Shire of Chittering Local Planning Policy No.33

Muchea Industrial Park

Design Guidelines

Contents Page

STATUTORY CONTEXT

The Muchea Industrial Park Design Guidelines ('Design Guidelines') have been prepared to guide landowners and assist the Shire of Chittering in achieving a high standard of development within the Muchea Employment Node Special Control Area (MEN SCA) as defined under Local Planning Scheme No. 6 (LPS 6).

The Design Guidelines have been adopted by the Shire of Chittering under the provisions of LPS 6 and have the same status as a Local Planning Policy adopted under the Scheme. The Design Guidelines do not form part of LPS 6 and shall not bind the Shire of Chittering in respect of its consideration of any scheme amendment, structure plan, subdivision application or application for planning approval. This notwithstanding, the Shire of Chittering shall have due regard to the objectives of the Design Guidelines before making its decision in relation to any planning application.

In the event of any inconsistency between the Design Guidelines and the Scheme, the Scheme shall prevail.

BACKGROUND

The Muchea Industrial Park (MIP) comprises an area of 1,167ha within the Shire of Chittering and is located approximately 2km east of the Muchea Town Centre. The MIP was identified in the North East Corridor Extension Strategy (WAPC, 2003) as having potential as an industrial area. Further planning studies have since been undertaken which resulted in the Muchea Employment Node Structure Plan Final Report (WAPC 2011). Subsequently, Amendments 52, 60 and 62 to LPS 6 have included Scheme provisions relating to subdivision and development in the MIP.

There are four primary precincts in the MIP requiring landowner coordination and structure planning to deliver services and infrastructure such as power, reticulated water, roads and drainage, as follows:

- Precinct 1 (North A and North B)
- Precinct 2 South
- Precinct 3 West
- Precinct 4 East

The Muchea Employment Node (Lot 102 Great Northern Hwy) Local Structure Plan 1 which relates to Precinct 1 North A, was approved by the WAPC on 13 October 2017.

Several small lots adjacent to Muchea East Road and Great Northern Highway, being Lots 700, 701 and 352 (previously described as Lots 100 and 101) and 102, M1606, 22, 30, 202, 3 and 201, are exempt from this structure planning requirement, however will be required to apply for development approval prior to development commencing.

In addition to LPS 6 and any approved Structure Plans, the Design Guidelines are intended to be read in conjunction with the Stormwater Drainage Design Guidance Note - Muchea Industrial Park. A copy of this supporting document is available from the Shire of Chittering.

In 2016, construction of the Northlink WA project commenced which provides a transport link between Morley and Muchea. The northern section, ending at Muchea, is projected to be completed in mid-2019. Such significant infrastructure contributes to the current demand for industrial land in the MIP.

Main Roads WA Restricted Access Vehicle (RAV) Routes determined that it will be permissible to use the Great Northern Highway for triple road trains (RAV 10) between Wubin to Northlink at the Muchea terminal, where a breakdown assembly area will be provided. It is considered appropriate and opportune to cater for this vehicle configuration throughout and where feasible in the MIP.

The MIP area, whilst considered suitable for industrial development, is not considered appropriate for certain industrial land uses that could cause harm to the environment. The Muchea Employment Node Structure Plan Final Report identified the following land uses as 'not permitted':

- Industry – hazardous, mining; and
- Industry – Noxious (Chicken litter fired power plant).

The MIP is located in the Ellen Brook Catchment of which a tributary ultimately leads to the Swan River environs. In this regard, water quality is paramount and developers will be required to demonstrate consideration for both hydrology and hydrogeology in the MIP area at both a catchment and local level.

The visual appearance of the MIP area is important particularly as it is located at the southern gateway to the Shire of Chittering adjacent to major road links including Northlink and the Great Northern Highway.

The MIP will deliver significant productivity benefits to the economy, industry, transport and the local community. Industrial land uses will be considered having ultimate regard for LPS 6 provisions.

1.0 PURPOSE OF THE DESIGN GUIDELINES

The MIP is intended to provide for service based and complementary industrial uses related to transport, livestock, fabrication, warehousing, wholesaling and general commercial use.

The purpose of the Design Guidelines is to ensure a high standard of industrial development that considers provision of servicing infrastructure, visual amenity, traffic access and egress and protection of the Ellen Brook Catchment.

The Shire of Chittering will review the Policy provisions at regular intervals to ensure appropriate development is occurring within the MIP

2.0 AREA SUBJECT TO THE DESIGN GUIDELINES

The land identified within the MEN SCA in Schedule 11 of LPS 6 shall be developed having due regard to the Design Guidelines. The area subject to the Design Guidelines is defined by the 'study boundary' relating to the Muchea Employment Node Structure Plan at **Figure 1**.

The Shire may also refer to the Design Guidelines to inform its consideration of any other industrial development within the Shire of Chittering.

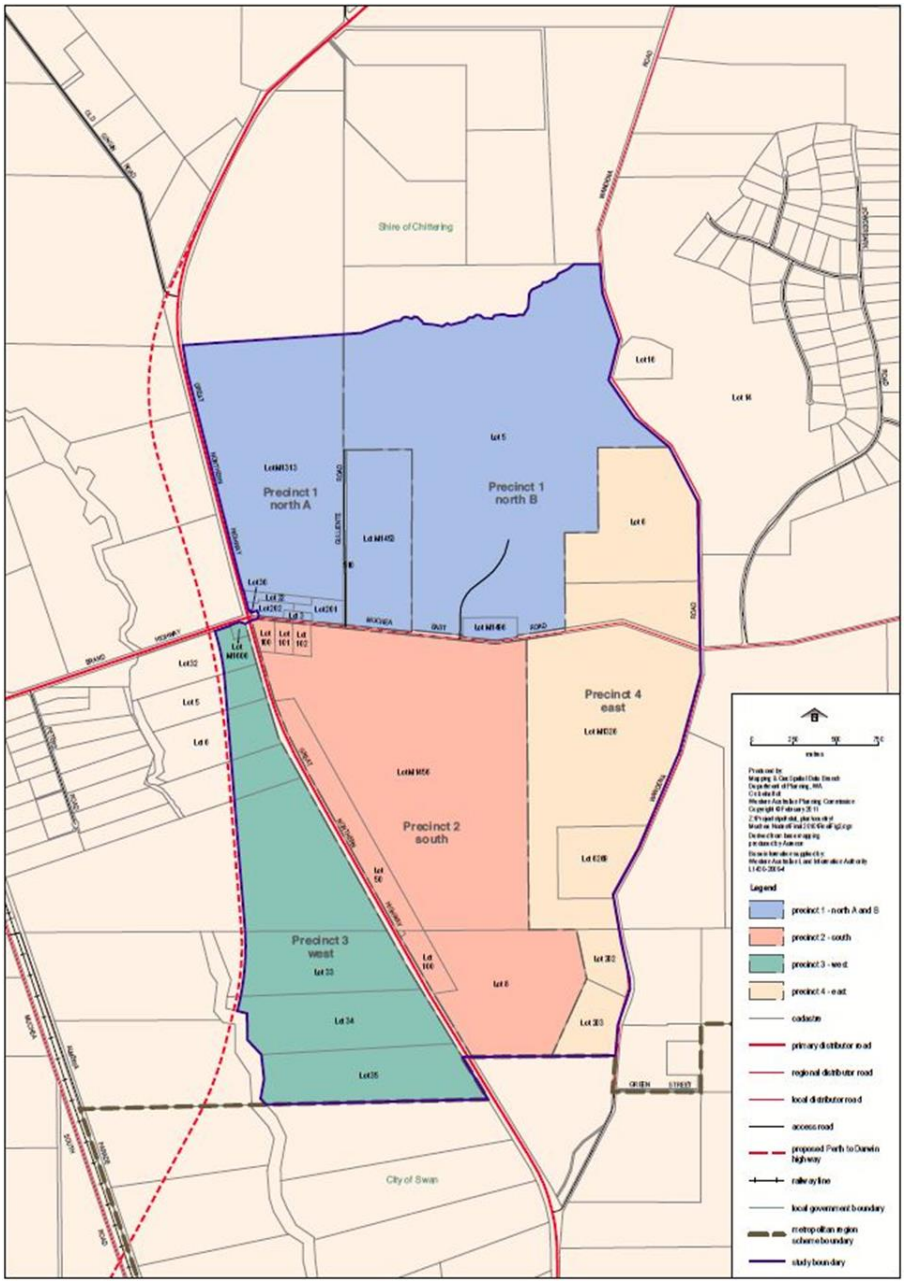

FIGURE 1 - AREA SUBJECT TO DESIGN GUIDELINES

3.0 NON RESIDENTIAL AMENITY CONSIDERATIONS UNDER LPS 6

The Design Guidelines are intended to achieve the following principles set out in clause 4.20 of LPS 6:

a) *the form and scale of the development is to be compatible with surrounding land uses;*

b) *the impacts of the development are to be contained on site and/or suitably managed off-site;*

c) *the impact of the development on the road network and traffic management is to be consistent with the road function and hierarchy;*

d) *adequate provision is to be made for parking for staff and visitors, with separation between staff / visitor parking and service / haulage vehicles;*

e) *buildings are to have co-ordinated or complementary materials, colours and styles, including:*

   i. *doors, windows and building materials that develop a coherent pattern, and are proportional to the building; and*

   ii. *screening of services and areas for waste management and essential services (eg air conditioning units).*

f) *visual impacts to be minimised by the use of vegetation screening, tree retention and building orientation;*

g) *landscaping to be provided, to a minimum of 10 per cent of the site area, using plant species approved by the local government, including provision of shade trees at 1 per 4 car bays;*

h) *the use of front fencing, is to be minimised and where required, fencing to be set back to the building line and behind the landscaped area where feasible, and coloured matt black or other dark tones;*

i) *external lighting shall be designed to minimise light spill and glare on adjoining properties;*

j) *storage of plant and equipment to be screened or remote from public areas, particularly from the street, and provision made on site for a loading bay where the land use requires it;*

k) *use of 'on building' signage where the building addresses the street, and where 'freestanding' signage is necessary it should either be affixed to a front fence, or located adjacent to it at a height that is compatible with the setting.*

4.0 IMPLEMENTATION

All development in the MIP shall comply with the following requirements which may be required by the Shire at Scheme Amendment, structure planning, subdivision or development stage.

4.1 LAND USE AND INDUSTRIAL DESIGN

i. Land use permissibility shall be in accordance with LPS 6 having due regard to any approved Structure Plans applicable to the area.

ii. The design of industrial buildings will be guided by the proposed land use and in accordance with any approved Structure Plans. It should be noted that design requirements may differ between the Precincts.

iii. It is expected that a reticulated water service will be required for general industrial land uses however in the event a licensed reticulated water scheme is not provided and connected to the MIP reticulated system, permissible land uses will be limited.

4.2 SITE PLANNING

4.2.1 Site Cover

Objective

Development will contribute to the desired streetscape in order to create attractive and high quality built form within the MIP.

Acceptable Development Criteria

i) Site Cover will be assessed on a case by case basis, having regard to:

- The intended or preferred uses for the site prescribed under an approved Structure Plan;
- Existing vegetation;
- Lot size;
- Soil conditions, including the requirements of any approved Local Water Management Strategy or Urban Water Management Plan; and
- The requirements of any other management plans prepared in support of a Structure Plan.

4.2.2 Streetscape

Objective

Development is to address and activate the street in order to create an attractive and safe environment within the MIP.

Acceptable Development Criteria

i) Achieving the minimum street setback of 6m for the administration, reception, customer and staff areas component of industrial development is encouraged for the purpose of achieving the streetscape objective.

ii) The street setback area (15m) may be used for landscaping, car parking and vehicular access and is not to be used for outdoor storage. Council may approve the street setback area for trade display.

SETBACK	DISTANCE
Primary Street – Office	6m
Primary Street – General Industrial Land Uses	15m
Secondary Street	3m
Rear	3m
Side Setback	3m
Great Northern Highway (rear)	15m

TABLE 1 – MINIMUM SETBACK DISTANCES

4.2.3 Stormwater Management

Objective

Stormwater will be managed appropriately and in accordance with an approved Urban Water Management Plan, to minimise stormwater runoff and impacts on the surrounding land.

Acceptable Development Criteria

i) Refer to the provisions in the Road and Drainage Design Guidance Note- Muchea Industrial Park, Porter 2018(attached).

ii) All stormwater management is to be constructed and maintained in accordance with an approved urban water management plan (UWMP).

iii) A stormwater management plan is required to be prepared by a qualified civil engineer and provided at development application stage.

VEGETATED STORMWATER SWALE CONCEPT

4.2.4 Effluent Disposal

Objective

Effluent disposal shall be managed in accordance with;

a) Scheme requirements to ensure no adverse environmental or health impacts within the MIP or on surrounding land.
b) The draft Government Sewerage Policy (2016) and explanatory notes

Acceptable Development Criteria

Local Planning Scheme Acceptable Development Criteria requirements (clause 4.9)

i) Where an on-site wastewater disposal system is proposed –

- Land capability assessment may be required at development application stage to demonstrate the capability of the site to manage wastewater and the suitability of the proposed system;
- The use of fill and drains to achieve the required separation from groundwater is to be limited; and
- A suitable and unencumbered land application area is to be set aside to distribute treated sewage.

ii) Within sewerage sensitive areas, secondary treatment systems with nutrient removal are to be utilised;

iii) Industrial development is to be restricted to 'dry industry' being land uses that intend to dispose of wastewater on site to the environment of a kind and volume ordinarily discharged from a habitable building at a daily volume of less than 540 litres per 1,000m^2 of the site area;

iv) Where trade waste is to be managed and/or disposed of on-site or off-site the associated risks must be identified and addressed, at development application stage including the vulnerability of the receiving environment.

Draft Government Sewerage Policy (2016) requirements

Refer to above Policy at Clause 5 and 6.4 specifically.

4.2.5 Road Design

Objective

The road network is designed to ensure;

a) safe and efficient movement of traffic to and from each site within the MIP
b) To permit Restricted Access Vehicles (RAV) access and egress to and within the MIP
c) Design to consider dual use/shared pathways to ensure the safety of pedestrians and cyclists

Acceptable Development Criteria

i) Refer to the provisions in the Road and Drainage Design Guidance Note- Muchea Industrial Park, Porter 2018 (attached).

ii) All subdivisional roads are to be designed to consider access and egress of RAV vehicles.

iii) Road reserves widths will be greater where drainage swales are included in design.

iv) A RAV Network Strategy is to be included to support a Structure Plan.

v) A dual use/shared pathway plan will be required at Structure Plan stage.

4.2.6 Earthworks

Objective

To ensure that all earthworks are completed in a manner that supports and implements an approved urban water management plan and stormwater management plan, having regard to streetscape objectives of the MIP.

Acceptable Development Criteria

i) Site works consistent with a bulk earthworks strategy prepared and approved at structure plan or subdivision stage, if required.

ii) Site works for cut and fill requirements will be limited at the subdivision stage. Where required, earthworks will be assessed based on proposed land uses at the time of the development application.

iii) Site works should have consideration for onsite native vegetation which shall be retained where practical.

4.2.7 Fencing

Objective

Fencing is to promote passive surveillance of the public realm and ensure safe, attractive and coordinated streetscapes.

Acceptable Development Criteria

i) Use of front fencing, is to be minimised and where required, fencing to be set back to the building line and behind the landscaped area where feasible, and coloured matt black or other dark tones;

ii) Fencing within the street setback area should be high quality open fencing, being 50% visually permeable (E.g. powder coated garrison fencing) to a maximum rail height of 1.8m and pillar height of 2.1m.

iii) New chain link fencing may be used on larger lots if incorporated with alternate entrance materials, as referenced in Point ii) above.

iv) Fencing within the street setback shall be setback a minimum of 2m with landscaping in front of the fence up to the property boundary.

v) Alternative materials including link mesh fencing may be used behind the street setback area and subject to compliance with the Shire's Fencing Local Law.

vi) New fencing materials will be required.

vii) Solid screen fencing will not be permitted in front of the building setback line.

VERTICAL GARRISON FENCING

4.2.8 Landscaping

Objective

a) Developments are to incorporate quality native landscaping that performs on a functional, aesthetic and sustainable level.
b) To ensure the survival, management and maintenance of landscaped areas.

Acceptable Development Criteria

i) A landscaping plan shall be submitted at development application stage which demonstrates the following:
- Use of flora species native to the area;
- Landscaping utilising low water usage plants and grouping of plants with similar water requirements;
- Maintenance and replacement plant program to be undertaken by the owner of the lot;
- Minimum of 3m landscape buffer along the primary street frontage of the lot with allowance for a minimum 1m landscape buffer along secondary street boundary;
- Shade trees to be provided in the car parking area at a minimum ratio of one tree per four car parking bays; and
- One tree is required on the Lot for every 10-20 metres of lot frontage.

ii) A landscape plan is required to be prepared and submitted at the development application stage by a suitably qualified professional. It is recommended the Proponent's landscape consultant liaises with the Chittering Landcare Centre in order to plant appropriate landscaping vegetation that has regard for the local environment.

iii) Landscaping requirements shall have regard to any approved Local Water Management Strategy or Urban Water Management Plan provisions.

iv) Landscaping within the road reserve, if required as a condition of subdivision approval, will be maintained by the subdivider for a further two summers following implementation of a landscape plan.

v) RAV 10 Local Distributor Road will require a vegetated median strip to be provided at subdivision.

4.2.9 Signage

Objective

Signage will be sensitively designed and located so as not to detract from the façade or streetscape, and not be excessive in scale or quantity.

Acceptable Development Criteria

The key objective of these provisions is to provide guidance on the design and placement of the common forms of advertising signs within the MIP. Where conflict between the Design Guidelines and other Local Planning Policies relating to signage exists, the Design Guidelines shall prevail to the extent of the conflict where applied within the MIP area.

i) All signage within the MIP shall be subject to Development Approval from the Shire.

ii) A Signage Strategy, being an overall plan for the whole of the development site or area, showing the location, type, size and design of all existing and proposed signs, as well as the outline of any buildings, landscaping, car parking areas, vehicular access points etc. will be required to be submitted upon application for development approval for:

- All new buildings where multiple tenancies are proposed;
- Signs for subdivision or development estates which propose more than ten lots;
- Signage where the total number of signs (existing and proposed) on the site exceeds a total of four.
- Involving a variation to the requirements of this Policy;

The strategy should explain and demonstrate the need for the extent and design of signs proposed, having regard to the objectives of the Design Guidelines and should seek to integrate the signage with the building design, particularly through the provision of signage panels within the building facades.

Recognising that specific uses may not be known at the development approval stage, it is not necessary to include specific signage content in the signage strategy.

Once approved, all subsequent sign applications will be assessed against previously approved signage strategies. Modifications to the signage strategy to permit additional signage will be subject to a further approval and will need to be further justified.

iii) The following provisions apply to all signage applications:

- A proliferation of signage on a property will not be supported;
- Signage will not be supported in any thoroughfare;
- Fencing signage will generally not be supported;
- Signage on entry statement walls may be permitted subject to it providing a clear statement/direction to the primary entry of the business;
- Signage shall not be hazardous to pedestrians on-site due to their location, size and materials;
- Signage shall not advertise activities/businesses on land other than the land which the advertising signage is located (no third-party advertising);
- Signage shall not distract/cause a hazard to traffic as a result of location, size, content and illuminance of signage;
- Illuminated signs shall not pulsate, chase or flash.

iv) Signage on lots with frontage to Tonkin Highway and Great Northern Highway shall be subject to meeting the following additional objectives:

- Signage shall not adversely impact and/or detract from the amenity and vista of the adjacent Highway; and
- Signage shall not detract from the architectural merit of a building(s) where appropriate.

N.B. Signage on land abutting a road under management of Main Roads WA (MRWA) is required to comply with MRWA's *Policy and Application Guidelines for Advertising Signs Within and Beyond State Road Reserves*.

4.2.10 Entry Statements

Objective

To provide guidance for the acceptable design and development standards for entrance signs/statement and to encourage the use of natural material with local themes.

Acceptable Development Criteria

i) Council may require entrance statements in strategic locations within the MIP. Given that the Great Northern Highway traverses the site in some cases, Main Roads WA permission may be required. In some instances lots may require a greater corner truncation to allow area for the entrance statement. The cost of design, illumination and construction shall be borne by the Proponent, if required. Council will contribute "in-kind" to the ongoing maintenance costs of the structure and landscaping following a Proponent maintenance period of 2 years.

ii) Design and materials:

- Encourage the use of Shire of Chittering Logo where possible;
- Masonry walls shall be constructed in dark render or stone;
- "Muchea Industrial Park" with a shire logo or environmental pattern will be encouraged in same material i.e. (stainless steel/iron lettering-laser cut);
- Solar power and low energy lighting is encouraged;
- Native plants are to be used which are endemic to the locality with low water requirements for landscaping;
- Turf is not permitted;
- Anti-graffiti treatment is required on all surfaces.

iii) Development approval and a Building Licence will be required including the permission of Council to locate the structure.

ENTRY STATEMENT CONCEPTS

4.2.11 Parking & Service Access

Objective

Developments will incorporate sufficient on site car parking to be designed and located to minimise any adverse impacts on the streetscape. The design and location of vehicle access points to meet the needs of businesses whilst not compromising safety, building design or drainage swale functionality.

Acceptable Development Criteria

i) All car parking will be provided onsite and designed in accordance with the Australian Standard for off-street parking. It will be paved, kerbed, drained and marked to the satisfaction of the Shire.

ii) Loading and unloading provision is to be made behind the street setback area, marked appropriately and screened from public view.

iii) Driveway access will not be permitted from Great Northern Highway, unless approved by Main Roads Western Australia.

iv) Parking areas and crossovers shall be constructed and drained to ensure stormwater is disposed of on-site.

v) Access shall be provided for loading and unloading of vehicles to the rear including any part of the development where provision is made in the external walls of the building. A paved access way shall be provided unless otherwise approved by Council.

vi) All access ways shall allow for all service and delivery vehicles to enter the lot and return to the street in forward gear with access ways being a minimum 4.5 metres in width for each direction of travel (i.e. two way access is to be 9 metres in width).

Parking ratios are set out in **Table 2 - Car Parking Standards**.

USE	NUMBER OF CAR PARKING BAYS
Abattoir	1 bay per employee
Animal Husbandry/Intensive	1 bay per employee
Aquaculture	1 bay per employee
Factory Unit	1 bay per employee plus 3 bays for every 50 square metres of retail floor bays
Farm Supply Centre	1 bay per 50 square metres of sales and display area but not less than 5 plus 1 bay per employee
Fuel Depot	1 bay per employee
Garden Centre	1 bay per 50 square metres of sales and display area but not less than 5
Industry-General	1 bay per 100 square metres of GLA plus 1 bay per employee but not less than 6 bays
Industry-Light	1 bay per 100 square metres of GLA plus 1 bay per employee but not less than 6 bays
Industry-Rural	1 bay per 100 square metres GLA or 1 bay per employee, whichever is greatest
Industry-Service	4 bays per 100 square metres GLA
Landscape Supplies	1 bay per 100 square metres of GLA plus 1 bay per employee
Lunch Bar	8 bays per 100 square metres GLA
Motor Vehicle Repair	4 bays per each working bay plus 1 bay per employee
Motor Vehicle Wrecking	1 bay per 50 square metres of sales and display area but not less than 5 plus 1 bay per employee (excludes vehicle storage area)
Motor Vehicle, Boat and Caravan Sales	1 bay per 100 square metres of GLA plus 1 bay per employee but not less than 6 bays
Open Air Display	1 bay per 100 square metres of GLA plus 1 bay per employee but not less than 6 bays
Plant Nursery	1 bay per 50 square metres of sales and display area but not less than 5
Roadhouse	To be negotiated with Council
Salvage Yard	1 bay per 100 square metres of GLA plus 1 bay per employee but not less than 6 bays
Showroom	1 bay for every 200 square metres of floor bay plus 1 bay per employee
Stockyards	1 bay per employee, if sale yard must also include car parking for buyers/agents
Telecommunications Infrastructure	Minimum 1 bay with all parking to be contained on the lot
Transport Depot	1 bay per employee
Veterinary Centre	1 bay per 30 square metres of GLA plus 1 bay per employee
Warehouse Storage	1 bay per employee plus 1 bay for every 200 square metres of floor space

**In the event a land use is not listed or in the event that the Proponent can demonstrate a variation to the above requirements, Council may use its discretion to consider alternatives.*

**This Table is consistent with Council's Local Planning Policy Car Parking Standards*

TABLE 2 – CAR PARKING STANDARDS

4.2.12 Storage, Refuse and Hard Stand Areas

Objective

Storage and hard stand areas are to be located and constructed to minimise any adverse visual impacts and to protect the amenity of the MIP from dust, run off and contamination.

Acceptable Development Criteria

i) Trafficable areas and car parking shall be paved, kerbed and drained. Council may require hard stand areas to be paved, kerbed and drained. Alternatively, Council may consider an alternative standard of construction for hard stand areas subject to provision of a transport assessment and/or engineering assessment which addresses the number of traffic movements, type of vehicles, proposed treatment and maintenance of hardstand, dust management, and drainage management to the satisfaction of the Shire.

ii) Outdoor storage, refuse and hardstand areas shall be located behind the street setback area.

iii) Fencing or walls of similar design feature to the main built form, or alternatively sufficient landscaping is to be used to screen outdoor storage, refuse and hardstand areas from public view.

iv) One or more areas for the storage of refuse is required and shall be screened from the street and enclosed by an approved wall of not less than 1.8m in height. The refuse area is to be accessible by vehicles.

4.2.13 Setbacks to Ellen Brook and Buffers to Sensitive Land Uses

Objective

To protect designated conservation areas, including Environmentally Sensitive Areas, Conservation Category Wetlands and vegetation protection areas from inappropriate impacts associated with adjacent development.

Acceptable Development Criteria

i) In addition to separation distances being considered at structure planning stage, land uses will be assessed at development application stage to determine appropriate setback distances from Ellen Brook and Sensitive Land Uses.

ii) The Shire will have regard to the comments received from referral agencies and the recommendations of the Environmental Protection Authority Guidance for the Assessment of Environmental Factors (in accordance with the Environmental Protection Act 1986) Separation Distances between Industrial and Sensitive Land Uses.

iii) Due regard will be given to State Planning Policy provisions.

iv) The Shire may require additional information to be provided at development application stage such as environmental impact assessment reports, acoustic or odour reports.

4.2.14 Conservation Area Interface

Objective

To provide a suitable interface between industrial development and conservation areas which protects environmental assets from encroachment by industrial uses and provides effective access for fire management and maintenance purposes.

Acceptable Development Criteria

i) At structure plan stage, roads should be provided at the interface between conservation areas and industrial development sites.

ii) In the event roads cannot be provided, as a minimum, a vegetated swale should be provided at the site boundary between the industrial development site and conservation area and incorporated a local water management strategy prepared in support of a structure plan.

4.2.15 Bushfire Management

Objective

Development will;

a) Be located to take into account fire protection requirements where there is any risk from bush fires,

b) Be located in areas with the least possible risk of bushfire,

c) Ensure that adequate bushfire protection measures are achieved to avoid any increase in the threat of bushfire to people, property and infrastructure and

d) Provide a response to any high risk land uses.

Acceptable Development Criteria

i) The Muchea Industrial Park is designated as “bushfire prone” on the Map of Bushfire Prone Areas and triggers the application of State Planning Policy 3.7 – Planning in Bushfire Prone Areas (SPP 3.7) In accordance with SPP 3.7 all strategic planning proposal, subdivisions and development applications within a designated bushfire prone area will need to be accompanied by either a Bushfire Hazard Level assessment, A BAL Contour Map and/or a BAL assessment as part of a Bushfire Management Plan.

ii) SPP 3.7 recognises that vegetation is not necessarily the only fuel in a bushfire event and that certain land uses may potentially ignite a bushfire, prolong its duration or increase its intensity. Such uses are considered ‘high-risk’ land use

and may also expose the community, firefighters and the environment to dangerous uncontrolled substances during a bushfire event.

iii) Subdivision and development applications proposing high-risk land uses must comply with Policy Measure 6.6 of SPP 3.7.

iv) Where a Bushfire Management Plan or any other condition of development/subdivision requires the installation of fire hydrants they must be compliant with Water Corporation Design Standard DS 63 Water Reticulation Standard.

4.3 BUILDING DESIGN

4.3.1 Building Design

Objective

To create high quality industrial developments which provide visual interest, and contribute positively to the streetscape.

Acceptable Development Criteria

i) Buildings should be designed to address the street, providing a visible and legible entrance for pedestrians and active frontages that contribute to the streetscape. The building façade shall run parallel to the street edge and corners, where applicable.

ii) Building facades that address the street or other public areas should be well articulated. Development is to provide variation in building plane, texture, materials and colour to reduce overall building bulk and massing and to create visual interest. Large expanses of blank wall are to be avoided.

iii) Where 'lean to' structures are added to the predominant building they must be appropriately incorporated into the design to ensure a high quality design standard.

iv) Servicing of the business shall be conducted at the rear and customer service areas shall be located on the street façade.

v) New building materials are to be used, unless otherwise approved by Council.

vi) Developers may be required to provide bicycle parking and end of trip facilities – such as showers, change rooms and lockers in commercial and industrial development.

APPROPRIATE BUILT FORM

4.3.2 Sustainable Design

Objective

Buildings will be designed to achieve excellence in environmental sustainability through innovative design, construction and management. Buildings should achieve reduced energy and water usage rates when compared to a Building Code of Australia base compliant building.

Acceptable Development Criteria

i) Built form should demonstrate sustainable design principles including;

- Reduced water and energy use;
- Passive solar design by optimising building orientation, shading, natural lighting and cross-flow ventilation;
- Utilisation of natural light through the provision of windows, openings and skylights, designed and oriented to minimise heat gain in summer months.

Porter
Consulting Engineers

ROAD AND DRAINAGE GUIDANCE NOTE

MUCHEA INDUSTRIAL PARK

Porter

Prepared for	**Shire of Chittering** 6177 Great Northern Highway Bindoon WA 6502
Job number	18-06-069
Our reference	R38H.18
Checked	

HISTORY AND STATUS OF THE DOCUMENT

Revision	Date issued	Author/s	Issued to	Revision type
Rev A	17/8/2018	M Cook & J Hopfmueller	Shire of Chittering	First Submission
Rev B	12/9/2018	S Highman	Shire of Chittering	Comments Addressed
Rev C	13/9/2018	S Highman	Shire of Chittering	Minor changes made
Rev D	18/9/2018	S Highman	Shire of Chittering	Minor changes made
Rev E	3/10/2018	S Highman	Shire of Chittering	Terminology changed
Rev F	29/10/2018	S Highman	Shire of Chittering	Steering committee input
Rev G	7/2/2019	S Highman	Shire of Chittering	Minor changes made
Rev H	06/05/2019	M Cook	Shire of Chittering	Minor drainage clarifications

CONTENTS

1.0 INTRODUCTION

1.1 Background

The Muchea Industrial Park (MIP) is a proposed industrial area, 1,113 hectares in size and located within the Shire of Chittering. It sits approximately 2km east of the Muchea town centre, with the Great Northern Highway and Muchea East Road dividing the area into precincts as shown in **Appendix A**.

The location of the MIP provides the opportunity to connect to key transport routes including Great Northern Highway, Brand Highway and Northlink WA Stage 3.

1.2 Purpose of this Report

The purpose of this document is to provide guidance to developers and their representatives regarding road, drainage and filling strategies within the MIP as part of any Planning and/or Development Application. The requirements noted in this document are not intended to be an exhaustive list but rather to inform developers of the general expectations.

2.0 SITE CONDITIONS

2.1 Topography

The general site topography of the MIP ranges approximately from 60m AHD to the west, rising up to approximately 140m AHD to the east, and is located within the Dandaragan Plateau and at the foothills of the Darling Scarp (Western Australian Planning Commission, August 2011).

2.2 Soils

The expected soils within the node area include Guildford formation, Leederville formation, sandy soils and laterite (Gozzard J.R, 1982) consisting of:

- Pebbly silt (Mgs1): strong brown, silt with common fines to occasionally course grained, sub-rounded laterite, quartz, heavily weathered granite pebbles, some fine to medium-grained quartz sand of alluvial origin (Guildford formation).
- Sand (S5): very pale brown, medium to course-grained, sub-angular quartz and a trace of feldspar, moderately sorted, loose of colluvial origin.
- Sand (S6): light grey, fine to course, angular to rub-rounded, quartz with some feldspar, moderately sorted, loose, of colluvial origin.
- Siltsone (ST1): white, thinly bedded, well laminated, fine-grained, some large ferruginous concretions and laminae, occasionally micaceous (Leederville formation).
- Laterite (LA1): massive cemented occasionally vesicular; up to 4m in thickness, overlain by a ferruginous gravel set in a clay-sand matrix of residual origin.

The pebbly silt is generally located to the western half of the MIP; with the sands, siltsone and laterite generally within the eastern half.

2.3 Acid Sulphate Soils

Based on the Acid Sulphate Soils risk mapping (Department of Water and Environmental Regulation, 2018), there is no known risk of acid sulphate soils to occur within the MIP (refer **Appendix B**). Nonetheless, this should be investigated early in the planning phase to determine the presence of actual and potential acid sulphate soils or the need to treat dewatering effluent compliant with the governing standards.

2.4 Surface Hydrology

The MIP is located in the Ellen Brook catchment which discharges into the upper Swan River estuary. Four main drainage waterways run from east to west across the site and drains to the Ellen Brook by the western boundary of the MIP. A number of wetlands are mapped within the MIP as shown in **Appendix C**, these shall be accounted for as part of any planning application. Careful consideration is needed during planning and implementation stages to ensure the receiving waters are not impacted by the construction of and ongoing use within the MIP.

2.5 Groundwater Hydrology

Based on the Perth Groundwater Atlas (Department of Water and Environmental Regulation, 2018) the groundwater levels range from approximately 62m AHD by the eastern boundary to 45m AHD by the western boundary flowing towards Ellen Brook.

2.6 Contaminated Sites

A search on the Contaminated Sites Database (Department of Water and Environmental Regulation, 2018) did not identify any known contamination within the MIP. However, there is risk of potential contamination activities resulting from private landfills, cattle dips, poultry farms, fuel and chemical storage areas (Western Australian Planning Commission, August 2011). Further assessments and investigations may be required as part of any application and should be considered early in the planning phase.

3.0 EARTHWORKS AND FILLING

3.1 Geotechnical Investigation

A geotechnical investigation shall be completed as part of all development proposals to identify any potential constraints at the earliest possible stage. The investigation shall be thorough and provide sufficient information to inform authorities and designers on the various site constraints and parameters.

3.2 Earthworks

It is expected that general earthworks will be required as part of a development. This may include the removal of topsoil, shaping of insitu material and importation of fill. The geotechnical investigation shall provide guidance regarding these matters.

Treatment of the existing ground or filling may be required to improve the site classification. Class A and S sites are traditionally accepted within Western Australia. If the intent is to create a development with a lesser classification, additional detailed supporting documentation is required.

3.3 Groundwater Separation

Filling may be required to achieve minimum separation to groundwater levels. Subsoil drainage may be utilised pending the outcome of the development's drainage study.

4.0 ROAD STRATEGY

4.1 Road Hierarchy

The District Structure Plan (**Appendix A**) indicates the higher level road network only. The lower level network is to be developed at the Local Structure Plan stage. Figure 1 below shows the higher level road network around the MIP.

Northlink WA Stage 3 is shown in green, including the grade separated MIP interchange. The Road Train Assembly Area is located to the south east of the interchange. These are under construction and scheduled for completion towards the latter part of 2019.

The current Restricted Access Vehicle (RAV) 7 network is shown in dashed purple. Other higher level existing roads are shown in dashed orange.

The eastern loop road (red) will provide primary access in and out of the MIP. The Structure Plan defines this road as a District Distributor A estimated to carry in the order of 7,000 vehicles per day. This road shall be designed to cater for RAV10 vehicles.

The completion of Northlink WA Stage 3 will alter the traffic flow and composition along Great Northern Highway. Precinct 2 may seek an additional high level road connection off Great Northern Highway (dashed red) however this is subject to Main Roads WA approval.

Precinct 3 gains access off the existing Great Northern Highway via a Loop Road (shown in blue). Similar to Precinct 2, an additional high level road connection for Precinct 3 may be required however this is subject to Main Roads WA approval. It is recommended this road is designed to cater for RAV 10 vehicles. Great Northern Highway is currently classified as RAV 7 however Main Roads have confirmed they will support the upgrade to RAV 10 pending an application and assessment.

Precinct 4 will gain access off the loop road (red) and via the existing Muchea East Road. Precinct 2 planning shall make sufficient RAV allowances off the loop road for Precinct 4.

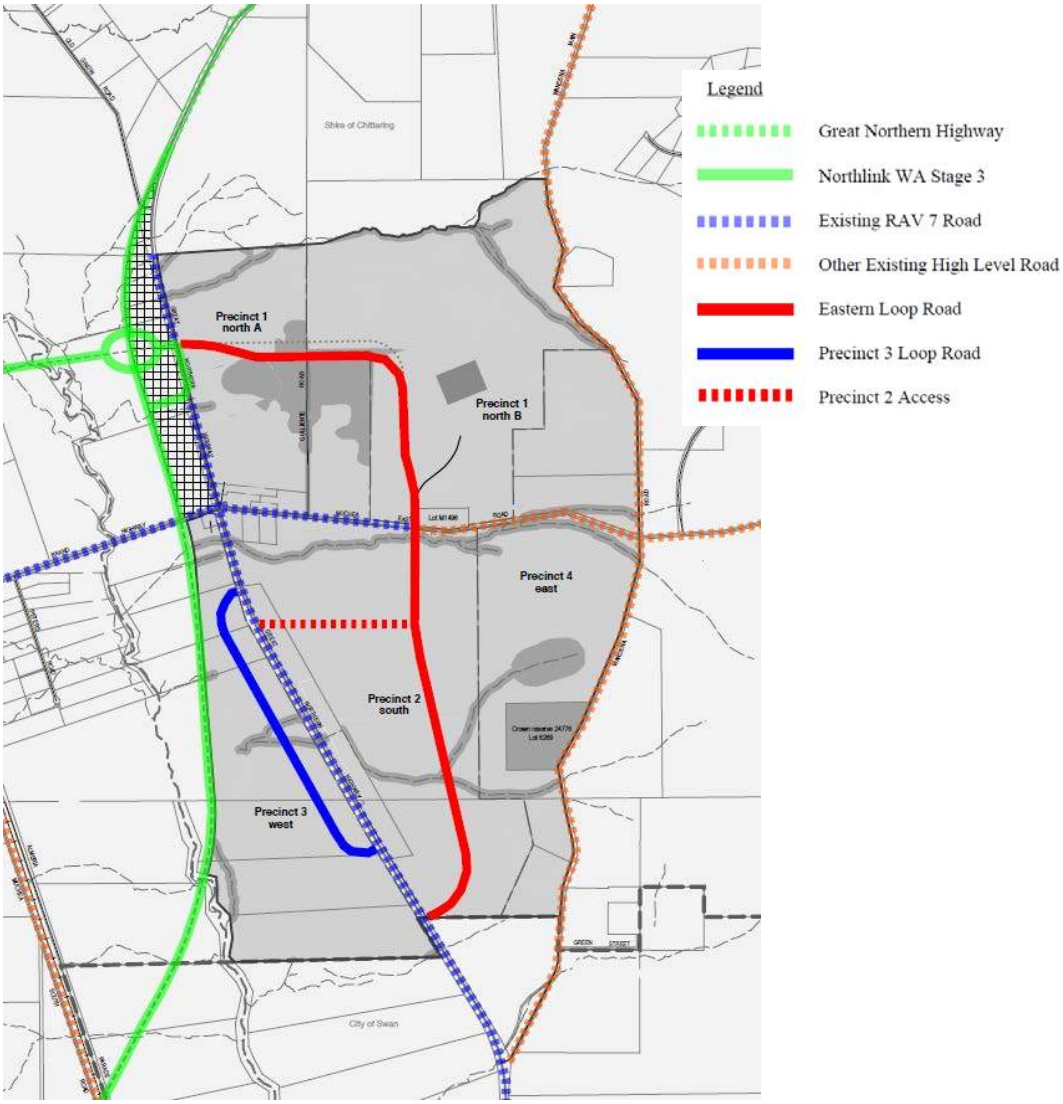

Figure 1 – Higher Level Road Network

4.2 Design Vehicle

The MIP road network shall allow Restricted Access Vehicles. The minimum design vehicle shall be RAV 4.

Consideration shall be given to the intended land use and subsequent number and location of lots within the development area requiring RAV 10 or RAV 7 access. This relates to freight, logistics and other transport facilities. A plan shall be included in the LSP confirming the proposed RAV classification of each road. Sufficient road reserve and pavement widths shall be provided to cater for the design vehicle. Swept path analysis is required as part of a planning application to verify road reserve widths at intersections. As part of the planning process, the developer shall liaise with Main Roads and provide evidence that the road network will achieve the nominated RAV classification.

Figure 2 below shows the higher level road layout with concept RAV classifications. It is expected the ultimate classification of part of Northlink WA Stage 3 and the Perth to Darwin Highway will be RAV 10 however this is subject to future upgrade works to the north (external to the MIP). It is expected the RAV10 classification will extend to the MIP interchange however the timing of this is unknown.

RAV 10 roads are shown in red and RAV 7 roads are shown in green. Other high level roads are shown in blue. Main Roads have confirmed they will support an increase in classification from RAV 7 to RAV 10 (shown as dashed red) for a portion of Great Northern Highway pending an application and assessment. Developers can seek approval from Main Roads to upgrade the RAV classification on other portions of the road network to facilitate access. Works maybe required on these roads to meet minimum RAV requirements.

Subject to the location of environmental and drainage reserves as well as other land allocations, it is suggested lots requiring RAV7 and RAV10 access are positioned adjacent to RAV10 roads. Lots requiring RAV7 access should be placed adjacent to the RAV7 roads. The balance of the MIP can be designed to cater for RAV7 and RAV10 pending vehicle access requirements.

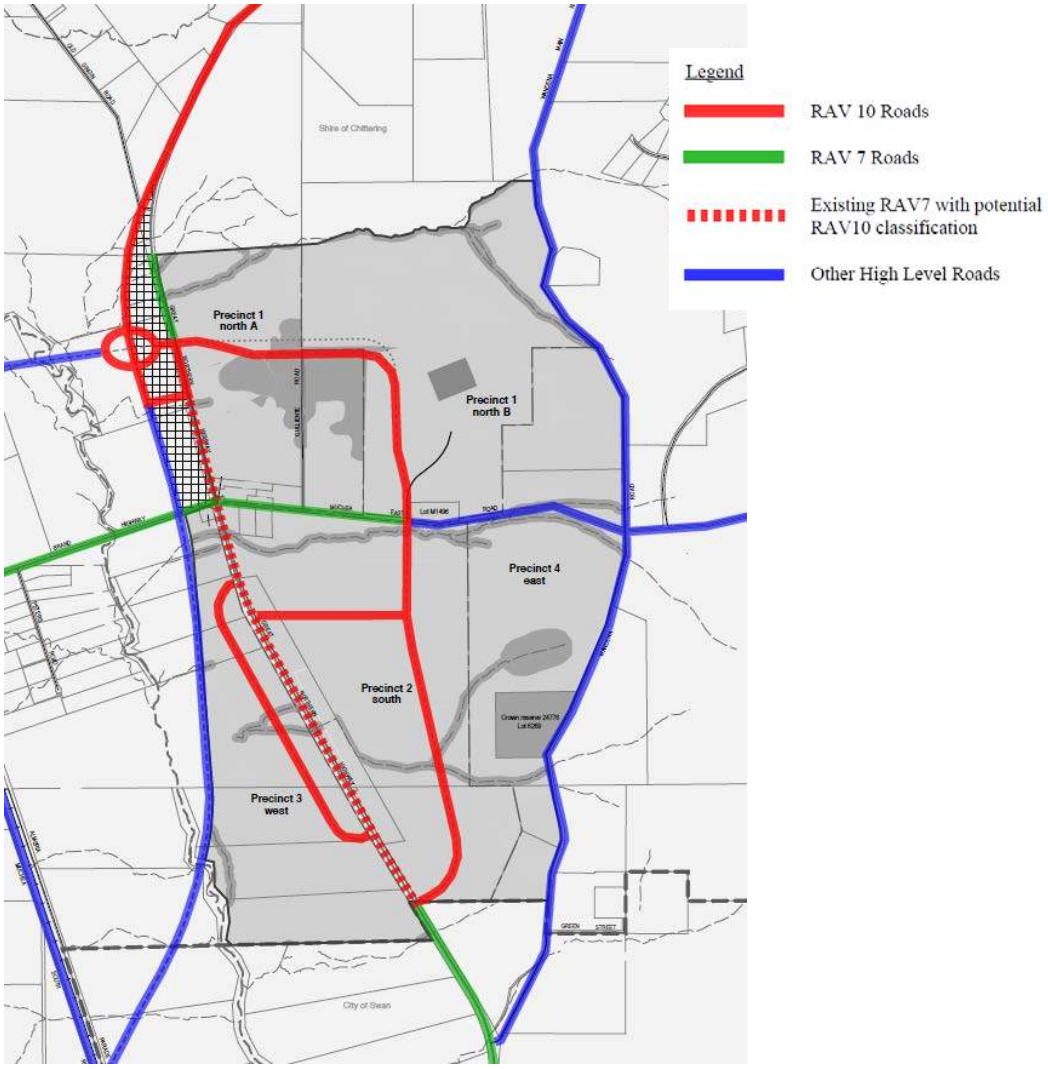

Figure 2 – Indicative RAV Network and Lot Access

Appendix D includes a copy of the Main Roads WA "Prime Mover, Trailer Combinations" which outlines examples of this category of vehicles however it does not necessarily represent all heavy vehicle combinations and their dimensions.

4.3 Road Reserve Widths and Cross Sections

The minimum road reserve width shall be 20m. Wider reserves may be required for differing RAV classifications and to provide sufficient room for services and stormwater drainage provisions. Typical cross sections shall be provided at the various planning stages to verify road reserves widths. Examples are presented in **Appendix E**.

The primary RAV 10 roads as noted in Figure 2 shall have a 40m (minimum) wide road reserve. Other RAV 10 roads may have a narrower road reserve width depending on traffic volumes, road formation, the number of lanes and swept paths. Typical cross sections shall be provided at the various planning stages to verify road reserves widths.

Truncations at intersections shall be set about swept path geometry and minimum verge widths.

The minimum road width (face of kerb to face of kerb) shall be 10m. Wider pavements may be required pending horizontal geometry and RAV classification (swept paths, access into properties etc). Pavement width verification shall be documented for developments with RAV 10 roads.

The minimum verge widths shall be 5m. This width may be reduced at intersection truncations pending servicing arrangements and a road safety assessment.

Consideration may be given to a reduction in pavement widths for multiple lane dual carriageways. This is subject to the RAV classification, a road safety assessment and consideration of IPWEA guidelines, Australian Standards and Main Roads requirements.

4.4 General Road Design Requirements

Roads shall be designed in accordance with IPWEA Guidelines and Austroads Guide to Road Design Part 3 Geometric Design. General design requirements for roads within the MIP are as follows:

- The maximum design speed for district and local distributor roads shall be 70 km/hr.
- The maximum design speed for local access roads shall be 60 km/hr.
- The maximum longitudinal grade for a sealed road to be used by RAV 10 vehicles is 5%.
- The minimum longitudinal grade shall be 0.5%.
- All roads shall be drained with sufficient space in the verge for the associated infrastructure.
- Minimum crossfall of 3% except where geometric design requirements dictate that superelevation is required.
- Verges shall have sufficient width to install public utility services.
- Future provision for 2.5m dual use path within verge (typically non swale side).
- Cul-de-sac shall be avoided.

4.5 Pavement Design

All roads shall be sealed (asphalt concrete) to meet the specific loading requirements of appropriate RAV vehicles.

RAV 10 routes shall be designed to accommodate AMMS 3 axle loads (23.5 tonne per axle). The damage caused by increased axle loads is exponential such that a 23.5 tonne AMMS 3 axle will cause almost double the damage caused by a normal 20 tonne axle. Given the increased damage caused by concessional loaded vehicles the pavement should be designed for 190% of the forecast traffic volume over the 40 year pavement life.

4.6 Pedestrian and Cyclist Facilities

Northlink WA Stage 3 includes a series of principal shared paths, shared paths and cycle paths. These run along the eastern side of the Highway and extend to the MIP interchange. Cycling within the MIP should be encouraged however given the nature of vehicles, off road cycle provisions are recommended.

There are no known public transport routes within the existing road network. Due to the transport orientated land uses within the structure plan, it is unlikely that there be a high demand for public transport services. If future development creates such a demand then a pedestrian network within the verge is required. It is anticipated there will be pedestrian attraction to some land uses (reserves, lunch bars etc) within the MIP.

The provision of a 2.5m wide concrete dual use path is required along all roads.

4.7 Intersections

Intersections shall be designed complaint with the IPWEA Guidelines and Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections subject to the RAV clarification.

It is recommended that approval in principle is obtained from Main Roads during the approval phase for the RAV network and intersection geometry to ensure compliance. Specific requirements with respect to intersection design requirements for RAV 10 access can be found within Main Roads WA document "*Standard Restricted Access (RAV) Route Assessment Guidelines, July 2017*. Alternative pavement treatments and markings shall be considered to delineate the additional swept path areas.

4.8 Crossover Requirements

All crossovers shall be to an industrial standard with the general requirements outlined below:

- A minimum width of 6m with a maximum width of 11m at the property boundary with approval from the Shire.
- Wings shall be a minimum of 2m wide on both sides of the crossover but should also be designed to accommodate the specific development's design vehicle turning movements. Ideally all movements shall be lane correct. Consideration may be given to RAV 7 and

RAV 10 vehicles that are not lane correct pending location, traffic volumes and composition.

Drawing 18-6-69/807 (**Appendix E**) shows the typical crossover set out requirements designed for swept paths of a RAV 10 network vehicle.

The location of crossovers shall comply with site access and sight line guidelines.

5.0 STORMWATER DRAINAGE STRATEGY

This section outlines in general terms, the objectives and design criteria for stormwater management strategies whilst being consistent with the principles of water sensitive designs and guidelines presented in Better Urban Water Management (Western Australia Planning Commission, October 2008). The Department of Water and Environmental Regulation has prepared several water management guidance documents which shall be used as part of the preparation of a drainage strategy. These include the Stormwater Management Manual for Western Australia and the Decision Process for Stormwater Management in Western Australia.

5.1 Groundwater Management

It is expected that the existing groundwater hydrology will be maintained with the following management strategies:

i. Groundwater leaving the site to be the same or better quality than when entering the site. The use of select planting and bio-retention areas to infiltrate minor storm events is expected to assist in reducing the nutrient loads to groundwater.
ii. If in the event a licensed wastewater service provider is not available, consideration could be given to the use of on site Aerobic Treatment Units (ATU's). An assessment of the lots capability to support ATU's shall be undertaken and shall address the soil conditions, clearance to groundwater and environmental constraints.
iii. Finished floor levels of buildings to have a minimum 500mm clearance above the maximum groundwater level or greater depending on the soil type. In areas with shallow depth to groundwater, earthworks and fill may be required to achieve the required clearance to groundwater. Detailed investigations may be required to verify the groundwater separation.

5.2 Stormwater Management

The stormwater philosophy to be adopted within the MIP is that post-development flows are to be limited to pre-development flow rates with the following management strategies:

i. Maintain the general pre-development inflow and outflow flow paths.
ii. Convey existing arterial flows through the site at pre-development peak flow rates. It is expected that existing waterway flow paths will be maintained along conveyance swales within respective lots and road reserves.

iii. The drainage networks are to be appropriately sized to ensure minor roads remain passable for the 10% AEP event.

iv. Treat the 1 hour 63.2% AEP (1 Exceedance per year) rainfall event runoff from the road reserves within the road reserve boundary. It is expected that the use of roadside swales located in the verges will be adopted to convey runoff to bio-retention areas and storage areas.

v. Detain flows from major storm events up to a 100 year ARI from road reserves within the development boundary to maintain pre-development peak flow rates leaving the site. It is expected that flood storage areas will be provided within road reserves in order to maintain pre-development flows.

vi. Treat the 1 hour 63.2% Annual Exceedance Probability (AEP) (1 Exceedance per year) rainfall event runoff within respective lots. It is expected that the use of bio-retention/infiltration areas and swales will be the primary measure employed.

vii. Detain flows for major rainfall events up to and including the 1% AEP to maintain the pre-development peak flows from the site. For developments where this is not achievable, further investigations and analysis is required to support the application. The Application shall include what AEP is being contained on-site and what impact the extra over post-development flows leaving the site have on the greater catchment.

viii. Drainage basin and swales shall be designed to avoid creating mosquito habitat. Drainage structures shall include a low flow discharge to prevent prolonged standing water and the inverts of basins / swales to have a minimum 300mm clearance to the maximum groundwater level.

ix. Apply appropriate structural and non-structural measures to reduce nutrient loads leaving the site. Considerations to the use of bio-retention areas and treatment swales with high Phosphorus Reduction Index (PRI) media, maintenance of drainage structures, removing/sweeping of silt and soil from roads and hard paved surfaces.

x. Special site specific measures may need to be considered depending on the expected usage or industry activity that will occupy the site.

xi. Finished floor levels to have a minimum 500mm clearance from the 1% AEP water level.

5.3 Future Studies

It is expected that further studies will be required to support future development and subdivision including, but not limited to, District Water Management Strategies, Local Water Management Strategies, Urban Water Management Plans and geotechnical, groundwater and environmental investigations. The items discussed in this document should not preclude considerations and recommendations in future studies.

The sizing of drainage swales, bio-retention areas, conveyance structures and storage structures, along with the assessment of pre-development flows will be determined as part of these future studies.

6.0 DISCLAIMER

Porter Consulting Engineers provides this document on the condition that the reader, by receiving and reading this document, agrees not to act upon its contents without first satisfying themselves as to its suitability for their purpose.

The reader shall have no claim against Porter Consulting Engineers should any part of the contents be considered incorrect or misleading.

7.0 REFERENCES

Department of Water and Environmental Regulation. (2018). *ASS Risk Maps*. Retrieved June 2018, 26, from https://www.der.wa.gov.au/your-environment/acid-sulfate-soils/65-ass-risk-maps

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APPENDIX A

Structure Plan[1]

[1] Western Australian Planning Commission. (August 2011). *Muchea Employment Node Structure Plan.* Final Report.

Development shall be generally in accordance with the structure plan guidelines and precinct policy statements outlined in section 6 of the report.

Shire of Chittering

City of Swan

Precinct 1 north A

Precinct 1 north B

Precinct 2 south

Precinct 3 west

Precinct 4 east

WAMIA site

1000 m

500 m

1000 m WAMIA buffer

Land refuse buffer

500 m rural residence buffer

500 m poultry buffer

500 m landuse buffer

500 m residence buffer

1000 m townsite buffer

Lot M1313

Lot M1453

Lot M1496

Lot M1606

Lot M1326

Lot M1456

Lot 5

Lot 6

Lot 14

Lot 16

Lot 30

Lot 22

Lot 202

Lot 201

Lot 3

Lot 100

Lot 101

Lot 102

Lot 32

Lot 50

Lot 33

Lot 34

Lot 35

Lot 8

Lot 203

Crown reserve 24776
Lot 6269

OLD GINGIN ROAD

GREAT NORTHERN HIGHWAY

MAIN ROAD

WANDENA ROAD

POWDERBARK ROAD

GULLIENTE ROAD 510

MUCHEA EAST ROAD

BRAND HIGHWAY

PETERS ROAD

ALMERIA MUCHEA SOUTH PARADE ROAD

GREEN STREET

N

0 250 500 750

metres

Produced by:
Mapping & GeoSpatial Data Branch
Department of Planning, WA
On behalf of:
Western Australian Planning Commission

Z:\Projects\pol\stat_plan\country\
Muchea Nodes\Final 2010\FinalFig8.dgn

Base information supplied by:
Western Australian Land Information Authority
LI 430-2009-4

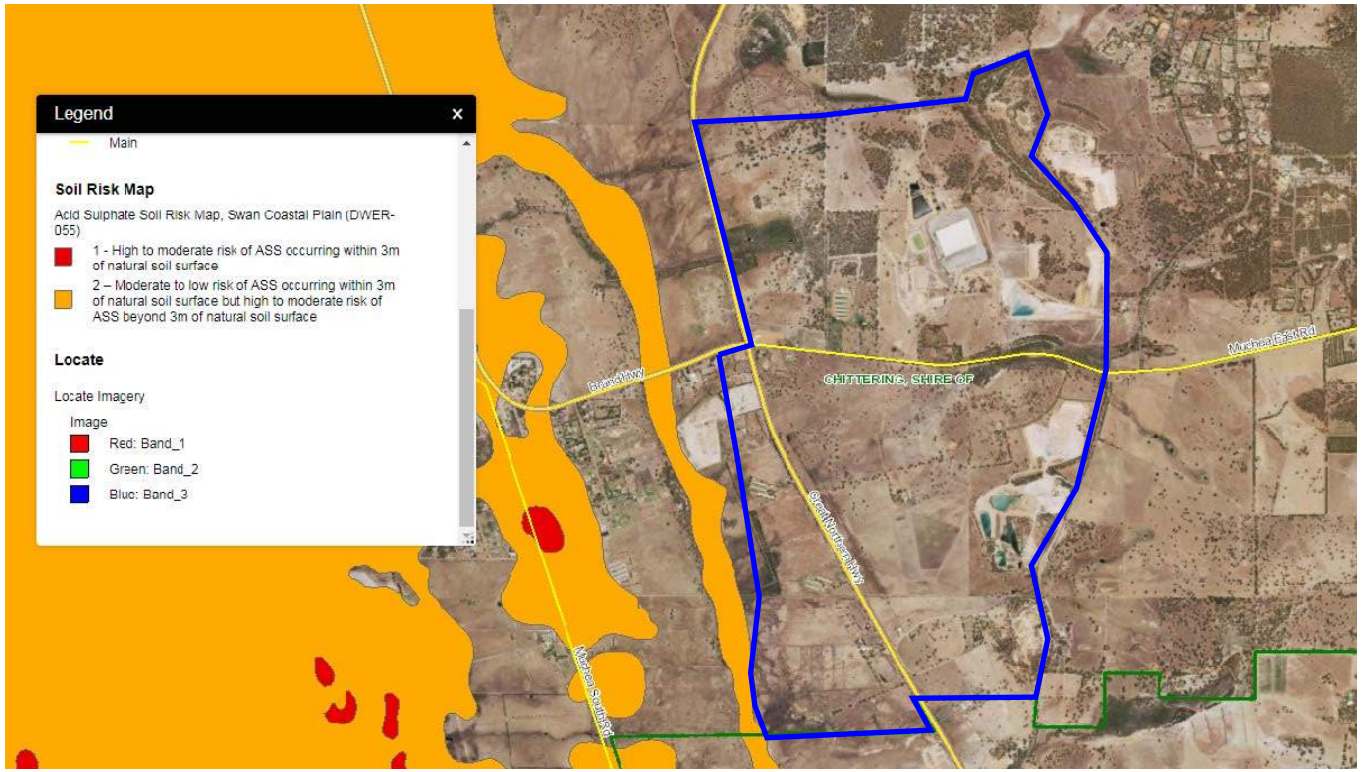
Derived from base mapping
produced by Aurecon

Legend

- proposed industrial development
- reserves for conservation, recreation, foreshore management or regional open space
- areas requiring special protection
- WAMIA (Wester Australian Meat Industry Authority) site
- area subject to further investigations
- cadastre
- precinct boundary
- sensitive land use buffer
- local ecological linkage
- primary distributor road
- regional distributor road
- local distributor road
- access road
- proposed Perth to Darwin highway
- proposed local distributor/ industrial (loop road)
- proposed access road (service road)
- realignment
- railway line
- major waterway, non-perenial
- minor waterway, non-perenial
- priority resource boundary
- local government boundary
- metropolitan region scheme boundary
- study boundary

APPENDIX B

Acid Sulphate Soils Risk Mapping

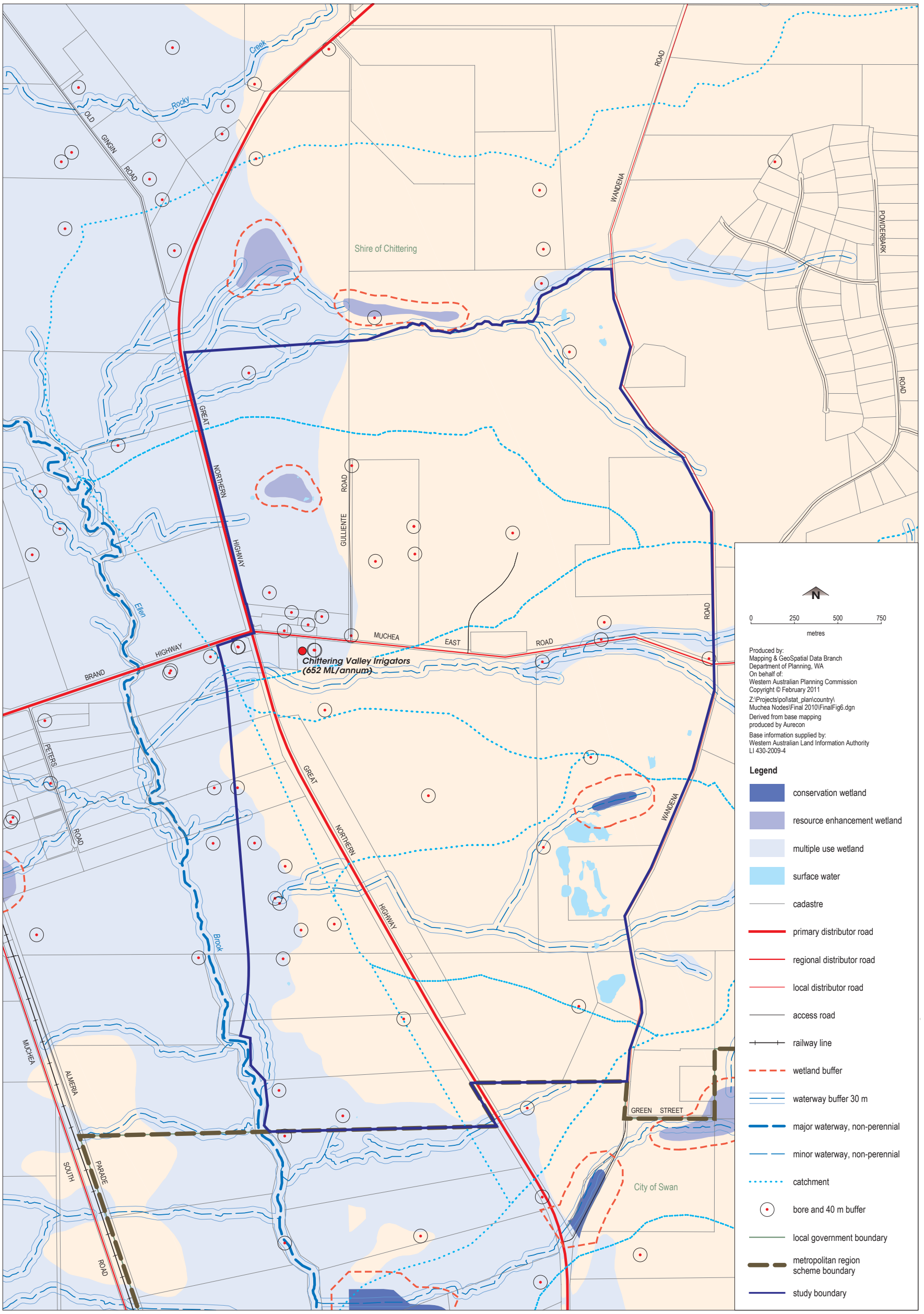


Attachment 2: Acid Sulphate Soils risk mapping for the Muchea Employment Node

APPENDIX C

Waterways[2]

[2] Western Australian Planning Commission. (August 2011). *Muchea Employment Node Structure Plan.* Final Report.



Attachment 3 - Waterways

APPENDIX D

Main Roads WA

"Prime Mover, Trailer Combinations, February 2018, Operating Conditions"

Prime Mover, Trailer Combinations

2016

Heavy Vehicle Services

VEHICLE DESCRIPTION AND CONFIGURATION CHART (RAV) – PRIME MOVER, TRAILER COMBINATIONS EXAMPLES

		Axle Spacing Table	Length (m)	Mass (T) Maximum Permitted Mass	RAV Network
Category 1	(A) PRIME MOVER, SEMI TRAILER TOWING A PIG TRAILER	A	≤20	50	Network 1
	(B) PRIME MOVER TOWING AN OVERHEIGHT SEMI TRAILER	A	≤19	42.5	
	(C) SHORT B-DOUBLE	A	≤20	50	
	(D) TWINSTEER PRIME MOVER TOWING SEMI TRAILER	A	≤19	47.5	
Category 2	(A) PRIME MOVER, SEMI TRAILER TOWING A PIG TRAILER	A	≤27.5	65.5	Network 2
	(B) PRIME MOVER TOWING SEMI TRAILER	A	≤20	47.5	
	(C) B-DOUBLE	A	≤27.5	67.5	
	(D) SHORT B TRIPLE	A	≤27.5	87.5	
	(E) CAR CARRIER SEMI TRAILER	A	≤25	42.5	
Category 3	(A) PRIME MOVER, SEMI TRAILER TOWING A DOG TRAILER	B	≤27.5	84	Network 3
Category 4	(A) PRIME MOVER, SEMI TRAILER TOWING 6 AXLE DOG TRAILER	A	≤27.5	87.5	Network 4
Category 5	(A) PRIME MOVER, SEMI TRAILER TOWING A DOG TRAILER	B	>27.5,≤36.5	84	Network 5
	(B) PRIME MOVER, SEMI TRAILER TOWING A DOG TRAILER AND CONVERTER DOLLY	B	>27.5,≤36.5	84+d	
	(C) B-DOUBLE TOWING A CONVERTER DOLLY	A	>27.5,≤36.5	67.5+d	
	(D) B-TRIPLE	A	>27.5,≤36.5	84	
Category 6	(A) PRIME MOVER, SEMI TRAILER TOWING 6 AXLE DOG TRAILER	A	>27.5,≤36.5	87.5	Network 6
	(B) B-TRIPLE	A	>27.5,≤36.5	87.5	
	(C) PRIME MOVER SEMI TRAILER TOWING A 6 AXLE TRAILER & CONVERTER DOLLY	A	>27.5,≤36.5	87.5+d	
Category 7	(A) PRIME MOVER, TOWING SEMI TRAILER AND B DOUBLE	A	>27.5,≤36.5	107.5	Network 7
	(B) B-DOUBLE TOWING A DOG TRAILER	A	>27.5,≤36.5	107.5	
Category 9	(A) PRIME MOVER, SEMI TRAILER TOWING 2 X DOG TRAILERS	B	>36.5,≤53.5	120.5	Network 9
	(B) PRIME MOVER, SEMI TRAILER TOWING A DOG TRAILER AND CONVERTER DOLLY	B	>36.5,≤53.5	84+d	
	(C) B DOUBLE TOWING A DOG TRAILER	A	>36.5,≤45	107.5	
	(D) PRIME MOVER, SEMI TRAILER TOWING A B-DOUBLE	A	>36.5,≤45	107.5	
Category 10	(A) PRIME MOVER, SEMI TRAILER TOWING 2 X DOG TRAILERS	A	>36.5,≤53.5	127.5	Network 10
	(B) B-DOUBLE TOWING A CONVERTER DOLLY CONNECTED T0 2 SEMI TRAILERS	A	>36.5,≤53.5	127.5	
	(C) PRIME MOVER, SEMI TRAILER TOWING B TRIPLE	A	>36.5,≤53.5	127.5	
	(D) B-DOUBLE TOWING 2 DOG TRAILERS	A	>36.5,≤53.5	147.5	
	(E) DOUBLE ROAD TRAIN TOWING B-DOUBLE TRAILERS	A	>36.5,≤53.5	147.5	
	(F) PRIME MOVER, SEMI TRAILER TOWING A 6 AXLE DOG TRAILER AND CONVERTER DOLLY	A	>36.5,≤53.5	87.5+d	

Example of Axle Groups

Example of Axle Group with An Optional Axle

Optional Axle

NOTES

1. Operators using a category of RAV outlined in this document must operate that RAV in accordance with the OPERATING CONDITIONS and only on the network specified.
2. These diagrams are a visual indication of the vehicle only.
3. Operators must refer to the OPERATING CONDITIONS for the full vehicle description.
4. The height of the vehicle can exceed 4.3 m but MUST NOT exceed 4.6 m when it is: (i) built to carry livestock or; (ii) carrying a crate to carry livestock or; (iii) carrying vehicles on more than one deck or; (iv) carrying a multi modal container or; (v) carrying a large indivisible item or; (vi) When operating with an appropriately licenced over height curtain side or pantechnicon trailer.
5. Maximum height of Pig Trailer must not exceed 3.5m.

Heavy Vehicle Services
Tel: **138 HVO (486)**
Email: hvs@mainroads.wa.gov.au
Website: www.mainroads.wa.gov.au

mainroads WESTERN AUSTRALIA

APPENDIX E

Main Roads WA

"Standard Restricted Access (RAV) Route Assessment Guidelines, July 2017, Sight Distance Requirements"

APPENDIX E – STOPPING SIGHT DISTANCES

Operating Speed km/h	Downhill			Level	Uphill		
	-9%	*-6%*	*-3%*		*3%*	*6%*	*9%*
RAVs Categories 2-6							
60	*	*	120	109	101	94	89
70	*	*	151	137	126	118	111
80	*	*	184	167	154	143	135
90	*	*	218	198	183	171	161
100	*	*	255	232	214	200	188
RAVs Categories 7-8							
60	*	*	136	120	109	101	94
70	*	*	172	152	138	127	119
80	*	*	211	187	169	156	145
90	*	*	252	224	202	186	173
100	*	*	*	261	237	218	203
RAVs Categories 9-10							
60	*	*	152	131	117	107	99
70	*	*	194	167	149	135	125
80	*	*	*	206	183	166	153
90	*	*	*	247	220	199	184
100	*	*	*	294	261	237	218

***** RAVs would need to descend in low gear to prevent overrun. "TRUCKS USE LOW GEAR" signs in conformity with AS 1742 must be installed on these grades approximately 100 m before the start of the descent.

The above values have been derived using the formula given in Austroads Guidelines with following factors:

	RAVs Categories 2-4	RAVs Categories 5-8	RAVs Categories 9-10
Reaction Time	2.5 s	3.0 s	3.5 s
Deceleration Rate (d)	0.24 g	0.22 g	0.20 g

APPENDIX F – ENTERING SIGHT DISTANCES

Operating Speed km/h	Downhill (approaching traffic)				Level	Uphill (approaching traffic)			
	-8%	*-6%*	*-4%*	*-2%*		*2%*	*4%*	*6%*	*8%*

RAVs Categories 2-4

40	97	94	92	90	88	87	86	85	84
50	130	126	123	120	117	115	113	111	110
60	167	162	157	152	149	146	143	140	138
70	209	201	194	188	183	179	175	172	169
80	253	243	234	227	220	215	210	205	201
90	302	289	278	268	260	253	247	241	236
100	364	346	331	318	307	298	290	282	276
110	448	422	400	382	367	353	342	332	323

RAVs Categories 5-8

40	102	100	97	96	94	93	91	90	89
50	137	133	130	127	124	122	120	118	117
60	176	170	165	161	157	154	151	149	147
70	218	210	204	198	193	189	185	182	179
80	264	254	245	238	231	226	221	216	213
90	314	301	290	281	272	265	259	254	249
100	377	360	345	332	321	312	304	296	290
110	463	437	415	397	382	369	357	347	339

RAVs Categories 9-10

40	108	105	103	101	99	98	97	96	95
50	144	140	137	134	131	129	127	125	124
60	184	178	173	169	166	162	160	157	155
70	228	220	213	208	203	198	195	191	188
80	276	265	256	249	242	237	232	228	224
90	327	314	303	293	285	278	272	266	261
100	391	373	358	346	335	326	317	310	304
110	479	452	430	412	397	384	373	363	354

The above values have been derived using the formula given in Austroads Guidelines with following factors:

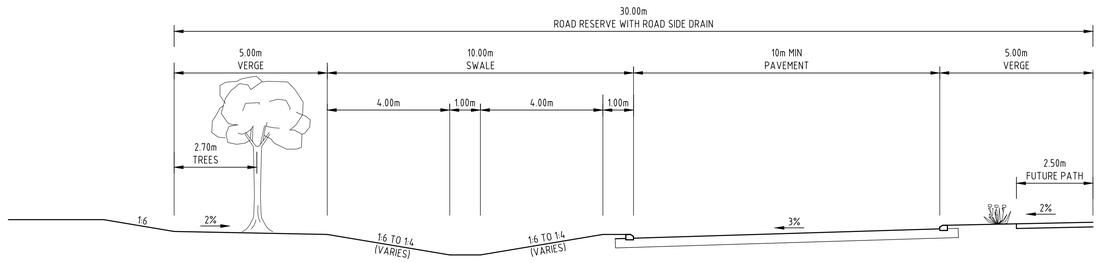
	RAVs Categories 2-4	RAVs Categories 5-8	RAVs Categories 9-10
Reaction Time	2.0 s	2.0 s	2.0 s
Observation Time	3.0 s	3.0 s	3.0 s
Brake Lag	1.0 s	1.5 s	2.0 s

(Deceleration rate of 0.29g up to 90 km/h, 0.28g at 100 km/h and 0.26g at 110 km/h.)

APPENDIX F

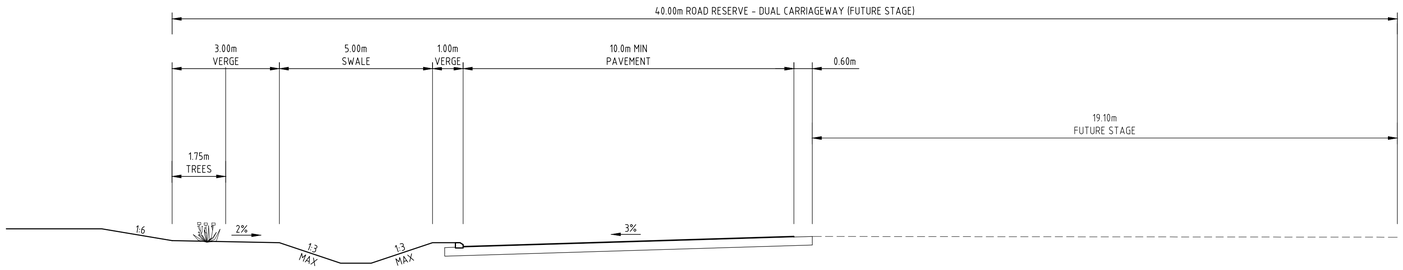
Sample Drawings

- 18-6-69/800 Rev A -Typical Cross Sections
- 18-6-69/807 Rev A -Crossover Setout



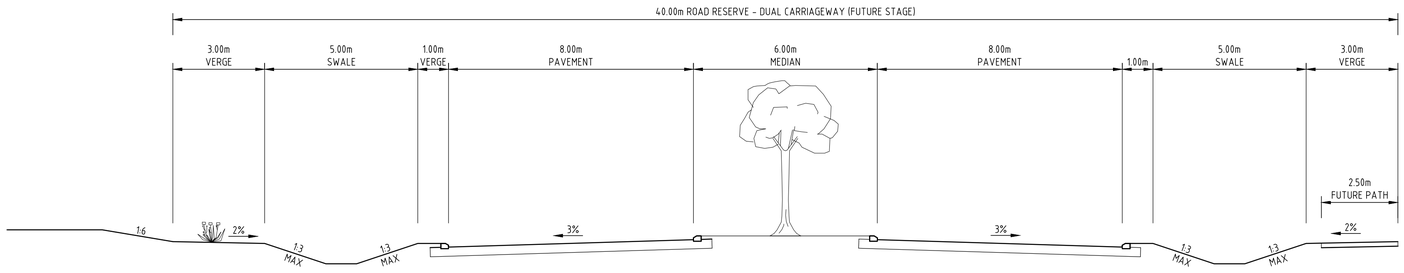
TYPICAL CROSS SECTION OF LOCAL ROAD WITH SWALE

1:100



TYPICAL CROSS SECTION OF LOOP ROAD - STAGE 1

1:100



TYPICAL CROSS SECTION OF LOOP ROAD - FUTURE DUAL CARRIAGEWAY

1:100

PROJECT:

MUCHEA EMPLOYMENT NODE

No.	DATE	REVISION	BY
A	23-7-2018	PRELIMINARY PLOT FOR COMMENT	MJV

Porter Consulting Engineers

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TVSMO Pty Ltd ACN 070 097 948 as Trustee for the Consulting Engineering Unit Trust trading as Porter Consulting Engineers ABN 78 636 396 385

CLIENT:

SHIRE OF CHITTERING

DRAWING:

TYPICAL CROSS SECTIONS

STATUS: **FOR APPROVAL**

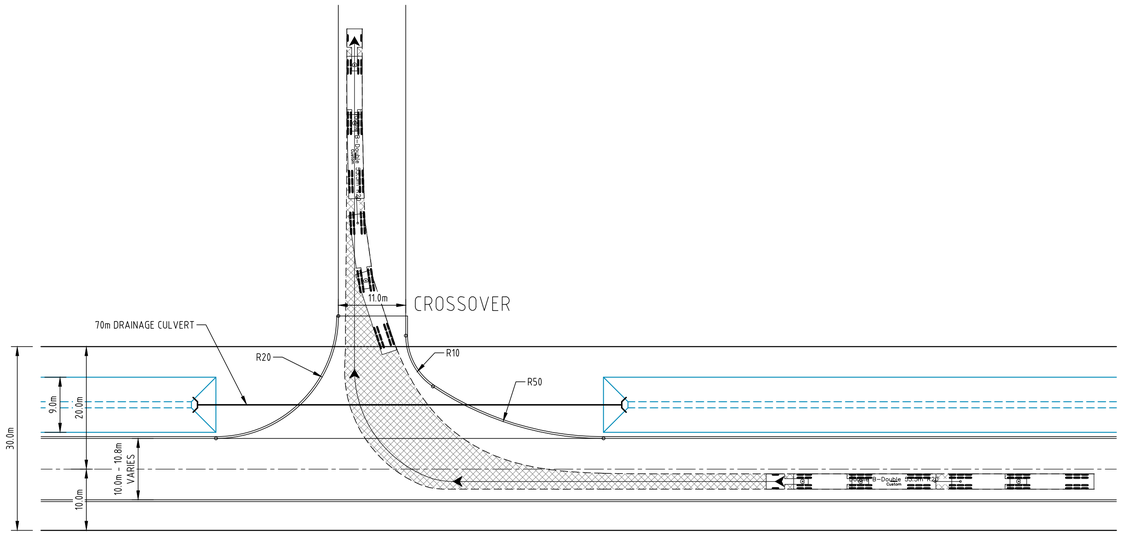
SCALE	1:1000
DATE	JULY 2018
DESIGN	JH
DRAWN	MJV
CHECK	
APP'D	

DRAWING No. **18-6-69/800**

REV No. **A**

ORIGINAL DRAWING SIZE **A1**

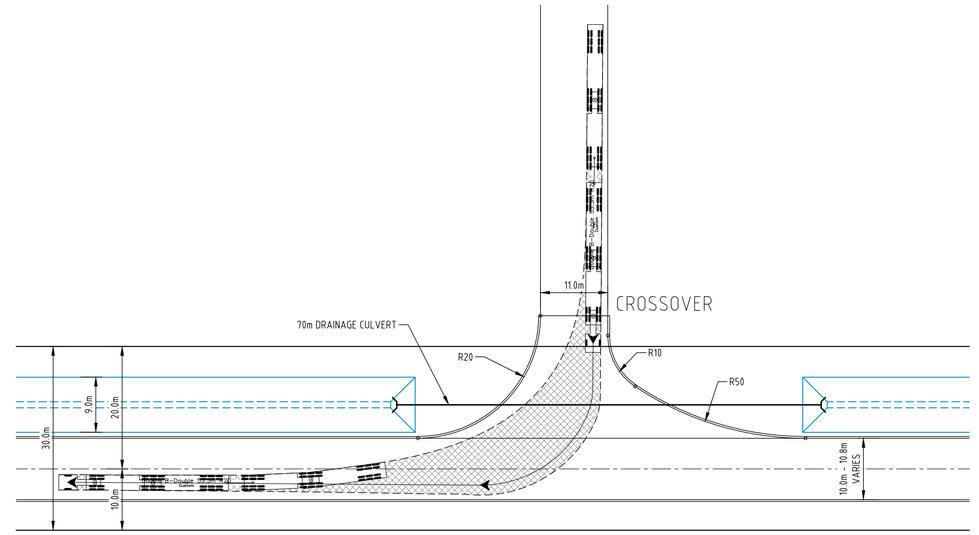
FILE NAME S:\ACTIVE PROJECTS\18-06-069\ACAD\18669-800.dwg



30m ROAD RESERVE - LOCAL ROAD (CARRIAGEWAY ON SOUTHERN SIDE)

CROSSOVER - RIGHT TURN ENTRY

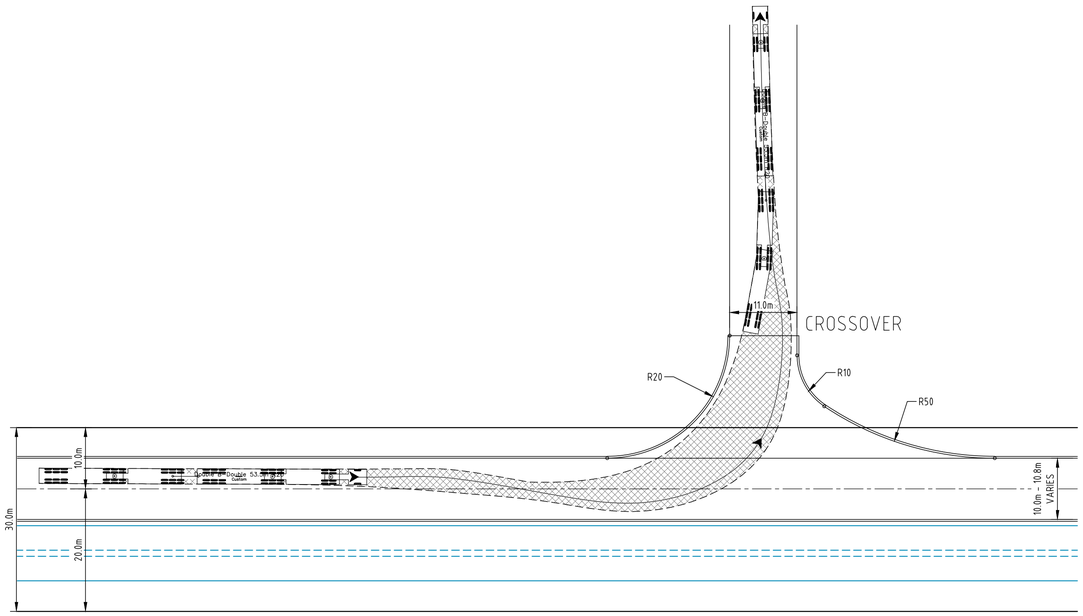
SCALE



30m ROAD RESERVE - LOCAL ROAD (CARRIAGEWAY ON SOUTHERN SIDE)

CROSSOVER - RIGHT TURN EXIT

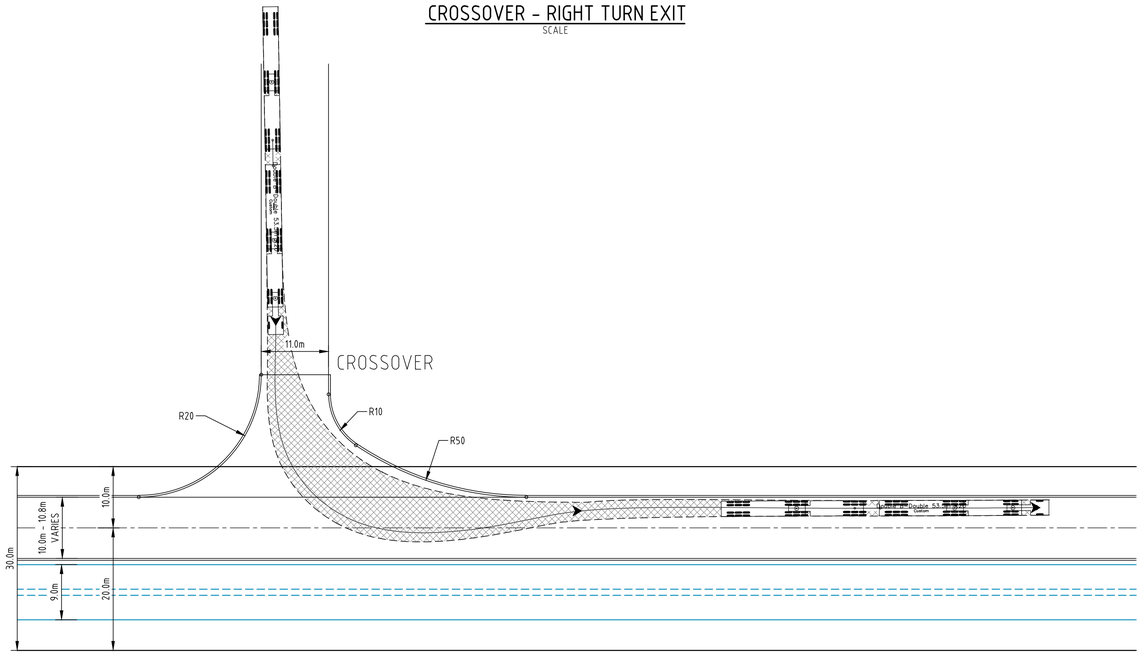
SCALE



30m ROAD RESERVE - LOCAL ROAD (CARRIAGEWAY ON NORTHERN SIDE)

CROSSOVER - LEFT TURN ENTRY

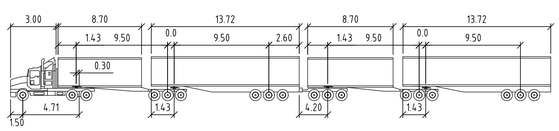
SCALE



30m ROAD RESERVE - LOCAL ROAD (CARRIAGEWAY ON NORTHERN SIDE)

CROSSOVER - LEFT TURN EXIT

SCALE



Tandem Drive Double B-Double 53.5m R20

meters

Tractor Width	:	2.58	Trailer Width	:	2.50
Tractor Track	:	2.50	Trailer Track	:	2.50
Lock to Lock Time	:	6.0	Articulating Angle	:	70.0
Steering Angle	:	14.5			

1:500 0 5 10 20 30

Half Size 1:1000 - SCALE (m)

PROJECT:

MUCHEA EMPLOYMENT NODE

No	DATE	REVISION	BY
A	23-7-2018	PRELIMINARY PLOT FOR COMMENT	MJV

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YUSHO Pty Ltd ACN 010 091 148 as trustee for the Consulting Engineering Unit Trust trading as Porter Consulting Engineers ABN 78 636 396 385

CLIENT:

SHIRE OF CHITTERING

DRAWING:

CROSSOVER SETOUT FOR RAV 10 VEHICLES

STATUS: **FOR APPROVAL**

SCALE	1:500
DATE	JULY 2018
DESIGN	JH
DRAWN	MJV
CHECK	
APP'D	

DRAWING No. 18-6-69/807

REV No. A

ORIGINAL DRAWING SIZE A1

FILE NAME S:\ACTIVE PROJECTS\18-06-069\ACAD\18669-807.dwg

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