Department of **Planning, Lands and Heritage**

GOVERNMENT OF WESTERN AUSTRALIA

Western Australian Planning Commission

MUCHEA
Industrial Park Structure Plan

April 2022

The Department of Planning, Lands and Heritage acknowledges the traditional owners and custodians of this land. We pay our respect to Elders past and present, their descendants who are with us today, and those who will follow in their footsteps.

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Minister for Planning Foreword

I am pleased to present the Muchea Industrial Park Structure Plan, a strategic planning framework to guide the park's future development and enable the area to fulfil its potential as a driver of economic growth and employment for the Wheatbelt region and Perth's outer north-east.

The Muchea Industrial Park is uniquely positioned to support a range of industrial enterprises including freight, logistics and agribusiness. With planned direct access to the State's triple road train network it will serve as a vital link between the metropolitan area and our mining and agricultural regions.

It also benefits from the early completion of NorthLink, providing significantly improved connections to Perth's air and seaports and other major centres, as well as seamlessly connecting the park with the greater Perth region and local workforce.

This structure plan strives to strike a balance between economic development and environmental sustainability by putting in place protections for significant environmental features, in particular the Ellen Brook and native flora.

With this long-term plan in place to guide development within the industrial park over the next 20 to 30 years, both business and the community will benefit from greater certainty around the release of land and the coordination of future service and infrastructure delivery.

I would like to acknowledge the Shire of Chittering, the community, and all stakeholders who have contributed to the development of this important document. I look forward to seeing the vision for Muchea Industrial Park being realised in coming years..

Hon Rita Saffioti, MLA
Minister for Planning

Chairman of the WAPC Foreword

The Muchea Industrial Park Structure Plan has been prepared by the Western Australian Planning Commission to coordinate development of the 1,167-hectare industrial park over coming decades.

Muchea Industrial Park is emerging as a key location for industry within the Shire of Chittering and is well located on the fringes of metropolitan Perth's growing north-east freight corridor. The industrial park's proximity to arterial roads – NorthLink, Brand and Great Northern Highways – establishes it as a strategic hub, connecting it to Greater Perth's air and seaports, commercial and industrial areas, with easy access to the Wheatbelt region, the north west of the State and further afield.

It is well placed to support a range of industrial enterprises, and will be particularly suited to freight, logistics and agribusiness.

An important feature of this plan is the provision of staging options for triple road-train access, designed to cater for increased demand anticipated as a result of new and future road upgrades, and the recently opened Muchea road train assembly area. These will make the industrial park accessible to heavy vehicles from the State's north and the mid-west and will enhance its appeal to freight and logistics operators.

Superseding earlier planning documents for the area, this plan's updated implementation framework and objectives set out the intent for coordinating services and infrastructure while ensuring that development within the industrial park responds appropriately to the rural character of its surrounds.

The finalisation of this plan represents a significant body of work. Led by the Department of Planning, Lands and Heritage, it has been informed by the expertise of a range of stakeholders, together with a WAPC-funded Regional Water Management Strategy, land demand assessment and RAV10 network assessment.

I particularly thank the multi-agency Working Group – comprising representatives from the Shire of Chittering, Department of Water and Environmental Regulation, Department of Biodiversity, Conservation and Attractions, Development WA, Main Roads WA, the WA Meat Industry Authority, and the Chittering Landcare Centre – for their invaluable contributions to this plan.

The WAPC is pleased to play a role in supporting the long-term development of the Muchea Industrial Park by delivering a clear pathway to strategically grow this future industrial hub.

David Caddy
Chairman, WAPC

Executive Summary

The Muchea Industrial Park is a developing 1,167ha industrial estate in the Shire of Chittering. It is located 50km northeast of the Perth Central Business District at the northern terminus of Tonkin Highway and the intersection of the Brand and Great Northern Highways as shown on Map 1 - Regional context.

This structure plan reviews and updates the Western Australian Planning Commission's 2011 Muchea Employment Node Structure Plan. This was necessary due to:

- the early arrival of Tonkin Highway which provides direct interchange access into the industrial park
- changes to State policy, particularly regarding catchment management and environmental assets
- the relocation of triple road train assembly facilities from Wubin (220km north) to Muchea and planned upgrades to Great Northern Highway
- a need to review economic drivers and assumptions made in the 2011 plan
- a need to set better direction for essential services, where there is no existing water or wastewater servicing.

These drivers, and the planning arrangements made to date, position Muchea as the closest industrial land to Perth with triple road train (RAV10) access to the State's mining and agricultural regions. As such, the industrial park is expected to have a strong focus on freight and logistics, as well as servicing agricultural districts.

This structure plan provides a land use planning framework to coordinate development of the industrial park. It is anticipated that the industrial park will accommodate a range of land uses including freight and logistics, agri-business, service-based commercial and industrial activities such as transport, livestock, fabrication, warehousing and wholesaling. The industrial park will also provide industrial land to serve local and regional demand.
Map 2 – Industrial context.

The preparation of the structure plan has been overseen and coordinated by the Department of Planning, Lands and Heritage, with assistance from a working group, with representatives from the Shire of Chittering, Department of Water and Environmental Regulation, Development WA, Main Roads WA, the WA Meat Industry Authority, Department of Biodiversity, Conservation and Attractions and the Chittering Landcare Centre. The WAPC also resourced three key technical inputs– a Regional Water Management Strategy (RWMS), land demand assessment and assessment of options for the RAV10 network in the industrial park – which have informed the preparation of the structure plan.

Precincts

The industrial park has been divided into five precincts based on their defining characteristics, which is shown on Map 3 - Land use context and Map 4 – Structure plan.

- **Precinct 1 (North A)** – This precinct is directly accessible to the Tonkin Highway/Brand Highway interchange and comprises the first stage of industrial subdivision and development in the industrial park. It contains the industrial park's most significant areas of vegetation, including banksia woodlands. Most of the precinct has an approved local structure plan in place, with subdivision and development underway.
- **Precinct 1 (North B)** – This precinct primarily comprises the WA Meat Industry Authority (WAMIA) landholding, which consists of sale yards as well as land which could be used for activities that are complementary to WAMIA's operations.
- **Precinct 2 (South)** – This precinct forms the central-most area of the industrial park with the least fragmented land ownership, and is the most suited area within the industrial park for general industry. This is because it can achieve the greatest separation from sensitive land uses outside the industrial park.
- **Precinct 3 (West)** – This precinct comprises multiple lots under various ownership and is located between Great Northern Highway and the Ellen Brook. Due to its size and site characteristics, it is most suitable for uses with more modest land requirements, and for light and service industries.
- **Precinct 4 (East)** – This precinct comprises land along the eastern edge of the industrial park, which holds clay resources of State significance. As a result, development is anticipated in the long term, when the resources are extracted. Due to its location on Wandena Road, it is most suited for light industry, to maintain a suitable interface with sensitive land uses to the east.

Road network

As demand for land within the industrial park is expected to be driven by users requiring access to a RAV10 road network, this structure plan proposes a distributor road network designed to accommodate RAV10 vehicles. The structure plan also presents options for the road network, on the basis that the uptake of industrial land is likely to occur over an extended timeframe, and development scenarios may vary. The existing road network is shown in Map 5 – Existing Road Network. The WAPC commissioned technical advice that provided the basis for a road design concept to guide future planning as shown in Map 6 – Road Concept.

Land use

The proposed breakdown of land uses and reserved land over the industrial park is indicated in **Table 1**.

TABLE 1 – Muchea Industrial Park structure plan - indicative land use allocation

Land use	Indicative area (ha)
Industrial (total) Existing industrially zoned land (as of 2021) Future industrial zone	**935ha** 147ha 788ha
Reserves (total) Reserves for conservation, foreshore management and open space (classifications subject to investigation) Other reserves (gravel)	**147ha** 129ha 18ha
Other protection areas (total) Environmental protection Rural character area	**85ha** 75ha 10ha
Total	**1,167ha**

Industrial interface

The industrial park is surrounded by rural and rural residential properties and the Muchea townsite is 2km to the west of the park. The transition to surrounding sensitive land uses is to be accommodated within the structure plan boundary. The structure plan recommends that general industry is focused in the central portion of the industrial park, and light industry around the edge, with service commercial possible adjoining Great Northern Highway, to retain potential industrial impacts within the park and to maintain a suitable interface with surrounding rural land. The structure plan denotes an indicative 1km buffer around the edge of the industrial park as a basis to restrict sensitive land uses establishing in this area.

Environmental values

The Chittering community places a high value on the environmental aspects of the Shire, and seeks to maintain a balance between economic development and the Shire's environmental values. The structure plan supports this intent, and proposes a range of approaches to protect and improve environmental assets.

The industrial park abuts Ellen Brook, which has the largest sub-catchment of the Swan-Canning River system. The industrial park features multiple use, resource enhancement and conservation category wetlands and is drained by three tributaries of Ellen Brook. The industrial park also contains an area of banksia woodland (a threatened ecological community), Carnaby's Black Cockatoo habitats and potentially other cockatoo habitats, of which are both protected under Commonwealth legislation. Key environmental features are shown on Map 7 – Vegetation and fauna and Map 8 – Water features.

The structure plan seeks to reserve 129ha of remnant vegetation and waterway buffers including land identified in the Shire of Chittering Local Biodiversity Strategy. It also identifies a further 75ha as environmental protection areas which may involve either formal reservation or protection of assets.

Landscape and rural character

The industrial park lies at the base of the Gingin Scarp, which marks the eastern edge of the Swan Coastal Plain. Key landscape features are shown on **Map 9 – Topography and landform**. The structure plan incorporates measures to reflect the industrial park's rural setting and incorporate landscape features. Approximately 10ha has been identified as rural character protection areas where consideration is to be given to retention of prominent trees which contribute to landscape values. The structure plan recommends that prominent trees and vegetation along Muchea East Road are retained, and that the local traffic function of this road remains unaltered. This retains Muchea East Road as the entry to the Chittering Valley, and helps to retain rural amenity, and a road network for local traffic.

Water management and servicing

Due to its location within the Swan Canning river system and being adjacent to the Gingin Scarp, water management is a significant issue for the industrial park, both in terms of groundwater and surface water. The State Government has recognised the importance of the Swan Canning river system, by legislating specifically for its planning, protection and management through the *Swan and Canning Rivers Management Act 2006*. Areas of the industrial park are variously affected by a high-water table, and prone to inundation, having multiple use wetlands or needing to accommodate creek lines or perform a drainage function.

As a result, water management forms a key aspect of future planning for the industrial park. The structure plan has been informed by a Regional Water Management Strategy (RWMS) endorsed by the Department of Water and Environmental Regulation, which includes updated information on the water regime and provides the framework for greater coordination of infrastructure through a regional approach to water management. This structure plan supports a 'three tier' approach to storm water runoff, with catchment onsite, in roadside drainage swales, and via the use of compensating basins.

Much of the industrial park is designated as sewage-sensitive under the State's sewerage policy, due to its location within the Swan Canning river system as shown on **Map 8 – Water features**. Original planning for the industrial park was on the basis that land uses would be for 'dry' industry, however, the sewerage policy requires a more stringent approach to management of wastewater and drainage.

Wastewater is proposed to be managed via the use of nutrient-stripping secondary treatment systems or aerobic treatment units (ATUs). This approach is consistent with Government policy. However, proponents will be responsible for managing any trade waste generated by their operations. This may include on-site waste management infrastructure, or it may also be provided in localised areas of the industrial park.

The RWMS has identified a significant gap in groundwater monitoring, including groundwater levels, groundwater quality and surface water quality. It is recommended that regional level monitoring be commenced. The WAPC will seek management and resourcing of this in consultation with the relevant agencies.

Water is an essential requirement for industrial development and the planning standard is for water to be supplied by licensed water suppliers. There is no prospect that the Water Corporation will have a role to play in Muchea.

In February 2020 Muchea Water was granted a licence by the Economic Regulation Authority to supply water to Stage 1 in Precinct 1A (North A). Muchea Water has also been licensed to service the Riverside residential development, which is approximately 4km north of the Stage 1 area.

Infrastructure co-ordination

Development contribution plans were originally contemplated for the industrial park to manage future infrastructure requirements. However, this approach was not suitable as the extended timeframe for development, and uncertainties relating to timing and staging would have been inconsistent with State policy. Infrastructure is to be funded on a user pays basis and agreements formed outside the planning process are likely to be the most suitable means of co-ordinating infrastructure provision.
Map 10 – Land ownership indicates the likely focus areas for co-ordination.

Staging and implementation

The full build-out of the industrial park is expected to occur over many years, depending on market conditions. As a result, the timeframes for individual precincts' progress depends on the developers' intentions. The structure plan provides alternative staging options for both discrete development of individual precincts without a full RAV10 network in place; or sequential development of precincts.

Future planning and actions

Part 1 of this document outlines objectives and measures required to implement the structure plan. Mostly these are to be implemented in future planning stages including local structure planning, zoning, subdivision and development.

However, some actions require greater Government attention to co-ordinate planning and development:

1. Government and industry are to develop a clear understanding of the triggers for infrastructure development in the absence of Development Contribution Plans, which are not suitable for the Muchea Industrial Park.
2. Access arrangements to the State Livestock Centre for RAV10 vehicles will need to be resolved as uncoupling of trucks at the RTAA facility is not acceptable due to animal welfare and security issues.
3. MRWA is to resolve future Great Northern Highway (GNH) alignment with possible realignment of GNH along the proposed loop road east alignment to overcome potential for access issues near the road train assembly area (RTAA).
4. A regional bore monitoring program should be progressed to identify regional-scale changes between existing and post-development parameters and to obtain a more accurate picture of groundwater conditions across the industrial park and broader catchment. Additional surface water monitoring is also required in the catchment. The WAPC will seek resourcing of this within Government.

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PART 1
The Structure plan

1.1 Purpose

The Muchea Industrial Park Structure Plan has been prepared to coordinate the development of the Muchea Industrial Park to provide industrial land and employment opportunities in the Shire of Chittering.

The structure plan covers an area of 1,167ha, approximately 50km north east of the Perth Central Business District at the northern terminus of Tonkin Highway at the intersection of the Great Northern and Brand Highways and abuts Ellen Brook to the west (See Map 1 – Regional context).

The structure plan updates the Muchea Employment Node Structure Plan (WAPC, 2011) to respond to changes in the land use planning framework (State, sub-regional and local) and economic drivers that have affected existing and future demand for industrial land and have brought forward planning and development activity. These changes include:

- **NorthLink/ Tonkin Highway extension** – The completion of the Tonkin Highway extension in 2020, which includes an interchange directly adjoining the industrial park, has increased the park's accessibility to the broader metropolitan area and freight network.

Tonkin Highway interchange adjoining the industrial park

- **RAV10 access and Great Northern Highway (GNH) upgrades** – Planned upgrades to 220km of GNH north of Muchea to Wubin, including the Bindoon Bypass and intention to alter the road classification will result in triple road trains up to 53.5m long (RAV10 vehicles) being able to travel to Muchea (refer to Map 1 – Regional context). Muchea will become the southern-most point of the RAV10 network from the Mid-West and North-West regions and the closest industrial area to Perth with RAV10 access.
- **Proposed Triple Road Train Assembly Area (RTAA)** – Approximately 7ha of land has been acquired by MRWA adjacent to the Tonkin Highway interchange and the industrial park for road train assembly (as shown on Map 4 – Structure Plan map). The facility is currently operational for up to RAV7 with future provision for RAV10 once upgrades to Great Northern Highway are completed to allow RAV10 access from Wubin. As a result, the industrial park is likely to experience considerable interest from the freight and logistics sector. The roads within the park will need to be capable of accommodating RAV10 vehicles and will require wider road reserves and larger intersections.

The RTAA facility is set to become the closest location to Perth on the State's RAV10 network

- **Commonwealth environmental legislation** - The industrial park includes areas of remnant vegetation, mainly banksia woodland, which has been listed as a threatened ecological community (TEC) under Commonwealth legislation, as well as breeding and foraging sites for the endangered Carnaby's Black Cockatoo and potential habitat for other vulnerable and endangered cockatoos as well.
- **Water management and impact on servicing** – There is a need to better understand the water regime of the industrial park, and to ensure that government sewerage policy and principles of Better Urban Water Management are reflected in the structure plan. The adjoining Ellen Brook is the largest contributor of nutrients into the Swan Canning river system.

  The industrial park is characterised by a high-water table, is prone to inundation, and features multiple use, resource enhancement and conservation category wetlands as well as three main waterways which flow into the Ellen Brook. Most of the western area of the industrial park is designated as sewage sensitive, and fit for purpose secondary treatment of sewage will be required. There is a need to set better direction for essential services, where there is no existing water or wastewater servicing.
- **Land demand** – There is a need to review the demand and timing assumptions for the industrial park, based on projected industrial activity at Bullsbrook which has increased under projections in the 2018 North-East Subregional Planning Framework.

The structure plan comprises the following sections:

Part 1 – the Structure Plan - this includes: -

- the structure plan map (Map 4)
- structure plan and precinct objectives
- proposed land uses
- proposed road network options (Figure 1) and road design concept (Map 6)
- proposed environmental protection water management and servicing
- staging, funding and implementation details.

Part 2 – Explanatory – this includes background and technical information to inform **Part 1**.

1.2 Structure Plan objectives

The objectives of the structure plan are outlined in **Table 2** and should be used to guide all future stages of planning and decision making. Specific objectives and planning considerations for each precinct in the industrial park are outlined in Section 1.3.

TABLE 2 – Structure Plan objectives

Facilitate the development of industrial land for economic and employment purposes.	Provide a mix of industrial land that caters to anticipated market demand.	Provide a basis for future detailed planning that co-ordinates services and results in sustainable form of development.
Optimize access for RAV10 vehicles throughout the park and develop a safe and efficient road network.	Retain identified ecological functions associated with the Ellen Brook and associated creeklines and protect Carnaby's Black Cockatoo habitat and habitat of other protected cockatoo species.	Identify areas to be set aside for conservation and foreshore management, and implement the Shire's Local Biodiversity Strategy.
Retain rural character and landscape values where possible.	Maintain local function and rural character on Muchea East and Wandena Roads to maintain provide low impact travel options for local traffic	Contain industrial impacts within the park, and manage the interface with surrounding rural areas.

1.3 Precincts

The industrial park has been divided into five precincts as shown on Map 4 – Structure Plan, each with specific development intents and issues which will need to be addressed in future stages of planning, as outlined in **Table 3**.

TABLE 3 – Precinct development intent and key planning considerations

Precinct	Description of area	Development intent of precinct	Key planning considerations
Precinct 1 North A Lot description – Lots 22, 30, 202 and 809 GNH and Lots 3, 201 and M1453 Muchea East Road	**Total area - 200 ha** Located in the northwest of the industrial park, directly adjoining the Tonkin Highway interchange and is the first stage of the park being subdivided and developed.	Driven by the precinct's location on the Tonkin Highway interchange and RTAA. Suited to general and light industry. Significant environmental assets.	More detailed development and subdivision guidance is set out in the approved Local Structure Plan. Future subdivision stages will need to make provision for RAV10 access, optimise linkages and road alignment as the role and alignment of the existing GNH changes post construction of Tonkin Highway. Ongoing protection of banksia woodlands and cockatoo habitat trees including establishment of environmental conservation reserves. Drainage and wastewater management.

TABLE 3 (cont) – Precinct development intent and key planning considerations

Precinct	Description of area	Development intent of precinct	Key planning considerations
Precinct 1 North Lot description – Most of Lot 51 Muchea East Road and Lot 7 Muchea East Road	**Total area - 244 ha** Located in the northeast of the industrial park, mostly comprising the WAMIA livestock centre	Driven by State Livestock Centre, and development options under relevant legislation which may include agri-business operations.	• Need to provide RAV10 access to the WAMIA livestock centre and for this to be in place by the time the RTAA is operational for RAV10 vehicles. • Protection of the loop road alignment. Road design will need to consider topography, limit impact on WAMIA infrastructure and operations , potential drainage issues and should seek to retain bushland. • Potential diversification of land uses as per the *Western Australian Meat Industry Authority Act 1976*. • The topography could limit complete build out of the site but provides fill opportunities for land development across the industrial park. • Protection of banksia woodlands and Carnaby's Black Cockatoo habitat trees within the precinct. • The sequential development of parts of the precinct including extraction of the significant geological supply (clay) resource and site rehabilitation.
Precinct 2 South Lot description – Lots 102, 700, 701 Muchea East Road, Lots M1456, 50, 204 and 205 GNH	**Total area – 284 ha** Located in the central portion of the industrial park and bound by GNH to the west and Muchea East Road to the north	Centrally located and in mostly single ownership, the precinct is most suitable for general industry uses which require greatest separation from rural and residential land uses.	• Coordination and staging of road and drainage infrastructure and servicing including reservation of waterways and drainage channels. • Road network, intersections and lot configuration. • Access to be controlled through an internal road system with a limited number of access points to GNH and the loop road. • Preservation of rural character including retaining large original trees in prominent locations along GNH and Muchea East Road, where identified as contributing to visual landscape character. • Interpretation of the heritage listed war-time airstrip on Lot 50 on GNH.
Precinct 3 West Lot description – Lots 35, 192, 194, 800, 801, 802 and 803 GNH and Lot 804 Granary Drive	**Total area – 197 ha** Located between Tonkin Highway, Ellen Brook and GNH, comprising several privately-owned lots	Light and service industry (along GNH) due to site area, water table, and proximity to Ellen Brook and Muchea townsite.	• Coordination and staging of road and drainage infrastructure and servicing over multiple lots including reservation of waterways and drainage channels. • Efficient and effective road network, intersections and lot configuration. • Access to be controlled through an internal road system with a limited number of access points to GNH and the loop road • Water management, development and road design to address high water table, potential for inundation and contamination and to maintain and improve the ecological values of the Ellen Brook including limiting pollutant and nutrient inflow.
Precinct 4 East Lot description – Lot 6, 6269, 202 and 203 Wandena Road, Lot M1326 Muchea East Road and part Lot 51 Muchea East Road	**Total area - 242 ha** Located on an elevated ridge mostly comprising extractive industry operated by Midland Brick	Suited to light industry and agri-business to maintain rural amenity of Wandena Road and interface with rural areas. Development in this precinct is to occur following extraction of clay resource.	• The sequential development of the precinct is subject to the extraction of the significant geological supply (clay) resource and site rehabilitation. • Adjoining roads, Wandena Road and Muchea East Road, are not proposed to be RAV10 roads and are to retain their existing local function. Therefore access for RAV10 vehicles will need to be through adjoining precincts. • Consideration of the interface between industrial land use and adjoining rural and rural residential areas with the transition area to be accommodated within the structure plan boundary. • Protection of prominent trees which contribute to rural character and landscape value along Muchea East Road. • Determining the future management or development of the Wandena Quarry heritage site. • Protection of cockatoo habitat trees.

1.4 Land use and industrial interface

The industrial park is expected to attract light and general industry, freight and logistics operators, agri-business, as well as some service commercial, warehousing/storage and fabrication operations.

In particular, the RTAA and proposed extension of the RAV10 network to Muchea are likely to generate considerable interest from the freight and logistics sector with uses such as transport depots, laydown areas and saleyards. Upgrades to the availability of transport related services and industries immediately adjacent to the RTAA will ensure that repairs, maintenance and other transport services can be carried out with minimal downtime, resulting in a significant saving to industry. It is anticipated that approximately one-third to one-half of demand will be from transport related uses.

It is anticipated that Precincts 1 and 2 could potentially accommodate a mix of industrial land uses, but have greater capacity for general industry uses relative to other precincts given their central location within the park and further distance from sensitive receivers such as residential land uses. In addition to transport uses, the first stages of development are also attracting mechanical and engineering services, manufacturing/processing and other support and service uses.

Precincts 3 and 4 would generally be more suited to light industry given their location on the edge of the industrial park. Those areas directly abutting GNH would also be suitable for service commercial. Precinct 4 may also be highly suited to agribusiness as it is closest to rural land to the east.

The opportunity for a mix of industrial land and diversity in industrial lot sizes is also likely to drive demand. The potential for the industrial park to provide large industrial lots in the order of 20ha is attractive to potential operators (Syme, Marmion & Co, 2019).

Land use distribution

The indicative future breakdown of total industrial land, reserves and other protection areas over the industrial park by precinct, on full build-out of the industrial park is shown in **Table 4**. Of the 1167ha in the industrial park, approximately 935ha is proposed for industry (inclusive of land for roads and infrastructure) with the remaining land for conservation and reserves.

TABLE 4 – Indicative land use distribution across precincts (in hectares)

Land use	Precinct 1A	Precinct 1B	Precinct 2	Precinct 3	Precinct 4	TOTAL
Industrial	162 (146 zoned)	170	245	174 (1 zoned)	184	**935** **(147 zoned)**
Reserves for conservation, foreshore management and open space	38	24	27	12	28	**129**
Other protection areas for: conservation; and rural character	- -	50 -	4 8	11 -	10 2	**75** **10**
Other reserves (existing)					18	**18**
TOTAL	**200**	**244**	**284**	**197**	**242**	**1,167**

Notes:

1. The final area of reserves and protection areas are subject to detailed site assessments and future local structure planning
2. The area for reserves for conservation/foreshore management and open space has changed from 327ha as referred to in previous planning documents and report as 198ha of vegetation for protection under the Shire's Local Biodiversity Strategy was previously removed from the industrial park. The specific reserve classification will be designated following onsite investigation and more detailed planning. It is expected most of this area would be for conservation and foreshore management purposes.
3. The total industrial park increased from 1113 ha in the Muchea Employment Node Structure Plan to the current 1167 ha following inclusion of the whole of Lot 809 Great Northern Highway in the Local Structure Plan prepared for Precinct 1A.

Under the Shire's Local Planning Scheme No.6, General Industry zoning would generally be suited to Precincts 1 and 2 as these are more centrally located and Light Industry zoning would generally be suited to Precincts 3 and 4 as these are on the edge of the industrial park. The General Industry zone is more suited to a broad range of industrial, service and related activities which by their nature require greater separation from residential and other sensitive land uses and impacts are to be managed within the zone. The Light Industry zone also provides for a range of industrial and service industries, but requiring less separation from sensitive land uses due to lower impacts from operators or smaller operations. Future industrial zoning is, however, subject to further site-specific assessment including land capability and more detailed review of suitable land uses in each area. These requirements are set out in the Shire's local planning scheme.

Industrial Interface with surrounding land uses

The industrial park is located approximately 2km east of the Muchea townsite, 600-700m east of rural residential dwellings on Peters Road and approximately 400m from the Wandena rural residential estate and two residential properties approximately 100m from the park on Wandena Road as shown on **Map 3 – Land use context**.

There are three main elements for containing impacts of industry within the park and managing impacts on sensitive land uses such as rural and rural residential around the park.

- **Location of general industry** – Industrial zones such as General Industry and industrial land uses with the greatest potential for off-site impacts and risk should be located within the core of the industrial park. Uses with a lesser potential for off-site impacts, are to be located towards the boundaries. These include light industry and may include service commercial where there is highway exposure. The transition area for industry and sensitive land uses such as residential properties is to be within the boundaries of the industrial park.
- **Industrial buffer** – A light industry buffer has been included along Wandena Road to avoid potential impacts from industry on adjoining rural and rural residential land. The buffer width of 200-300m is indicative and has been selected with regard to topography and natural features. The ultimate land uses and zoning will depend on detailed site assessment and demonstration that zoning and land uses are suitable at local structure planning stage. Any zoning and development application will need to account for health and environmental standards and address potential impact on nearby properties.

  As a result of the buffer, the distance between the General industry zone and most sensitive receivers exceeds 1km. This means the industrial park will be able to accommodate separation distances for most types of general industrial operations which are likely to establish in the park as per the *Separation Distances between Industrial and Sensitive Land Uses* (EPA, 2005) . The indicative buffer width will result in approximately 500m separation distance between dwellings and general industry which will still be able to accommodate a range of industrial operators. Environmental licensing will control siting and the nature of industrial operations to address potential impacts on sensitive receivers.

  The structure plan also denotes an indicative 1km buffer around the boundary of the industrial park shown on **Map 3 – Land use context** which is featured in the Shire's Local Planning Strategy. It is non-statutory and serves to trigger consideration of the relationship between sensitive land uses and industrial uses at future planning and development stages. The existing scheme controls will continue to apply to rural zoned land in this area.
- **Special Control Area** – Land in the industrial park is covered by the Muchea Employment Node Special Control Area (SCA) in the Shire's local planning scheme. The SCA serves to accommodate impacts from industrial uses within the industrial park and restricts sensitive land uses such as single houses and caretaker dwellings within the park's boundary. The suitability of zoning proposals in the industrial park are to be assessed based on their location relative to sensitive land uses and environmental suitability.

Environmental assessment and licensing may also apply to particular industrial uses to control and manage impacts. This includes actions taken under Part 4 and 5 of the *Environmental Protection Act 1986*.

1.5 Road network and access

The industrial park is located to take advantage of major transport linkages offered by the regional road and rail network. Significant State road projects and investments in freight infrastructure are also likely to generate considerable demand for freight and logistics operators at Muchea.

To cater for this demand, roads within the park will need to be capable of accommodating RAV10 vehicles, requiring wider road reserves and larger intersections.

In precincts with fragmented ownership and varied development intentions, one of the major road planning challenges lies in the co-ordination of a movement network that accommodates RAV10 vehicles. The establishment of a safe and efficient movement network is also critical with a defined road hierarchy to be established with individual lot access from local access roads and restricted access from primary and distributor roads.

State road and RAV network

The industrial park is located at the junction of three primary distributor roads being GNH, Brand Highway and Tonkin Highway which are all under the care and control of MRWA (see Map 1 – Regional context). Muchea East Road is classified as a regional distributor road and Wandena Road, to the east of the park, is a local distributor. Both roads are under the control and management of the Shire.

The industrial park is accessible for RAV7 vehicles from the North-West and Mid-West Regions via GNH and Brand Highway. Muchea East Road, between GNH and the WAMIA access road is also capable of carrying RAV7 vehicles. Wubin, 220km north of Muchea, is the closest point to Perth that RAV10 vehicles can currently access. RAV10 vehicles must decouple loads at Wubin before freight can travel further south on GNH.

The existing local road and RAV network is shown in Map 5 – Existing road network. Further detail on RAV specifications is also provided in Appendix 2.

The industrial park is located on a major intersection in the State road network

Great Northern Highway upgrades and Bindoon Bypass

The 220km section of GNH between Muchea and Wubin is being upgraded including widening and resurfacing of the existing highway and construction of bypasses at Bindoon and New Norcia. The Bindoon Bypass, which is fully funded by the State and Australian Governments, will provide the final 66km link in upgrading GNH.

On completion of the road upgrades, MRWA also intends to make changes to the road classification, such that triple road trains will be able to operate north of Muchea. MRWA has confirmed that Muchea will form the southern-most point of the RAV10 network from the Mid-West and North-West Regions.

Proposed RAV10 Road Train Assembly Area

The 7ha RTAA site is adjacent to the Tonkin Highway/ Brand Highway interchange and currently operational for up to RAV7. Following completion of upgrades to GNH, the RTAA will provide an alternative to Wubin and facilitate the future use of longer combination vehicles between Muchea and Wubin up to RAV10. The RTAA will improve operational efficiencies for logistics companies operating road trains into and out of Perth from the north.

It is critical that RAV10 access to the WAMIA facility is resolved before the RTAA is able to accommodate RAV10 as uncoupling of trucks at the RTAA facility is unacceptable due to animal welfare and security issues. This has been listed as a key action in the implementation of the structure plan.

Tonkin Highway (NorthLink)

Tonkin Highway has been extended from Reid Highway in Malaga to Muchea as part of the NorthLink project. The highway extension opened in early 2020 and provides uninterrupted freeway controlled access between Muchea and Perth Airport and other key industrial areas in the Perth metropolitan area. It has significantly increased the industrial park's accessibility to the broader metropolitan area, freight network and employment market. A grade separated interchange directly adjoins the industrial park in Precinct 1A (North A).

Road safety

With vehicles up to RAV10 in Muchea, the road network will need to safely accommodate a range of road users. It will need to be safe and efficient for a range of vehicle and traffic types including heavy, light and commercial vehicles, local traffic, tourist traffic and through traffic, which will be sharing roads with RAV10 vehicles which have much longer acceleration and deceleration times.

To optimise safety and efficiency, along with the attractiveness of the industrial area for businesses, it will also be important to ensure traffic flows as freely as possible along major roads including GNH. Additional treatments requiring wider road reserves and/or restrictions on certain movements may be required at intersections. Of particular concern would be heavy vehicles making right turn movements, where there may be difficulty in finding gaps in traffic flow and the obstruction of traffic lanes whilst turning.

Vulnerable road users such as pedestrians, cyclists and motorbikes must also be considered. All roads and intersections accommodating RAV10 vehicles, need to be designed to safely accommodate RAV10 vehicles and other road users in accordance with MRWA specifications.

Development intent

Loop roads (East and West)

The key components of the future road network in the park are two loop roads, east and west. The loop roads are to be constructed to carry RAV10 vehicles and perform a distributive function to open-up land for industry with RAV10 access across the park. Loop road east will also provide an essential function in providing access for RAV10 vehicles to the WAMIA facility.

The proposed loop road alignments are shown on Map 4 – Structure Plan. Loop road east will connect from the Tonkin Highway interchange and back to GNH at the southern end to service Precincts 1A, 1B and 2. Loop road west will service Precinct 3 and join with GNH at each end. The road alignments in the structure plan have been selected to maximise access to lots in each precinct.

The loop roads will be reserved and constructed as subdivision and development occurs. A reservation width of 50m to 60m has been included in the structure plan to protect the future road alignment as per the accepted standard for RAV10 roads inclusive of drainage swales, verge and median and provision for oversize and overmass vehicles. Should future traffic volumes be significantly greater than current forecasts, the loop road would need to be a four-lane dual carriageway, which could be accommodated within the reservation.

There will also need to be provision for a 40m radius (indicative size subject to detailed design) roundabouts for four-way intersections and widening for auxiliary lanes at three-way intersections. This is discussed in more detail in this section under specific headings.

Direct lot access to the loop road could compromise operation of the network. Individual lot access will generally be via local access roads which connect to the loop road with restricted direct lot access and limited intersections on the loop road. However, some direct lot access from loop road west may be permitted subject to traffic assessment and future planning. The detailed local road network will be established through local structure planning.

Great Northern Highway (GNH)

The portion of GNH south of the Tonkin Highway NorthLink interchange will remain a restricted access primary distributor under MRWA control with restricted direct access to lots and minimal intersections. The alignment and function of GNH directly north of the interchange near Precinct 1A has altered upon the completion of Tonkin Highway and is now restricted to oversize and over mass vehicles.

The current GNH alignment joins the loop road close to the Tonkin Highway interchange which could result in delays and potential incidents on the network, associated with vehicles leaving Tonkin Highway turning south onto GNH (or into the RTAA) but having insufficient storage and queuing space due to the high number and length of turning vehicles, creating conflict between larger vehicles and local traffic. If safety and/or efficiency issues develop, remediation measures would have to be implemented such as left in-left out access.

In the future the alignment of GNH could alternatively follow the proposed district loop road east which will be designed to have limited access points. This would be subject to further planning. Until the GNH alignment is resolved there is a need to retain flexibility over future options, particularly at the southern connection of the loop road and GNH.

Muchea East Road

The existing function of Muchea East Road and designation as a district distributor road is to be retained. The road will primarily cater for local traffic and retain its existing RAV7 classification. Vegetation and prominent trees are to be retained along the road to contribute to landscape value as the entry road to the Chittering Valley.

To reduce the number of vehicles accessing WAMIA via Muchea East Road, access from the loop road is a priority. Once the loop road is operational, remedial works may be required to reduce the attractiveness of the road for heavy vehicle traffic.

There is, however, one section of Muchea East Road, approximately 500m long, which could be upgraded to RAV10 standard to provide access to the northern part of Precinct 2, Lot 1453 (in Precinct 1A) and the western portion of the WAMIA site as shown on **Map 4 – Structure Plan**. Access via Muchea East Road would be necessary to service this area as access is not possible from the loop road to these lots due to engineering constraints.

To the east of the WAMIA site, Muchea East Road is not expected to carry road trains or other higher-class commercial vehicles, maintaining its current function.

Wandena Road

Wandena Road is an existing local distributor road that passes to the east of the industrial park and connects to GNH at either end. It is fully sealed south of Muchea East Road, but it is partially unsealed at its northern end. It is proposed to retain the current function of Wandena Road to maintain the rural character and amenity between the industrial park, and rural properties to the east.

Upon future development in the park and increased use by local traffic deviating around the park, it is anticipated that traffic volumes on this road will increase and road upgrades will be required into the future, including upgrades to the intersection with GNH at the northern end.

Local road network and planning

Further detailed lower level road network planning is required in preparing local structure plans. This should include a local road network which provides effective access within the proposed precincts and to the proposed district distributor roads with access at appropriately spaced locations and capable of accommodating RAV10 vehicles. It should also demonstrate how it will integrate with the broader road network and connections throughout the park. This is particularly important for Precinct 4 where access to this area would be from the loop road east in Precinct 2.

RAV10 accessible area and cost estimate

As shown on **Figure 1**, on completion of the full loop road (under scenario C), all proposed industrial land could potentially be RAV10 accessible. If Precinct 4 is to have access it would have to be from the west of the estate, because the intent of this plan is to retain the existing form and function of Muchea East Road and Wandena Road.

Full construction of the proposed road network is estimated to cost between $20million to $24million inclusive of upgrades to GNH, based on a preliminary high-level cost estimation undertaken in 2019. The timing of construction is unknown and future availability of fill, materials and market conditions may alter the construction cost estimate. Further detail on cost estimates are provided in **Appendix 2 – RAV10 Concept drawings and cost estimate**.

Development scenarios

Staging and timing of construction for the full loop road is dependent on individual developer intentions. The structure plan canvasses four different scenarios shown in **Figure 1** which demonstrate how development of discrete areas is possible without sequential development of each precinct. The approximate area of the park with RAV10 access and relative road construction costs are indicated under each scenario.

The full loop road alignment would still need to be protected to provide for future construction of the loop road. In the absence of the construction of full length of loop road, GNH will need to be reclassified to allow for RAV10 vehicles with some upgrades required, at an expected cost of between $4million to $5million. There is currently no proposal to upgrade GNH and upgrades would rely on developer funding and require MRWA approval. A private access road via Precinct 1A (North A into the WAMIA facility would also be required for RAV10 access if the loop road is not built in time for RAV10 vehicles traveling south to Muchea.

Road design concepts

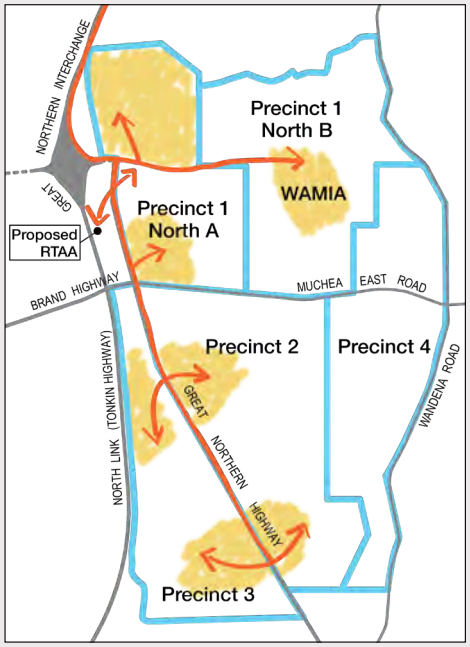
Design concepts and sketches were commissioned by the WAPC to inform the development of the future RAV10 network and to determine order of magnitude costings based on MRWA requirements (see **Map 6 – Road concept**). The road alignments and intersection locations and designs are conceptual in nature and final road design will be subject to detailed engineering design. MRWA will need to be consulted on all RAV10 road design considerations, design of oversize and over mass vehicle corridors and intersection design.

The design concepts were based on a oversize and overmass RAV10 vehicle. On assessment of ultimate trip generation, traffic volumes were predicted to be less than 10,000 vehicles per day, so a single carriage way has been applied.

The road concept comprises roundabouts for four leg intersections, access restrictions (including minimum of 100m from all intersections), road reserve requirements for servicing and drainage and gradients for RAV10 vehicles. Typically, a 50m road reserve is required to accommodate the loop roads including design vehicle turning movements, forecast traffic volumes, road drainage and swales, and public utilities. However, a wider reservation would be required in Precinct 1B (north B) due to the gradient and significant volumes of cut and fill would be needed for RAV10 vehicles to climb the hill and along loop road east should the road be required to be four-lane dual carraigeway.

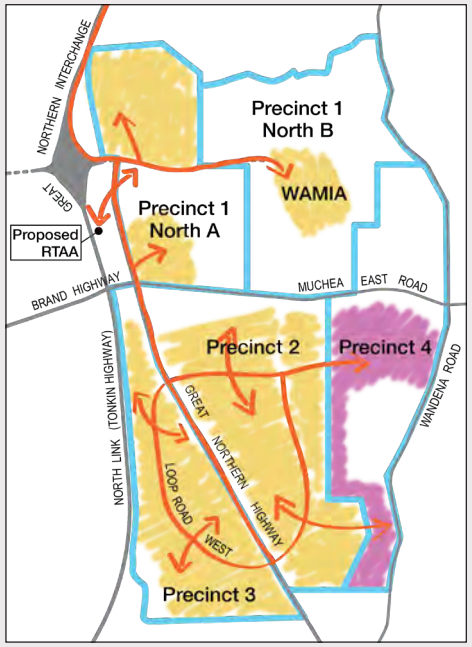
Roundabouts with a 40m radius have been used to determine an indicative maximum land reservation requirement for intersections. The ultimate form of each intersection will need to be determined through more detailed design and traffic impact assessment.

Two options for access to the WAMIA livestock centre from the loop road have been identified including access directly from the loop road or from Muchea East Road. The ultimate access arrangement would depend on detailed road design and assessment and until the full loop road exists could also comprise a driveway from Precinct 1. As shown in the concept sketches and design, the access points and design of the road should retain WAMIA's dams as these are important for their operations.



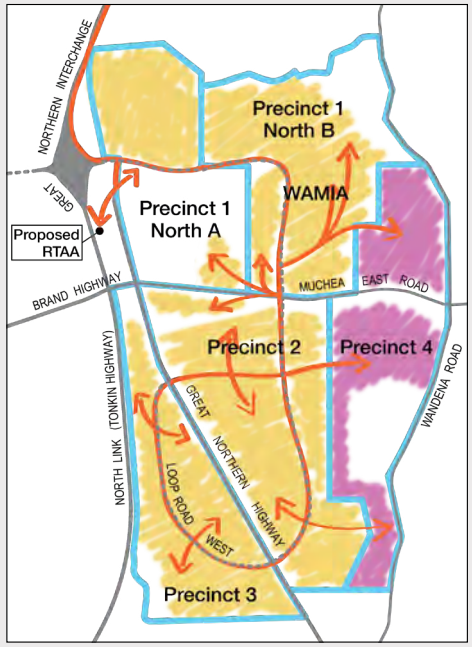
Scenario A - Short Term Option

- RAV10 access off Great Northern Highway to parts of Precinct 2 and 3
- WAMIA access via driveway from Precinct 1 North A
- Estimated potential area with RAV10 access – 350ha (Approximately 40% of industrial area)
- Estimated cost of road construction – $10M-$11M (high level estimate).



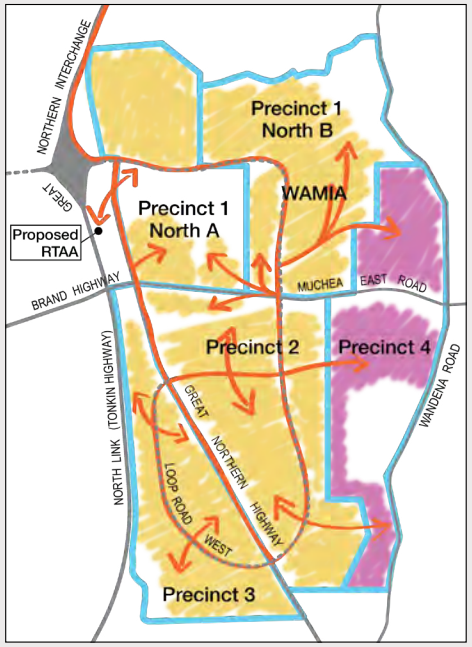
Scenario B - Intermediate option

- Partial loop road construction
- Loop road east services Precinct 2
- Loop road west services Precinct 3
- WAMIA access via driveway from Precinct 1 North A
- Estimated potential area with RAV10 access – 728ha (Approximately 80% of land for industry)
- Estimated cost of road construction – $14M-$17M (high level estimate).



Scenario C - Full loop road

- Full loop road but RAV10 not extended to GNH
- WAMIA access options
- Estimated potential area with RAV10 access – 890ha of 935ha (95% of land for industry) – WAMIA access arrangements to be resolved
- $16M-$20M (high level estimate).



Scenario D - All roads RAV10

- Full loop road constructed and GNH upgraded
- All precincts with potential RAV10 access
- WAMIA access options
- Estimated potential area with RAV10 access – 935ha (100% of land for industry)
- Estimated cost of road construction – $20M-$24M (high level estimate).

Legend

- RAV 10 Road
- Indicative expansion of RAV 10 network for local access
- RAV 10 accessible area
- RAV 10 accessable possible via adjoining precinct

Note: Accessible areas for RAV 10 vehicles is dependent on detailed subdivision and road design and extension of the RAV10 network will require MRWA approval. Plans do not show areas which may need to be reserved for environmental or drainage purposes.

FIGURE 1 - RAV10 ACCESS SCENARIOS

Objectives and implementation measures

The following objectives and implementation measures apply to the establishment of the road and access network upon future planning including development and subdivision in the park.

OBJECTIVE 1 – Optimise RAV10 access throughout the park to provide development opportunity for freight and logistics operators

Measures: -

i. The loop road alignment is to optimise access to industrial lots in each precinct while minimising total road kilometrage.

ii. All road reserves within the park, including the loop and local access roads, are to be wide enough to accommodate RAV10 vehicles including turning movements, road drainage and services.

iii. RAV10 roads design and construction to be in accordance with Austroads and MRWA road design guides for Double B Double (RAV10) including swept path, gradient, road width, stacking/sight distances, lateral and overhead clearances for vehicles up to 53.5m long. MRWA Heavy Vehicle Services to be consulted on RAV10 design.

iv. The loop road shall be a minimum width of 50m to accommodate 2 x 3.5 m lanes, 2 x 2 m shoulder, 1 x 5 m median, 2 x 7.6m swale drain and 2 x 3 m verge

OBJECTIVE 2 – Protect the road alignments and construction to provide for integrated development across the park.

Measures: -

i. The full loop road reservation (50m-60m in width) and land required for drainage and intersections are to be reserved upon creation of the first lot in any subdivision. Developers are to construct the full length of road within the subdivision once all lots are created. The loop road east reservation may be required to accommodate four lanes subject to future land-use confirmation and traffic assessment.

ii. Land is to be reserved for intersections along the loop road and GNH, including roundabouts at four-way intersections with a minimum 40m radius at locations indicatively shown on Map 6 – Road concept, widening for auxiliary turning lanes as well as road widening for upgrades to GNH to provide for RAV10 access where required (subject to MRWA advice)

iii. The full extent of local access roads within a subdivision are to be reserved at the first stage of subdivision and creation of the first lot. The full length of roads within a subdivision area are to be constructed once all lots are created, which may require a staging plan which sets out triggers for road construction in a Local Structure Plan.

iv. The developer is to construct sealed access roads which tie into the loop road and suit the development's lot size and layout. Temporary turning circles may be required as part of staged development.

v. In cases where roads are required, traversing lots in multiple ownership, details of the staging of road reservation and construction are required prior to zoning for industry.

vi. Construction and funding of access for RAV10 vehicles between the RTAA and WAMIA facility is to be resolved prior to RTAA being operational for RAV10 vehicles (WAMIA and MRWA to coordinate).

vii. Planning for the loop road and local roads in each precinct is to address relationship with adjoining areas to establish connections and support coordinated road delivery across the industrial park.

OBJECTIVE 3 – Ensure the safety and efficiency of the road network for all road users

Measures: -

i. The ultimate road and intersection design is to be based on current, updated traffic volumes and forecasts to be determined at local structure planning stage in a transport impact assessment and reflecting intended future land uses.

ii. Lot access, including temporary access, will be restricted from GNH (south of the interchange) and the loop road in all but exceptional circumstances. Bushfire access/egress including emergency access should be provided for on local network roads.

iii. Lot access is to be taken from local access roads via a controlled number of intersections from the loop road and GNH (some access from loop road west may be possible).

iv. Access to individual lots from any road is not to be provided within 130 m of an intersection with loop road east or GNH.

v. All intersections on RAV10 classified roads are to be designed to safely accommodate RAV10 vehicles which may require restricted vehicle movements at some intersections and/or additional treatments and additional land requirements.

vi For loop roads and GNH, a typical three-leg intersection shall feature a priority controlled auxiliary turn lanes and typical four leg intersection shall be a roundabout with an indicative 40m radius. Refer to Appendix 2 for detailed drawings. The timing and funding of a roundabout or other intersection treatments will depend on when demand is established.

vii. A sealed shoulder for cyclists is recommended in road cross-sections.

OBJECTIVE 4 – Provide safe and efficient lot access and egress for RAV10 vehicles

Measures: -

i. Lot dimensions to be in accordance with **Table 5** but may be varied where proponents demonstrate that unloading, decoupling, safe egress and ingress and general operation of RAV10 vehicles can be accommodated on-site.

ii. Where lot access is permitted from a loop road, these lots must accommodate all RAV10 movements on site.

iii. Where entry gates are required to control lot access, these are to be set back from roads to allow room for RAV10 vehicles without impeding traffic flow.

iv. Developers shall undertake and submit a transport impact assessment in accordance with WAPC transport impact assessment guidelines and in consultation with the Shire

TABLE 5 – Lot configurations required to accommodate RAV10 access on site

	MINIMUM LOT DEPTH	LOT WIDTH	MINIMUM LOT SIZE
Two-way driveway – single frontage	324m	197m	6.38ha
One-way driveway – single frontage	159m	197m	3.13ha
Dual frontage – one-way driveway	159m	n/a	n/a

1.6 Environmental conservation and landscape

The structure plan seeks to provide employment land while protecting key environmental and landscape values. Key environmental features in the industrial park are shown on Map 7 – Vegetation and fauna and Map 8 – Water features.

Vegetation and fauna

The industrial park contains two 'matters of environmental significance' under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act): a threatened ecological community - banksia woodlands; and habitat for the endangered Carnaby's Black Cockatoo as well as potential habitat for other vulnerable and endangered cockatoo species.

The banksia woodland is predominantly located in Precinct 1A (North A) and is identified as an Indicative High Conservation Value Area in the Shire of Chittering's Local Biodiversity Strategy and is a State-listed priority ecological community and a Federal-listed threatened ecological community. Approximately 40ha is to be reserved, located over Lots 809 Great Northern Highway and Lot M1453 Muchea East Road. The area to be reserved within Lot 809 Great Northern Highway is as per the approved Local Structure Plan.

An additional 88ha has also been identified throughout the park to be reserved for environmental protection including conservation category wetland buffers and drainage tributaries as discussed further in the Wetlands and Waterways section.

The structure plan identifies a further 75ha as environmental protection areas which are potential cockatoo feeding areas and include other vegetated areas which require further investigation prior to subdivision or development to confirm environmental values and identify a suitable management approach or determine if formal protection is needed.

OBJECTIVE 1 – Protect and manage biodiversity, including fauna habitat

Measures: -

i. Subject to assessment and area refinement, areas of high conservation value within the industrial park, as shown on Map 4 – Structure Plan to to be protected in reserves for Environmental Conservation, to be Scheme reserves and ceded to the Crown at time of subdivision and vested in the Shire of Chittering.

ii. Subject to assessment and area refinement, other protection areas for conservation as shown on Map 4 – Structure Plan, may need to be reserved or other approaches may be appropriate to protect vegetation at subdivision or development stage to be outlined in Local Structure Plans. This may include buffers, lot layout/boundaries to protect vegetation, increased building setbacks/reduced building footprints and identification of key vegetation for protection.

iii. Vegetation to be protected and managed in accordance with initiatives in the Shire of Chittering *Local Biodiversity Strategy*. This includes retention and protection of remnant vegetation to form a buffer to adjoining rural residential areas and rehabilitation of priority vegetation.

iv. Prior to subdivision and when preparing a local structure plan, flora surveys to be undertaken in accordance with EPA and DBCA requirements, which may include a Level 2 Flora and Vegetation Survey. Where significant flora is outside formal protection areas, appropriate management strategies are to be developed by the proponent.

v. Prior to subdivision and when preparing a local structure plan, a targeted fauna habitat survey should be undertaken to identify significant cockatoo habitat areas including the Carnaby's Black Cockatoo habitat, as required under EPA guidance and Commonwealth legislation.

vi. Bushland areas that include foraging, roosting and potential nesting trees for cockatoo habitat should be retained within secure conservation reserves. Where habitat is not included in formally protected areas, appropriate management strategies are to be developed by the proponent to the satisfaction of DBCA and Commonwealth Department of Agriculture, Water and Environment.

Banksia Woodland along Gulliente Road identified for reservation

Wetlands and waterways

The Ellen Brook is located directly to the west of the industrial park, which has the largest sub-catchment of Swan Canning river system and contributes 28% of total nitrogen and 39% of total phosphorous which enters the system. The industrial park features multiple use, resource enhancement and conservation category wetlands and is drained by three tributaries of the Ellen Brook. It also has a history of land uses which have contributed to nutrient discharge into the Ellen Brook and potential for contamination. Therefore, the structure plan seeks to improve on the existing condition of environmental functions, drainage and catchment health of the Ellen Brook.

The structure plan outlines indicative buffers for waterbodies and foreshore management based on DWER guidelines, including 100m from waterways and the edge of mapped conservation category wetlands, however, distances would be confirmed via specific assessment. The indicative foreshore of the Ellen Brook is larger and correlates to the 1 per cent annual exceedance probability (AEP).

The water bodies and buffers are to be reserved, although buffer areas will need to be refined through more detailed on-site assessment. There may also be other drainage lines, identified through on-site assessments which require protection.

Protection of waterways and wetlands will also depend on water management strategies to ensure inflows (surface and groundwater) are appropriately managed and to limit nutrient and pollutant inflow. Further detail on water management is provided under section 1.7. It should also be noted that natural waterways and drainage lines have been altered in the park, and there may be a need to re-establish ecological functions to pre-development standards.

OBJECTIVE 2 – Protect, and manage and improve the environmental values of wetlands, waterways and the Ellen Brook.

Measures: -

i. Detailed on-site assessment conducted at the wettest time of year, to determine presence of wetlands and drainage lines and specific wetland and waterway buffer requirements to be undertaken in accordance with DWER and DBCA policy and assessment guidelines

ii. At local structure planning stage, a more detailed water balance should be completed for any identified water asset to demonstrate that changes to the regime have been avoided or can be improved post development.

iii. Areas of high conservation value within the industrial park including conservation and resource enhancement wetlands and waterways and their buffers to be reserved for environmental conservation in the scheme and ceded to the Crown at subdivision and vested with the Shire of Chittering.

iv. Management and remediation strategies may be required for foreshores, wetlands and waterways, potentially through management plans prepared and approved in consultation with DWER and DBCA at local structure planning stage.

v. Wetlands should not be used for drainage, and the hydrological sensitivity of the wetlands and waterways should be addressed when planning appropriate adjacent land uses.

vi. Development within multiple use wetlands is permitted, provided steps are taken to ensure that post-development storm water discharge conditions match pre-development levels.

vii. Stormwater management systems should be designed to prevent mobilisation of sediment, nutrients and contaminants to wetlands and the Ellen Brook.

Rural character and landscape

The industrial park is located in a rural setting, at the entrance to the Chittering Valley. The structure plan seeks to retain rural character and landscape values where possible, particularly along existing roads which will continue to carry local traffic including Muchea East Road and Wandena Road.

The structure plan identifies rural character areas adjacent to GNH and Muchea East Road where special consideration of landscape values is required prior to subdivision and development. These areas feature large remnant trees that should be retained and remain visible from major roads. In some cases, these areas fall within areas that are identified for conservation or foreshore protection. In other cases, these can be protected by establishment of landscape buffers identified in local structure plans and applied at subdivision stage.

Outside designated rural character areas, measures should still be taken to contribute to rural character and landscape value including landscaping and screen planting along roads and on industrial lots. Landscaping and screen planting are also important to enhance amenity for users of the park and to enhance the park's visual appeal. The images on the following page show examples where this has been achieved in other industrial areas in Perth.

Ellen Brook, located to the west of the park.

OBJECTIVE 3 – Enhance rural character and amenity by retention of prominent trees and landscape features

Measures: -

i. Within rural character areas shown on Map 4 - Structure Plan, landscape assessment is to be undertaken consistent with guidance provided in the WAPC's *Visual Landscape Planning Manual* (2007) prior to subdivision. This is to assess the significance of trees in terms of visual characteristics, value as cockatoo habitat, and contribution to protecting and enhancing landscape values. This will also assist in maintaining the ecological stability of the area.

ii. Siting of industrial development on lots should seek to retain trees, particularly those with higher visual and ecological values.

Example of landscaping along a road reserve (Flinders Valley Estate, Hope Valley)

OBJECTIVE 4 – Enhance the amenity and appearance of the park through landscaping and building design

Measures: -

i. Screen planting buffers are recommended along major roads, or as a backdrop, to screen industrial development areas and clay bunds.

ii. Landscaping is recommended along roads and around industrial buildings.

iii. Industrial development should be designed to be visually compatible with the rural and natural character as viewed from roads with consideration to be given to building orientation, footprint and bulk, use of non-reflective materials, and signage.

Example of landscaping of a factory unit, Welshpool

Example of onsite tree retention on industrial lot

1.7 Water and wastewater management

Water management is a significant issue for the future development of the industrial park. The industrial park is located in a sensitive catchment, characterised by a high water table and prone to inundation. It also features wetlands and drainage tributaries which flow into the Ellen Brook. Most of the western industrial park is also designated as sewage sensitive due to its location within the Swan Canning River river system.

Regional Water Management Strategy (RWMS)

The WAPC commissioned the preparation of a RWMS to support preparation of this structure plan to:

- confirm the existing hydrological regime
- understand water management implications of future development
- provide a framework for greater coordination of infrastructure through a regional approach to water
- to identify what further investigations may be required.

The study area comprised of the industrial park and wider catchment including the Muchea townsite and upper reaches of the Ellen Brook to Chandala Brook to provide an integrated catchment approach.

A hydrological model was developed to provide a regional scale understanding of the existing surface water hydrological regime producing flood mapping for major and minor events. A post-development surface runoff model for the industrial park has been completed to estimate requirements for structural stormwater management measures, in addition to the waterways, foreshore areas, wetlands and wetland buffers.

The RWMS identified that future development in the industrial park needs to address data gaps and consider the environmental constraints and risk posed by potential water management measures, especially in relation to water quality (groundwater and surface water). Regional ground and surface water monitoring is imperative for future planning, development and the ability to audit and ensure compliance by landowners. Most risks can be managed through implementation of appropriate management measures; however, ongoing maintenance of systems is key to ensuring the protection of water quality and environmental assets into the future. The RWMS should be referred to for additional detail on implementation measures outlined in this section.

Local Water Management Strategies

A Local Water Management Strategy (LWMS) will be required to accompany local structure plans as they are prepared for the industrial park. An LWMS is to be prepared in accordance with *Better Urban Water Management* (WAPC, 2008) and the *Government Sewerage Policy* (2019) (as updated) and should address the following matters: -

- areas required for water management purposes
- measures to protect water assets including waterways and wetlands, their buffers, and ecological linkages
- sewage collection, treatment, on-site disposal and nutrient retention
- treatment of storm water before it enters water assets
- demonstration of the suitability of proposed land uses with regard to wastewater and impact on stormwater and groundwater
- maintenance of existing arterial flows (that is, flows into and out of existing assets)
- design criteria and water balances in accordance with the RWMS.

The suitability of water management approaches will need to be determined through appropriate on-site investigations, risk assessment, consultation with regulatory authorities and demonstration of compliance with relevant guidelines and policies. Urban Water Management Strategies will be required at subdivision stage.

Groundwater

Groundwater is at or near the surface over much of Precinct 1A (north 1) and Precinct 3 and generally flows west towards the Ellen Brook. This creates challenges for drainage management across the site and increases risk of pollutants entering waterways and wetlands. The soil is likely to contain excess nutrients due to historical land uses and the site geology. Drainage from the site will require adequate water quality treatment to reduce nutrient loads to the Ellen Brook and the Swan Canning river system. In order to respond to flooding constraints and provide wastewater management, extensive fill is expected across each industrial lot in areas with a high groundwater levels and prone to regular inundation.

There are significant gaps in monitoring data both spatially and temporally for groundwater levels, groundwater quality and surface water quality due to limited bore monitoring. Given the current and proposed land uses associated with the site, nutrients and pesticides (associated with agricultural areas) and heavy metals and hydrocarbons (associated with industrial areas) are considered to be a key concern and should be included in any proposed monitoring program.

Undertaking additional groundwater monitoring is a key recommendation of this structure plan and the WAPC will seek resourcing of this within Government.

OBJECTIVE 1 – Groundwater quality leaving a site should be the same, or better quality, than groundwater entering the site.

Measures: -

i. Development to have adequate separation to ground water or fill to be imported to provide adequate groundwater separation in accordance with the Government Sewerage Policy (as updated) with the suitability of the fill to be determined prior to application .

ii. Industrial land uses should be operated in accordance with relevant DWER guidelines to manage pollutant and contaminant volumes.

iii. The pollutant load to a site to be managed through appropriate stormwater and wastewater management development practices.

iv. Measures should be undertaken to maximise vegetation retention on the site to lower the water table and prevent saline and/or acidic seepages from occurring.

v. The introduction of no additional contaminants or adverse impacts to groundwater quantity or quality should be demonstrated prior to development and when local structure plans are prepared.

OBJECTIVE 2 – Manage impacts on groundwater quality from site work, construction and development

Measures: -

i. Geo-technical investigations to be undertaken prior to subdivision and development to confirm underlying soil conditions and site capability.

ii. Prior to subdivision, detailed site assessments to identify risk from contamination in accordance with DWER requirements.

iii. Prior to subdivision, preliminary acid sulfate soil assessments to be undertaken and more detailed investigations to occur where there is high to moderate risk of disturbance in accordance with DWER requirements.

OBJECTIVE 3 – Improve understanding and management of groundwater resources

Measures: -

i. Investigate opportunity for a regional bore monitoring program across the industrial park and broader catchment to obtain baseline data prior to development including flow rates, nutrient and pollutant levels, identify regional-scale changes between pre and post development and to have a single database to support future proposals. The WAPC will seek resourcing of this within Government.

ii. Where more detailed coverage of individual lots is required, localised monitoring should be conducted by proponents. As per DWER guidelines, monitoring is to occur over 18 months prior to development and 24 months post development.

Storm water, drainage and surface hydrology

The structure plan generally proposes a 'three tier' stormwater runoff approach, with catchment on site with bio-retention systems, in roadside drainage swales, and via the use of compensating basins. As much of the structure plan area is prone to inundation it is expected development sites will need to be filled extensively.

The RWMS contains a post-development surface runoff model for the industrial park to estimate requirements for structural stormwater management measures. It divides the industrial park into sub-catchments based upon the location of existing inflows and outflows, waterways, wetlands, flow paths and establishes detention requirements and peak discharge to be achieved for each sub-catchment. More detailed assessment of surface hydrology is required via preparation of local and urban water management strategies and proponents are to demonstrate post development hydrological modelling is comparable to modelling presented.

An indicative 50m indicative buffer to waterways and drainage lines has been shown in the structure plan taken from the centre line of waterways in accordance with DWER guidance. The specific area requirements will be finalised through more detailed on-site assessments.

Example of vegetated roadside swale (Flinders Valley Estate, Hope Valley)

Objective 4 – Establish an integrated drainage network as development occurs over the industrial park

Measures: -

i. Local Water Management Plans will need to demonstrate how an integrated drainage network will be achieved as development is staged over time, to be approved by SoC and DPLH, incorporating DWER and DBCA advice. This is expected to require filling of lots to be development ready when lots are created.

ii. Existing tributaries and surface water flow paths are to be retained, unless it can be demonstrated that replacement with piped systems will maintain or improve habitat values and the water quality of receiving waterways.

iii. A network of surface water swales to be developed in road reserves integrated with street landscaping or along drainage reserves, the location of which to be outlined in local structure plans.

iv. Subdivision and development proposals need to address surface flow paths, potential for flooding and appropriate management of the associated risks, which will likely require additional surface runoff modelling and management plans.

OBJECTIVE 5 – Development to retain storm-water on site, where practical

Measures: -

i. Small rainfall event runoff is to be treated within lots and road reserves (where practical).

ii. Flows from major storm events are to be detained within each lot boundary and within road reserves to maintain existing peak flow rates.

iii. Native vegetation retention and landscaping is to maximise stormwater retention and hardstand areas to be limited where possible.

iv. Stormwater should be managed in accordance with the Stormwater Management Manual for Western Australia and Decision Process for Stormwater Management in WA (DWER) and water sensitive urban design principles.

OBJECTIVE 6 – Maintain pre-development flow rates and improve water quality as development occurs across the industrial park

Measures: -

i. Site-specific pre-development hydrological modelling should be completed to support any future structure planning and/or subsequent development stages.

ii. Future development will need to demonstrate how the post development water balance will be maintained on a catchment and site basis in accordance with the RWMS and address all run off from a site. This requires developers to undertake additional surface water sampling.

iii. Drainage from the site will require adequate water quality treatment to reduce nutrient loads to the Ellen Brook and the Swan Canning river system and management plans will be required in accordance with DWER and Shire requirements.

iv. Government to examine options to address need for surface water quality sampling across the industrial park and catchment where necessary to establish baseline water quality parameters including flow rates, nutrient and pollutant levels and to assist with a coordinated approach to water management.

Wastewater

There are no reticulated wastewater services available within the industrial park and wastewater is disposed of via on-site treatment systems in Muchea. The population and land uses in the Muchea area would not make a reticulated system viable.

The Muchea area is generally unsuitable for traditional 'primary' on-site effluent disposal due to the environmental constraints and high-water table and most of the area being designated as sewage sensitive. However, the technology associated with 'secondary' on-site treatment is evolving rapidly and can be a suitable alternative to a reticulated service.

Planning for the industrial park has proceeded on the basis that future servicing will be delivered by licensed service providers via use of nutrient stripping secondary treatment systems or aerobic treatment units (ATUs). This approach is consistent with the Government Policy.

The RWMS designates land as "incompatible", "restricted" or "unconstrained" for on-site wastewater disposal and designates the suitability of different on-site wastewater disposal options in each case (refer to Appendix 3 – Wastewater servicing options). The areas which are designated as incompatible align with areas to be reserved for drainage and environmental conservation in the structure plan. It is noted that the suitability of on-site wastewater disposal methods will require site specific assessment.

Trade waste generated by individual operators, being a wastewater of a kind and volume not ordinarily discharged from an ordinary dwelling by occupants, via a reticulated wastewater disposal system, is to be the responsibility of individual proponents. This is because a wastewater system cannot be devised without knowing the volume and composition of trade waste that might be produced. Trade waste is to be managed through on-site disposal or on-site capture and disposal off-site which may be provided in localised areas of the industrial park.

OBJECTIVE 7 – Implement and maintain wastewater treatment systems to protect environmental values and public health

Measures: -

i. All planning proposals should identify site and soil conditions and demonstrate the capacity to accommodate wastewater disposal on-site. This should account for anticipated land uses, wastewater quality and the ability of land to handle effluent disposal, assimilate nutrients, and treat pollutants. It should also demonstrate suitable areas for on-site wastewater disposal, with regard to matters including groundwater depth, fill, soil type, topography, post-development water movement and areas prone to inundation and flooding.

ii. On-site wastewater treatment proposals must demonstrate adequate nutrient removal capability, clearance to groundwater and water resources and an unencumbered land application area for sewage treatment to satisfy requirements of the SoC, DWER and DoH and in accordance with requirements of Government policy. This is to be demonstrated through a site and soil evaluation under winter conditions and other supporting documentation including details on proposed treatment systems.

iii. Secondary treatment systems with nutrient removal are to be used in sewage sensitive areas.

iv. Lot owners are to ensure on-site wastewater treatment units operate correctly and provide the necessary level of treatment before wastewater is discharged in accordance with the requirements of Government policy, DoH, DWER and the Shire of Chittering.

1.8 Services and Utilities

Land will be required within precincts and adjoining roads to provide for major public utility infrastructure, drainage and servicing. Land for service corridors outside major road reserves will be required.

Water supply

A water supply is essential for the industrial park, and this structure plan recommends that it be a requirement for all development. The WAPC is open to any fit for purpose infrastructure provision, provided it is licensed by the Economic Regulation Authority (ERA).

In February 2020, Muchea Water was granted a license by the ERA to service Precinct 1 of the industrial park.

Other servicing arrangements can be made as planning progresses in other precincts.

While existing land uses in the park make use of rainwater tanks and hardstand harvesting, there is to be no intensification of land use without a licensed water supply.

Electricity

It is anticipated that electricity will be distributed to the industrial park through mains and underground connections, in accordance with Western Power policy and design criteria.

There is currently limited capacity in the industrial park to provide additional power, but this is not a major barrier to development. Existing services may also be required to be relocated to achieve the required vertical and horizontal distances for oversize and over mass vehicles.

Gas

The Dampier to Bunbury Natural Gas Pipeline is located approximately 2.5km to the west of the industrial park.

The provision of a reticulated gas supply to the industrial park is possible, and would depend on an individual operator with large demand for gas.

1.9 Infrastructure co-ordination

As some precincts in the park are in fragmented ownership, development co-ordination is a challenge. While development contribution plans were originally contemplated for the industrial park, the uncertain development timeframe meant that this approach was inconsistent with WAPC policy.

It is anticipated that infrastructure will be designed and provided for, as each precinct is developed and provided on a user-pays basis. The provision of infrastructure is to be in accordance with principles of *State Planning Policy 3.6 - Infrastructure Contributions* and funded equitably among landowners. Contribution arrangements outside the planning system such as deeds of agreements are likely to be most suited to funding infrastructure over the estate, particularly where landownership is fragmented.

Although development agreements do not form part of the planning framework, the key components of development agreements, which are the relationship between funding and staging, and triggers for funding to be provided, will need to be considered in scheme amendments, local structure plans and at subdivision stage. Failure to do so could result in incomplete road or drainage networks.

1.10 Staging and implementation

Full build-out of the industrial park is likely to occur over many years. It is necessary to have an adaptable planning framework that enables the development of a suitable range of industrial land uses while achieving an integrated and coordinated industrial area.

Demand drivers

A demand assessment was prepared in 2007, when the initial structure plan was in preparation. At this time, the Tonkin Highway extension was contemplated to be operational with a 20-30 year timeframe.

The short to medium term drivers were anticipated to be local demand, the WAMIA facility, and a small amount of long-term metropolitan spill-over.

Since publication of original structure plan, there have been major changes in the economic drivers and the planning framework for industrial land which have the potential to impact the industrial park's demand profile. Upgrades to GNH and the proposed RTAA are likely to attract more demand from freight and logistics operators.

The completion of Tonkin Highway has also increased Muchea's exposure to the broader metropolitan industrial land market by significantly reducing travel times from the Perth region. Muchea's improved connectivity and lower land prices make it potentially attractive for a range of operations currently occupying high-value land but engaged in lower-value, land-intensive activities. With the benefits of increased access and integration with the broader metropolitan industrial land market now evident, demand for early stages of development increased and overall development timeframes may be brought forward. Planning by CBH to establish a grain handling and distribution facility at Muchea may also drive demand for associated land uses in the area.

An additional 1,000ha of industrial land was also proposed at Bullsbrook, 15km to the south of Muchea. This did not form part of the original demand assessment, and there was a need to ensure the relationship between Bullsbrook and Muchea was clearly expressed.

In 2019, the WAPC commissioned an updated land and demand assessment to support preparation of this structure plan. This has established that there is surplus industrial land in the north-east and north-west sub-regions of Perth, and that existing development projects in the Muchea area will likely meet short to medium term demand.

As such, Muchea's future demand will be highly dependent on its transport-related location factors which reinforces Muchea's likely focus for long-haul transport as well as agricultural products and livestock handling and associated operations. The future take-up of land at Muchea will depend on individual projects that can take advantage of Muchea's location and improved connectivity based on the combined Tonkin Highway and RAV10 access.

The demand assessment also confirmed that Muchea and Bullsbrook have a point of difference in terms of timing and products. This is because Muchea is currently under construction via Stage 1, and the industrial park will be pitched at freight and logistics to serve mining and agricultural interests. Bullsbrook, on the other hand is larger and is currently being planned to accommodate an intermodal facility, so may have a greater relationship with port freight and will require upgraded access to Tonkin Highway.

Precinct staging and implementation

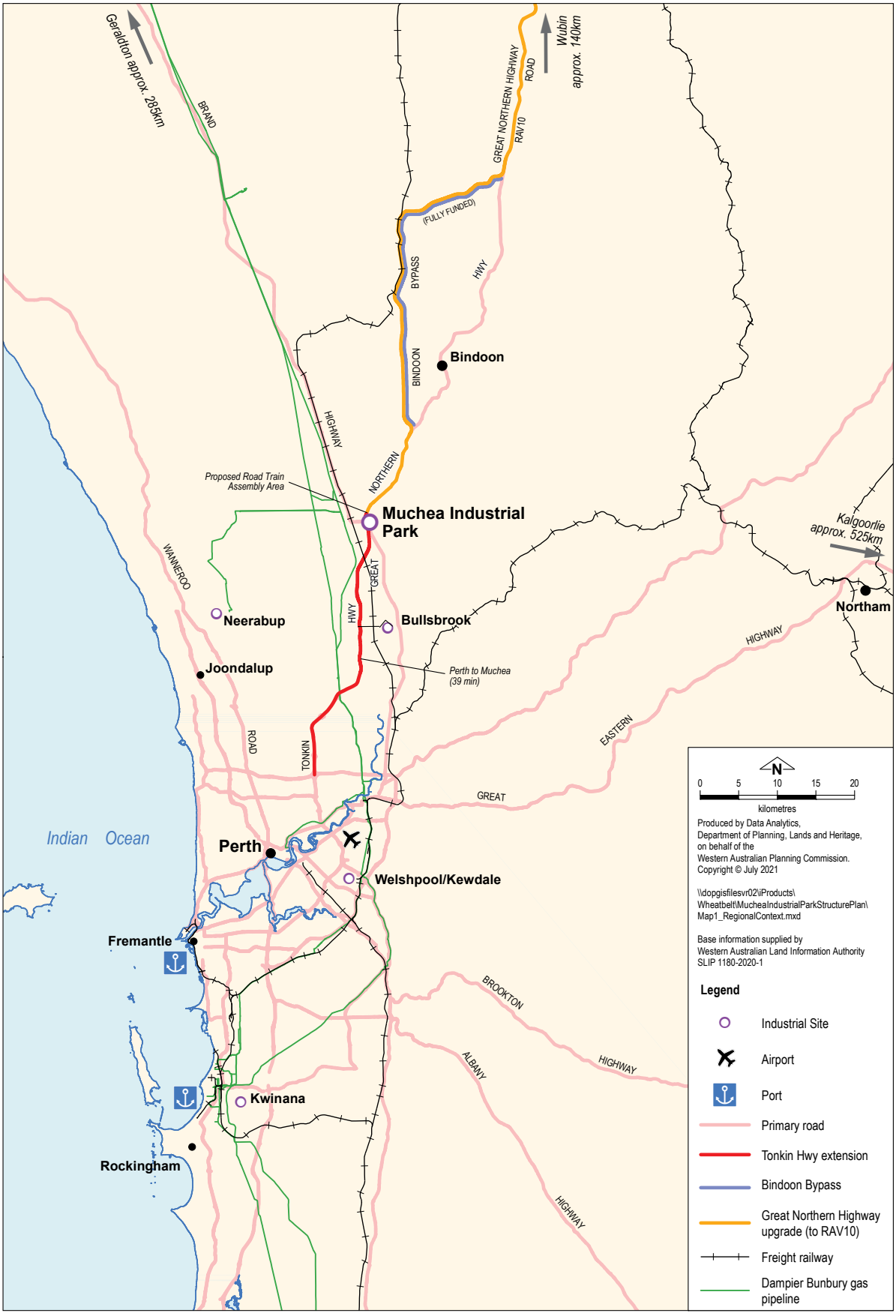
The availability of future industrial land in the north-east sub-region, fragmented ownership of land over the industrial park and site characteristics such as the presence of clay resource, means that implementation of the structure plan is likely to be protracted. The staging of the industrial park will be market led and depend on major anchor tenants being attracted to the park to prefund infrastructure.

The structure plan has been prepared on the basis that precincts can be developed independently and are not required to be developed in a sequential order.

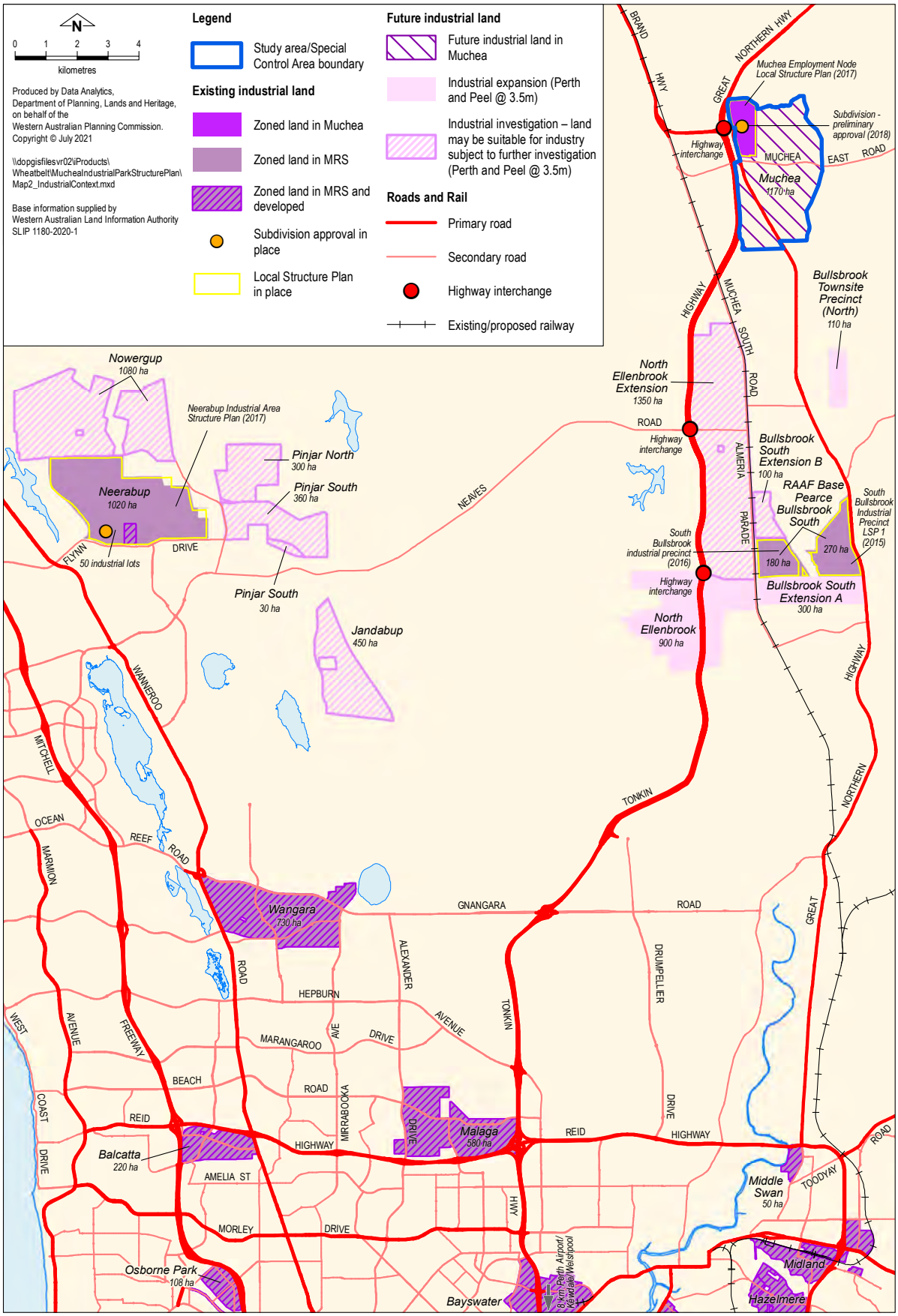
Implementation of the structure plan at the precinct level will be addressed through preparation of local structure plans. At the precinct level, staging will need to ensure that there will be coordinated provision of infrastructure as subdivision occurs, particularly road construction and the establishment of an integrated drainage network which should be addressed in scheme amendments and/or local structure plans.

Requirements for future planning stages, including local structure plans are set out in the Shire of Chittering's local planning strategy and scheme and this document.

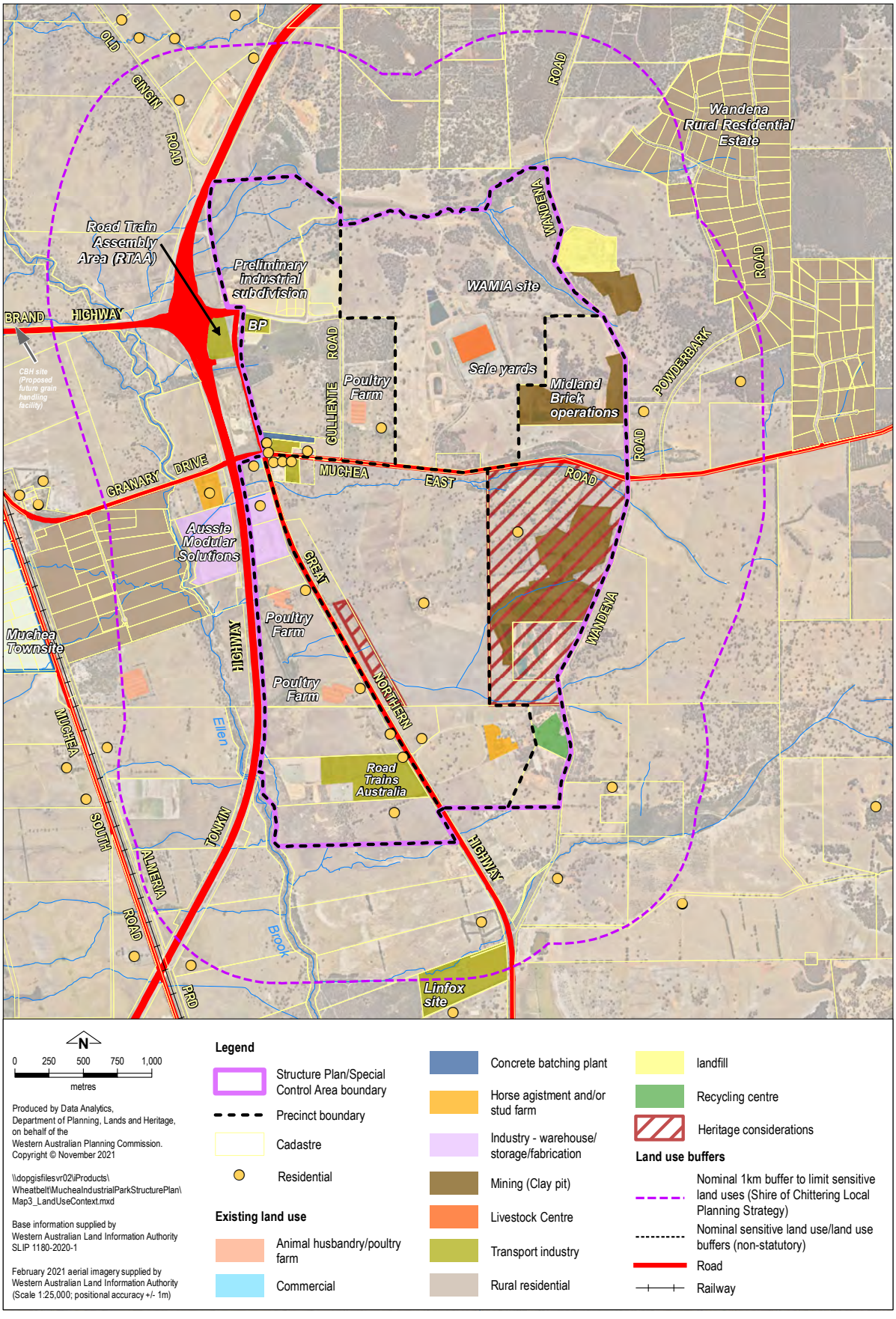
MAPS



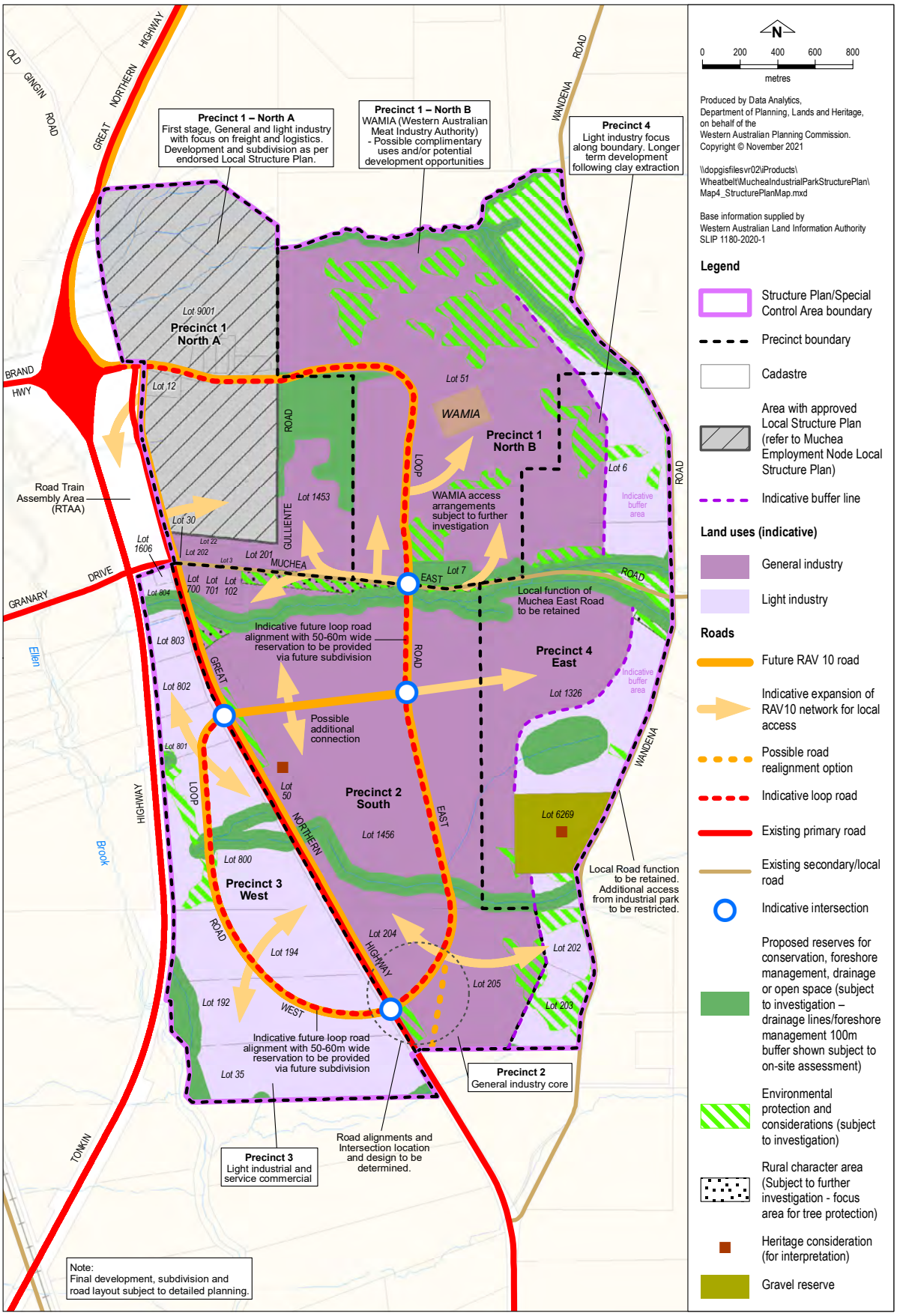
Map 1 – Regional context



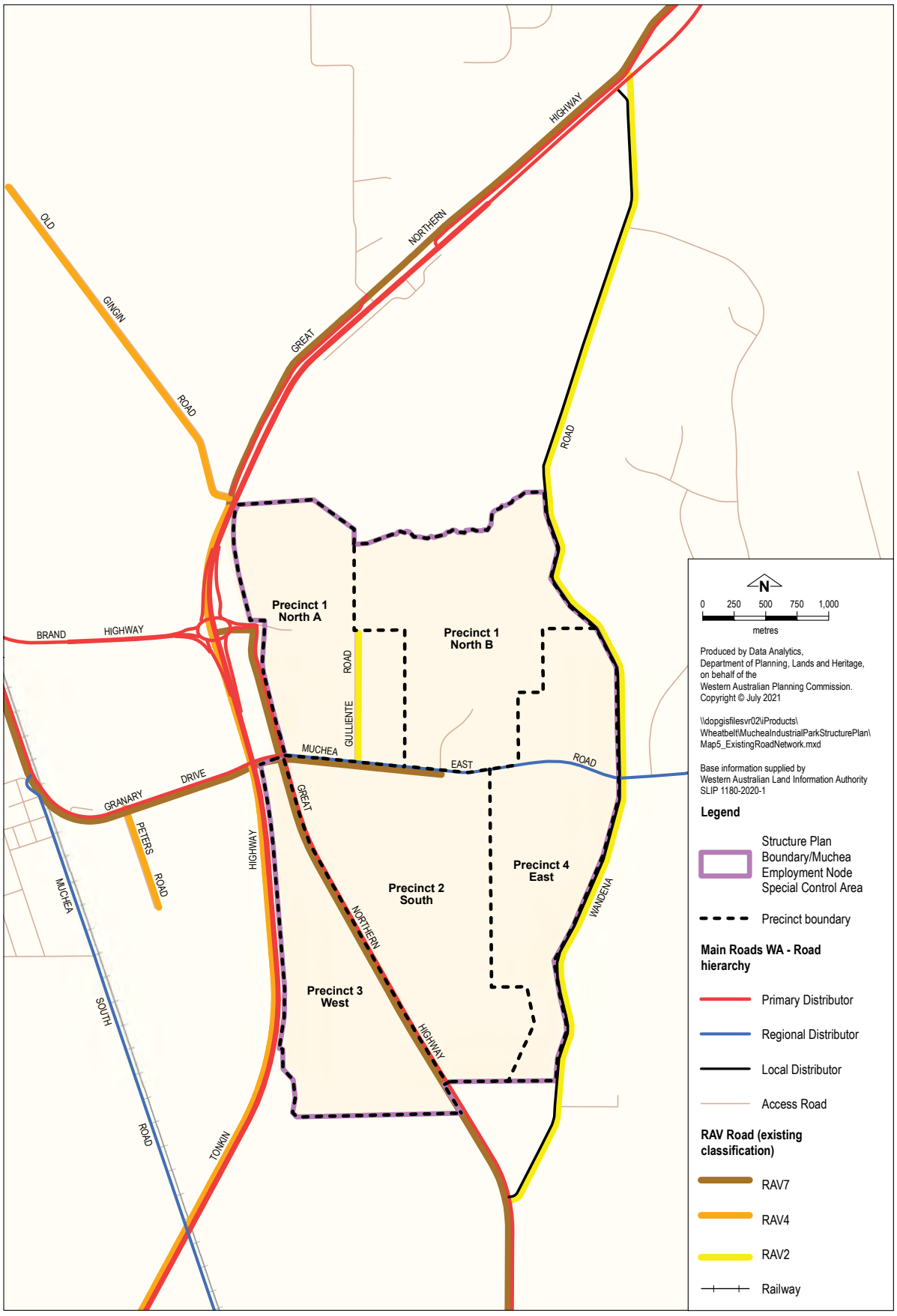
Map 2 – Industrial context



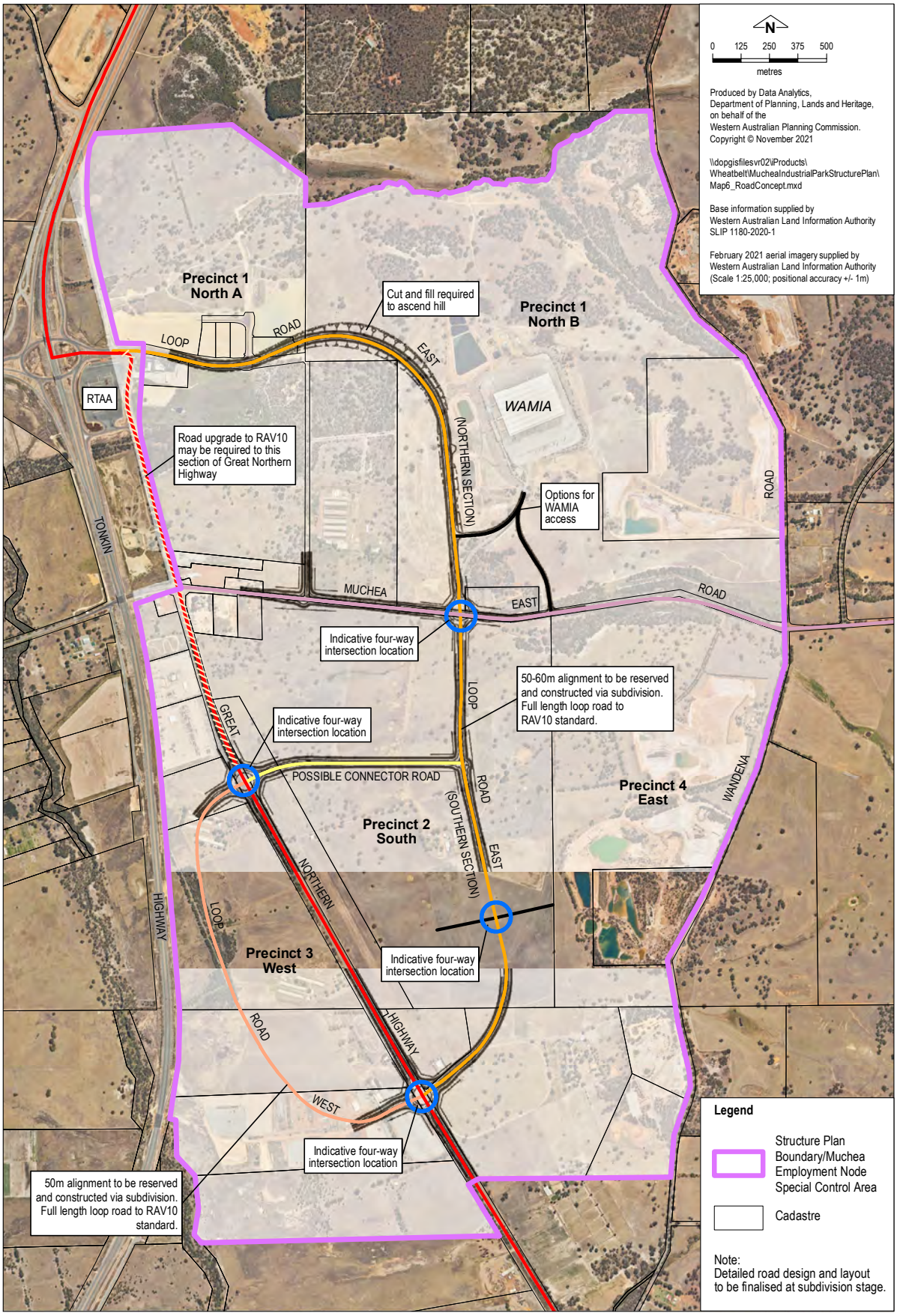
Map 3 – Land use context



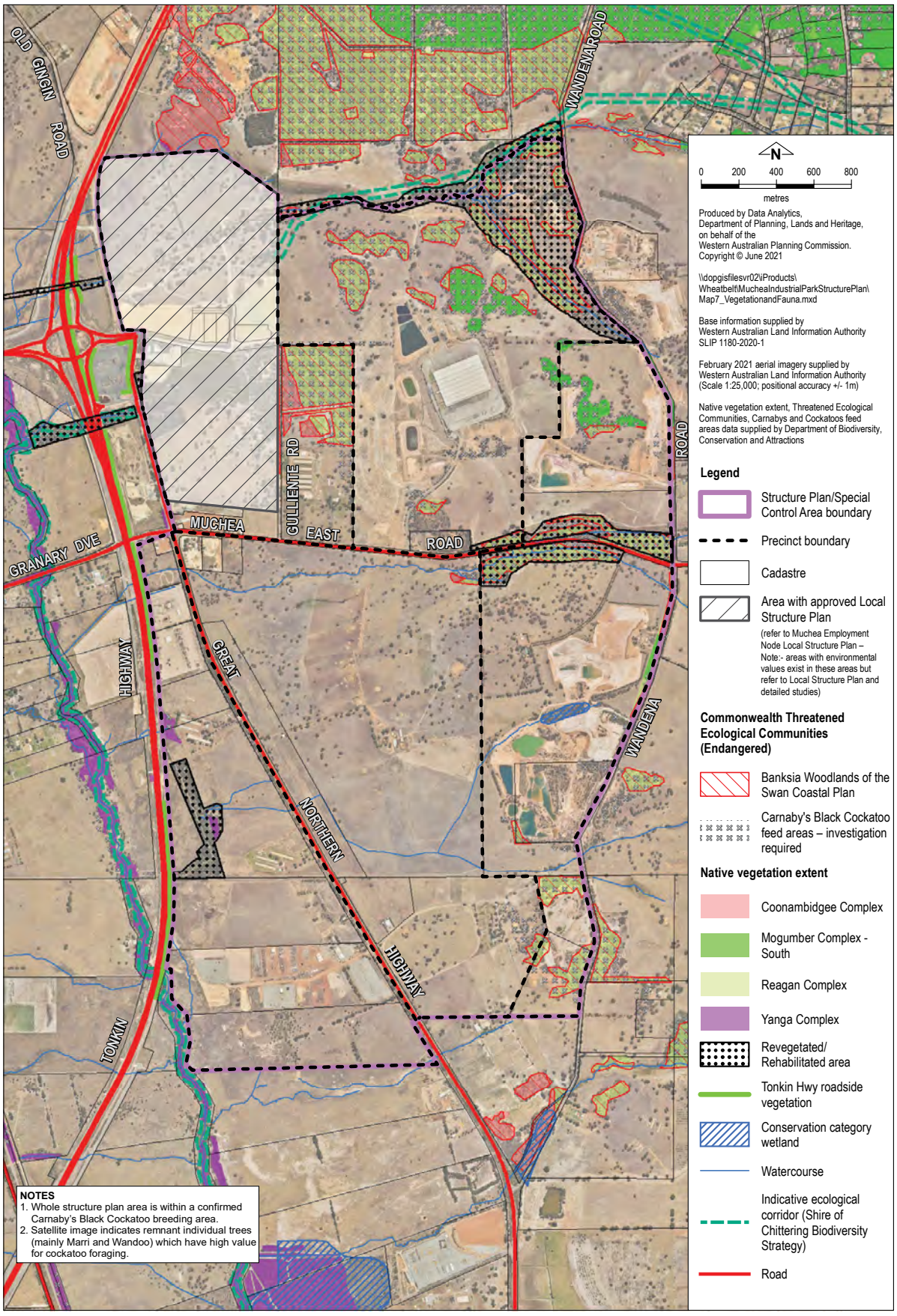
Map 4 – Structure plan



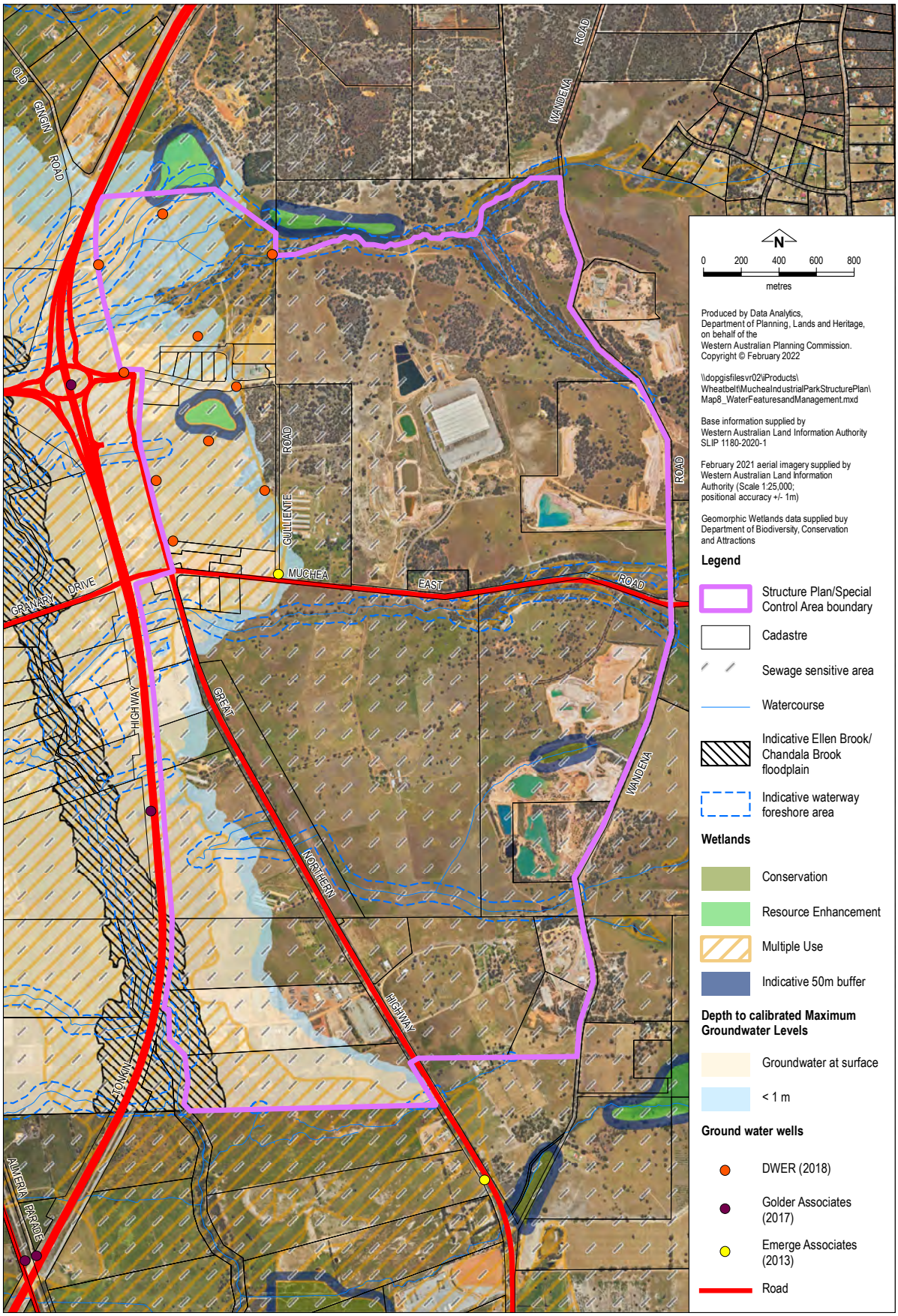
Map 5 – Existing road network



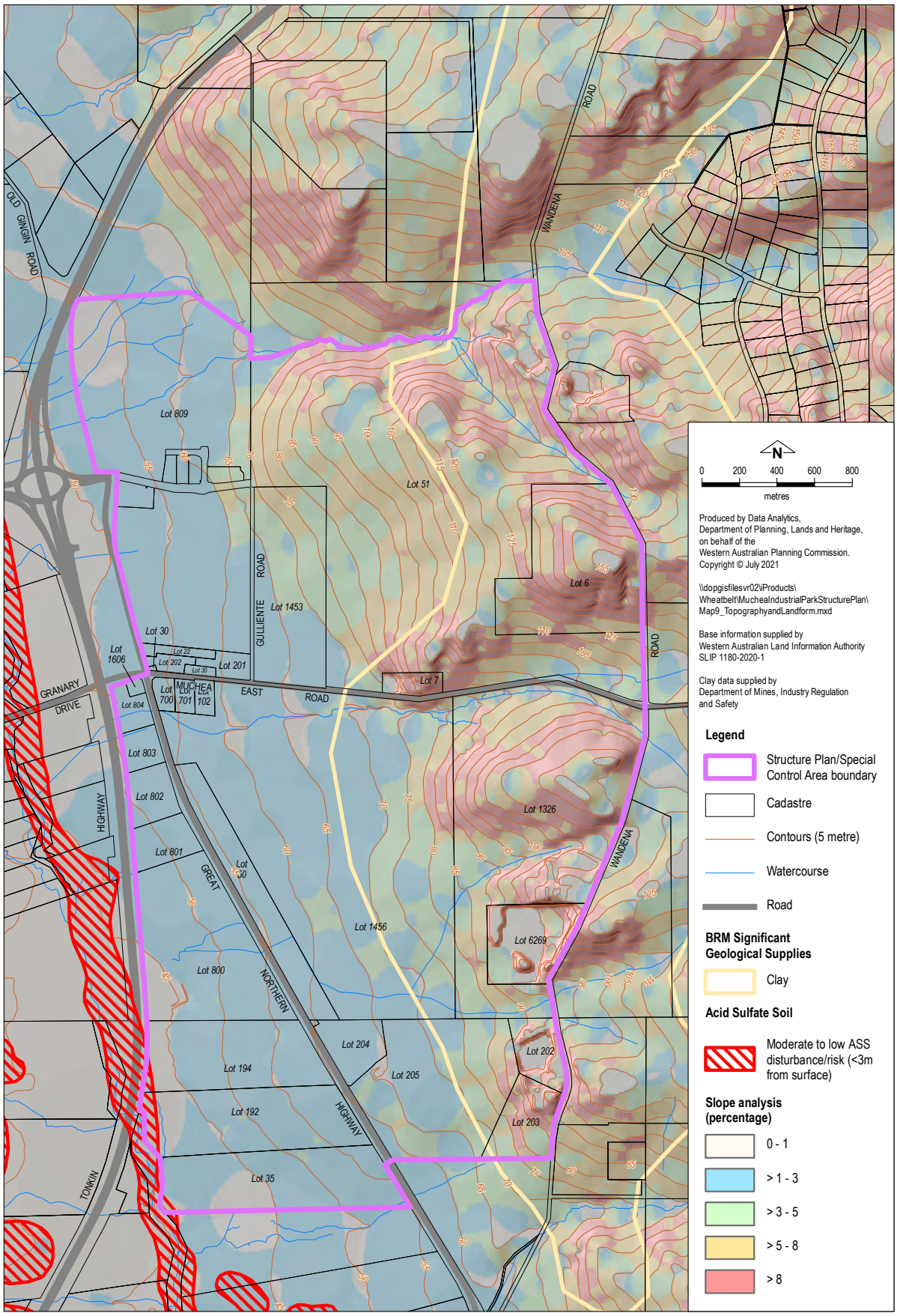
Map 6 – Road concept



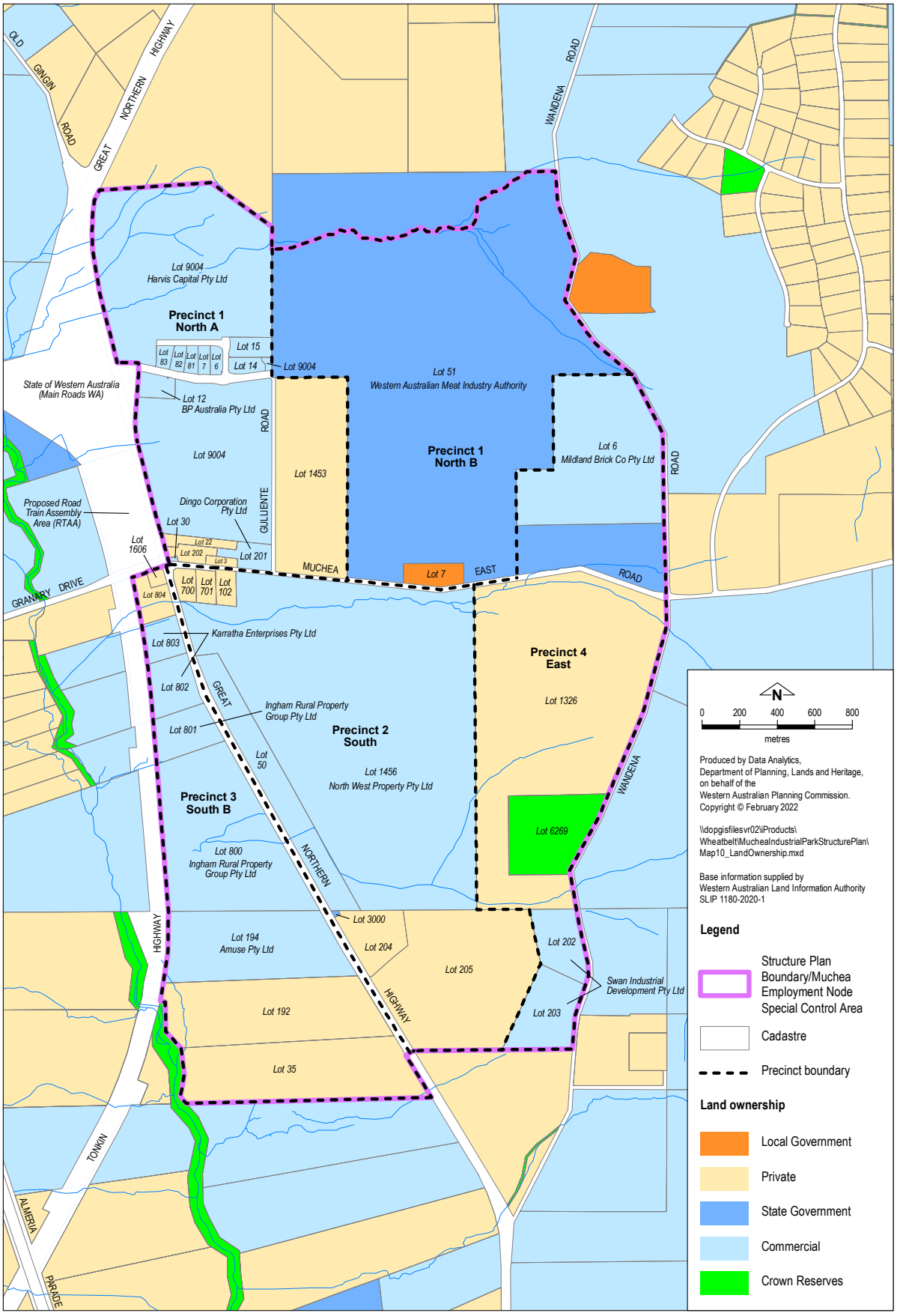
Map 7 – Vegetation and fauna



Map 8 – Water features



Map 9 – Topography and landform



Map 10 – Land ownership

APPENDICES

Appendix 1 – RAV specifications

2016

Prime Mover, Trailer Combinations

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

Source – Heavy Vehicle Services Main Roads Western Australia, 2019

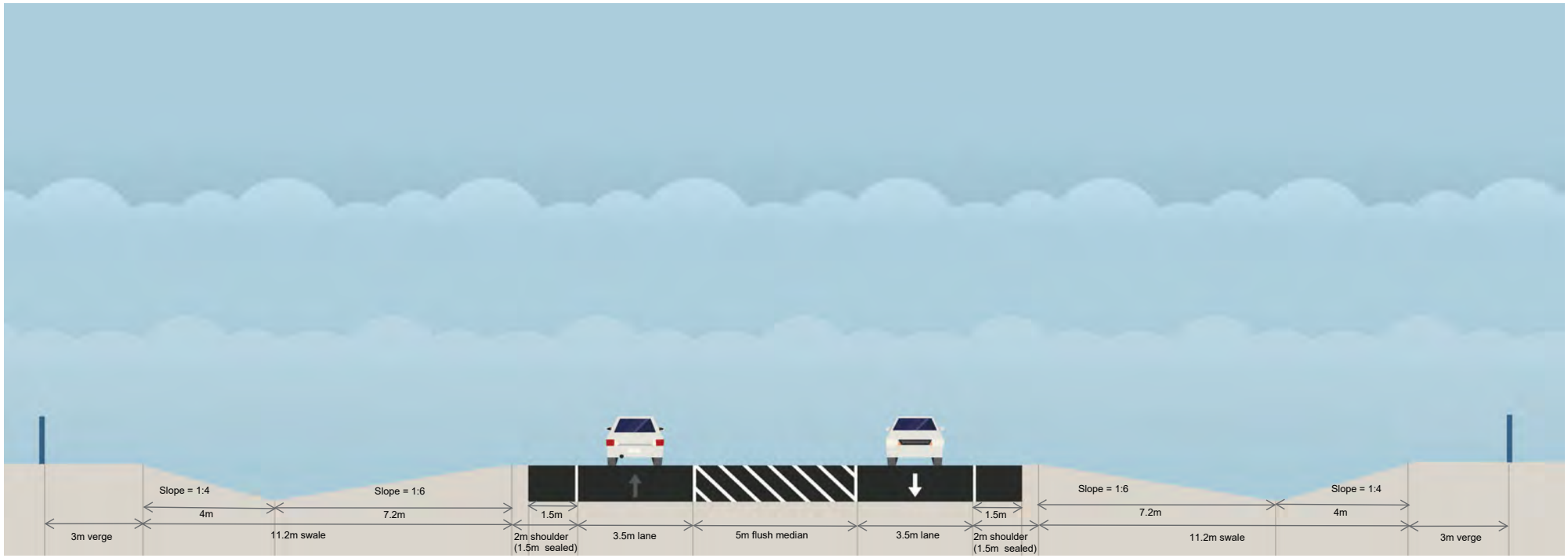
Appendix 2 – RAV10 concept drawings and cost estimate

Disclaimer: - Concept drawings for purpose of obtaining indicative order of magnitude costs and to provide general guidance on road design. The estimate is high level and based on preliminary design information only. Ultimate road layout subject to detailed planning.

TABLE 6 – Estimated costings of new roads and intersections

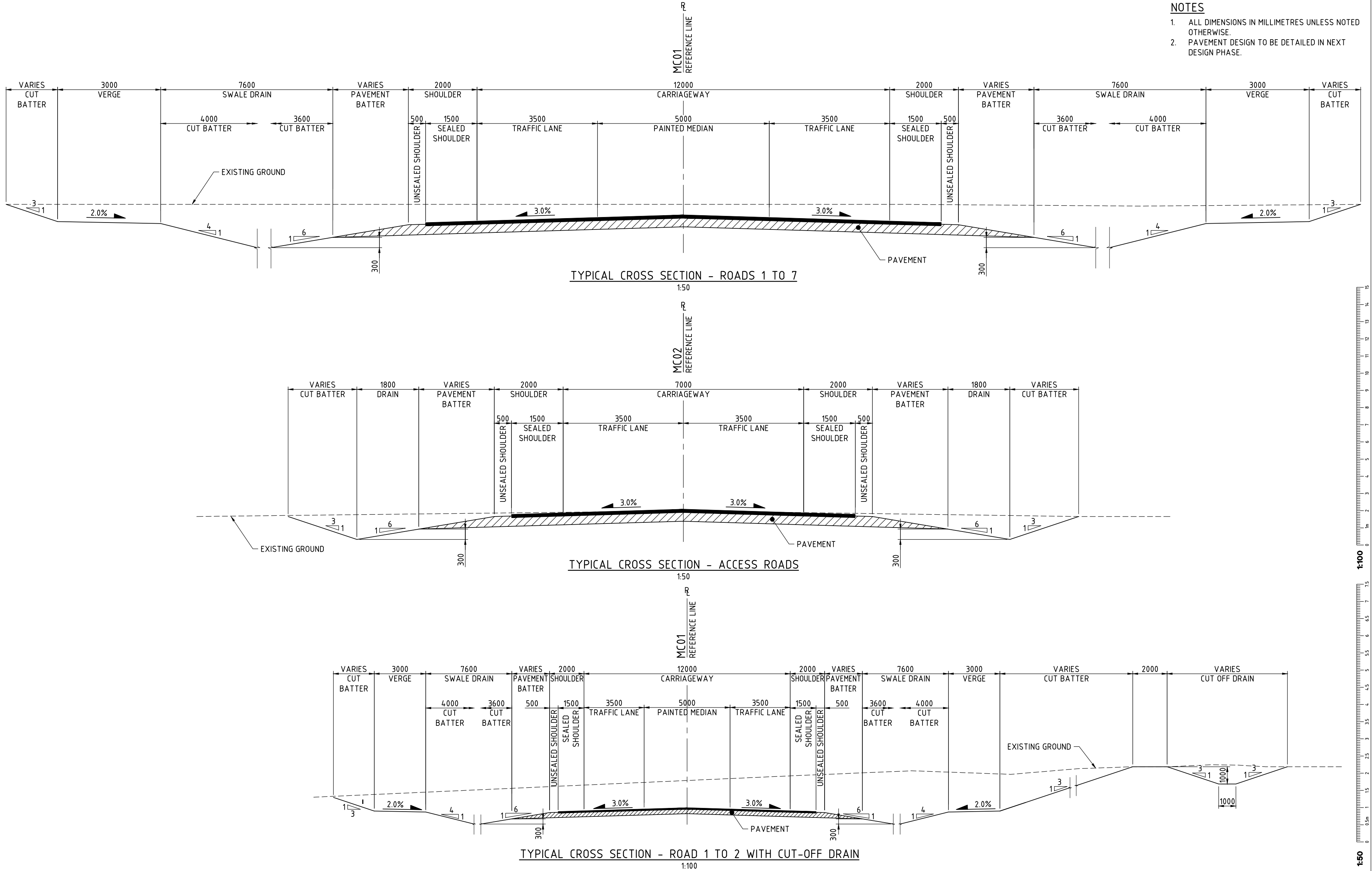
ROAD	TOTAL VALUE	
	LOWER VALUE	UPPER VALUE
Loop road East (Northern Section) – 2.4km	$6,513,208	$7,598,743
Loop road East (Southern section) – 2.35km	$3,348,299	$3,906,349
Loop road West – 2.5km	$3,562,020	$4,155,690
Muchea East Road – 1.06km	$1,574,112	$1,836,464
Great Northern Highway- 2.9m	$4,131,943	$4,820,601
Possible connector between Loop Road East and GNH – 1.0km	$1,424,808	$1,662,276
TOTAL	**$20,554,390**	**$23,980,123**

RAV10 Road profile (indicative)



NOTES

1. ALL DIMENSIONS IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. PAVEMENT DESIGN TO BE DETAILED IN NEXT DESIGN PHASE.



Note:- Concept drawings for purpose of obtaining indicative order of magnitude costs and to provide general guidance on road design. Ultimate road layout subject to detailed planning.

SKETCH ONLY

WSP
Level 5
503 Murray Street
Perth WA 6000
Telephone +61 8 9489 9700
Facsimile +61 8 9489 9777
Email: perth@wsp.com

DATE	12/11/2019	PROJECT	MUCHEA INDUSTRIAL PARK 5% CONCEPT DESIGN
SCALE AT A1	AS SHOWN	TITLE	TYPICAL CROSS SECTION
GRID	PCG94		
PREPARED	M.BOCESKI		
SHEET		PROJECT No. PS116975	SKETCH No. SK-0001 REV B

NOTES

1. ALL DIMENSIONS IN METRES UNLESS NOTED OTHERWISE.
2. REFER TO DRAWING No. PS116975-SK-0001 FOR TYPICAL CROSS SECTIONS.
3. REFER TO DRAWING No. PS116975-SK-0021 AND PS116975-SK-0022 FOR PLAN AND PROFILES.
4. REFER TO DRAWING No. PS116975-SK-0031 AND PS116975-SK-0032 FOR INTERSECTION PLAN AND VEHICLE SWEPT PATH.

LEGEND

CADASTRAL BOUNDARY

NO DRIVEWAY ACCESS ALLOWED

PLAN
1:5000

1:5000

Note:- Concept drawings for purpose of obtaining indicative order of magnitude costs and to provide general guidance on road design. Ultimate road layout subject to detailed planning.

SKETCH ONLY

wsp
Level 5
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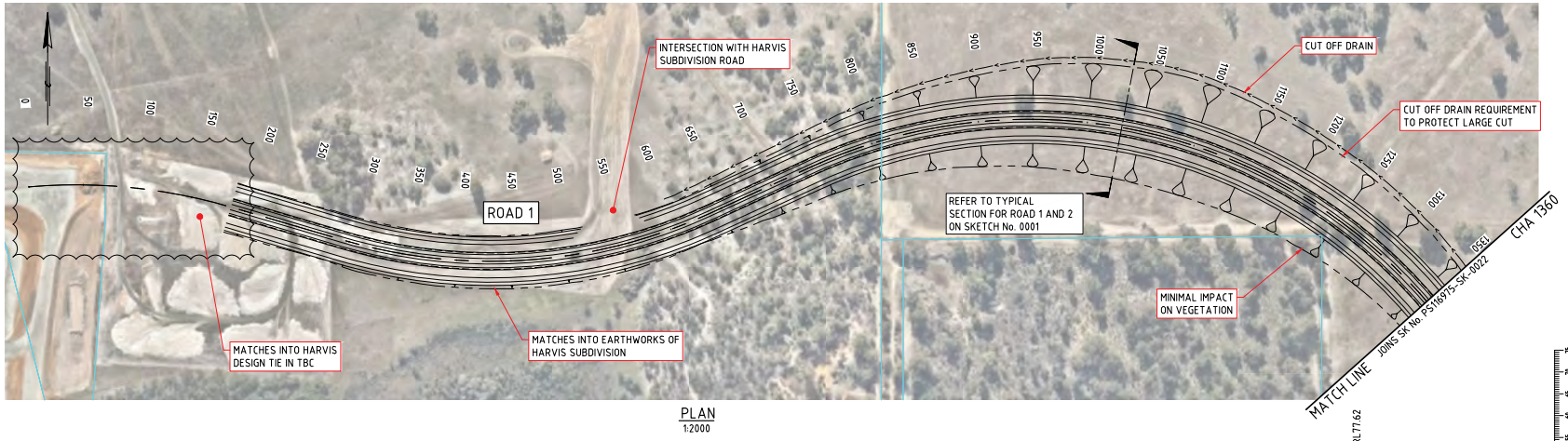
Telephone +61 8 9489 9700
Facsimile +61 8 9489 9777
Email: perth@wsp.com

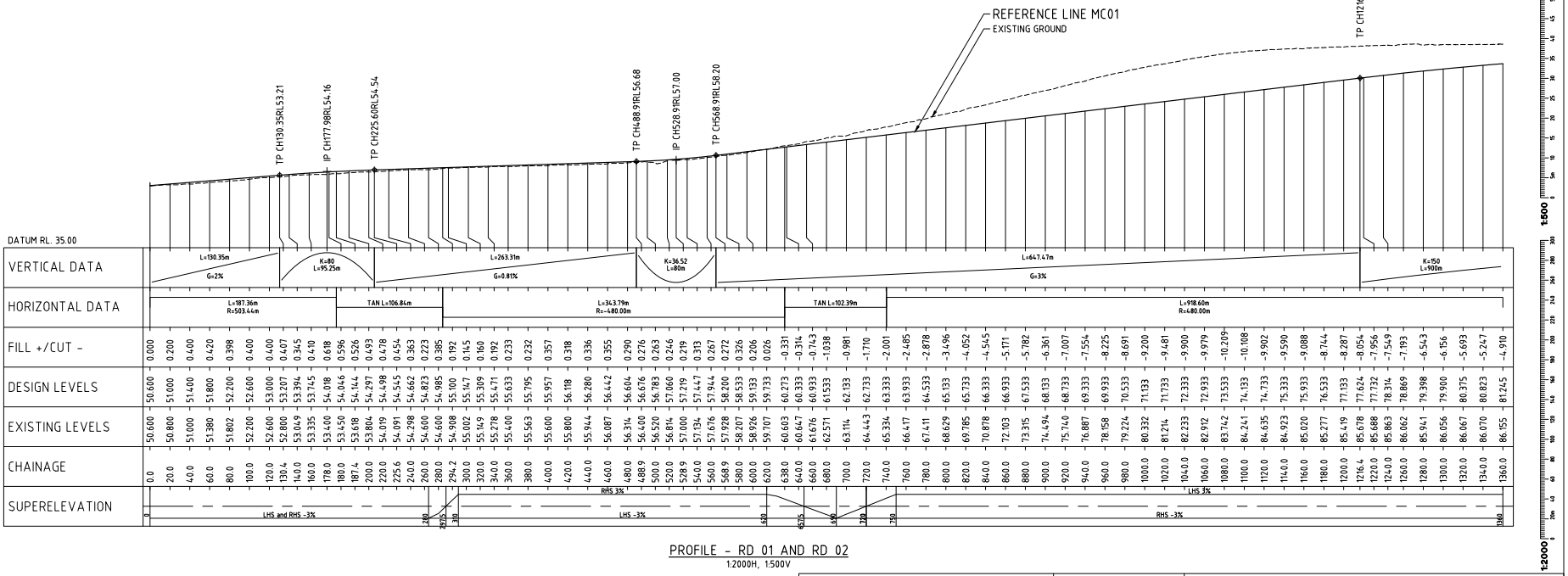
DATE	26/03/2020
SCALE AT A1	0 50 100 150m SCALE 1:5000
GRID	PCG94
PREPARED	D.MARKOV
SHEET	

PROJECT: MUCHEA INDUSTRIAL PARK 5% CONCEPT DESIGN
TITLE: GENERAL ARRANGEMENT

PROJECT No.	SKETCH No.	REV
PS116975	SK-0010	C



PLAN
1:2000



PROFILE - RD 01 AND RD 02
1:2000H, 1:500V

Grade may need to be 2% to meet MRWA heavy vehicle requirements. Subject to further detailed design.

SKETCH ONLY

wsp
Level 5
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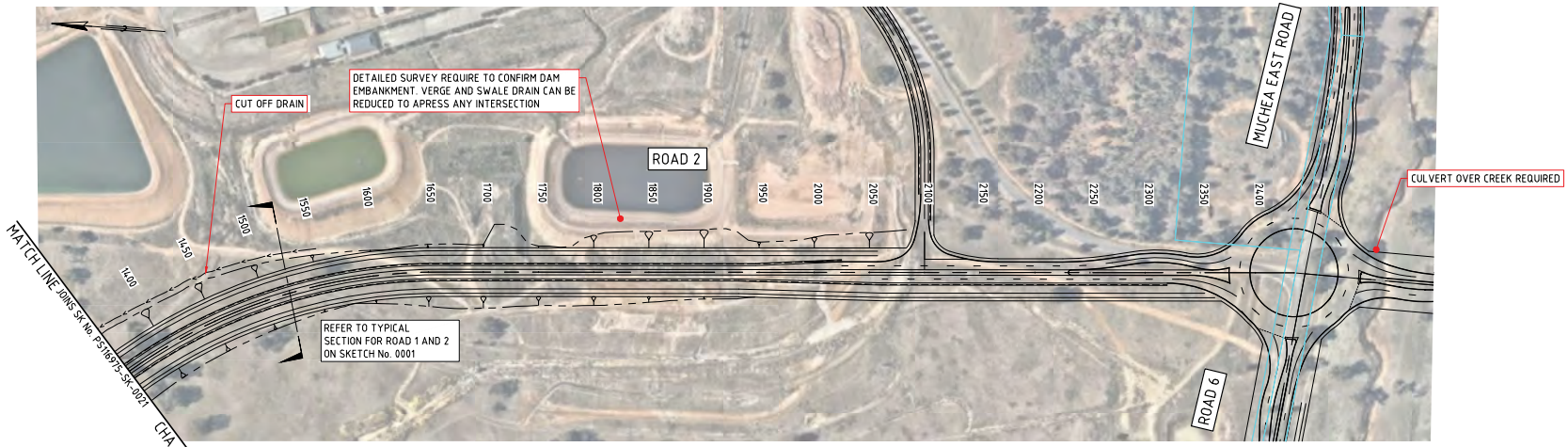
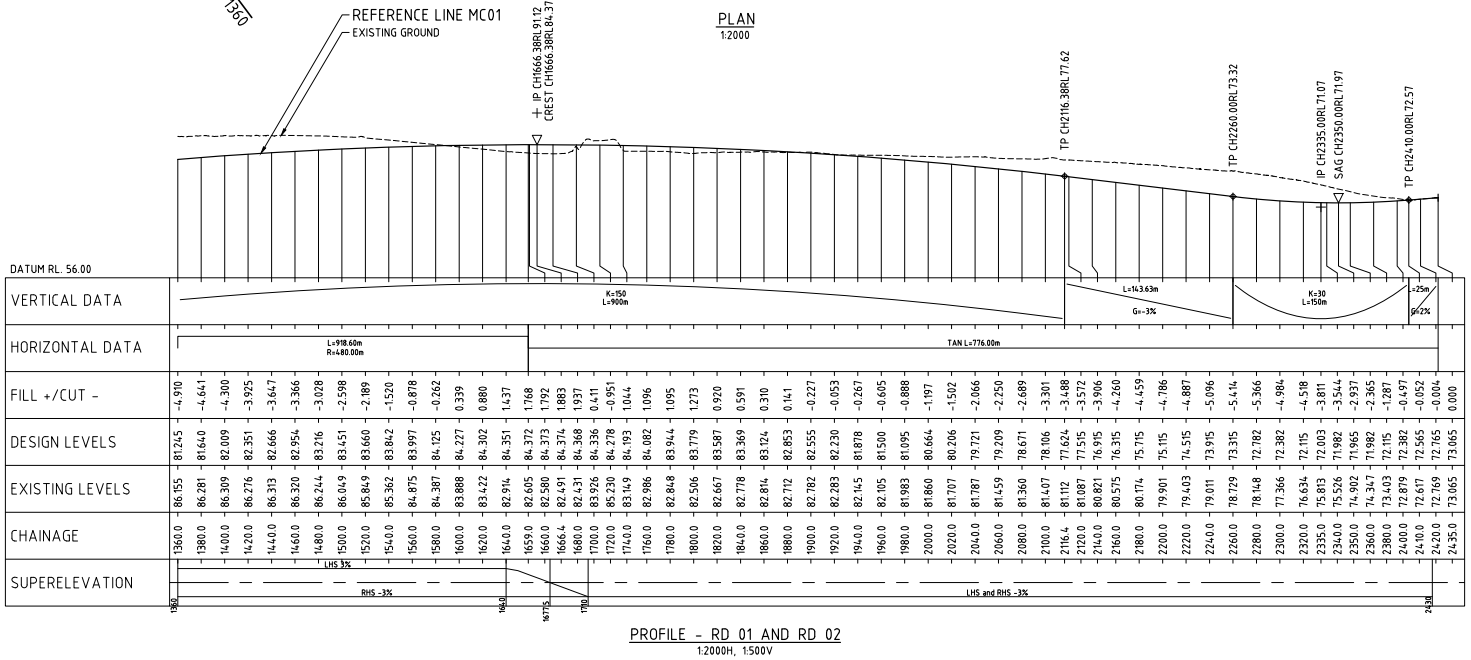
Facsimile +61 8 9489 9777
Email: perth@wsp.com

DATE	30/03/2020
SCALE AT A1	0 20 40 60m SCALE 1:2000
GRID	PCG94
PREPARED	D.MARKOV
SHEET	
PROJECT	MUCHEA INDUSTRIAL PARK 5% CONCEPT DESIGN
TITLE	PLAN AND PROFILE MC01 - CHA 0 TO CHA 1360
PROJECT No.	PS116975
SKETCH No.	SK-0021
REV	C





PROFILE - RD 01 AND RD 02
1:2000H, 1:500V

1. The access to WAMIA off Loop Rd should be Left In/ Left Out only. Right turn movements particularly heavy vehicles will block traffic lanes for significant periods.
2. Location of WAMIA access off Muchea East Rd will need detailed assessment of suitability given geometry of this location, design vehicle and speed limit.
3. Further work needs to be undertaken to ensure grades for RAV10 access.
4. Timing and funding for construction of WAMIA access is to be resolved.

Note:- Concept drawings for purpose of obtaining indicative order of magnitude costs and to provide general guidance on road design. Ultimate road layout subject to detailed planning.

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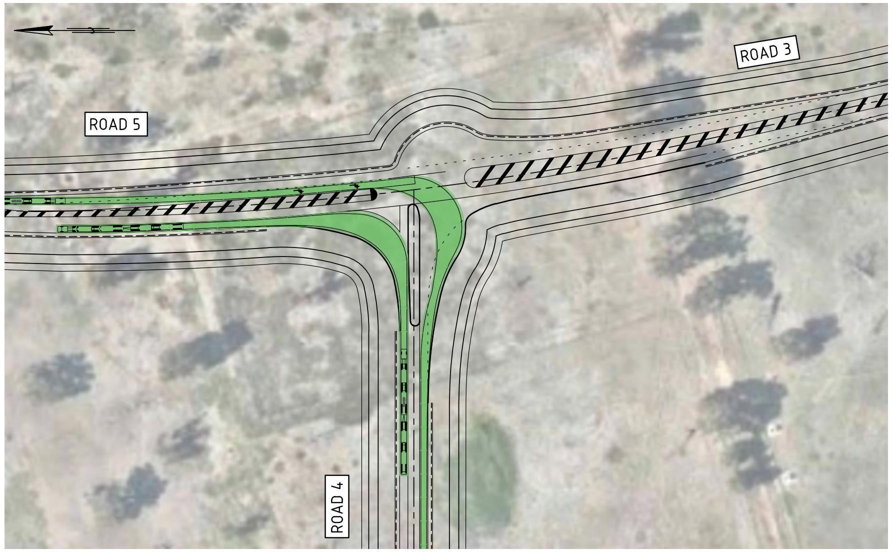
DATE	30/03/2020
SCALE AT A1	0 20 40 60m SCALE 1:2000
GRID	PCG94
PREPARED	D.MARKOV
SHEET	

PROJECT	MUCHEA INDUSTRIAL PARK 5% CONCEPT DESIGN
TITLE	PLAN AND PROFILE MC01 - CHA 1360 TO CHA 2435
PROJECT No.	PS116975
SKETCH No.	SK-0022
REV	C



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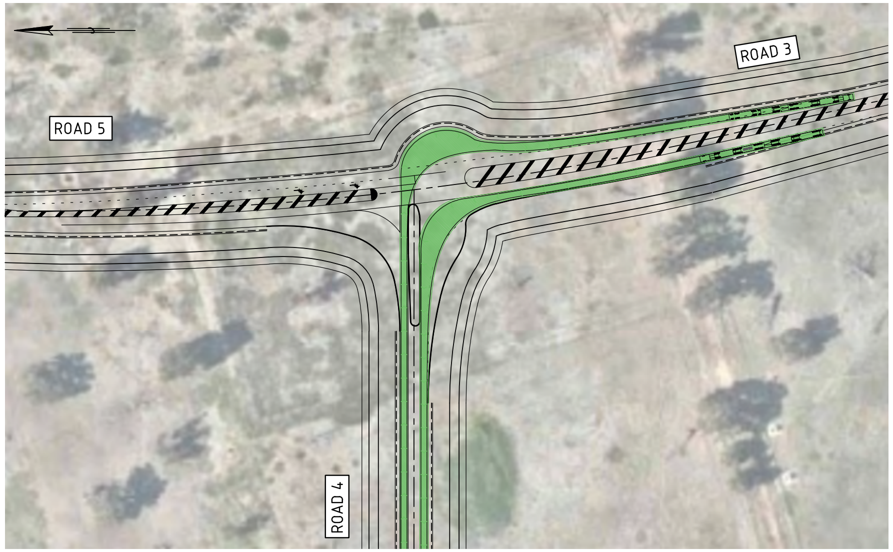

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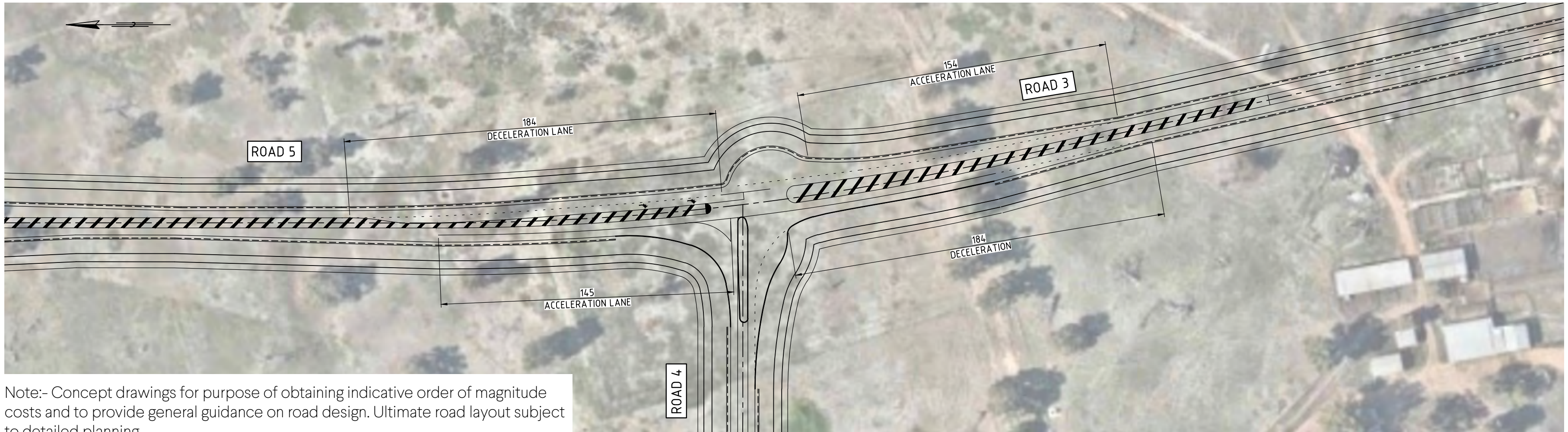

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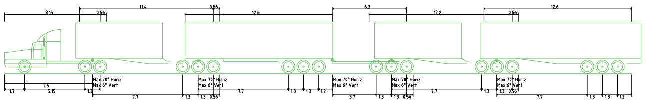

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Overall Width	2.500m
Overall Body Height	4.300m
Min Body Ground Clearance	0.540m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	15.000m

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SCALE AT A1	SCALE 1:1000
GRID	PCG94
PREPARED	D.MARKOV
SHEET	
PROJECT	MUCHEA INDUSTRIAL PARK 5% CONCEPT DESIGN
TITLE	INTERSECTION PLAN AUXILIARY LANE TYPE VEHICLE SWEPT PATH
PROJECT No.	PS116975
SKETCH No.	SK-0031
REV	A

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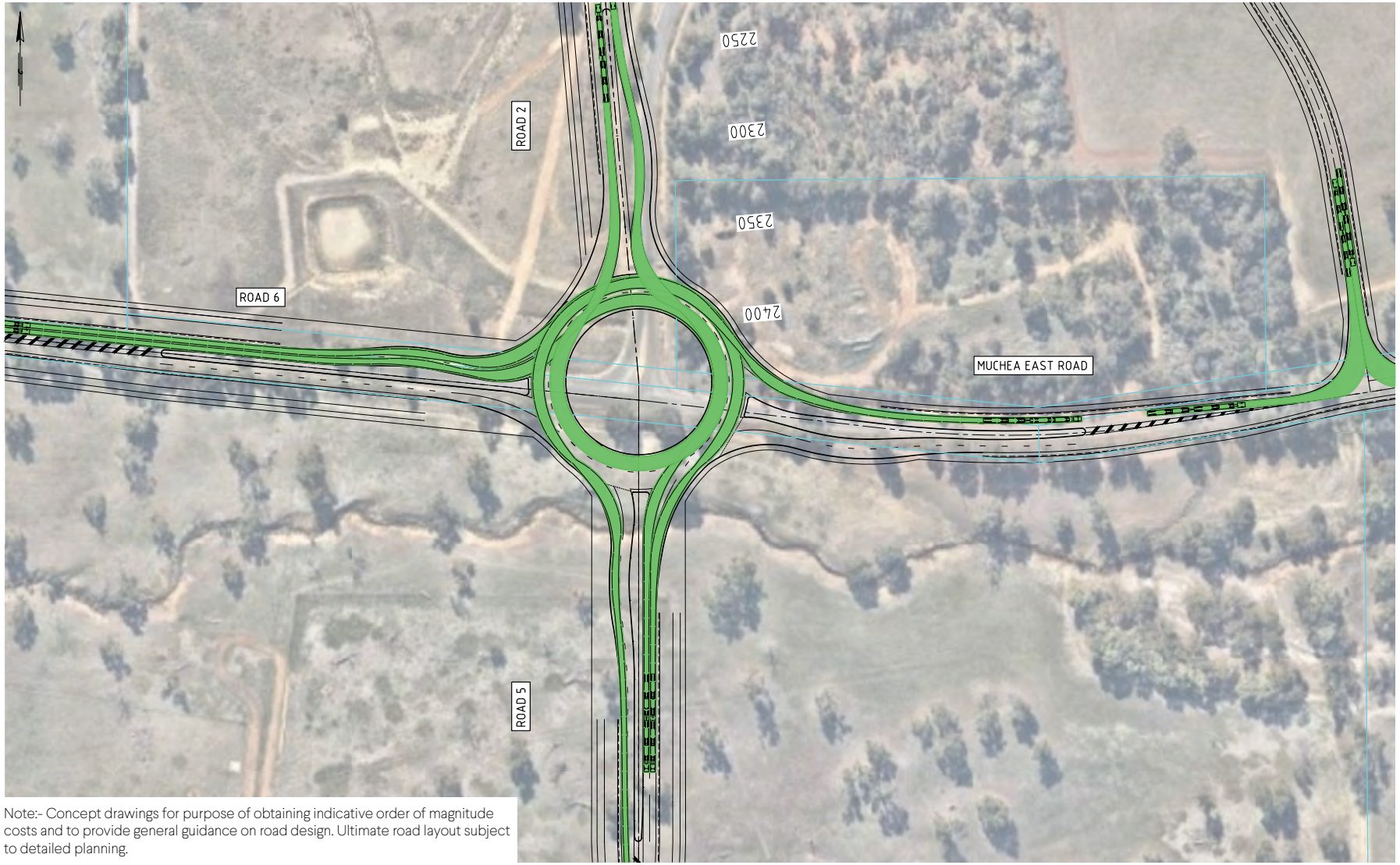

Note:- Concept drawings for purpose of obtaining indicative order of magnitude costs and to provide general guidance on road design. Ultimate road layout subject to detailed planning.

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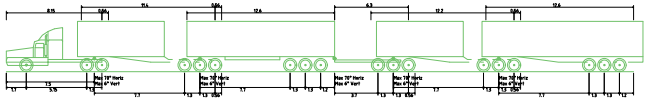

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Overall Length	53.500m
Overall Width	2.500m
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Min Body Ground Clearance	0.540m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	15.000m

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DATE	26/03/2020
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GRID	PCG94
PREPARED	D.MARKOV
SHEET	
PROJECT	MUCHEA INDUSTRIAL PARK 5% CONCEPT DESIGN
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PROJECT No.	PS116975
SKETCH No.	SK-0032
REV	B

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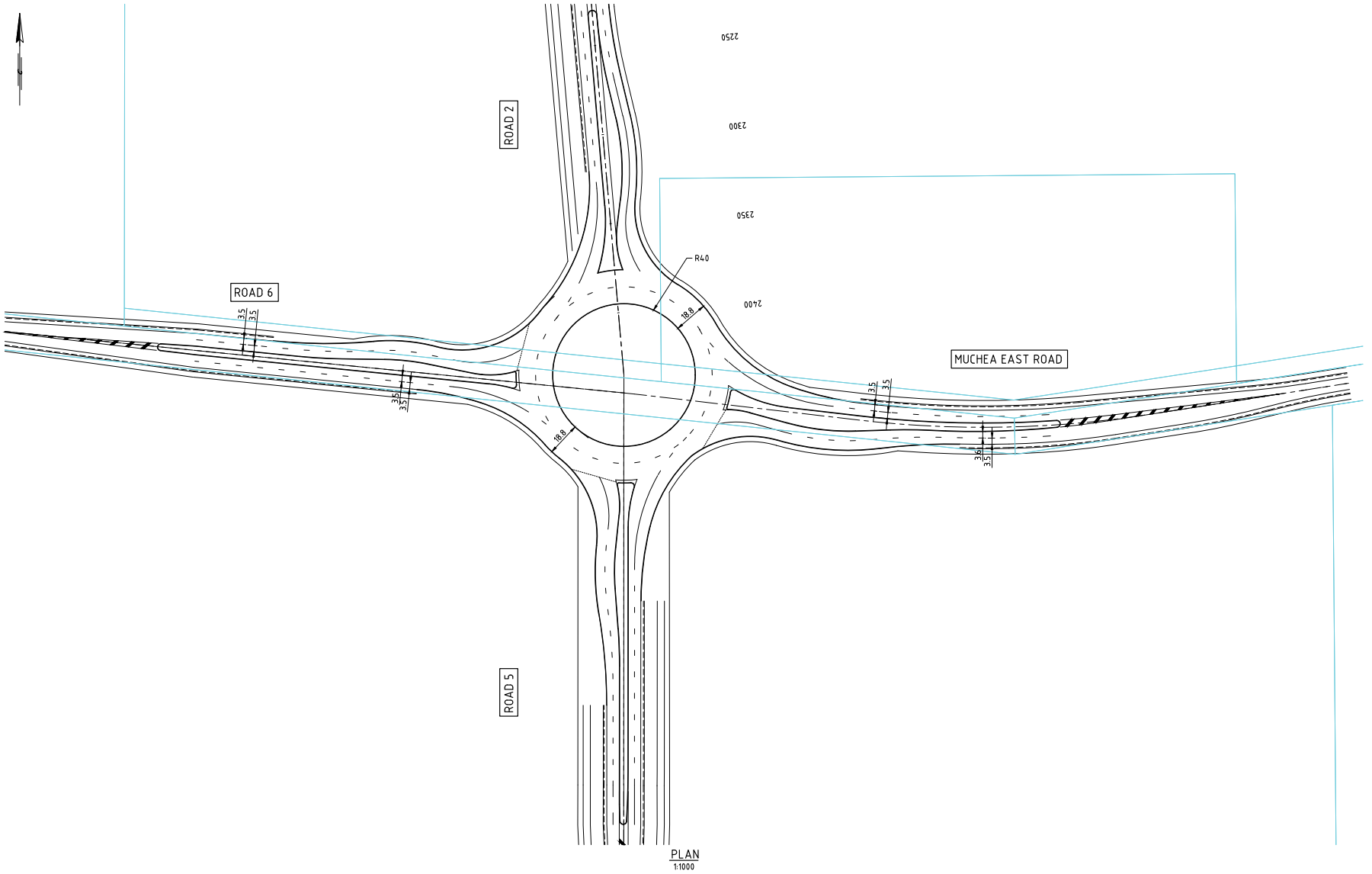

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DATE	28-10-19
SCALE AT A1	0 10 20 30m SCALE 1:1000
GRID	PCG94
PREPARED	D.MARKOV
SHEET	
PROJECT	MUCHEA INDUSTRIAL PARK 5% CONCEPT DESIGN
TITLE	INTERSECTION PLAN ROUNDABOUT
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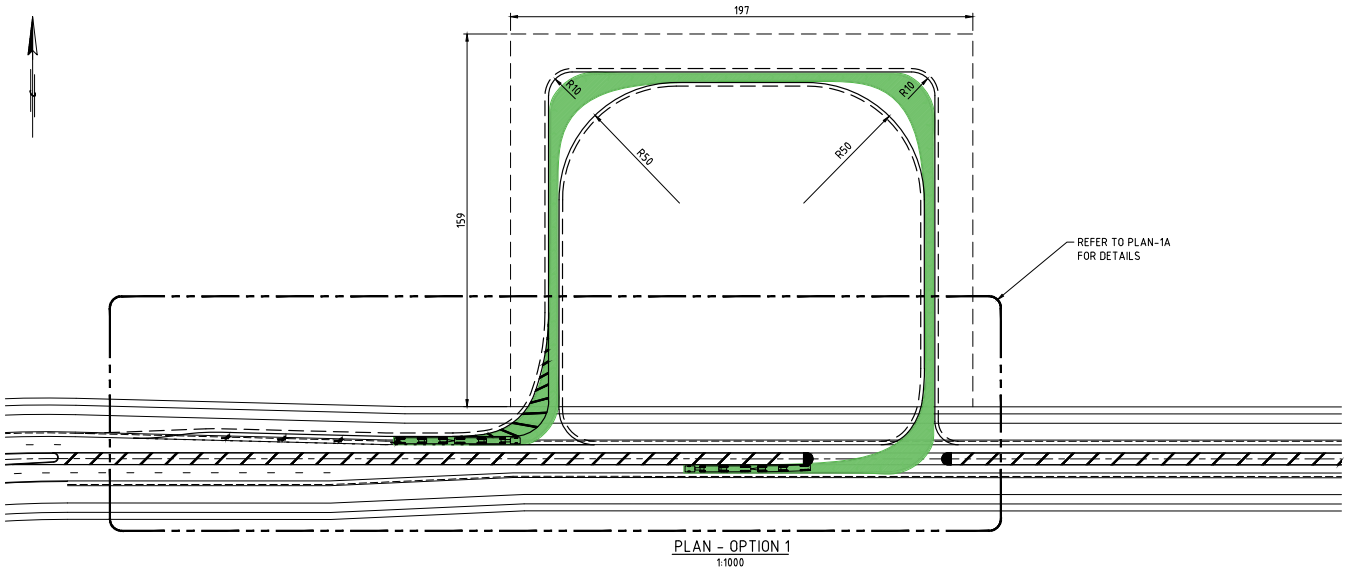

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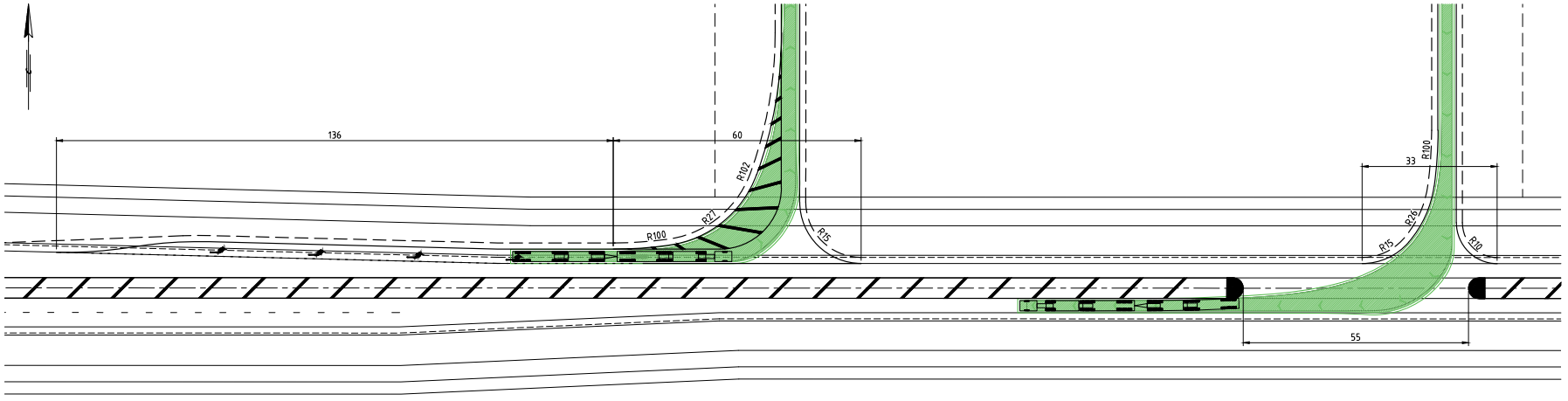

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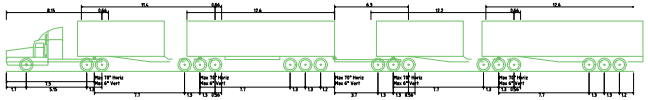

MRWA RAV 10(B) REV1

Overall Length	53.500m
Overall Width	2.500m
Overall Body Height	4.300m
Min Body Ground Clearance	0.540m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	15.000m

SKETCH ONLY

Note:- Concept drawings for purpose of obtaining indicative order of magnitude costs and to provide general guidance on road design. Ultimate road layout subject to detailed planning.

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GRID	PCG94
PREPARED	D.BEGOS
SHEET	
PROJECT	MUCHEA INDUSTRIAL PARK 5% CONCEPT DESIGN
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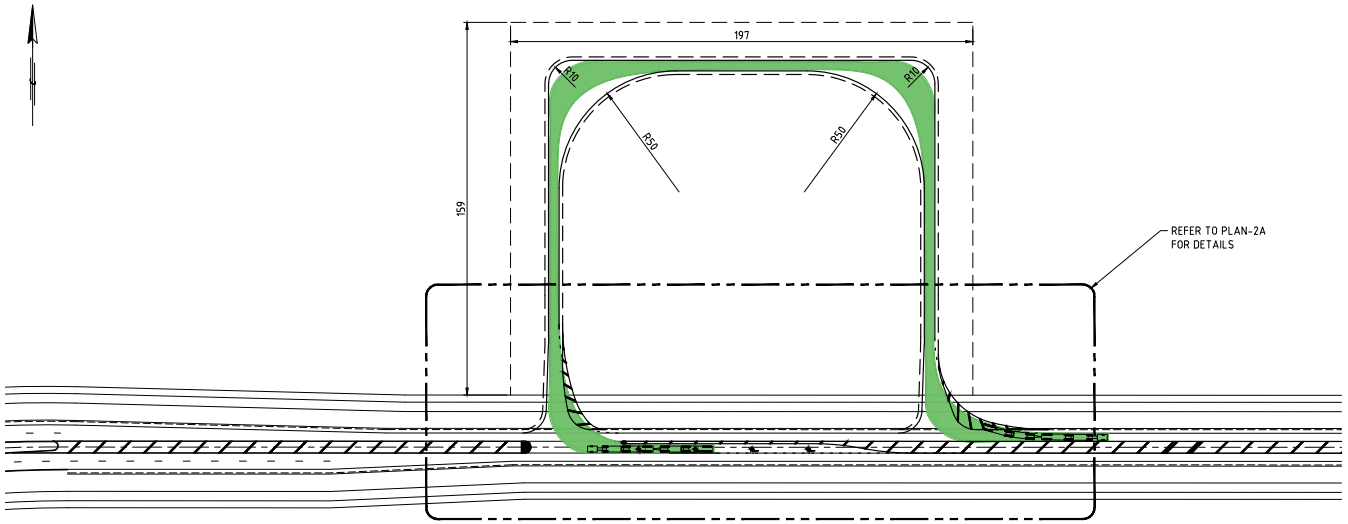
PROJECT No.	PS116975
SKETCH No.	SK-0041
REV	A



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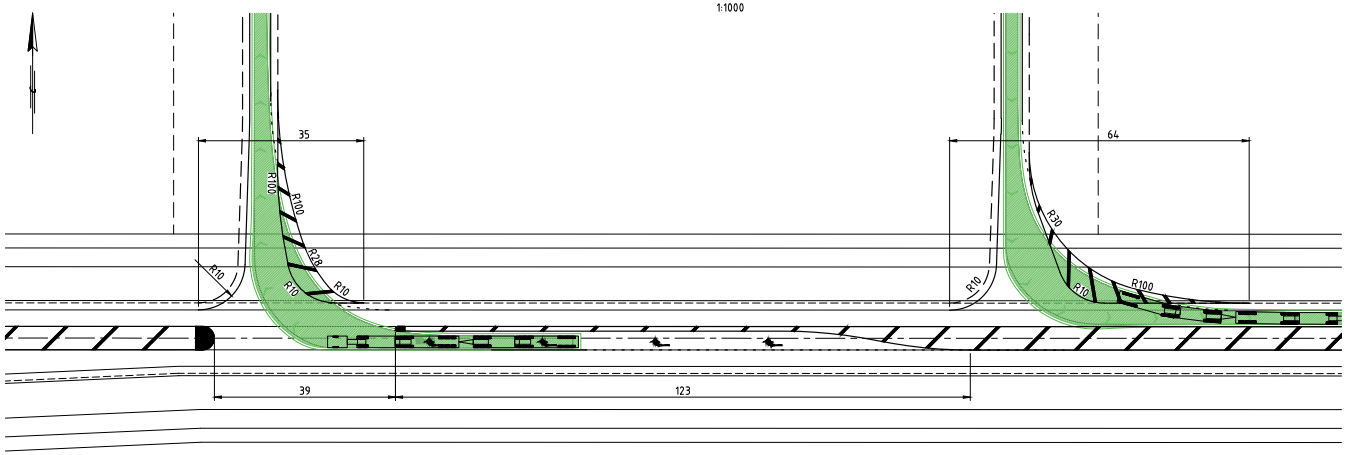

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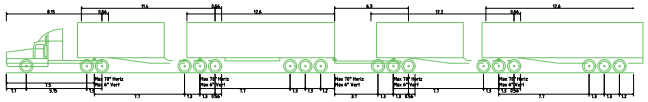

MRWA RAV 10(B) REV1

Overall Length	53.500m
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Overall Body Height	4.300m
Min Body Ground Clearance	0.540m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	15.000m

SKETCH ONLY

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DATE	5/12/2019
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GRID	PCG94
PREPARED	D.BEGOS
SHEET	
PROJECT	MUCHEA INDUSTRIAL PARK 5% CONCEPT DESIGN
TITLE	DRIVEWAY CROSSOVER VEHICLE SWEPT PATH OPTION 2
PROJECT No.	PS116975
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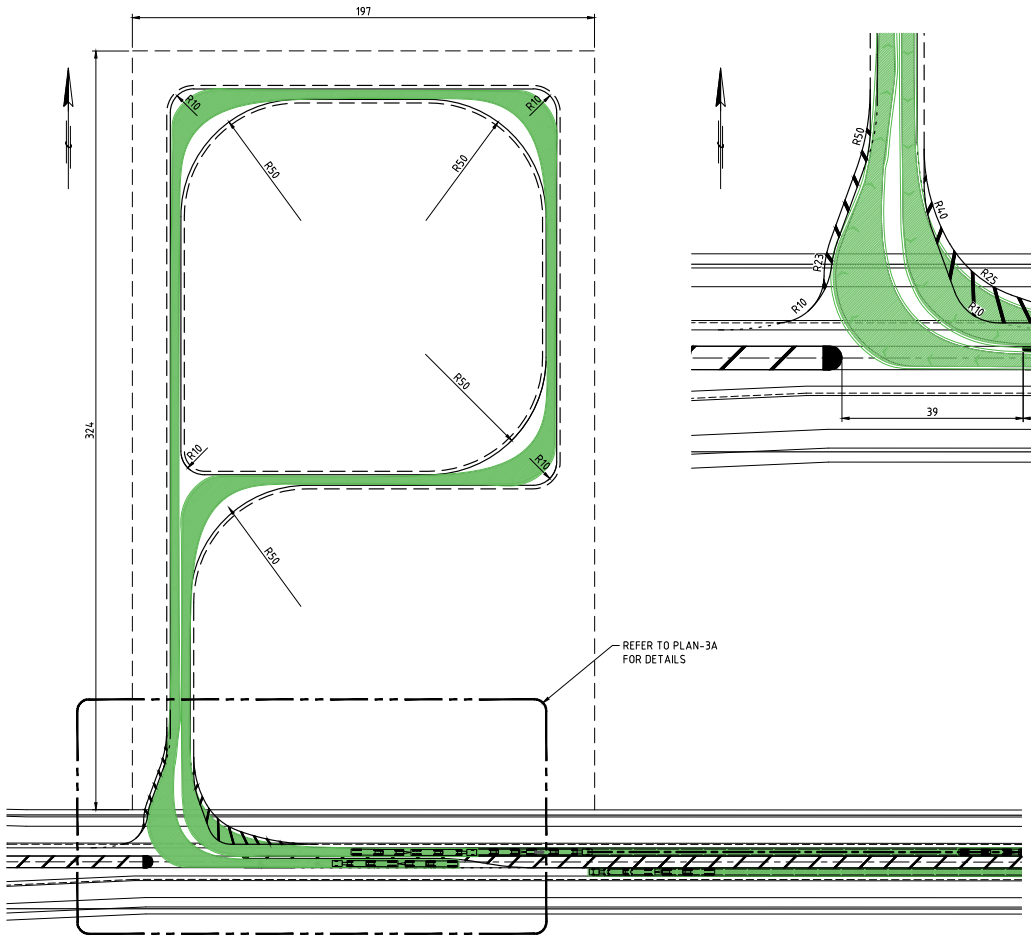

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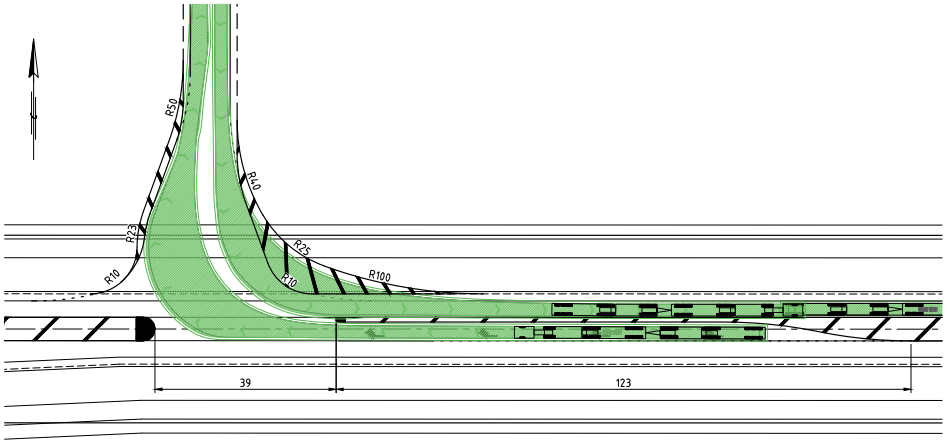

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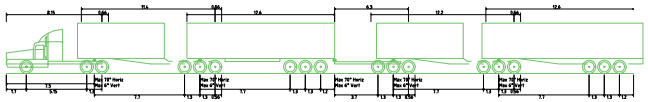

MRWA RAV 10(B) REV1

Overall Length	53.500m
Overall Width	2.500m
Overall Body Height	4.300m
Min Body Ground Clearance	0.540m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	15.000m

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GRID	PCG94
PREPARED	D.BEGOS
SHEET	
PROJECT	MUCHEA INDUSTRIAL PARK 5% CONCEPT DESIGN
TITLE	DRIVEWAY CROSSOVER VEHICLE SWEPT PATH OPTION 3
PROJECT No.	PS116975
SKETCH No.	SK-0043
REV	A

Appendix 3 – Wastewater servicing options

TREATMENT OPTIONS	INCOMPATIBLE		RESTRICTED		UNCONSTRAINED	
	INDUSTRIAL WASTEWATER	TRADE WASTE	INDUSTRIAL WASTEWATER	TRADE WASTE	INDUSTRIAL WASTEWATER	TRADE WASTE
Reticulated sewer (centralised or decentralised)	Yes, subject to WWTP facilities		Yes	Yes, subject to WWTP facilities	Yes	Yes, subject to WWTP facilities
Primary treatment - septic tanks/leach drains	No	No	No	No	Yes, subject to demonstration of suitable site conditions and compliance to guidelines and policies	No
Secondary treatment - pre-approved ATUs	No	No	Yes, subject to demonstration of suitable site conditions and compliance to guidelines and policies	No	Yes, subject to demonstration of suitable site conditions and compliance to guidelines and policies	No
Secondary treatment - site specific ATUs/treatment plants	No	No	Yes, subject to demonstration of suitable site conditions and compliance to guidelines and policies			
Containment devices and practices	No	Yes	No	Yes	No	Yes
Treatment WSUD measures						
Off-site treatment storage						

Source - Muchea Regional Water Management Strategy

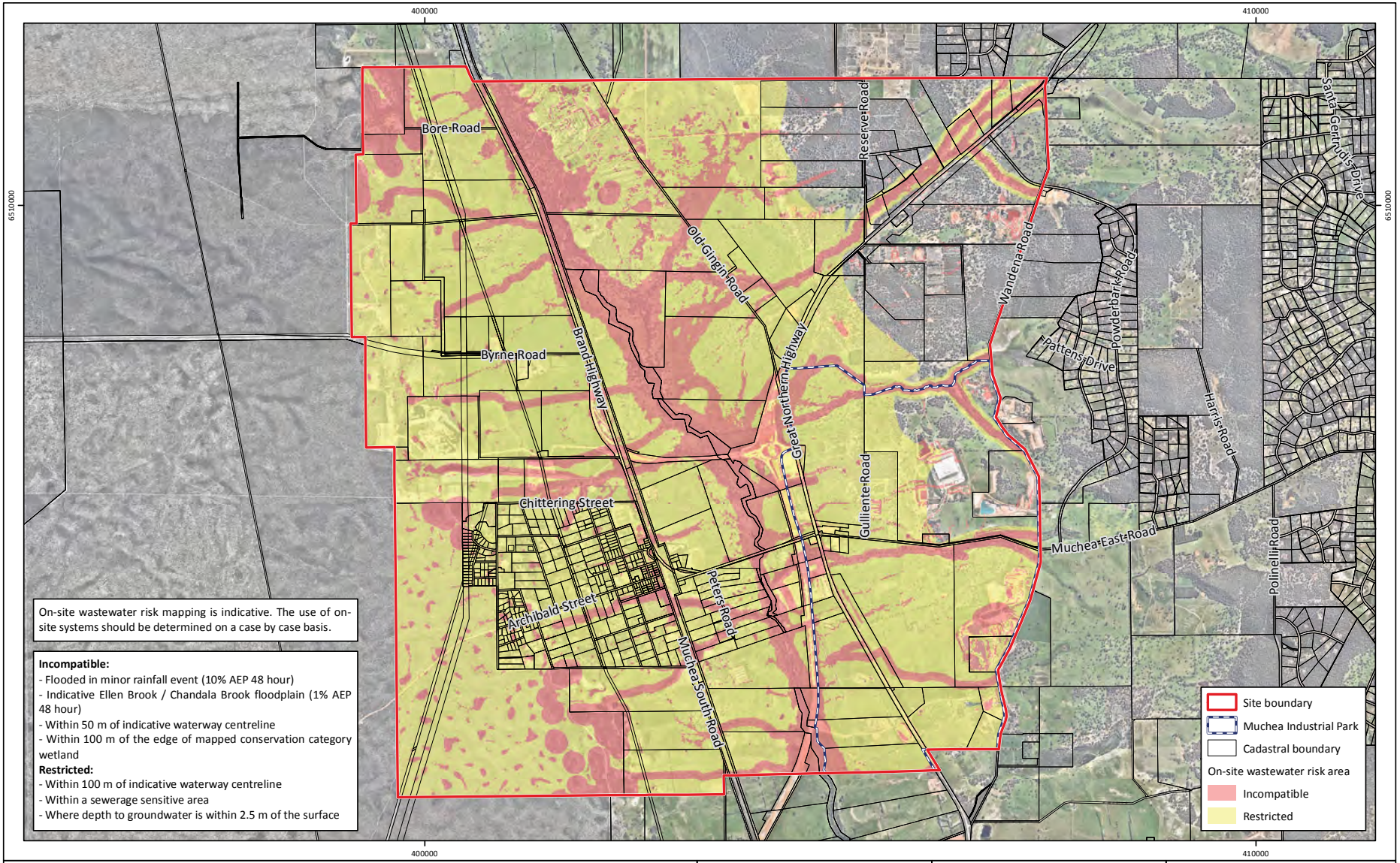

Figure 16: On-Site Wastewater Risk Mapping

Project:	Regional Water Management Strategy Muchea
Client:	Department of Planning, Lands and Heritage

Plan Number:	**EP18-104(02)--F15c**
Drawn:	KNM
Date:	22/08/2019
Checked:	ASC
Approved:	RLE
Date:	22/08/2019

N

0 0.5 1 1.5 2
Kilometres
Scale: 1:60,000@A4
GDA 1994 MGA Zone 50

emerge ASSOCIATES

Abbreviations

AHA	Aboriginal Heritage Act
AHD	Australian Height Datum
AEP	Annual Exceedance Probability
ATU	Aerobic Treatment Unit
BAL	Bushfire Attack Level
BUWM	Better Urban Water Management
DBCA	Department of Biodiversity, Conservation and Attractions
DOT	Department of Transport
DMIRS	Department of Mines, Industry Regulation and Safety
DPLH	Department of Planning, Lands and Heritage
DWER	Department of Water and Environmental Regulation
EBICG	Ellen Brook Integrated Catchment Group
EELS	Economic and Employment Lands Strategy
EPA	Environmental Protection Authority
EY	Number of exceedances per year
IHCA	Indicative High Conservation Area
kV	Kilovolt
LPP	Local Planning Policy
LSP	Local Structure Plan
MGL	Maximum Groundwater Level
MRS	Metropolitan Region Scheme
MRWA	Main Roads Western Australia
MVA	Mega Volt Amp
PDWSA	Public Drinking Water Supply Area
RWMS	Regional Water Management Strategy
RAAF	Royal Australian Airforce
RAV	Restricted Access Vehicle
RTAA	Road Train Assembly Area
SCA	Special Control Area
SPP	State Planning Policy
TEC	Threatened Ecological Community
WAMIA	Western Australian Meat Industry Authority
WAPC	Western Australian Planning Commission
WMS	Water Management Strategy
WRPIF	Wheatbelt Regional Planning and Infrastructure Framework

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PART 2
Explanatory report

2.1 Background

Planning for a major industrial estate at Muchea has been driven by a need to provide industrial land in the Shire of Chittering, employment for the developing north-east corridor of Perth, and to leverage employment from the relocation of the Midland Sale Yards to Muchea.

In 1997, the State Planning Strategy identified the need for a strategic industrial site and employment node in the north-east corridor. An area located on the Swan and Chittering local government borders was identified in the WAPC's *North-East Corridor Extension Strategy* (July 2003) comprising approximately 1,172 ha across the both local government areas. The proposed Muchea Employment Node was subsequently shown in the Shire's Local Planning Strategy (2004) as an investigation area. This planning coincided with the WA Meat Industry Authority livestock centre (WAMIA) relocating from Midland to Muchea in 2010.

The WAPC's *Muchea Employment Node Structure Plan* (2011) assessed potential fatal flaws associated with development of the site, and undertook baseline environmental studies and demand analysis. It established that 596ha of industrial land would be required in the area by 2030 in addition to the 302ha WAMIA landholding, of which approximately 13ha comprises the WAMIA sale yards.

Initial modelling indicated that when fully developed Muchea could provide approximately 1,000 jobs, most likely driven by the needs of primary production, freight and logistics and by local demand as there was previously no industrial zoned land in the Shire. The 2011 plan ultimately comprised 1,113ha of land only in the Shire of Chittering.

Since 2011 there been several changes, that have brought forward the implementation of the industrial park and altered demand scenarios. The industrial park is likely to attract freight and logistics operators due to the road train assembly area and upgrades and reclassification of Great Northern Highway (GNH) to carry RAV10 vehicles which will position Muchea as the closest industrial land to Perth with RAV10 access. The Tonkin Highway extension has also increased the exposure of the park from the broader metropolitan region. This has prompted a review of infrastructure and servicing arrangements, particularly the need to accommodate RAV10 vehicles.

Significant proposals and developments between 2015 and 2020 in the industrial park are listed in **Table 7**.

Subdivision and road works in Precinct 1A - North A

TABLE 7 – Significant developments and proposals 2015-2020

YEAR	PROPOSAL/DEVELOPMENT
2015	Rezoning of land in Precinct 1A - North A from 'Agricultural Resource' to 'Industrial Development' and introduction of the Muchea Employment Node Special Control Area into Shire of Chittering Local Planning Scheme No.6.
2017	Local Structure Plan for Precinct 1A – North A approved.
2018	Preliminary subdivision approval for the first 12 industrial lots in Precinct 1A - North A
2018	Estate renamed to Muchea Industrial Park by the Shire of Chittering. Release of a prospectus to facilitate future development
2020	Licensed water service provider established Preliminary subdivision approval for a further 5 industrial lots in Precinct 1A – North A and creation of first lots. Completion of NorthLink/Tonkin Highway Completion of service station and truck stopping facility in Precinct 1A
2021	Planning for Precinct 3 and portions of Precinct 2 progressing Submission of amendment to Precinct 1 Local Structure Plan

Muchea Industrial Park Structure Plan update

The WAPC resolved to update the structure plan in response to the increased level of activity in the estate; the need to update details on servicing; infrastructure and funding; and reflect updated stakeholder and landowner aspirations for the industrial park's future. The update was also required to reflect policy and legislative changes including introduction of the State Government Sewerage Policy and the Commonwealth listing of banksia woodlands as a threatened ecological community.

The Department of Planning, Lands and Heritage, on behalf of the WAPC, has prepared the updated Muchea Industrial Park Structure Plan . This has been overseen and coordinated by a working group, with representatives from the Shire, other key stakeholders, including DWER, Development WA, MRWA, WAMIA and the Chittering Landcare Centre. The Freight and Logistics Council, Westport, DOT and DBCA have also been represented at meetings.

The draft plan was advertised for three months at the end of 2020. A total of 23 submissions were received which were mostly from developers and agencies with comments on the draft plan. In response, modifications have been made to address matters including the relationship of the park to the rural land to the east and clarification of requirements for water management and protection of Ellen Brook.

Technical studies

In 2018, the WAPC allocated $200,000 for technical studies to inform this structure plan update including a Regional Water Management Strategy (RWMS), land demand assessment and assessment of options for the RAV10 network in the industrial park.

These documents have informed preparation of the structure plan, and are referenced in the structure plan and available on the Department's webpage.

Muchea Regional Water Management Strategy

The structure plan update called for a customised RWMS to model the broader Muchea catchment while providing detailed recommendations for water management to guide coordinated land use planning in the industrial park. Project funds were also allocated to commission a surveyor to obtain original data sets where spatial data was unavailable to inform modelling. The RWMS was endorsed by DWER in December 2019.

Muchea Industrial Park Land Demand and Economic Assessment

This study was commissioned by the WAPC to review the assumptions and findings of the 2008 industrial land assessment following the revised focus of Muchea for freight and logistics and to determine the impacts arising from the industrial land designations in the Perth and Peel @3.5million frameworks including additional industrial investigation land at Bullsbrook.

Muchea Industrial Park Road Network/RAV10 Assessment

This study involved the preparation of a series of concept road designs for road alignments throughout the park to establish order of magnitude costs and to determine requirements for road and intersection design and construction for RAV10 access throughout the park.

Shire of Chittering projects and Muchea Industrial Park prospectus

The preparation of the structure plan update coincided with the Shire undertaking a series of projects to promote and co-ordinate development in the industrial park. The Shire committed approximately $50,000 and obtained $120,263 in Australian Government funding through the Building Better Regions Fund to appoint a Strategic Projects Manager, develop a prospectus and prepare road network and drainage guidelines and landscaping plans.

2.2 Strategic and statutory context

The Western Australian State planning framework provides the context for the structure plan.

2.2.1 State and regional strategic planning context

State Planning Strategy 2050

State Planning Strategy 2050 is an overarching strategic document that seeks to facilitate co-ordinated and sustainable economic development based on a projected doubling of the State's population by 2056. The Strategy recognises the need to plan for the State's economic development by ensuring that land is released for infrastructure and industry to meet the needs of enterprise and reflects the need to support the creation of strong and resilient regions.

State Planning Strategy 2050 promotes structure planning for industrial areas. Planning for the Muchea Industrial Park was first envisaged under the previous State Planning Strategy which identified an extension to the north-east corridor as a core area for future structure planning.

Wheatbelt Regional Planning and Infrastructure Framework 2015

The *Wheatbelt Regional Planning and Infrastructure Framework* is a regional strategic planning document that provides an overview of planning issues and priorities for the Wheatbelt region. The key objectives established in the framework for industry are effective infrastructure and service delivery; a diversified and adaptive economy; and management of natural amenity to support social, cultural and economic development.

The framework recognises Muchea as a strategic industrial estate in the context of the Wheatbelt. Development at Muchea is also aligned to actions that seek to ensure a ready supply of land for industrial and economic purposes.

2.2.2 State Planning Policies, Development Control Policies and other WAPC guidance

A number of state planning policies and development control policies have particular relevance to the industrial park:

- *State Planning Policy 2: Environment and Natural Resources Policy*
- *State Planning Policy 2.5: Rural Planning*
- *State Planning Policy 2.9: Water Resources*
- *State Planning Policy 2.10 Swan Canning River System*
- *State Planning Policy 3.6: Infrastructure Contributions*
- *State Planning Policy 3.7: Planning in Bushfire Prone Areas*
- *Draft State Planning Policy 4.1: Industrial Interface* (November 2017)
- *State Planning Policy 5.4 Road and Rail Noise*
- *Government Sewerage Policy* (2019)
- *Operational Policy 1.1 – Subdivision of Land, general principles*
- *Development Control Policy 1.7: General Road Planning*
- *Development Control Policy 1.10: Freeway Service Centres and Roadhouses, Including Signage*
- *Development Control Policy 4.1: Industrial Subdivision*
- *Development Control Policy 5.1 – Regional Roads (Vehicle Access)*
- *Visual Landscape Planning in Western Australia: A Manual for Evaluation, Siting and Design*

2.2.3 Environmental legislation and guidelines

Environmental Protection Act 1986

The EPA has statutory obligations under the *Environmental Protection Act 1986* (EP Act) to conduct environmental impact assessments for schemes, scheme amendments and development proposals with potential environmental impacts.

Proposals that would result in the clearing of native vegetation may be assessed by the EPA under part V division 2 (clearing of native vegetation) of the *Environmental Protection Act 1986*. If other significant impacts in addition to clearing may occur, proposals and schemes should be referred to the EPA.

Regulation of prescribed premises Part V Division 3 of the *Environmental Protection Act 1986* makes it an offence to cause an emission or discharge from activities carried out on prescribed premises unless a works approval or licence is held for the premises. Prescribed premises are listed in Schedule 1 of the *Environmental Protection Regulations 1987*. It is anticipated the industrial park will have a limited number of prescribed premises, primarily concrete batching plants.

Industrial land uses that are not prescribed premises as they are below specified production thresholds may still generate emissions and require special consideration by planning decision-makers. Examples of such land uses include automotive spray painting, metal fabrication, service stations, transport depots, panel beating, abrasive blasting, and joinery and wood working premises.

Environmental Protection Guidance Statement No.3 - Separation Distances between Industrial and Sensitive Land Uses (2005)

This guidance statement supports strategic and statutory land use planning and development decisions by relevant planning authorities where proposed land uses have the potential to adversely impact on human amenity and health. It provides advice on which land uses require separation and recommendations for separation distances.

Separation distances for existing uses in the industrial park are outlined in **Table 8**.

TABLE 8 – Indicative separation distances * – Environmental Protection Authority Guidance Statement No.3

ACTIVITY/LAND USE	INDICATIVE SEPARATION DISTANCE FROM SENSITIVE LAND USES
Animal feedlot	1-2km depending on size
Concrete batching plant	300-500m depending on size
Livestock saleyard	Minimum of 1km
Poultry farm	300-1000m depending on size
Service stations	50m
Waste disposal or resource recovery plant	Case by case
* There are many other factors that can affect a separation distance, including mitigation and treatment of impacts, topography, prevailing winds etc.	

Swan and Canning Rivers Management Act 2006 (SCRM Act)

The SCRM Act seeks to ensure the protection of the Swan and Canning rivers and associated land to ensure maintenance of ecological and community benefits and amenity. The objectives of the SCRM Act include the management of activities that affect the ecological and community benefits and amenity of the Swan and Canning rivers, and the promotion and facilitation of the good management of the catchment area. The catchment area includes the land and waters contained within the industrial park and appropriate development within this locality is therefore relevant to application to the SCRM Act .

Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act)

At the Federal level, referral guidelines under the EPBC Act require referral of proposals where a threatened ecological community is likely to occur and where vegetation is within 12 km of a confirmed breeding site for Carnaby's Black Cockatoo which is applicable to the whole park.

2.2.4 Local planning framework

Shire of Chittering Local Planning Strategy 2019

The Strategy, sets out the Shire's long-term planning direction. It seeks to consolidate residential development in existing settlement areas with infrastructure and services and protect natural areas and rural character.

The Strategy recognises the industrial park as the principal location for industrial development and will be the Shire's major economic and employment driver. It promotes the park's development while respecting the environmental values and ensuring appropriate design and protection measures.

The Strategy denotes a nominal 1km buffer around the industrial park and seeks to limit the introduction of sensitive land uses within this buffer which could be affected by industrial development in the industrial park as shown on Map 3 – Land use context.

Shire of Chittering Local Planning Scheme No.6

Zoning and reserves

Most land in the industrial park is zoned Agricultural Resource which generally allows for rural uses. There is also a 3.7ha lot reserved for Parks and Recreation, managed by the Shire, on Muchea East Road.

As of 2022 approximately 150ha of the 1,167ha park has been rezoned for industrial use. This mostly comprises land zoned Industrial Development in Precinct 1A - North A (146ha). Land zoned Industrial Development is to have a local structure plan prepared before rezoning to either light or general industry. A further 2ha has been rezoned general industry and 7,000m^2 has been rezoned light industry on two sites near the GNH and Granary Drive (former Brand Highway) intersection.

Most land surrounding the industrial park is also zoned Agricultural Resource. The Muchea townsite, to the west of the industrial park, is zoned Townsite and land located east of the park at Powderbark Road and to the west of the park on Peters Road is zoned Rural Residential.

As there has previously been no industrial land zoned in the Shire, some industrial uses such as transport depots have located in the Agricultural Resource zone. The Scheme was amended in 2019 to limit new industrial activities this zone and direct further industry to the industrial park. Existing transport depots and warehouse/storage uses in the Agricultural Resource Zone were designated as additional uses to allow their continued operation.

Muchea Employment Node Special Control Area

The Muchea Employment Node SCA applies to the whole industrial park. It: -

- sets out requirements for structure planning for coordinated provision of services and infrastructure before rezoning
- identifies matters to be addressed prior to rezoning including wastewater/storm water management, environmental impacts, impacts on waterways and wetlands, land capability and impact on sensitive land uses
- seeks to contain industrial impacts within the park and limit development that may compromise industrial activity including prohibiting development of residential uses including caretaker's dwellings.

Local Planning Policies

Local planning policies (LPPs) relevant to planning in and around the industrial park include:-

- LPP No 6: Water Supply and Drainage
- LPP No 18: Setbacks
- LPP No. 33: Muchea Industrial Park Design Guidelines and Drainage Guidance Note.

2.3 Land use, heritage and landscape

2.3.1 Local context

Significant landmarks and uses in the area are shown on Map 3 – Land use context and include:-

- the Muchea townsite, 2km to the west and its agricultural surrounds
- The Tonkin/Brand Highway interchange which provides direct access to the industrial park
- Midland-Geraldton railway line approximately 2km to the west
- Midland Brick quarry operations west of Wandena Road South
- WAMIA's Muchea livestock centre in the northeast of the industrial park
- Pearce air weapons range approximately 4km to the west
- Ellen Brook with its environmental and heritage values directly to the west
- heritage features comprising the airstrip on GNH and Wandena Quarries
- poultry farms, feedlots and similar agricultural industries.

2.3.2 Existing development and land use

Most of the structure plan area is cleared and used for rural land uses.

Precinct 1A (North A)

Precinct 1A is adjacent to the GNH and the Tonkin Highway and Brand Highway Interchange, is privately owned land zoned Industrial Development. It is the first stage of development and subdivision in the park and is expected to accommodate the initial demand for large scale industrial land in the industrial park and support freight/logistics operations and agri-business.

The precinct contains most of the environmental assets in the industrial park, including resource enhancement wetlands, several waterways and flow paths which enter Ellen Brook, and two matters of National Environmental Significance under the *Environment Protection and Biodiversity Conservation Act 1999*, comprising banksia woodlands, which is a threatened ecological community, and habitat for the endangered Carnaby's Black Cockatoo.

Muchea Local Structure Plan Stage 1 (LSP), which covers 147ha, was approved by the WAPC in 2017. The LSP identifies 104.5ha for General Industry, 30ha for conservation and 8ha for drainage. It provides for the coordination of subdivision of approximately 30 industrial lots and includes the first section of a loop road connecting to Tonkin Highway.

The first stage of industrial subdivision in the park was approved in May 2018 directly adjacent to Tonkin Highway and the RTAA comprising 12 freehold industrial lots and development has commenced. In February 2020, an application a further eight industrial lots to the east of the existing subdivision was approved.

In June 2019, the development of a BP service station/ truck refueling facility was approved on one of the lots by the Mid-West Wheatbelt Joint Development Assessment Panel which opened mid-2020. A concrete batching plant has also been constructed on Lot 22 GNH. Lot M1453, at the corner of Muchea East Road. A poultry farm is located on Gulliente Road.

Elders development in Precinct 1

BP Service Station and Truck stop in Precinct 1A (north A)

Precinct 1B (North B)

Precinct 1B is largely owned by WAMIA and accommodates the Muchea Livestock Centre. The northwest portion of this lot has been excluded from the industrial park due to its environmental significance with banksia woodland.

Muchea Livestock Centre is the largest dual species undercover livestock selling facility in Australia. Annually, it handles around 100,000 head of cattle (mainly from the north) and 600,000 sheep. There is likely to be little change to WAMIA operations in the short to medium term.

WAMIA is considering the possibility of excavating and selling sand from a hill at the northern end of the property which could address requirements for fill elsewhere in the industrial park. The resulting level area could be a site for a feedlot to allow for resting of cattle prior to sale. There may be other opportunities for small scale developments on the property.

Operations that can be undertaken on the WAMIA site are governed by the *Western Australian Meat Industry Authority Act 1976* (WAMIA Act) which sets out the powers and functions of WAMIA. Under this Act, WAMIA may use account funds on expenses directly connected to the control or management of WAMIA assets and activities. WAMIA also has the power, with approval from the Minister for Agriculture and Food, to acquire, hold, manage, improve, develop and dispose of property in relation to the sale yard. This allows WAMIA to undertake business arrangements such as leasing land that is directly related to the sale yard operations.

WAMIA facility in Precinct 1B (north B)

WAMIA could enter into a ground lease; for example, for a business that has synergies with the operation of the Muchea Livestock Centre such as cattle holding yards or transport depots. Alternatively, Ministerial approval could be sought to allow for other activities.

Precinct 1B is adjacent to the Muchea landfill and recycling centre on Wandena Road (north). The special control area buffers for the landfill and recycling centre, WAMIA livestock centre, poultry farms and other uses that exist in or around the precinct do not restrict the future development of the land for industry.

Loop road east is proposed to provide access for RAV10 vehicles between WAMIA and the triple road train assembly area. A RAV 10 connection between WAMIA and assembly area is needed so that livestock are not held at the assembly area which would cause animal welfare issues. The road design, alignment and access point will need to address WAMIA operations and seek to limit loss of remnant bushland and may require interim arrangements such as a private driveway in the absence of the loop road.

Precinct 2 (South)

Precinct 2 comprises a small number of primarily large private landholdings bounded by GNH to the west and Muchea East Road to the north. The more significant land uses have been feedlots and grazing and a thoroughbred horse stud. Lot 50 on GNH contains a heritage listed wartime airstrip. The precinct is relatively flat and presents relatively few development constraints compared to the other precincts, although, there are numerous trees of potential habitat value for endangered Carnaby's Black Cockatoo and large trees worthy of protection along GNH and Muchea East Road to maintain rural character.

Precinct 3 (West)

Precinct 3 comprises privately-owned lots fronting GNH and is adjoined by NorthLink and Ellen Brook to the west. Land is held by several different owners and accommodates semi-industrial land uses such as a shed fabricator, transport depot and poultry farms. Landowners in Precinct 3 have engaged planning consultants to work towards zoning the precinct for light industrial use.

The precinct is adjacent to Ellen Brook and prone to inundation and comprises several water features including several drainage lines which will influence development of the site.

Shed fabrication in Precinct 3 along GNH

Precinct 4 (East)

Precinct 4 features an elevated ridge of land running north-south along Wandena Road. Midland Brick owns and leases land to the eastern boundary of the industrial park along Wandena Road. Clay has been excavated from this part of Muchea for many years because of the uniqueness of the resource and proximity to the metropolitan area. Midland Brick is the largest clay brick manufacturer in the Perth metropolitan region and its operations in Muchea are ongoing.

Excavation activities occurring within Lot 1326 have an expected life of more than 15 years, depending on market demands for the product. Midland Brick also owns another 50ha site (Lot 6 Wandena Road), which is adjacent to the WAMIA site. This lot also contains an identified high-quality resource that is yet to be excavated. The future release of Precinct 4 for industrial development is highly dependent on the extraction operations by Midland Brick in this part of the industrial park.

Clay bunds in Precinct 4

2.3.3 Surrounding land uses

The industrial park is mostly surrounded by rural land. There are also rural residential areas near the industrial park. These include the Wandena Estate comprising 111 lots on Powderbark Road to the east of the park and 24 lots properties to the west of park on Peters Road. The Muchea townsite, which has a population of approximately 750 residents, is approximately 2km west of the park (ABS 2016).

The Muchea Employment Node Special Control Area serves to accommodate impacts from industrial uses within the industrial park and restricts sensitive land uses such as caretaker dwellings within the park's boundary.

There are existing dwellings within the industrial park, and the intent of owners will need to be addressed as land is progressively planned and rezoned.

There may be scope, however, for workforce accommodation to provide for workers involved with transport operations. Scheme requirements to control workforce accommodation in industrial zones, to ensure that it is sited and designed to be compatible with surrounding industrial uses, would be required.

The Shire's Local Planning Strategy identifies a nominal 1km buffer around the industrial park to limit the introduction of new sensitive receiver land uses in this area. It is also proposed to focus light industry and service commercial in some locations around the edge of the industrial park to reduce land use conflict with sensitive receivers and retain vegetated areas around the boundary. Under draft SPP 4.1, separation between land uses may be reduced where potential for impacts can be managed.

Certain industrial operations within the park will require separation from residential dwellings which are classed as sensitive receivers due to potential impacts such as noise, dust and odour, in accordance with EPA's *Separation Distances between Industrial and Sensitive Land Uses* (2005).

The RAAF Base Pearce is located 5 kilometres south of the industrial park . The Department of Defence must approve any permanent or temporary structure or object that may cause a hazard to military aviation within an approximately 15km radius of the air base. Future development will also need to consider potential to contribute to bird strike, cause smoke plumes and limit extraneous lighting and glare. The use of non-reflective materials is recommended.

Wandena Estate Rural Residential

2.3.4 Lot size and ownership

Lot sizes across the industrial park vary from less than 1ha to properties of more than 100ha. The availability of large industrial lots is a main competitive advantage for Muchea. The largest lot, which is over 300ha, belongs to WAMIA containing the livestock centre. Industrial lots within the first subdivision stages in Precinct 1 (North A) range from approximately 1ha to 4ha.

The land is primarily held in private freehold ownership, however, there is one Crown Reserve for gravel (Reserve 24776, Lot 6269). Map 10 – Land ownership shows land ownership throughout park.

Precincts 1(North A), 1(North B) and 2 (South) are predominantly large single landholdings, owned respectively by Harvis Capital, WAMIA and Northwest Pty Ltd. Precinct 3 (West) is, however, owned by several different landowners and a clear framework needs to be established among landowners to coordinate the delivery of services and roads within this precinct. The range of landownership across the industrial park will also need to be factored into the staging and delivery of major roads and drainage networks.

2.3.5 Aboriginal and historic heritage

Aboriginal heritage

The Aboriginal heritage database lists two Aboriginal heritage places in the structure plan area:

- Registered Aboriginal Site 3525 – Ellen Brook: Upper Swan – a large-scale mythological site covering the majority of the Park
- Registered Site 20008 – Gingin Brook Waggyl Site –a large-scale mythological site that covers the north-western portion of the site

The *Aboriginal Heritage Act 1972* (AHA) protects all Aboriginal sites in Western Australia, whether they are registered with or not. Prior to subdivision works, proponents should investigate if approval is required under the AHA and search the Register of Aboriginal Sites to identify any recordings in the area. If anything of significance is found during works, proponents are to cease works. If any site is damaged or altered this may result in a breach of the AHA and plans should be modified to avoid damaging or altering a site. If impact to a site is unavoidable, proponents must give notice to the Aboriginal Cultural Material Committee.

In 2006, an Aboriginal heritage study was undertaken for the WAMIA site. No archaeological sites or artefactual materials were discovered, and no previously recorded sites occur in the survey area. Two scarred trees were identified and, although not determined to be Aboriginal archaeological sites under the *Aboriginal Heritage Act 1972* (AHA), it was recommended that they be protected and preserved.

Historic heritage

The Heritage Council of Western Australia's heritage places database identifies two heritage places in the structure plan area as shown on **Map 3 – Land use context**. Neither site is on the State Register of Heritage Places

- Airstrip – War Time (Place 14253) – located on Lot 50 Muchea East Road in Precinct 2 (South) The site was assessed by the HCWA in July 1998 and was recommended for further research and interpretation, and adopted into the Shire's Municipal Inventory in 1999.
- Wandena Quarries (Place 14257) – a local heritage site located on Wandena Road in Precinct 4 (East). The site covers several landholdings, predominantly land used for Midland Brick operations. Mining operations have occurred at this location for a number of years and the site continues to be used for clay extraction. The sequence of clay deposits is the only known outcrop close to Perth. Plans to rehabilitate the excavated pits were prepared but have not yet been implemented. The site has not been classified but is recommended for further interpretation.

2.3.6 Visual impact and landscape

The structure plan area exhibits rural character, with areas of remnant and rehabilitated bushland, including bushland along some creek lines. Individual remnant trees with large canopies, mainly marri, jarrah, wandoo and powderbark wandoo, are scattered through cleared pasture and create a 'parkland' appearance. It is also a gateway to Chittering, which is popular for its undulating rural scenery and local produce, wineries, orchards and other commercial tourist attractions.

The area comprises three major landscape character units including Ellen Brook and its immediate floodplain (Precinct 3), parkland cleared footslopes (mostly in Precinct 1 and 2) and upper slopes (mostly in Precinct 4). Land slopes up from Ellen Brook to the Gingin Scarp, with the area closest to Tonkin Highway occupied by low-lying, floodplain associated with Ellen Brook. The backdrop in easterly views from Tonkin Highway comprises the upper slopes and footslopes, both elevated character units, with parts of the upper slopes located on the skyline itself. Midland Brick's clay extraction operations are located on elevated portions of the Gingin Scarp, and several bunds of light-coloured earth are prominent.

The Ellen Brook character unit is particularly prominent and visually sensitive due to its location in the foreground of views from Tonkin Highway, where the road is level with or higher than the surrounding landscape and wide, unobstructed views prevail especially from three flyovers about 10m above natural ground level. The high volume of road users are likely to be sensitive to the appearance of industry in a rural landscape setting as most of the industrial park will be seen from the highway. Therefore, vegetation throughout the park and minimising the impact of industrial development will be important. Much of

Precincts 1 (North A) and 1 (North B) and the clay extraction bunds in Precinct 4 (East) will be readily seen from the interchange flyovers.

Large remnant trees create a 'parkland' appearance, contributing to rural character

Tonkin Highway, with its elevated profile and high volume of large trucks, is also a very prominent, large-scale built element that dominates the western portion of the industrial park, largely separating it from nearby Ellen Brook. Embankments and adjoining drainage swales have been planted with wattles and eucalypts which, when mature, will form a prominent vegetated corridor and assist in screening of industrial structures.

The WAMIA facility is situated on the face of the Gingin Scarp, it is not intrusive. It is screened from Muchea East Road by the intervening landform and remnant vegetation and is not readily noticeable from GNH. Its shorter edge is orientated westwards and its sawtooth roof profile creates deep, unobtrusive shaded areas below it.

WAMIA roof line which blends into landscape

Measures should be taken to reduce the impact of heavy vehicles and industrial elements on the rural landscape ensuring that industrial elements that may be visible are not dominant and retaining rural elements as prominent landscape features as valued by the local community and important in maintaining Chittering's values as a tourist destination. The application of visual management objectives would result in an industrial estate which displays contemporary and best practice design for industrial parks in rural settings and also supports environmental outcomes. For example, industrial infrastructure set amongst tall, native trees; watercourses and other surface drainage features apparent in the landscape; and the Gingin Scarp in view as an elevated backdrop, with a vegetated horizon line. Roadways would have rural characteristics, business signage would be unobtrusive and urban characteristics would be minimised.

Looking south from Wandena Road over the Swan Coastal Plain

2.4 Environmental considerations

2.4.1 Climate

Muchea is characterized by a Mediterranean climate with hot, dry summers and mild, wet winters. Temperatures recorded at the nearby Pearce RAAF station show average daily maximum temperatures ranging from 17.9 C in July to 33.5 C in January (BOM, 2019).

Long-term climatic averages indicate that the site has moderate to high rainfall, receiving 654.6mm on average annually with over half of the region's rainfall received between June and August (BoM 2019). However, this amount is predicted to reduce by 6 per cent by 2030 (DPIRD 2019). The region experiences rainfall (›1 mm) on an average of 57 days annually (BoM 2019). The intensity of heavy rainfall events is likely to increase while drought conditions are expected to become more frequent (DPIRD 2019).

The declining rainfall and increased variability in rainfall patterns has implications for water supply. There will be a requirement for a reticulated supply, rather than reliance on ground and rain water.

2.4.2 Landform and topography

Landform units

The industrial park is located between four physiographic units from west to east which comprise:-

- the low-lying Pinjarra Plain on the Swan Coastal Plain (generally Precincts 1A, 2 and 3)
- the Piedmont zone, a series of spurs and colluvial slopes at the base of the scarp (area generally in between Precincts 1A and 1B and eastern part of Precinct 2)
- the Gingin Scarp, a line of hills that forms the eastern boundary of the Swan Coastal Plain (generally Precinct 1B and southern part of Precinct 4)
- the Dandaragan Plateau, areas of higher elevation, undulating hills and eroded river valleys (generally the northern part of Precinct 4) (Gozzard 2011).

Topography

The structure plan rises from approximately 60m AHD next to Ellen Brook in the southwest corner to approximately 155m AHD in the northeast, on the Gingin Scarp. There is a strong contrast between the gently-sloping western portion of the site, located on the coastal plain adjoining Ellen Brook's floodplain, and the steeper slopes of the Gingin Scarp to its east. Continued clay extraction along the Wandena Road ridge on the scarp is also significantly altering the natural topography of excavation areas by creating flat surfaces, pits and ponds, usually behind steep bunds.

The degree of constraint that topography has on industrial development in each precinct is outlined in **Table 9** and shown on Map 9 – Topography and landform.

Topography will impact the on-site arrangement and orientation of buildings and roads, as well as the cost of earthworks and fill.

TABLE 9 – Precincts affected by topographic constraints

AVERAGE SITE SLOPE %	PRECINCTS	IMPACT ON INDUSTRIAL DEVELOPMENT	COMMENTS
0-1	Small areas over park – mostly Precinct 3	Slight constraint for large scale industrial and moderate constraint for small scale	Can result in areas of poor drainage and larger-than-normal gravity flow systems
1-3	Most of Precinct 1A, 2 and 3	Optimal slope particularly for large lot development	Positive drainage generally attained without excessive regrading
3-5	Located at the base of the Gingin Scarp in Precincts 1A and 2	Moderate constraint for large scale industrial and slight constraint for small scale	Small scale – minimum size of 4000m^2.
5-8	Most of precincts 1B and 4 on Gingin Scarp	Severe constraint for large scale industrial and road construction and moderate constraint for small scale	The developable area in precincts 1B and 4 will be largely defined by the final surface contour plan for sequential development once the clay resource in this area has been extracted.
8 and above	Most of Precinct 4	Severe constraints for all industrial development	These slopes dominate the topography for most of Precinct 4, which equate to approx. 20 ha of land in the north east sector of the precinct.

2.4.3 Geology and soils

Significant geological supplies

The eastern portion of the structure plan (mostly Precinct 4 and parts of Precinct 1 North B) are characterised by deposits of high-quality clay. This unique resource is a significant geological supply which is still being excavated. Development should not occur until the material is extracted and land is remediated in accordance with *SPP2.4 – Basic Raw Materials*. The indicative areas of with clay resource is shown on Map 9 – Topography and landform.

In those areas with underlying significant geological supplies and surrounding land which may impact on these areas, details of land staging and site remediation including identification of finished ground levels is required prior to development and road construction, including consultation with DMIRS, mining operators and tenement holders.

Soil profiles

The western side of the industrial park (generally Precincts 1A, 2 and 3), located on the Pinjarra Plain, comprises of low permeability pebbly silt. The low soil permeability requires careful consideration of drainage prior to industrial development, particularly in low lying areas in proximity to the Ellen Brook. There is also gravel to at least 10m below ground level at the central western side of the industrial park where rock, likely to be shale, is present which can lead to localised perched groundwater.

Further east, at the foothills of the scarp (Piedmont zone) is sandy soil. There are pockets of high permeability gravel and low permeability laterite typically at higher elevations and steeply sloped areas on the scarp. Several large pockets of siltstone (clay) also exist along the eastern edge of the industrial park which generally exhibit low permeability and may lead to localised perched groundwater.

Acid sulfate soils

Acid sulfate soil (ASS) risk mapping as shown on Map 9 - Topography and landform classifies the eastern half of the site as having 'no known risk' of ASS occurring within 3m of natural soil surface (DWER 2018a). The western half of the site, including the Ellen Brook waterway, is categorised as having 'moderate to low' risk of ASS within 3m of the surface. Further studies undertaken by Chittering Landcare Group have also identified potential ASS along the waterway south of Muchea East Road.

Before subdivision and development, site investigations must be undertaken in accordance with Acid Sulfate Soils Planning Guidelines (WAPC) and DWER's Identification and Investigation of Acid Sulfate Soils Guidelines.

2.4.4 Groundwater

Much of the study area is characterised by high groundwater levels as shown on Map 8 – Water features, with a large portion of the area abutting Ellen Brook, in Precincts 1 (North A) and 3, with groundwater at or near the surface. This may reflect the high surficial or superficial aquifers and/or perched groundwater.

Groundwater levels across the industrial park range from approximately 62m AHD by the eastern boundary to 45m AHD by the western boundary (DWER, 2020). Groundwater flows towards the Ellen Brook and other sensitive receiving environments across most of the site. Higher levels of nutrients including nitrogen and phosphorous have been recorded in the area, particularly in downstream locations, reflecting the use of land for agriculture. The management of groundwater quality is therefore essential for the protection of the surrounding waterways and wetlands.

Review of available groundwater data in the Muchea region has identified a lack of reliable groundwater data. Assessment of the available groundwater data has been used to produce high-level, regional depth-to-groundwater mapping, however, this data is indicative and detailed site-specific investigations are required to determine appropriate groundwater management levels and quality. A regional monitoring program is recommended to provide more comprehensive data coverage of the site. This should identify regional scale changes between pre and post development, water changes and potential sources of pollution.

There are no proclaimed Public Drinking Water Source Areas (PDWSAs) in the study area.

Ellen Brook near Precinct 3

Winter inundation within Precinct 3

Drainage line through Precinct 3

2.4.5 Surface hydrology

The site is within the Ellen Brook catchment, which is the largest sub-catchment of the Swan Canning river system on the Swan Coastal Plain and a priority catchment in the Swan Canning River Protection Strategy (Swan River Trust, 2015). Although the Ellen Brook only flows in winter, its catchment contributes 8.3 per cent of the total water input into the estuary and is the single largest contributor of nutrients entering the Swan River estuary, representing 28 per cent of total nitrogen (TN) and 39 per cent of total phosphorous (TP) into the system.

The industrial park consists three main drainage tributaries to the Ellen Brook flowing east to west as shown on Map 8 – Water features. Future assessments may conclude that some additional flow paths may be defined as waterways. Waterways linking the scarp to Ellen Brook have been subjected to vegetation clearing and damage by stock, or they have been incorporated into engineered drains. Several wetlands with surface water features are also located within the industrial park as shown on Map 8 – Water features. The wetland categories are outlined in **Table 10**.

Surface water quality monitoring has been conducted by the Ellen Brockman Integrated Catchment Group (EBICG) as part of the Ellen Brook Catchment Water Quality Monitoring program. Surface water quality monitoring has determined that several surface water flows within the site exhibit elevated nutrient (and some other pollutants) concentrations, as compared to guideline values and high acidity and salinity readings. The *Ellen Brook Catchment Nutrient Report* (2018) identifies Ellen Brook as failing both short and long term targets for TN and TP and has stated that a 69 per cent reduction in TN and 79 per cent reduction in TP is needed. EBICG has planted extensive corridors of water-tolerant native trees along waterways and in naturally wet areas to address high surface water levels and nutrient runoff.

The *SCRM Act* seeks to ensure the protection of the Swan and Canning rivers and associated land to ensure maintenance of ecological and community benefits and amenity. The objectives of the Act include the management of activities that affect the ecological and community benefits and amenity of the Swan and Canning rivers, and the promotion and facilitation of the good management of the catchment area. Appropriate development within the structure plan area is therefore relevant to application to the *SCRM Act*.

State Planning Policy 2.10 – Swan Canning River System states that land use changes should not result in further water quality degradation but should where possible improve the situation. The development of the structure plan area should therefore be undertaken in accordance with best management practices to ensure that water quality from future industrial sites will be appropriate prior to entering the Ellen Brook and ultimately the Swan and Canning rivers. **Table 11** outlines the types of water management plans needed at different planning stages.

TABLE 10 – Geomorphic wetlands of the Swan Coastal Plain

WETLAND TYPE	LOCATION	DESCRIPTION
Conservation category wetland	Lot M1326 in Precinct 4.	Demonstrates a high level of ecological attributes and function Highest priority wetlands, with wetlands and their buffers being fully protected Severely compromised by Midland Brick activities and must be assessed for rehabilitation by Midland Brick and/or the landowner.
Resource enhancement category wetland	Between Gulliente Road and GNH in Precinct 1 (north A).	Supports substantial ecological attributes and functions but may have been partially modified. Protection of this wetland and its buffer has been incorporated in to the local structure plan for Precinct 1A.
Multiple use wetlands	There are six multiple use wetlands in the industrial park, mostly associated with the Ellen Brook.	The most extensive is in the western portion of the industrial park, incorporating the Ellen Brook's floodplain and tributaries. Development within multiple use wetlands is permitted, provided that post-development storm water discharge conditions match pre-development conditions.
source: Department of Biodiversity, Conservation and Attractions, 2018b		

TABLE 11: Level of Water management plans and responsible agencies

PLANNING STAGE	DOCUMENTATION	APPROVAL AND REFERRAL AGENCIES
Zoning and schemes	District water management strategy	DPLH on advice from DWER, Shire and DBCA
Local structure planning	Local Water Management Strategy	DPLH on advice from DWER, Shire and DBCA
Subdivision/development application	Urban Water Management Plan or equivalent	Shire on advice from DWER, and DBCA (if needed)
Construction/operation	Wastewater treatment systems	Shire and/or DoH on advice from DWER, and DBCA (if needed)

2.4.6 Flora and vegetation

The industrial park contains remnant vegetation and areas of banksia woodland, a threatened ecological community (TEC) under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and State-listed priority ecological community as shown on Map 7 – Vegetation and fauna. However, much of the industrial park's original vegetation has been cleared.

There are four vegetation complexes in the structure plan area, identified from Heddle vegetation mapping including:

- Coonambidgee - low open forest and low woodland to open woodland
- Mogumber South - open woodland
- Reagan - low open woodland to closed heath
- Yanga - closed scrub and low open forest

Percentage thresholds to describe vegetation have been established in a suite of Australian, State and local government policies, including the EPA's Guidance Statement No. 33 Environmental Guidance for Planning and Development, and WALGA's Local Government Biodiversity Planning Guidelines, which informed the Shire of Chittering's Local Biodiversity Strategy. Vegetation types (ecological communities) should be maintained above 30 per cent of their pre-European extent within the bioregion, and are considered to be 'endangered' if cleared below 10 per cent of their pre-European extent. The thresholds inform targets for protection within the National Reserve System as well as planning and decision making at the State and local levels.

All the vegetation complexes within the industrial park are considered to be regionally significant as less than 10 per cent of their original extent is formally protected. There is also declared rare and priority fauna in the Gulliente Road reserve in Precinct 1A (North A).

The industrial park also comprises scattered mature trees, which provide food and potential nesting sites for Black Cockatoos. Smaller patches of remnant vegetation are also considered critical to maintaining the ecological functions of larger areas.

Shire of Chittering Local Biodiversity Strategy (LBS)

The Shire of Chittering's *Local Biodiversity Strategy (LBS)* 2010 identifies 57 sites over 12,284 ha across the local government area as indicative high conservation value areas (IHCA). This includes 21.6ha of banksia woodland in Precinct 1A (north A) which is to be protected as a conservation reserve upon subdivision in Precinct 1A. The LBS also identifies a local ecological linkage which extends across the north of the industrial park and is intended to connect non-contiguous natural areas, comprising rehabilitated land immediately east of Ellen Brook, the resource enhancement wetland, and areas of high-quality remnant vegetation.

The LBS's specific recommendations for the industrial park include retaining and protecting remnant vegetation, rehabilitating creek lines to improve connectivity, and locating industrial uses on cleared land without individual remnant trees as a priority.

The Chittering Landcare Group and Ellen Brockman Integrated Catchment Group are actively involved in protecting and rehabilitating areas of remnant vegetation

in the structure plan area, including portions of the ecological linkage and along waterways. This includes re-vegetation along the main drain on Lot 800 Great Northern Highway in Precinct 3 to assist in reducing the water table and improve water quality.

Banksia Woodlands in Precinct 1A (North 1A)

2.4.7 Fauna

The industrial park is located entirely within a confirmed breeding area for Carnaby's Black Cockatoo (Calyptorhynchus latirostris), a species which is classified as endangered and protected under both the *Biodiversity Conservation Act 2016* and the national *Environment Protection and Biodiversity Conservation Act 1999* . DBCA also has records of Baudin's cockatoo (Calyptorhynchus baudinii) and forest red-tailed black cockatoo (C. banksii naso) within a 10km radius of the structure plan area. These species are also protected under this legislation. For young birds to survive, there needs to be adequate food within the identified breeding area, which comprises the area within 12km of the nesting site. Anecdotal evidence indicates that there are also several breeding sites in the area immediately east of the industrial park, so the structure plan area provides food for young birds located at multiple sites.

A detailed survey undertaken in Precinct 1(North A), identified 404 potential Cockatoo breeding habitat trees, of which 55 were observed to have one or more hollows. Of these, 13 were seen to contain hollows which were possibly suitable for a Carnaby's Black Cockatoo. The trees identified were either growing in remnant bushland or comprised isolated trees located in cleared pasture.

The importance of the industrial park to provide for both foraging and breeding of cockatoos places a very high priority on retaining remaining bushland and individual trees in otherwise cleared pasture. The majority of remnant bushland in the industrial park comprises vegetation that provides food for cockatoos (i.e. Banksia woodland), and the species of paddock trees, marri and wandoo also comprise a food source.

Carnaby's Black Cockatoo
(source: B. Knott)

2.4.8 Site contamination

Preliminary site investigations have determined that most of the industrial park is cleared and used for grazing purposes. Potential soil and groundwater contaminating activities include private landfills, cattle dips, old farm houses, fuel and chemical storage areas, poultry farms, clay pits, feedlots and the airstrip.

There are no contaminated sites registered on the DWER Contaminated Sites database in or near the industrial park nor any land parcels which reported as potentially contaminated, including those awaiting classification (DWER, 2019). Before subdivision and development detailed site inspections, sampling and other investigations will be required in accordance with DWER's site contamination guidelines to determine the nature and extent of any contamination, the suitability of the land for the proposed land use, and rehabilitation and management measures.

2.4.9 Bushfire risk

The entire Shire of Chittering, including the industrial park is designated as bushfire prone by the Fire and Emergency Services Commissioner under the *Fire and Emergency Services Act 1998* (as amended). The WAPC's *State Planning Policy 3.7 – Planning in Bushfire Prone Areas* (SPP 3.7) and *Guidelines for Planning in Bushfire Prone Areas* (the Guidelines), which set out the requirements for risk-based land use planning and development across WA, apply to all planning proposals that are in designated bushfire prone areas or introduce a bushfire hazard including revegetation.

Due to the broad scale of the structure plan, individual precinct characteristics and unknown lot layout, more detailed assessment of bushfire risk will be conducted at future planning stages as detailed local structure plans and subdivision proposals progress. This will involve the preparation of bushfire level assessments, a bushfire attack level (BAL) assessment and/or bushfire management plans depending on the nature of proposals in accordance with SPP 3.7.

The industrial park will interface with areas of vegetation that will present bushfire hazard. It is considered that lot sizes will be large enough to accommodate building setbacks to achieve minimum setback requirements and asset protection zones so that industrial buildings are not exposed to BAL ratings exceeding BAL-29.

High-risk land uses such as service stations, fuel depots and some transport operations are likely to locate in the industrial park. The location of such uses should address bushfire risk and be avoided on lots that abut bushfire prone vegetation. Risk management plans and emergency evacuation plans will be required.

2.5 Land demand and economic profile

2.5.1 Land demand assessments

In preparing the Muchea Employment Node Structure Plan in 2011, the WAPC commissioned a demand assessment. (Connell Wagner, 2007). This indicated sufficient industrial land demand to justify proceeding with structure planning for the park, comprising a total demand for 596ha of industrial land by 2030 inclusive of: -

- 302ha at the WAMIA site
- 139 ha for local demand
- 95ha for transport operations
- 50ha for metropolitan spillover
- 10ha for complimentary uses to WAMIA operations.

It estimated 800-1,000 jobs will be created in the park, including 40 jobs associated with the WAMIA facility.

The WAPC commissioned an updated land demand assessment to inform the structure plan update, to account for several changes to economic drivers with the potential to impact the industrial park's demand profile and changes to regional planning frameworks.

2.5.2 Regional planning frameworks

Economic and Employment Land Strategy: non-heavy industrial: Perth Metrop olitan and Peel Regions 2012 (EELS).

EELS seeks to provide an ongoing supply of industrial land in the Perth and Peel regions. Although Muchea sits outside the Perth and Peel regions and is not included in EELS, it immediately borders the region and is directly related to the broader industrial land market, particularly that of the north-east corridor. Map 2 – Industrial context shows the location of existing and proposed industrial land in the north-east and north-west corridors of the Perth region in relation to Muchea.

EELS identified total demand for 1,646ha of industrial land in the north-east corridor by 2031 and a 117ha deficit by 2031, should no additional industrial land be released.

EELS proposed 3,400ha of new industrial land in the north-east corridor including: -

- 2,428ha of industrial land at North Ellenbrook
- 471ha of industrial land at Bullsbrook South
- 115ha at Bullsbrook Townsite Precinct.

North-East Sub-Regional Planning Framework

The *North-East Sub-Regional Planning Framework* is one of four frameworks prepared for the Perth and Peel regions under the 2018 *Perth and Peel@3.5million* suite of documents. This provided the strategic planning framework for integrated land use and infrastructure planning for each sub-region.

The Framework estimates total additional demand for 2,810ha of industrial land by 2050 and a potential supply of 3,580 ha has been identified for long-term development including land already zoned or for investigation or expansion and future rezoning.

The most significant proposed future industrial land is 2,760ha located at Bullsbrook/North Ellenbrook which has been identified as either industrial expansion to be rezoned in the future (1310ha), or industrial investigation, where its suitability for industry will need to be confirmed (1450ha). This expands upon the existing 450ha at Bullsbrook (South) industrial area which is already zoned in the MRS.

The Framework resulted in redistribution of future industrial land in the north-east corridor that was proposed in EELS. This resulted in the addition of 1350 ha in Bullsbrook to the east of Tonkin Highway and north of Stock Road and a further 400ha at Bullsbrook South, while removing land further south from future supply.

By adding the Muchea Industrial Park to the region's prospective land supply, a surplus of between 625ha and 830ha is estimated for the 2015-2050 timeframe.

Bullsbrook Freight and Industrial District Land Use Planning Strategy

The Bullsbrook/North Ellenbrook industrial area is in the City of Swan approximately 32km from the Perth CBD and around 15km south of Muchea. DPLH is preparing the *Bullsbrook Freight and Industrial District Land Use Planning Strategy* as part of the implementation of the Perth and Peel@3.5million framework to provide a clear strategic vision for future development of the industrial land, service infrastructure, and transport requirements, to support a proposed intermodal terminal in Bullsbrook and provide for long-term employment opportunities.

This strategy is to cover a gross land area of 3,100 ha across four major precincts:

- Bullsbrook South – 450ha (existing zoned for industry)
- Bullsbrook South Extension A: 300 ha gross (shown as industrial expansion in the Framework)
- Bullsbrook South Extension B: 100 ha gross (industrial investigation)
- North Ellenbrook: 900 ha gross (industrial expansion)
- North Ellenbrook Extension: 1,350 ha gross (industrial investigation).

The likely development yield may be around 50-70 per cent of the gross area or between 1,325ha and 1,855 ha with an average take-up of up to 20ha per annum. This would imply a development timeframe of at least 70 years across the whole area. Potential industrial activities in Bullsbrook include freight and logistics, value added industry, service commercial, mining industry, general industry, warehousing, enterprise/ business park and technology/training precinct.

It is unlikely that all land in Bullsbrook/North Ellenbrook and Muchea will be developed to its short and medium-term schedule, or meet long-term development expectations. However, there are some key differences that indicate different future demand profiles for each as discussed further in section 2.5.3.

2.5.3 Industrial land demand drivers

Transport factors

The Tonkin Highway extension and completion of the NorthLink project has fundamentally changed the assessment of Muchea's economic role, positioning Muchea directly within the broader metropolitan industrial land market. With the transport benefits of Tonkin Highway now evident, this is driving early demand and may bring forward development timeframes for the industrial park.

The other significant driver of land use in Muchea is its location relative to major transport links to agricultural land and pastoral areas, for transport of livestock and grain. Transport connections to the Mid-West and North-West will be improved with RAV10 access to Muchea and the park has the potential to attract freight and logistics operators as it is the closest industrial land to Perth connected to the regional RAV10 network. Commercial traffic on Tonkin Highway and GNH is strongly linked to the resources economy in the Mid-West and North-West, with large scale transportation of general cargo, bulk goods and mining equipment.

Accordingly, Muchea rates highly on transport-related location factors and links to the resources economy for general cargo, bulk goods and mining equipment as well as agricultural and pastoral sectors including livestock and grain handling.

On the other hand, Muchea is further from main population areas and is less likely to be as competitive as other locations for general and light industry overall. Bullsbrook/North Ellenbrook has a larger scale, better access to labour, slightly better services availability, and may become more suitable for a wider range of light and general industrial uses. This reinforces the likely long-term focus for Muchea as long-haul transport and for handling agricultural products and livestock and grain handling.

Land price and lot sizes

Relatively low-cost land that becomes available in the industrial park may also attract businesses involved with vehicle servicing, storage and mining operations and some spillover of industrial land uses from the metropolitan area.

Muchea also has potential for very large lots in the order of 20ha, separated from residential development. This means that uses requiring buffer zones will be easier to accommodate. Land prices are currently also much lower than alternatives and attract operators such as laydown facilities and long term storage yards. It is estimated that five or six major transport operators will require 20ha sites. This might be most applicable to storage and load assembly of large, low tech objects (e.g. dump truck tyres and refurbished parts) as opposed to technology equipment (e.g. major items of machinery) or general cargo.

The first stage of development in Precinct 1 has involved some adjustment to the subdivision plan towards smaller lots in the order of 6000m^2 to 4ha. These are expected to cater for a greater proportion of higher service, higher labour and less land intensive industrial uses including engineering and support and service uses. It is likely these have been attracted to the first stage of development at Muchea given the now evident quality of connection to Perth via Tonkin Highway and integration with broader industrial land market and Precinct 1 is particularly well located to take advantage of this. However, more broadly, industrial demand is expected to be mostly from operations with larger land requirements and earlier expectations of land use mix or availability of industrial land for larger operators have not materially changed.

Local demand and other demand factors

Local demand for industrial land is estimated to be generated from the Chittering Valley, with the industrial park providing the only industrial land in the Shire.

There may be scope for processing operators and feed-mills in Muchea, however, this would require servicing including gas and additional water supply. There is likely to be limited meat and other food processing due to water supply constraints. It is possible that gas could be supplied to Muchea, which may ultimately attract gas-dependent activities.

2.5.4 Future industrial demand and supply

There is likely that there is already adequate land in development in Muchea with the combined Precinct 3, Harvis, CBH and Linfox developments (the latter two are outside of the Muchea Industrial Park area – refer to Map 3 – Land use context) to satisfy short and medium-term demand for more general requirements (e.g. road transport operations and local demand) and for specialised processing (e.g. feed mills).

Together the above projects and land holdings account for a gross land area of 505 ha and might be expected to yield total net development sites of around 380 ha. Of this, transport-related uses are likely to account for around one-third to one-half of all demand. Depending on the outcome of development at Bullsbrook/North Ellenbrook, it might also be sufficient for long-term needs. However, some of the projects and their land uses are still in the planning and assessment stages and if these do not eventuate, this will impact land demand in other locations.

The expected over-provision of industrial land supply in the north-east corridor, including Muchea, means that take-up of land at Muchea will depend on individual projects that can take advantage of Muchea's location and improved connectivity based on the combination of the access to Tonkin Highway and being the closest industrial park to Perth with RAV10 access.

Providing for several large lots (in the order of 20ha) and opportunities for a variety of industrial land uses including access for RAV10 throughout the park will create greater flexibility for businesses to locate in the industrial park, where they are compatible with land capability and the level of servicing.

2.5.5 Land use and employment distribution

Once fully developed, the industrial park is likely to have a high proportion of land uses with low employment density such as transport and logistics. However, it is a large industrial park and will have substantial overall employment capacity.

The land use mix and employment can be estimated by reference to existing estates that show some similar characteristics.

A potential land use mix for Muchea at full build out is indicated in **Table 12**.

If the Muchea Industrial Park develops similarly to estates such as Hazelmere and Forrestfield it would have total employment of 2,300 – 2,500. This can be assumed as a best estimate at full build-out.

Employment numbers may increase more quickly in the short term with the early development of Precinct 1 and its mix of land uses, however overall employment numbers are still likely to be approximately 2,500.

TABLE 12 – Potential Land Use Mix

LAND USE	FLOORSPACE PROPORTION
Storage/distribution	50%
Manufacturing/processing/fabrication	15%
Service industry	15%
Office/business	10%
Utilities/communications	5%
Entertainment/recreation/culture	1%
Health/welfare/community services	1%
Primary/rural	1%
Other retail	1%
Shop/retail	1%
TOTAL	**100%**

2.6 Roads, transport and freight

2.6.1 Road network

The primary and regional distributor roads in and around the industrial park are shown on Map 5 – Existing road network. The industrial park benefits from being adjacent to primary distributor roads including GNH and Brand Highway, both of which form important north-south linkages between Perth and the Mid-West and North-West regions, as well as Tonkin Highway which provides a direct connection to Perth's eastern suburbs. A grade separated interchange located at the junction of GNH, Tonkin and Brand Highway directly abuts Precinct 1A, providing direct access to the industrial park. All three highways are under the control of MRWA. Direct frontage access onto these roads is either limited or prevented.

Other distributor roads in the industrial park include Muchea East Road and Wandena Road. These roads are under the control and management of the Shire.

Muchea East Road is a regional distributor road which leads into Chittering Road tourist drive and serves an important local traffic function. It also provides access to the WAMIA site and works were undertaken to widen and upgrade the road prior to the opening of this facility in 2010. There is limited scope to upgrade and widen the road due to vegetation along the road and a number of smaller lots around the GNH intersection.

Wandena Road, to the east of the park, is a local distributor. The road has two sections, Wandena Road south and Wandena Road north. Both sections connect Muchea East Road to the Great Northern Highway. Wandena Road south is sealed and used by heavy vehicles associated with the Midland Brick clay extraction. Wandena Road north is unsealed and provides access to the Muchea waste disposal facility.

NorthLink/Tonkin Highway

The NorthLink project, which was completed in early 2020, extended Tonkin Highway 37km from Morley to Muchea to freeway standard comprising grade separated interchanges as shown on Map 1 – Regional context. Tonkin Highway now provides access to a broader employment market from Perth's eastern suburbs and growing residential areas such as Ellenbrook. It is estimated to shift 80 per cent of heavy vehicles from GNH (south of Muchea). An interchange at Neaves Road provides direct access to the north-western suburbs. The new road has reduced travel times from Perth CBD to Muchea to 39 minutes, from the airport to Muchea to 30 minutes and from Fremantle Port to Muchea to 60 minutes.

Changes to road alignments in Muchea have resulted from NorthLink with the Brand Highway alignment moved 750m northwards and realignment of GNH resulting in a portion adjacent to Precinct 1A (North 1A) no longer part of the highway and the northern section of GNH connecting into the Tonkin Highway alignment. The former section of Brand Highway abutting the site was renamed Granary Drive following completion of NorthLink.

Great Northern Highway upgrades

To the north of Muchea, GNH is undergoing a series of upgrades over approximately 220km as shown in Map 1 – Regional context. This will ultimately provide RAV10 access to Muchea as discussed in section 2.6.2. Stage one is complete and stage two is underway comprising town bypasses at Bindoon and New Norcia, wider roads, more passing lanes, flattening crests and easing curves, safer roadsides, more rest stops and additional facilities for heavy vehicles. The $347.8 million project is jointly funded by the Australian and Western Australian Governments. The Bindoon Bypass, which is fully funded by the State and Australian Governments will provide the final 66km link in upgrading GNH.

2.6.2 Freight network

RAV network

Main Roads Heavy Vehicle Services (HVS) is responsible for administering road access for RAVs in Western Australia. There are many types of RAVs operating within WA, which have different performance characteristics, require a different amount of road space when operating and have different impacts on the road infrastructure.

Table 13 outlines the existing and future RAV classifications for roads within or in the vicinity of the industrial park. Primary distributor roads adjoining the park including GNH and Brand Highway provide for RAV7 access from northern regions. Muchea East Road also provides RAV7 access to the WAMIA site. Significant livestock volumes are transported into the metropolitan area via these roads (20,600 trailers per year).

TABLE 13 – Existing and proposed RAV classifications

ROAD	EXISTING CLASSIFICATION	PLANNED FUTURE CLASSIFICATION
Great Northern Highway (north of Brand Hwy interchange)	RAV7	RAV10
Great Northern Highway (south of Brand Hwy interchange)	RAV7	RAV7*
Brand Highway	RAV7	RAV7
Muchea East Road (between GNH and WAMIA)	RAV7	RAV7
Tonkin Highway (Morley to Muchea)	RAV4	RAV4
Wandena Road	RAV2	RAV2
Guillente Road	RAV2	RAV2

* reclassification possible via developer funded upgrades, subject to MRWA approval

The improvements to GNH between Muchea to Wubin, will provide access between Muchea and the Mid-West and North -West for RAV10 vehicles. Accordingly, road design in the industrial park should provide for RAV10 vehicles to take advantage of this strategic road and freight infrastructure. As of 2021 there are an estimated 130 daily movements of RAV10 vehicles to and/or from the Wubin RTAA facility, many of which could be anticipated to travel to Muchea once the RAV10 network is extended south.

Upon opening the proposed RTAA it will also be critical that access for RAV10 vehicles is provided to the WAMIA facility to prevent livestock security and welfare issues. MRWA has confirmed that Muchea will form the southernmost point of the RAV10 network and closest point to the Perth metropolitan area.

Rail freight

WA's freight network also consists of rail infrastructure to service the agricultural sector. Rail is the most efficient and productive means of transporting large volumes of homogeneous goods, such as grain, over large distances. The freight rail is the main network for transporting grain from CBH receival points to ports across the State. The rail network is owned by the State Government and leased to Arc Infrastructure until 2049. Rail transport also lends itself to industries that have a need to transport a high volume of freight on a regular schedule. This could include, for example, manufacturing/assembly.

The Midland to Geraldton railway line, located west of the industrial park, follows the alignment of the Brand Highway. The line is strategically important as a freight route between Perth and the northern Wheatbelt and Mid-West regions.

A proposed future intermodal (road–rail) freight terminal is proposed to be located at Bullsbrook in the medium to long term, to facilitate related strategic employment and optimise the use of transport infrastructure.

There may be potential for a smaller scale, privately owned and operated rail spur facility in Muchea, outside the industrial park boundary along the Perth-Geraldton railway. Such a facility would influence the industrial park's demand profile and potentially create demand for complementary operations.

Ports

The major ports at Fremantle, Kwinana and Bunbury handle various products that are imported and exported, including containers, dry and liquid commodities, livestock, cars and scrap metal. As Perth and the

surrounding areas grow, container freight traffic has begun to test the capacity of the suburban road and rail networks and it is vital that the State's freight connection to ports can meet the growing demand.

In August 2020, the State Government endorsed the Westport Taskforce's recommended location and design for a future container port at Kwinana to respond to existing and future challenges associated with WA's freight and logistics network and port capabilities. The design comprises a land-backed port within the Kwinana Industrial Area, connected by an uninterrupted freight corridor via Anketell Road and Tonkin Highway, which provides a direct connection via Northlink to Muchea.

The Westport Taskforce will continue with detailed planning and design to formalise the transport corridors that will support this new freight infrastructure. This will help to determine the timetable of transitioning freight from Fremantle Port to the Outer Harbour at Kwinana which will occur either in one step by 2032 or over a phased period with both ports sharing the freight task for approximately 15 years.

Revitalising Agricultural Region Freight Strategy

The Revitalising Agricultural Region Freight Strategy (RARFS) is a high-level strategic document that identifies the core issues with the agricultural freight network and sets out the priorities to support improved efficiency of WA's agriculture supply chains over the next 10-15 years. The objectives of this Strategy are:

- connected and continuous supply chains
- seamless modal integration
- optimised infrastructure and policy environment
- improved transport efficiency
- improved road safety
- regional economic growth

The RARFS has identified 21 infrastructure project packages and several non-infrastructure projects. These proposed project packages and non-infrastructure projects seek to, individually and cumulatively, improve the productivity of the agricultural transport supply chain. Proposed projects will be further developed by both industry and government.

The projects most relevant to the industrial park include: -

- rail improvements to Perth to Geraldton Rail (Watheroo to Geraldton)
- roads to Perth – targeted road network investment, increased heavy vehicle access
- Wheatbelt local roads – targeted road network investment.

2.6.3 Traffic generation

The potential traffic generation from the industrial park has been reviewed to inform the development of road design concepts.

It has been determined that the entire industrial park would generate approximately 7935 vehicles per day (vpd) in the short to medium term and 19,987vpd under an ultimate development scenario. The forecast traffic distribution per precinct upon the ultimate development scenario is outlined in **Table 14**.

Based on the trips generated and the distribution of trips outlined above there is no demand for two lanes on the loop road even with the fully realised ultimate development as less than 10,000vpd would be on the loop road.

TABLE 14 – Anticipated ultimate development traffic volumes (vehicles per day)

PRECINCT	SOUTH VIA GNH	NORTH VIA GNH	WEST VIA BRAND HWY	EAST VIA MUCHEA EAST RD	SOUTH VIA WANDENA RD	TRIPS (VPD)
1	2,403	1,093	655	219	n/a	4,370
2	3,529	1,604	962	321	n/a	6,417
3	2,404	1,093	655	219	n/a	4,370
4	0	1,207	725	241	2,657	4,830
ALL	**8,336**	**4,997**	**2,997**	**1,000**	**2,657**	**19,987**

2.6.4 Public transport, cyclists and pedestrians

The provision of public transport facilities has not been included in the industrial park. The large-scale industrial land uses proposed for the site would make feasible provision of public transport difficult to achieve and Muchea does not have a public transport connection. The proposed road network is designed to provide access for trucks, and would enable bus routes to be introduced if desired in the future.

No formal cycle or pedestrian facilities are provided in the structure plan. The large-scale industrial land use would largely make provision of a pedestrian network difficult. Pedestrian links could be developed in local structure plans if required. A sealed shoulder which could be used by cyclists is recommended in the road cross-sections.

2.7 Servicing infrastructure

2.7.1 Water supply

Existing water supplies

The industrial park is not near Water Corporation's existing services and it does not have plans to supply reticulated potable water to the site.

Potable and non-potable water supply for the Muchea area comes from the Gingin groundwater area and rain water harvesting. Water servicing for the WAMIA sale yards consists of collection of rainwater from the buildings' roofs into large-scale water tanks.

It is anticipated that existing groundwater allocations will be used to supply water to the industrial park.

In February 2020, Muchea Water was granted a license by the ERA to service Precinct 1A of the industrial park. This includes construction of a water treatment facility on Lot 2 Reserve Road to the north of the industrial park as part of a proposed 250 lot residential development. The project proposes drawing water from the Leederville Aquifer, with treatment to meet drinking water quality guidelines.

A second potential water service provider has also begun the process of gaining approval to provide a reticulated service in the industrial park from groundwater as the supply source. Other servicing arrangements can be made as planning progresses in other precincts.

The surficial aquifer in the Eclipse Hill subarea, located east of Brand Highway and Old Gingin Road, also has approximately 1.9 GL of unallocated volume per annum but the quality of it is unknown which may impact the suitability of this as a water supply source option.

Other water supplies and management considerations

Where additional water is required, such as process water or for washdown, water supply may be supplemented through the establishment of measures such as rainwater collection, hardstand harvesting or wastewater re-use in the lot.

Developers will need to consider their total water needs as part of the development of an urban water management plan based on the *Better Urban Water Management framework*. These plans are to identify how development can be supported by addressing all the water supply and water management issues and adopting water-wise practices.

2.7.2 Sewage and wastewater

Sewage sensitive areas

Most of the industrial park is classified as a sewage sensitive area by the *Government Sewerage Policy* (DPLH 2019) as shown on **Map 8 – Water features**. This is due to its location within the Swan Canning river system as it abuts Ellen Brook and as it contains several wetlands. Adding to the site's sensitivity are the wetlands that link to Ellen Brook, one of three first priority catchments in the *Swan Canning River Protection Strategy 2015* and the generally highwater table (often less than 1m separation).

Sewage-sensitive areas generally comprise Precincts 1 (North A) and 3 (West) which adjoin Ellen Brook, and areas within Precinct 4 (East) due to the presence of a conservation category wetland. Wastewater treatment must be to a very high standard to limit the impacts on surrounding waterways and bodies.

Wastewater services and options

There are no reticulated wastewater services available within the industrial park and there are no plans for areas within or adjacent to the site to be serviced by centralised sewerage. Muchea is also generally unsuitable for traditional 'primary' on-site effluent disposal due to the environmental constraints and high-water table.

The WAPC commissioned an engineering study commissioned in 2014 which demonstrated that servicing was feasible for industrial development via secondary treatment. This has provided the basis for future servicing to be delivered by licensed service providers.

The *Government Sewerage Policy* (GSP) which is anticipated to be incorporated into an updated SPP2.9 outlines acceptable standards for alternative wastewater disposals, largely through the use of Aerobic Treatment Units (ATUs), and in the case of sewage-sensitive areas, ATUs that can strip nutrients from the generated wastewater. Technology associated with 'secondary' on-site treatment is evolving rapidly and it can now be considered as a suitable alternative to a reticulated service. All systems should meet the requirements of the DoH and Shire as part of approvals processes and be monitored, however, separate consideration will need to be given to trade waste as discussed further in this section.

A minimum lot size of 1ha applies in sewage-sensitive areas for onsite sewage disposal in the GSP, however, it must still be demonstrated that each lot can accommodate on-site sewage disposal without endangering public health or the environment. The suitability of on-site sewage disposal is dependent on the sensitivity of the receiving environment, appropriate clearance to groundwater and flood levels, soil conditions, nutrient and stormwater loading as well as ongoing maintenance and providing the necessary level of treatment before discharging wastewater to the local environment.

Some high water user type industries are expected to be established in the area. Where such industries may be established, methods for re-using or treating larger water volumes will need to be assessed.

The RWMS comprises an indicative risk assessment which identifies areas that are incapable of supporting on-site wastewater treatment (incompatible areas) and areas that may can support on-site wastewater treatment subject to compliance with guidelines and policies (restricted areas) and sets out appropriate management solutions. These categories are based on the criteria in **Table 15**.

TABLE 15 – Wastewater area criteria

Incompatible areas	• flooded in the minor rainfall event • within the indicative Ellen Brook / Chandalla Brook floodplain • within 50m of an indicative waterway centreline • within 100m of the edge of a mapped CCW
Restricted areas	• within 100m of an indicative waterway centreline • within a sewage-sensitive area • where depth to groundwater is within 2.5m of the existing surface

It is expected that these areas will be refined through on-site investigations such as identification of waterways, wetlands and their buffers. Other considerations discussed within the GSP will need to be addressed for each proposed development, such as setbacks to surface or subsurface drainage systems that discharge into downstream waterways or waterbodies.

Trade waste

Wastewater from industry can be split into two categories: that from staff/visitor facilities, and trade waste. In contemplating a reticulated wastewater system, the requirement for certain volumes of wastewater is critical for the successful functioning of a system. In the case of an industrial park where volumes from staff facilities may be variable or the staff numbers are not known, a reticulated system is not viable.

Industrial operators expect to be required to manage their own trade waste requirements, either through on-site disposal or on-site capture and disposal off-site. The suitability of on-site disposal will depend on hazardous materials on-site, the risks posed by accidents, the likely failure mode of the primary containment, the sensitivity of receiving environments and the potential pathways for any resultant discharge to enter the stormwater system or downstream environments.

2.7.3 Storm water and drainage

The impacts of stormwater on public health and safety and the environment are considered primarily through management of stormwater quantity and quality prior to discharge offsite or towards waterways and wetlands. Storm water management and drainage should broadly replicate, as closely as practicable, the natural hydrological regime relative to the pre-development condition. This approach has been shown to provide the best economic, social and ecological outcomes (DWER, 2017).

The structure plan generally proposes a 'three tier' storm water runoff approach, with catchment on site, in roadside drainage swales, and via the use of compensating basins. This includes management of runoff from small rainfall events for ecological protection, management of runoff from minor rainfall events for serviceability, amenity and road safety and management of runoff from major rainfall events for flood protection. This will ultimately be achieved through the implementation of appropriate best management practices and Water Sensitive Urban Design measures and reservation of significant drainage lines across the industrial park. These stormwater management systems should be designed to prevent mobilisation of sediment, nutrients and contaminants from the site to wetlands and the Swan Canning river system.

Management of small event runoff should be provided through methods that respond to site-specific conditions. This will involve the retention and/or detention, and appropriate treatment of runoff from the small rainfall event (currently defined as the first 15 mm of rainfall) as close to the source as possible and where it is practicable to do so. Any flows that discharge from a development area in the 1 EY event will also need to be maintained relative to the existing peak flows and total discharge volume where possible.

Preliminary calculations show that for the eastern part of the park, a 5m-wide bioretention swale with a 1m-wide filtration area is sufficient for treatment purposes for a 10ha lot. However, to the west, treatment in a swale is not sufficient and further treatment would be required in a bioretention basin. This type of treatment would require a total area uptake of approximately 1.5 per cent of a lot. It should be noted that these calculations are for water quality purposes only and it is likely that further land uptake will be required for storm water attenuation purposes.

More detailed storm water treatment and attenuation modelling is required for development of a local and urban water management strategies to identify suitable attenuation and treatment measures to be established and identify their area requirements.

2.7.4 Electricity supply

There is existing Western Power infrastructure in the industrial park, including 22kV overhead powerlines along GNH and Muchea East Road.

Muchea zone substation is the closest zone substation to the park. It is a 132/22 kV substation with three 132/22 kV (2x10 MVA, 1x33 MVA) transformers, and seven 22 kV feeders. There is remaining capacity of approximately 20 MVA at the Muchea zone substation area and this is forecast to remain steady over the next five years due to the current minimal load growth, however this is subject to change. It is important to note that access to this capacity needs to be assessed on a case-by-case basis as there may be other network and operational constraints depending upon network configuration and customers' requirements (Western Power, 2020).

It is anticipated that electrical power will be distributed through mains, in accordance with Western Power policy and design criteria. Power will be brought to the park from high voltage infrastructure in the area and connected to substations in the industrial park.

Preliminary investigations have identified the need for two additional substations in the industrial park on sites approximately 110 x 110 m2. Substation sites will be necessary throughout the development, subject to staging and detailed design requirements.

2.7.5 Gas supply

There is no existing gas infrastructure in the park. The Dampier to Bunbury natural gas pipeline lies to the west of the Brand Highway, 2.5 km from the park. There are no current plans to extend the gas infrastructure into the park.

Lack of access to reticulated gas is a main barrier to some potential and otherwise viable land uses, such as feed mills.

If a supply of reticulated gas into the industrial area is required, a pressure-reducing station connecting from the Dampier to Bunbury natural gas pipeline would be required with an estimated cost between $1-$1.5 million. It is only likely that a large gas user would pay for the offtake. Unless a distributor is prepared to reticulate gas, it is highly unlikely that general gas reticulation will occur in the area.

2.7.6 Telecommunications

The National Broadband Network (NBN) was brought to Muchea in 2021.