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North Wyong Industrial Estate

WSUD / Flood Risk Management
Traffic and Transport Issues

Prepared for Macroplan

April 2012

Introduction:

Cardno (NSW/ACT) Pty Ltd is pleased to present the following two reports relating to the North Wyong Industrial Estate Rezoning from 'General Industrial and Light Industrial' to 'B6 Enterprise Corridor' zoning.

PART A: Water Sensitive Urban Design (WSUD)/Flood Risk Management Requirements

PART B: Traffic and Transport Issues

These reports are intended to provide an overview of the status of the issues relating to these two topics. They address in part several issues raised by Wyong Shire Council in their letter to MacroPlan Australia Pty Ltd 16 January 2012 in which Council outlined what further work that is required when making a submission of a revised Planning Proposal. Council referred to the Department of Planning and Infrastructure 'Planning Proposal Guideline' document 'Proposal Format – Part 6 Accessibility and Part 7 Flood Inundation'.

The Cardno WSUD/Flood Risk Management Requirements report was prepared based on background information provided by MacroPlan Dimasi

The Cardno Traffic and Transport Issues report was prepared based on reference to current traffic generation guidelines, current knowledge of the road infrastructure, standard procedures for preparing detailed traffic and transport assessments and reference to current bus and rail timetable information.

PART A: Flood Risk Management

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Abbreviations

AEP	Annual Exceedance Probability
AHD	Australian Height Datum
ARI	Average Recurrence Interval
ASS	Acid Sulphate Soils
BoM	Bureau of Meteorology
DCP	Development Control Plan
FPL	Flood Planning Level
GIS	Geographic Information System
IFD	Intensity Frequency Duration
IWCM	Integrated Water Cycle Management
LEP	Local Environment Plan
LGA	Local Government Area
RTA	NSW Roads and Traffic Authority
SEPP	State Environmental Planning Policy
TG	Technical Guideline
TN	Total Nitrogen
TP	Total Phosphorous
TSS	Total Suspended Solids
WELS	Water Efficiency Labelling and Standards
WEZ	Wyong Employment Zone
WSUD	Water Sensitive Urban Design
WTC	Warnervale Town Centre

1 INTRODUCTION

Cardno has been commissioned by Macroplan to undertake an assessment of the likely stormwater management requirements for a rezoning application in the North Wyong Industrial Area. The following report reviews the storm water management requirements set out in Wyong Shire Council's governing document, *DCP 36 North Wyong Industrial Area,* and recommends suitable WSUD and Flood Risk Management for the proposed change in land use.

DCP 36 covers a range of issues with regards to the development of the North Wyong Industrial Area. This report however, focuses on the stormwater management requirements within the DCP. It also provides advice on how to address Council's Flood Policy.

1.1 Background

The North Wyong Industrial Area is located in the north-east of Wyong, as shown in **Figure 1.1**. The site is bounded by the railway line in the west and the Pacific Highway in the south and the east. To the north of the site is the Porters Creek wetland, and existing open space.

The site is currently zoned as industrial, and contains a number of industrial businesses and warehouses. The Industrial Area was created approximately 40-50 years ago and the development of industrial properties has been piecemeal thereafter. There remains a number of partly constructed roads and some lots appear to have some sort of earthworks undertaken before being abandoned.

1.2 Proposed Rezoning

The following intentions describe underpin the application for rezoning:

- The site is underutilised with its current zoning for industrial/commercial use
- A Data Centre has been developed in the vicinity that would attract a range of businesses to the area
- The location is closely linked to a range of services
- Allowing for mixed uses would allow for integration of business and residential development that could improve the progress of development

2 REVIEW OF DCP 36: NORTH WYONG INDUSTRIAL AREA

The DCP provides stormwater management conditions for the North Wyong Industrial Area. The DCP has two broad areas of requirements – water quality requirements and levee bank and pump system requirements. The management of stormwater flows is particularly important at this site as the Porters Creek wetland, a protected wetland under SEPP 14, is directly downstream.

2.1 Water Quality

The DCP states that WSUD systems must achieve:

- 90% Reduction in average annual gross pollutant load (size >5mm)
- 85% reduction in the average annual total suspended solids load
- 65% reduction in the average annual total phosphorus load
- 45% reduction in the average annual nitrogen load
- No visible hydrocarbons (oil and grease) in discharge
- Post development durations below 3-5 times the existing stream-forming flow duration

With regards to the WSUD methods used to achieve these reductions, the DCP states that:

- Source controls shall demonstrate the principles of WSUD and include on-site treatment, harvesting and reuse to minimise demands on Council's potable water supply.
- Conveyance controls shall demonstrate the principles of WSUD and integrate with landscape, bushfire management, access and maintenance requirements
- End of pipe controls shall demonstrate the principles of WSUD and incorporate both a retention / detention pond and artificial wetland as necessary

2.2 Levee Bank and Pump System

The DCP requires that development undertaken north of Lucca Road must incorporate a levee bank and pump system along its northern edge to protect the development from flooding in the floodplain to the north.

The levee must be constructed to a minimum RL of 6.5mAHD to provide protection from the 100% AEP event with a minimum freeboard of 300mm. Extension of this levee is proposed under the DRAFT Porters Creek Flood Risk Management Plan to protect flood prone properties along Lucca Road and the Pacific Highway.

2.3 Stormwater Management

The DCP states that stormwater is to be managed in accordance with the *Water Cycle Management Plan, Central Coast Business Park – Warnervale* (Young Consulting Engineers, 2003).

However, a number of studies have been undertaken following this to develop IWCM elements in more detail. The following list includes a number of previous studies that outline the principles of the Porters Creek IWCM scheme**:**

- Integrated Water Cycle Management Strategy: Wyong Employment Zone (Ecological Engineering, 2006)
- Water Sensitive Urban Design Solutions or Catchments Above Wetlands (Ecological Engineering, 2007)
- Warnervale-Wadalba Integrated Water Cycle Management: Section 94 (EDAW AECOM, 2008)
- Stage 1 Contamination Assessment & Preliminary Acid Sulphate Soil Assessment
- Porters Creek Flood Study (Cardno, 2009)
- Porters Creek Wetland & Wyong River Risk Assessment (AECOM, 2010)

The IWCM scheme is based on the principles of WSUD and aims to incorporate water management measures across the total water cycle in order to minimise the impact of urban development. The scheme is comprised of neighbourhood wetlands in the upper catchment, and a large central storage in the lower catchment.

The wetlands have a dual purpose. Firstly to treat stormwater run-off to meet the BMP water quality objectives which are consistent with those outlined in Section 2.1. This is achieved through a combination of settling and biological treatment. The wetlands typically comprise an inlet pond to collect stormwater, the wetland to provide treatment, and a downstream storage pond. The storage pond provides the second purpose, which is to harvest stormwater for re-use, and to manage the discharge from the wetland to retain the current catchment hydrology.

A large central storage, as discussed in Council's Ordinary Meeting Business Paper (Wyong Shire Council, 2011), is proposed to be constructed in the central floodplain of Precinct 7A. The concept is to retain post development flows behind a bund extending northwards from the existing flood control levee around the Lucca Road industrial properties to the edge of the SEPP 14 wetlands. The bund would retain stormwater on the floodplain east of the bund. Inclusion of a large storage of this kind would eliminate the requirement for many of the wetland storages, proposed under the IWCM scheme (EE 2007), scattered across the catchment to the east, resulting in both cost savings, and reduced wetland footprints.

The central storage and bund will also serve to manage the upstream hydrology to preserve the flow regime for the downstream wetlands.

The sizing of the wetlands, and other water quality treatment devices are discussed in the various documents listed above relating to the Porters Creek *Integrated Water Cycle Management Scheme*.

The key guidelines from the *Integrated Water Cycle Management Plan* with regards to the sizing of treatment measures for land use with an impervious percentage of 80%, being typical for commercial/industrial uses, are:

- **Swales** – Applied to 50% of road lengths. Road area assumed to be 10% of catchment area
- **Wetlands** – Wetlands to be 3% of catchment of area with swales, or 5% of catchment if swales are not used
- **Wetland Storage Volumes**– storage to be provided at a rate of 170KL / ha impervious
- **Wetland Storage Re-use Rate** – 38KL per ha per day
- **Rainwater Tanks** – 10L/m^2
- **Rainwater Reuse** – 1L/ha/day

In addition, the IWCM Plan, and associated Council documentation requires the preservation of the predevelopment hydrology in order to conserve Porters Creek wetland.

3 SITE WATER QUALITY MANAGEMENT

As discussed in **Section 2.1**, the site will be required to meet the water quality conditions set out in DCP 36.

The following chapter discusses the management and treatment options available for use within the site.

3.1 Water Quality Management Options

There are a number of options available for managing the quality and volume of stormwater run-off. Summarised in **Table 1** are common WSUD measures, general details on their operation, and their suitability to the site based on the preliminary plan and Council WSUD guidelines and preferences.

Table 1: Water Quality Management Options

Treatment Type	General Details
Rainwater harvesting	Run-off from property roofs is collected and stored for later use on-site which reduces the demand on potable water supply.
Gross Pollutant Traps	Capture gross pollutants and coarse sediments. The upstream removal of these pollutants increases the efficiency of downstream water quality measures.
Porous Paving	An alternative to conventional impermeable pavements designed to allow infiltration to the underlying soil. Reduces site run-off, attenuates peak flows and increases groundwater re-charge.
Rooftop Greening	The construction of vegetated surfaces on building roofs to provide treatment of rainwater prior to capture and storage for re-use. Also provides green space which can be minimal in dense residential and commercial and industrial development areas.
Grass Swales	Linear depressions to collect and convey overland flow. Also aid in the removal of gross pollutants and coarse sediment.
Bio-filters	Vegetated sand filters designed to provide biological treatment to stormwater to remove phosphorus and nitrogen loads. Vegetation may also remove gross pollutants and coarse sediment, although the accumulation of this material will lessen the effectiveness of the system.
Constructed Wetlands	A series of permanent water bodies that filter and bio-remediate stormwater. Can include a storage volume to provide for stormwater re-use.

3.2 Suitability of Treatment Options to the Site

Not all WSUD treatment options are suitable for all sites. The suitability of the options listed in Section 3.1 are shown below in **Table 2**.

Table 2: Suitability of Water Quality Management Options

Treatment Type	Suitability	Reasons
Rainwater harvesting	High	Rainwater harvesting forms a part of Councils Integrated Water Cycle Management Plan to reduce the load on the piped potable water system and to improve water management. The proposed development will have significant roof areas which will be capable of collecting rainwater.
Gross Pollutant Traps	High	Gross pollutant traps area available in a variety of proprietary systems suitable to instalment in diverse locations including piped drainage, pipe outlets and channels. They should be included to preserve the efficiency of downstream water quality treatments systems.
Porous Paving	Medium	The use of porous paving is limited to areas with light traffic or pedestrian loads and mildly sloped sites. Based on the preliminary information available, such areas may be limited in the proposed development. However, if pedestrian areas are included in the development, it may be possible to utilise porous paving in these areas.
Rooftop Greening	Medium	The site will be developed at a high density, limiting the amount of green, open space. It may be possible to implement rooftop greening on some buildings to provide this open space, along with water quality treatment. Its use will be limited by the buildings adopted, and its financial feasibility.
Grass Swales	Low	Grass swales are typically located alongside roadways or within car parks. A review of the preliminary design information available for the site suggests that this incorporation will be limited. The vision of a mixed used technology park suggests that space for landscaped roadways and car parks will be limited.
Bio-filters	Low	Council has expressed a preference against bio-filters due to maintenance requirements. Their existing maintenance capabilities are geared to other WSUD measures, and as such they favour these types of bio-filters.
Constructed Wetlands	High	A number of constructed wetlands have been constructed in the wider Porters Creek catchment area. Council has the equipment and expertise to manage these wetlands, and they are the preferred treatment option to provide water quality improvements and storage.

4 FLOOD RISK MANAGEMENT

Areas of the North Wyong Industrial Park are affected by Council's Flood Planning Areas. These areas are located adjacent to the lower floodplain of Porters Creek where inundation is caused by a combination of overland flow from the catchment and back water from Wyong River. As a result there is little opportunity to reduce the risk of flooding with drainage measures. However there is the opportunity to prevent flood ingress with the use of a levee bund. The levee is specifically proposed to address flood risk on low lying properties where other flood risk management measures are unsuitable. Shown in **Figure 4.1** are the areas of the site affected by Councils Flood Planning Areas, and the locations where a levee bund has been considered by Council as a suitable flood risk management measure.

In other regions of the site where the flood planning areas apply, Councils Flood Policy, *F5: Flood Prone Land Development* (Wyong Shire Council, 2004) defines the following measures to reduce the risk of flooding:

- Habitable rooms are to be constructed with a freeboard of generally 300mm above the 1% AEP level or at 2.7mAHD, whichever is the greater
- Machinery and electrical installations which are not flood compatible are to be constructed with a freeboard of 500mm above the 1% AEP level
- Commercial and industrial buildings are to be constructed with a floor level at the 1% AEP level, or 2.4mAHD, whichever is the greater
- Non-flood compatible materials stored outside the building to be permanently stored at a level not less than the 1% AEP level

Note that Council is currently undertaking a review of its Flood Policy, and that the above conditions may require updating as a result.

As part of the Porters Creek Floodplain Risk Management Plan (Cardno, 2011), the following guidelines were proposed to manage development on flood prone land:

- Within Flood Planning Area 3 (Floodway) no development is permitted, save for recreational and agricultural structures constructed of flood compatible materials
- Within Flood Planning Area 2 (Flood storage) residential properties must be constructed at the 1% AEP flood level plus 500mm freeboard, and commercial and industrial properties must be constructed at the 1% AEP flood level
- Critical infrastructure and sensitive facilities must be located above the PMF flood level

The Flood Planning Areas for the surrounding area and the Floodplain Development Matrix from the Porters Creek Floodplain Risk Management Plan are included in **Appendix A**.

5 SITE ASSESSMENT

In **Section 3**, potential WSUD options were investigated for use on the site. In this chapter, a preliminary analysis is undertaken on site constraints and opportunities with regards to the construction of water quality treatment options.

5.1 Site Catchment Areas

It has been assumed that the site will be divided into two catchment areas, as shown in **Figure 5.1**. Under existing conditions, the western catchment drains directly to the Porters Creek Wetland to the north. The eastern catchment area discharges into the floodplain to the north, and into the central storage zone proposed as part of the Precinct 7A rezoning (Wyong Shire Council 2011). The recommended post-development hydrology is discussed in **Section 5.3**.

It has been assumed that the technology park will have an impervious area percentage similar to existing commercial and industrial zones within the wider locality. This has been assumed to be 80%, which includes the impervious areas for roadways.

Based on this, the catchment areas and pervious / impervious areas for each catchment is summarised in **Table 3**.

Table 3: Suitability of Water Quality Management Options

Catchment	Area (ha)	Pervious Area (ha)	Impervious Area (ha)
East	59.5	11.9	47.6
West	24.1	4.8	19.3

5.2 Site Stormwater Management Measures

Based on the recommended treatment sizes (**Section 3.2**) rainwater tank sizes, wetland areas and storage volumes for each catchment have been calculated and are shown in **Table 4**.

Table 4: Provisional Footprint Requirements Stormwater Management Measures

Catchment	Rainwater Tank Storage	Gross Pollutant Traps	+Wetland Area	Wetland Storage Volume
East	10L/m^2 (lot area)	Located at collection and discharge points	3.0 ha	8,092 m^3
West	10L/m^2 (lot area)	Located at collection and discharge points	1.2 ha	*3,281 m^3

**this volume could be accommodated within the central storage facility of the Precinct 7A IWCM plan*
+based on the assumption that swales are not included throughout the rezoning area a wetland footprint 5% of total area is required

Assuming that the storage ponds are 1m deep, the required area for stormwater management:

- Eastern Catchment: 3.0 ha (storage area included in central storage facility)
- Western Catchment: 4.5 ha

There are no significant constraints envisioned concerning the locating and construction of the rainwater tanks and gross pollutant traps. These stormwater management measures may be relatively easily designed to fit within the urban areas of the development.

The constructed wetlands and storage ponds however are subject to constraints on their location and design. These constraints include, but are not limited to:

- Cannot be located within Flood Panning Zone 3
- Cannot be located within environmental conservation areas containing Endangered Ecological Communities (EECs)
- Must be located in the downstream regions of the catchment to allow flows to drain into the wetland inlet pond
- Integration with the proposed development
- Acid Sulphate Soils
- Access for maintenance
- Soil Salinity
- Groundwater Levels

Professional services should be sought in relation to identifying the above constraints in further detail during design of the WSUD measures. The constraints may be managed with suitable mitigation measures such as low bund heights to reduce flood level impact and soil amelioration to manage moderate to high levels of salinity.

Based on the current zoning and available land outside of Flood Planning Area 1 and Conservation Areas (EECs) and in line with the constraints listed above, possible locations for the placement of wetlands within the site have been identified, and are shown in **Figure 5.2**.

The locations identified provide an area of 8.0 ha, allowing some flexibility in the placement of the wetlands.

5.3 Site Hydrology Management

As discussed in **Section 2.3**, the site is required to retain the existing hydrology, so as not to alter the hydrology of Porters Creek wetland, located immediately downstream.

Under the proposed development plan of Precinct 7A, a central storage area will be constructed to the north of the site. This storage area will manage the flow regime from the Precinct 7A catchment.

It is recommended that the site drainage be designed such that it drains into this central storage area following treatment in constructed wetlands. If this does not prove feasible, flow management devices

such as pumps will be required to ensure that the existing site hydrology is maintained. This has been a suggested approach for the Lucca Road Industrial Lots where a storage basin and pumps are included behind the flood control levee. The inclusion of such stormwater management techniques is not recommended as they rely on automated devices that are prone to failure, especially during flood when electricity connection can be disrupted. The preliminary sizing of such devices is beyond the scope of this report.

6 CONCLUSIONS AND RECOMENDATIONS

This is a preliminary DRAFT report to inform the likely WSUD and flood risk management measures that are available and would be acceptable to Council. The report is presented to Macroplan with the intention of generating discussion prior to update of the report to a FINAL version for delivery to Council.

7 REFERENCES

AECOM. (2010). *Porters Creek Wetland & Wyong River Assessment.* Prepared for Wyong Shire Council.

Cardno. (2009). *Porters Creek Flood Study.* Prepared for Wyong Shire Council.

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Douglas Partners. (2009). *Stage 1 Contamination Assessment & Preliminary Acid Sulphate Soil Assessment.* Prepared for Wyong Shire Council.

Ecological Engineering. (2006). *Integrated Water Cycle Management Strategy: Wyong Employment Zone.* Prepared for Wyong Shire Council.

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EDAW AECOM. (2008). *Warnervale-Wadalba Integrated Water Cycle Management: Section 94.* Prepared for Wyong Shire Council.

Wyong Shire Council. (2011). *Business Paper: Ordinary Meeting.* Meeting held 09 March 2011.

Wyong Shire Council. (2004). *F5: Flood Prone Land Development.*

Young Consulting Engineers. (2003). *Water Cycle Management Plan, Central Coast Business Park - Warnervale.* Prepared for Wyong Shire Council.

Figures- See attached sheets


Woongarrah
Hamlyn Terrace
Kanwal
Watanobbi
Wyong
Wyongah
Tuggerawong
North Wyong Industrial Park
Proposed Re-Zoning Area
Imagary from Google Maps (5/04/2012)
FIGURE 1.1
STUDY AREA
Proposed Re-zoning Area
North Wyong Industrial Area
Cardno
Map Produced by Cardno NSW/ACT Pty Ltd
Date: 05 April 2012
IN4858_Figure_1.1_Study_Area

FIGURE 4.1

FLOOD AFFECTED REGIONS AND PROPOSED LEVEE

100yr ARI Flood Extent

Proposed Flood Protection Levee

Proposed Re-zoning Area

Cardno

Map Produced by Cardno NSW/ACT Pty Ltd
Date: 05 April 2012
W3558_Figure_4.1_Flood_Affected_Area

FIGURE 5.1

CATCHMENT AREAS

West Catchment
East Catchment

Cardno

Map Produced by Cardno NSW/ACT Pty Ltd
Date: 05 April 2012
W4858_Figure_5-1_Catchment_Area

FIGURE 5.2

POSSIBLE WATER MANAGEMENT AREAS

Possible Water Management Area

Cardno

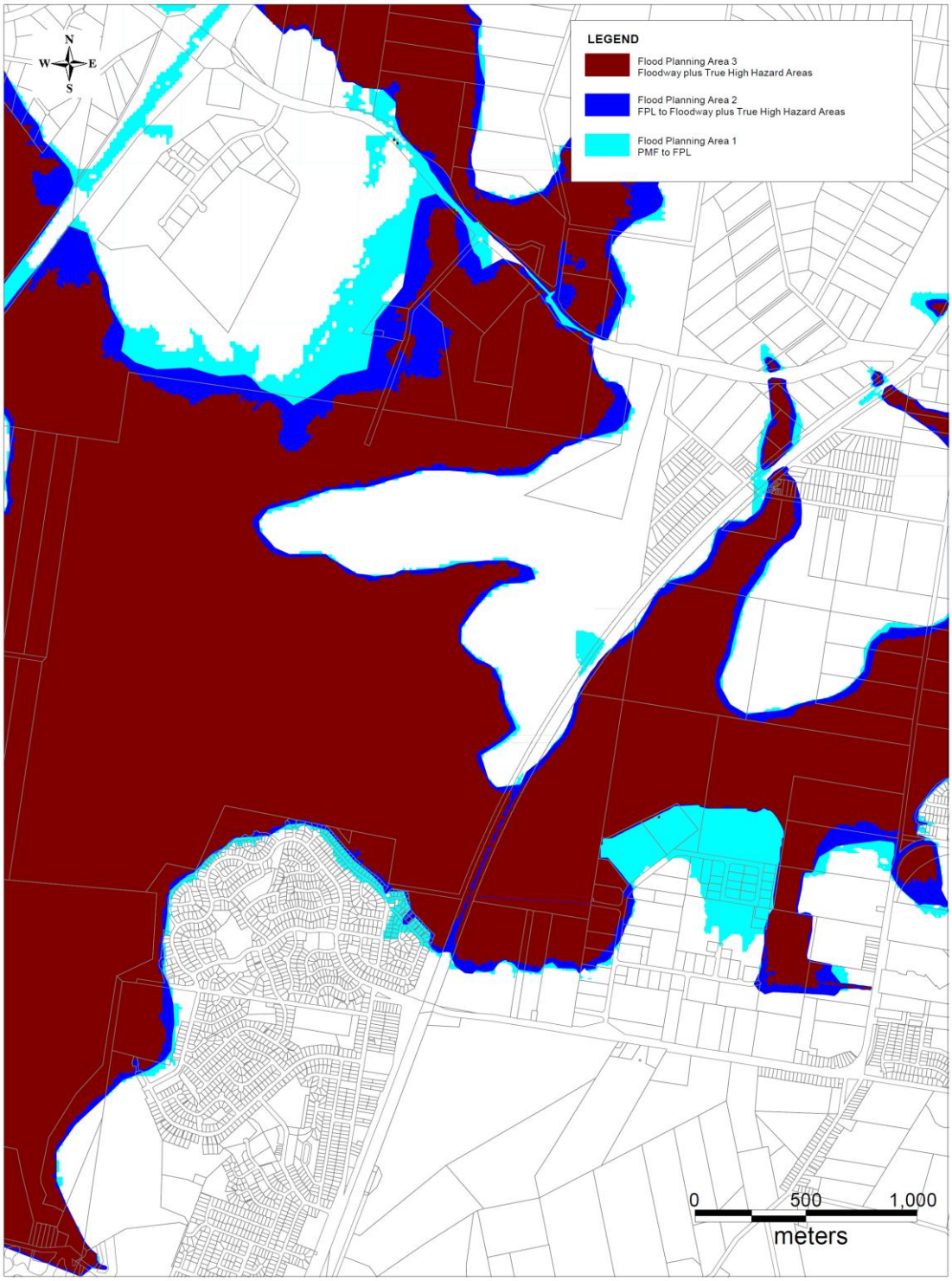
Map Produced by Cardno NSW/ACT Pty Ltd
Date: 05 April 2012
W4858_Figure_5-2_WetlandArea

Appendix A

Supplementary Information

Flood Planning Areas

From the Porters Creek Floodplain Risk Management Plan



Flood Planning Matrix

From the Porters Creek Floodplain Risk Management Plan

Figure 2: Floodplain Development Matrix

PART B: Traffic and Transport Issues

1 BACKGROUND:

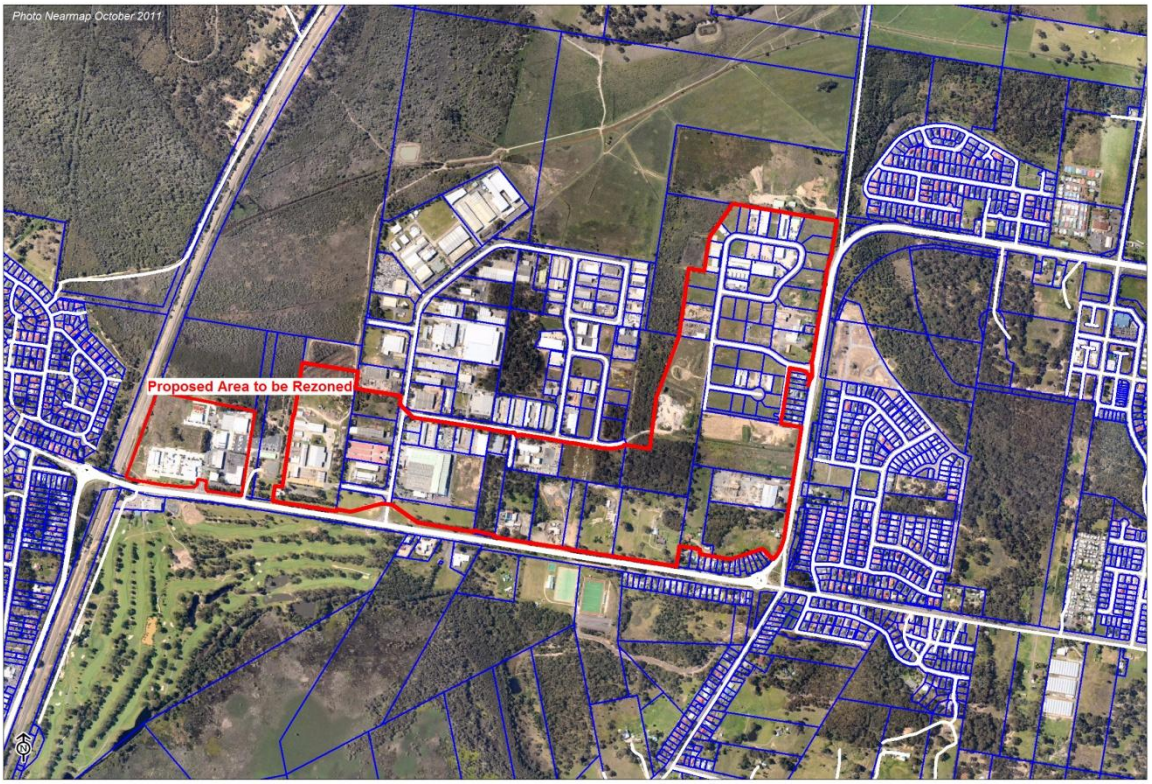
The Henry Kendall Group Pty Ltd is in the early stages of putting together a submission to Wyong Shire Council (WSC) to rezone a part of the North Wyong Industrial Estate from an Industrial Estate to a Zone B6 Enterprise Corridor (as described in the NSW Standard Instrument LEP template). The extent of the rezoning application is shown in Figure 1.

The rezoning application to Wyong Shire Council is being prepared by MacroPlan Australia Pty Ltd who in turn has retained Cardno to provide comments on the Stormwater and Traffic/Transport aspects of the application. This Technical Note addresses the traffic and transport issues.

MacroPlan prepared a report to WSC for the Henry Kendall Group titled North Wyong Industrial Estate Technology Business Park Rezoning December 2010. The report set out the basis for their rezoning submission which was to encourage and support future businesses to complement and build on the success of the Verb Data Centre which they see is unique as it is the first implementation of Hewlett Packard's POD (Performance Optimised Datacentre) technology in the Asia Pacific region.

The land is presently zoned 'General Industrial and Light Industrial'. The area is now proposed to be rezoned B6 Enterprise Corridor in response to feedback received from Wyong Shire Council.

Figure 2: North Wyong Industrial Area extent of Rezoning Proposal



2 INDUSTRIAL VERSES B6 ENTERPRISE CORRIDOR ZONING:

An area is zoned as a 'B6 Enterprise Corridor' if it is generally intended for the area to accommodate office and light industrial uses, including high technology industries. An area is zoned B6 Enterprise Corridor if the objective is:

- To promote businesses along main roads and to encourage a mix of compatible uses
- To provide a range of employment uses (including business, office, retail and light industrial uses).
- To maintain the economic strength of centres by limiting retailing activity
- To encourage activities which will contribute to the economic and employment growth for the area
- To allow some diversity of activities that will not:
  a) Significantly detract from the operation of existing or proposed development, or
  b) Significantly detract from the amenity of nearby residents, or
  c) have an adverse impact upon the efficient operation of the surrounding road system

The main difference between areas zoned Industrial and areas zoned B6 Enterprise Corridor is that an area zoned B6 Enterprise Corridor will usually be more intensively developed with a higher worker density through smaller lot sizes and the types of permitted uses. For example the following two references highlight this difference with respect to an area zoned Business Park which has similar permitted uses to an area zoned as a B6 Enterprise Corridor

- The Draft North Wyong Shire Structure Plan November 2010 mentions that areas zoned industrial (warehousing and storage) can have 10 to 20 workers per hectare while an area zoned as a Business Park (i.e.B6 Enterprise Corridor) could accommodate up to 100 workers per hectare.
- The Northeast Business Park Response to EIS Submissions July 2008 (near Brisbane) mentions industrial land uses generate in the order of 40 workers per hectare and a world class Business Park (i.e. B6 Enterprise Corridor) will generate 60-70 workers per hectare.

The point here is that an area zoned B6 Enterprise Corridor will generate from two to five times the number of workers per hectare compared to an area zoned Industrial.

For the North Wyong Industrial Estate, specific developmental guidelines are contained in the Wyong Shire Council's North Wyong Industrial Area Development Control Plan (DCP No. 36) adopted 26 November 2008. Relevant details in this document include:

- A minimum area for an allotment is 2,000m^2.
- Notwithstanding the above an allotment shall not be created with frontage to the main thoroughfare (Donaldson Street/Brussels Road/London Drive) with an area of less than 4,000m^2 to ensure a range of lot sizes and to provide improved vehicular circulation on sites fronting the major internal thoroughfare.
- Car parking and access shall be provided in accordance with Council's Chapters for Industrial Development and Carparking, and in accordance with AS/NZS 2890 Parking Facilities.
- The intensity of development in an Industrial Area is based on a maximum floor space ratio of 0.8:1 and maximum site coverage of 50 percent for the buildings on the site.

3 TRAFFIC GENERATION:

The RTA Guide to Traffic Generating Developments (ver. 2.2 2002) provides a guide to the number of vehicle movements generated by areas zoned Industrial and Business Park. The RTA Guide does not have a separate category for an area zoned B6 Enterprise Corridor but it can be assumed for this exercise that an area zoned B6 Enterprise Corridor will generate traffic and parking at a similar rate to an area previously zoned as a Business Park. In all cases the number of vehicle trips depends on the type and intensity of the development and hence the number of workers expected to be accommodated in the area.

The following indicative rates of traffic generation apply to areas zoned Industrial and an area zoned as B6 Enterprise Corridor. At this stage they can be used as a guide only as the final traffic generation rates will depend on the precise nature of the future developments.

For industrial areas the RTA Guide distinguishes between Factories and Warehousing uses.

- For factories (the RTA Guide assumes an employee density of 28 workers per hectare) the vehicle generation rate is 1 vehicle trip per 100m^2 gross floor area (GFA) in the peak hour or 5 vehicles trips per 100m^2 GFA per day
- For Warehousing the vehicle trip generation rate is 0.5 vehicle trips per 100m^2 GFA or 4 vehicle trips per 100m^2 GFA per day.

For an area zoned as B6 Enterprise Corridor there is a range of permitted land-use types in an integrated complex. The developments generally incorporate a number of individual units of similar size. The developments typically include elements of industrial, manufacture, research, warehousing, office space, retail, commercial, refreshment and recreational activity. They are generally located in industrial areas and the uses within the area are generally to a scale appropriate for the anticipated workforce.

- From the RTA Guide the typical vehicle generating rate for a Business Park (i.e. B6 Enterprise Corridor), if further details about the development are not known is 1.1 vehicle trips two-way per 100m^2 gross leasable area (GLA). However the rate could vary greatly depending on the scale and nature of the development.

The gross floor area (GFA) means the sum of the areas of each floor of a building where the area of each floor is taken to be the area within the outer face of the external enclosing walls as measured at a height of 1400 millimetres above each floor level excluding:

- columns, fin walls, sun control devices and any elements, projections or works outside the general line of the outer face of the external wall;
- lift towers, cooling towers, machinery and plant rooms, and ancillary storage space and vertical air-conditioning ducts;
- Carparking specifications which meet requirements of council and internal access thereto; and space for the loading and unloading of goods.

In the case of restaurants, gross floor area includes areas occupied by patrons outside the external walls.

The gross leasable area (GLA) means the sum of the area of each floor of a building where the area of each floor is taken to be the area within the internal faces of the walls, excluding stairs, amenities, lifts corridors and other public areas but including stock storage area.

4 ACCESS TO THE SITE:

There are three vehicle access roads into the North Wyong Industrial Estate from the Pacific Highway. They are

- Pacific Highway/**Amy Close** intersection- provides access to the western portion of the site which is occupied by the Verb Centre
- Pacific Highway/**Lucca Road** intersection – also provides access to the eastern part of the development
- Pacific Highway/**London Drive** intersection – provides access to the northern part of the site.

These three intersections with the Pacific Highway have not been upgraded for many years. They have the capacity to accommodate existing traffic movements but Wyong Shire Council will require a traffic study to ensure that they have the capacity to meet any future traffic generated from any future developments. This will apply whether the area is rezoned or not. For example if a new conforming development were proposed within the existing North Wyong Industrial Estate it would be necessary for the applicant to submit a traffic report to WSC to support their development application (DA).

Within the North Wyong Industrial Estate there is no vehicular access between sections of the proposed area to be rezoned as a B6 Enterprise Corridor with access off Amy Close, Lucca Road and London Circuit. If access was required between these three sections it would be necessary to negotiate with local property owners particularly for the properties with access off Amy Close and Lucca Road.

The internal road network is also only partly defined at this time. Further refinements to the road network can be made in the future when further details are known about the scale and nature of the future developments.

Access to the section of Industrial land north of the proposed area to be rezoned as B6 Enterprise Corridor

Under the current road network plan access to the section of Industrial land north of the proposed B6 Enterprise Corridor will be through the proposed B6 Enterprise Corridor unless alternative access arrangements can be made for direct access from the Pacific Highway north of London Drive.

5 PARKING REQUIREMENTS:

All developments of the site will need to provide off-street parking and if necessary Load Docks. The RTA Guide to Traffic Generating Developments provides a guide on the number of off-street parking spaces that should be provided for each type of development.

- For Factories the parking rate is 1.3 spaces per $100m^2$ GFA
- For warehouses the parking rate is 1.0 spaces per $300m^2$ GFA
- For Business Parks (assumed to similar to an area zoned b6 Enterprise Corridor) the parking rate is 1.8 spaces per $100m^2$ GLA (gross leasable office)/showroom leasable factory/warehouse area if component development area is available.

6 INTERNAL ROAD NETWORK:

As a guide Wyong Shire Council has adopted the following minimum dimensions for the internal roads:

- Local Roads 20m reserve (4.5m+11.0m+4.5m) – 4.5m verges plus 11.0m of pavement
- Collector Roads 21m reserve (4.5m+12.0m+4.5m) – 4.5m verges plus 12m of pavement

7 PUBLIC TRANSPORT ACCESS:

The site is located mid-way between the Wyong and Warnervale Railway Stations; about 2km from each station. This is beyond an acceptable walking distance to a public transport railway station or bus stop; which is usually 800m walking distance to a railway station and 400m to a bus stop.

The bus operator 'Busways' is the current bus operator in the Wyong area. They operate 6 bus services along the Pacific Highway throughout the day. None of these bus services pass through the North Wyong Industrial Estate. Public transport access to the North Wyong Industrial Estate could be greatly improved if Busway were to provide a bus service linking the Estate to the two railway stations

Figure 2 highlights the Busway bus services past the site

Figure 2: Busways Bus Routes past the site

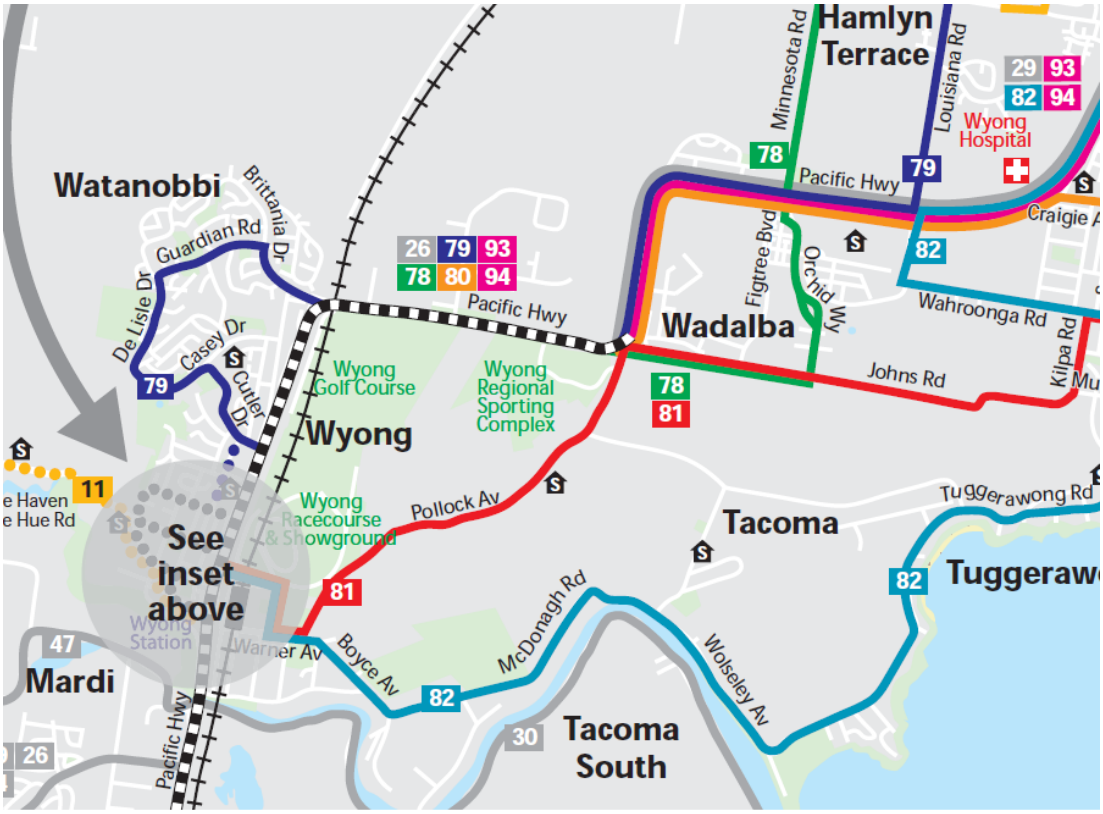


Table 1 summarises start and finish times and frequency of bus services along the Pacific Highway and Table 2 summarises CityRail services to and from Wyong Railway Station during the morning and evening peak hours.

Table 1: Bus Services on Pacific Highway past the Site

Route	Description	Start/finish Times (past site)	Service Frequency Morning Peak Hour (7-8am)	Service Frequency Afternoon Peak Hour (5-6pm)
Weekday				
78	Lake Haven Shops–Wyong -Tuggerah	6.40am-7.30pm	SB: 1 service per hour NB: 2 service per hour	SB: 1 service per hour NB: 2 service per hour
79	Lake Haven Shops–Wyong-Tuggerah	5.30am-9pm	SB: 2 service per hour NB: 3 service per hour	SB: 2 service per hour NB: 2 service per hour
80	Lake Haven Shops–Wyong-Tuggerah	5.30am-6.30pm	SB: 2 service per hour NB: 2 service per hour	SB: 2 service per hour NB: 2 service per hour
81	Lake Haven Shops–Wyong-Tuggerah	5am-9pm	SB: 2 service per hour NB: 2 service per hour	SB: 2 service per hour NB: 2 service per hour
93	Noraville to Tuggerah	6.30am- 8.30am- 5.35am-8.15pm	SB: 1 service per hour NB: 0 service per hour	SB: 0 service per hour NB: 1 service per hour
94	Budgewoi to Tuggerah	7am-8.3am 6pm-8.15pm	SB: 2 service per hour NB: 0 service per hour	SB: 0 service per hour NB: 1 service per hour
ALL ROUTES		**5am-9pm**	**SB: 10 services/hour NB: 9 services/hour**	**SB: 7 services/hour NB: 10 services/hour**

Figure 2: CityRail Services to and from Wyong Railway Station

Route	Description	Start/finish Times (past site)	Service Frequency Morning Peak Hour (7-8am)	Service Frequency Afternoon Peak Hour (5-6pm)
Weekday				
Wyong to Central	Newcastle to Central Service (Depart Wyong)	2.40am- 12.30am	5 Trains per hour	2 Trains per hour
Central to Wyong	Central to Newcastle Service (Arrive Wyong)	3.30am- 2.05am	4 Trains per hour	3 Trains per hour

8 SUMMARY OF TRAFFIC AND TRANSPORT NEEDS AND RISKS:

In summary the traffic and transport needs for the proposal to rezone a portion of the North Wyong Industrial Estate from Industrial to an area zoned as a B6 Enterprise Corridor are

Needs

- A description of the scale and types of development expected to occupy the B6 Enterprise Corridor.
- A traffic and transport report to summarise the future vehicle and public transport vehicle movements to and from the B6 Enterprise Corridor compared to the results for the existing Industrial Estate
- Hold discussions with WSC and RMS (formerly RTA) on their plans to upgrade the Pacific Highway and to provide additional access intersections off the Pacific into the North Wyong Industrial Estate.
- Finalise an internal road network with a possible road link between all sections of the B6 Enterprise Corridor.
- The need to find an alternative access link to the Industrial area located north of the proposed B6 Enterprise Corridor.
- Investigate the possibility of a new railway station adjacent to the B6 Enterprise Corridor north of the Brittania Drive/pacific Highway roundabout

The traffic and transport risks for the rezoning are;

Risks

- The need to upgrade the three existing intersections off the Pacific Highway into the proposed B6 Enterprise Corridor. The risk is who pays for the upgrades and the timing when they will be upgraded if they are needed.

  The portion of costs a developer is required to pay towards the cost of new infrastructure is determined by the WSC's Section 94 Plan for that type of development. WSC has prepared separate Section 94 Plans for residential and commercial development areas. A Section 94 Plan (a section of the *Environmental Planning Act (EPA) 1979*) establishes the proportion of costs a developer is required to pay towards the cost of new infrastructure. With respect to the North Wyong Business Park the cost of new infrastructure will be shared amongst all developments within the B6 Enterprise Corridor usually proportioned on the basis of gross floor area (GFA) for each development.

  If the ultimate development of the B6 Enterprise Corridor requires the intersections to be upgraded WSC usually allows the upgrading to be staged in line with the increasing developments within the area. The traffic plan that WSC insists must accompany each development will highlight the trigger point for when each intersection will need to be upgraded.

- The need to improve access to public transport to the two railway stations and to regular bus services throughout Wyong. Workers in a B6 Enterprise Corridor highly value accessibility to public transport as usually there is insufficient parking to fully meet the demand for parking from workers and visitors in the area. The risk is related to the level of

public transport that is required to attract workers to the area and to meet the minimum expectations of WSC for public transport services to the area.

- The need to improve pedestrian access to the area. The risk is pedestrian safety for workers walking within the area and to and from the area.
- The need to develop an internal road network with a road link between all sections of the B6 Enterprise Corridor. The risk is who will pay for these roads and when they will be constructed. An internal road network will help to distribute traffic between the three access road intersections. This will assist in developing an efficient staging plan for the upgrade of these intersections if and when required.
- That an alternative access road to the industrial area immediately north of the B6 Enterprise Corridor cannot be found and that all access to this industrial land will need to pass through the proposed B6 Enterprise Corridor. The impact on the B6 Enterprise Corridor will be an increase in industrial type vehicles (large trucks) travelling through the B6 Enterprise Corridor. This means that internal roads within the B6 Enterprise Corridor will need to be constructed (with respect to pavement width and pavement strength) to accommodate these vehicles. There may also be an impact on the configuration of upgrading the Pacific Highway/Lucca Road and Pacific Highway/London Drive intersections as they will need to be configured and constructed to accommodate these vehicle types (large trucks). On this basis the cost of upgrading these intersections will also be shared by new developments within the industrial land north of the B6 Enterprise Corridor.

9 THE NEXT STAGE:

So far this report has addressed the traffic and transport issues at a strategic level in order to paint a picture of the traffic and transport issues which will have an impact on this rezoning application to a B6 Enterprise Corridor.

To determine the cost implications of the traffic and transport issues a traffic study is required.

The objective of a traffic study would be

- To estimate future road infrastructure costs for the ultimate development of the B6 Enterprise Corridor based on 2012 costs.
- To provide feedback from WSC and RMS (RTA) on their plans to upgrade the Pacific Highway, the possibility of constructing the missing road links within the B6 Enterprise Corridor, the possibility of providing another intersection on the Pacific Highway with direct access to the industrial area north of the proposed B6 Enterprise Corridor and their approach to cost sharing these infrastructure works.
- To obtain from WSC a copy of their traffic model results for the Pacific Highway through North Wyong for the next 25 years if that is available. WSC updates a traffic model of the area in conjunction with Gosford Council to estimate future traffic flows on major roads in the area so as to assess the traffic impact of major residential and commercial developments on these roads.
- To provide feedback from CityRail on the possibility of another railway station between Wyong and Warnervale railway stations.

- To provide feedback from Busways on the basis for them to provide a bus service through the B6 Enterprise Corridor connecting to Wyong and Warnervale railway stations.

To undertake this traffic study it will be necessary to collect traffic data at each of the three intersections along the Pacific Highway at Amy Close, Lucca Road and London Drive. In addition it would be useful to collect traffic data at the two roundabouts at the Pacific Highway/Brittania and Pacific Highway/Johns Road intersections. The traffic data that needs to be collected is the morning and evening peak period traffic movements through each intersection.

The output from the traffic study will be

- An idea on the ultimate configuration for the three intersections on the Pacific Highway into the site
- The cost to upgrade these three intersections if necessary
- The estimated cost of the internal road network
- Feedback comments from RMS (RTA), WSC, CityRail and Busways
- Issues with completing the internal road network to provide road links throughout the B6 Enterprise Corridor.

The traffic study will basically treat the North Wyong Business Park in isolation and only look at local traffic issues.

It is also our recommendation that we integrate the traffic study to address planning issues such as the suitability of an area zoned as a B6 Enterprise Corridor located in North Wyong, the impact of the North Wyong B6 Enterprise Corridor on other B6 Enterprise Corridors/Business Parks within the Wyong Shire LGA or the overall demand for a B6 Enterprise Corridor in North Wyong.