural residential areas to the north due to topography, vegetation and stockpiling on the quarry site. However, in some instances views are available of the existing quarry site.

Long distance views are available to and from part of the site from the east. However, it is considered that the impacts are minimal as the field of vision is reduced due to the distance. Further, the south eastern portion of the site has high ecological values and is not proposed to be developed. Therefore, the existing vegetation will be retained.

The subject site is not visible from the M1 Pacific Motorway due to the existing vegetation and industrial buildings constructed on land in-between the subject site and the motorway. Figure 13 illustrates the general nature of the land between the M1 Pacific Motorway and the subject site. A habitat corridor link is proposed along the M1 Motorway in accordance with the Gosford LEP 2014. Therefore, the vegetation is likely to remain along the edge of the Motorway. Further, the adjoining land is generally higher than the subject site, so development on this land would also screen the future development on the subject site.

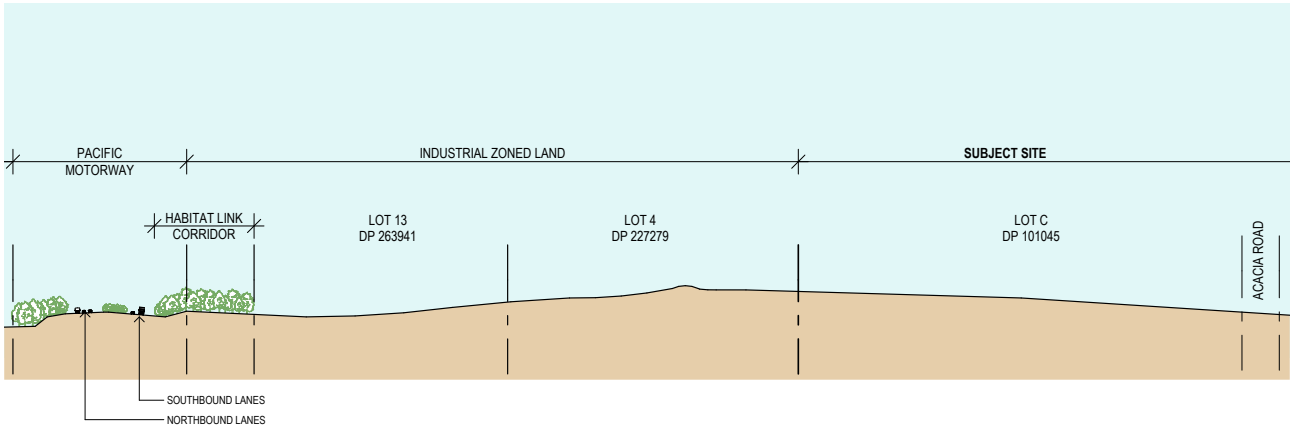
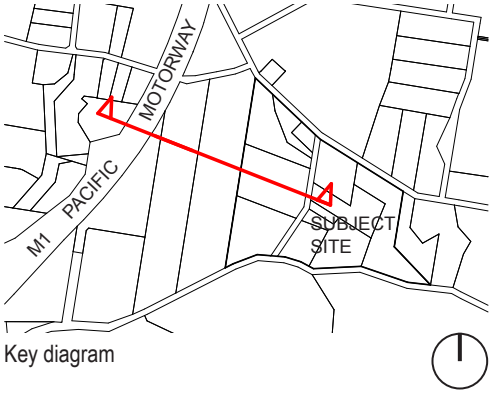


Figure 13 – Indicative east-west section looking north



Key diagram

7.0 Mitigation Measures

The following outlines the mitigation measures to be undertaken for the subject site if it is to be rezoned for employment lands:

- Maintain existing vegetation along the boundaries of the site and enhance with additional vegetation where possible.
- Retain the vegetation in the south eastern portion of the subject site.
- Consideration should be given to the preparation of design guidelines for the Somersby Business Park, which would also apply to the subject site.
- Buildings should use non-reflective materials.
- All future industrial subdivisions should incorporate appropriate landscape treatment including larger trees.
- Access to all employment lands should be from Acacia Road.
- The development should incorporate street tree planting along Acacia Road.

8.0 References

GHD 2014, *Topography* Map (9 May 2014)

GHD 2010, *Gosford City Council Employment Lands Investigation* (December 2010)

Google 2014, *Google Earth Pro*

Gosford City Council 2014, *Gosford Local Environmental Plan 2014*

Gosford City Council 2014, *Gosford Development Control Plan (DCP) 2013*

Roads and Maritime Services 2013, *Environmental Impact Assessment Practice Note. Guideline for Landscape Character and Visual Impact Assessment EIA-N04* (28 March 2013)

Sensis Pty Ltd (2014), *whereis.com* (last accessed 31 July 2014)