APPENDIX 2

Engineering Servicing Report (Cossill & Webley)

Cossill & Webley
CONSULTING ENGINEERS

Engineering Servicing Report
District Structure Plan
Mundijong Road, Baldivis
June 2023

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Contents

1. INTRODUCTION

The following report has been prepared by Cossill & Webley, Consulting Engineers (CW) and summarises civil engineering and future servicing considerations of the proposed District Structure Plan (referred to herein as the Site). The report has been prepared to support the District Structure Plan (DSP) submission and subsequent MRS Ammendment process.

This report has been prepared based on civil engineering infrastructure requirements to service the site and covers siteworks, sewerage, water reticulation, power supply, stormwater drainage and utility services.

Details included in this report are largely based on preliminary advice from various service authorities, and is subject to change once formal submissions have been made to those service authorities.

The site, located in the suburb of Baldivis (City of Rockingham), consists of separate landholdings with an approximate total area of 757 Ha. The land is a rural site with agricultural, industrial, and commercial uses. To facilitate the proposed development, the site will be required to be re-zoned to Urban status through a Metropolitan Region Scheme Amendment.

The proposed the District Structure Plan is shown below in Figure 1.

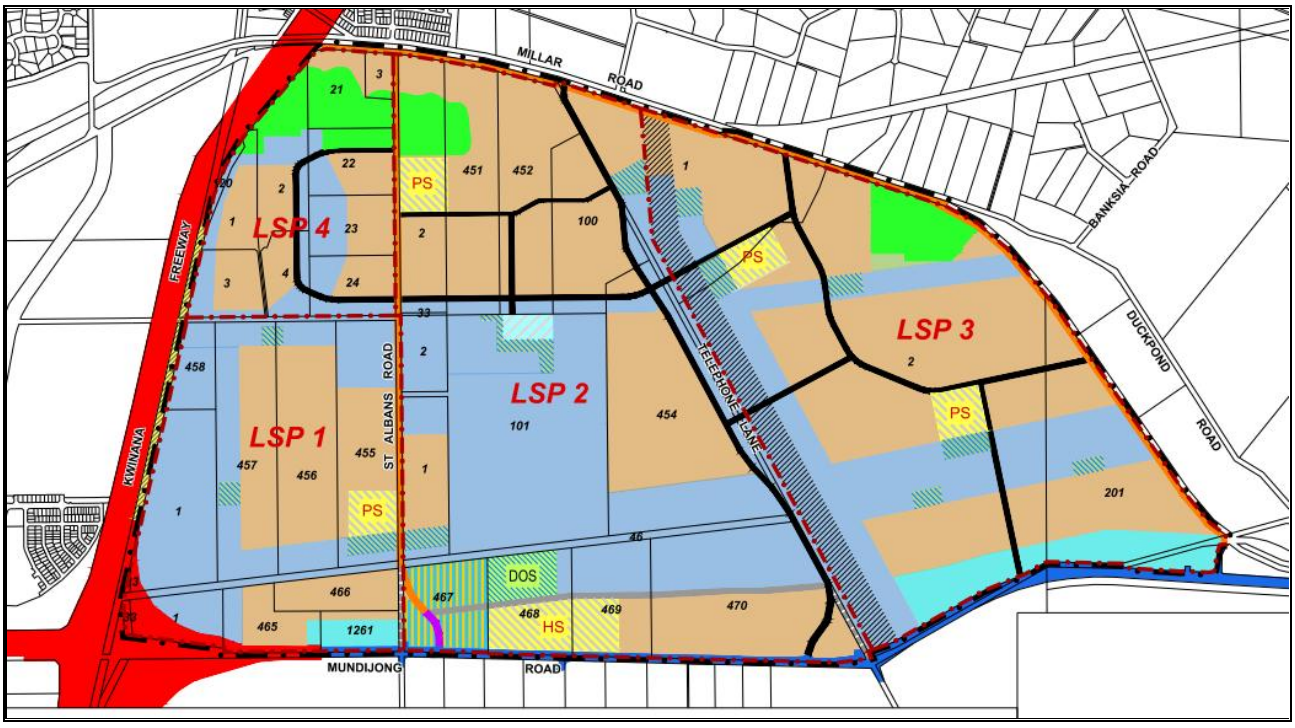
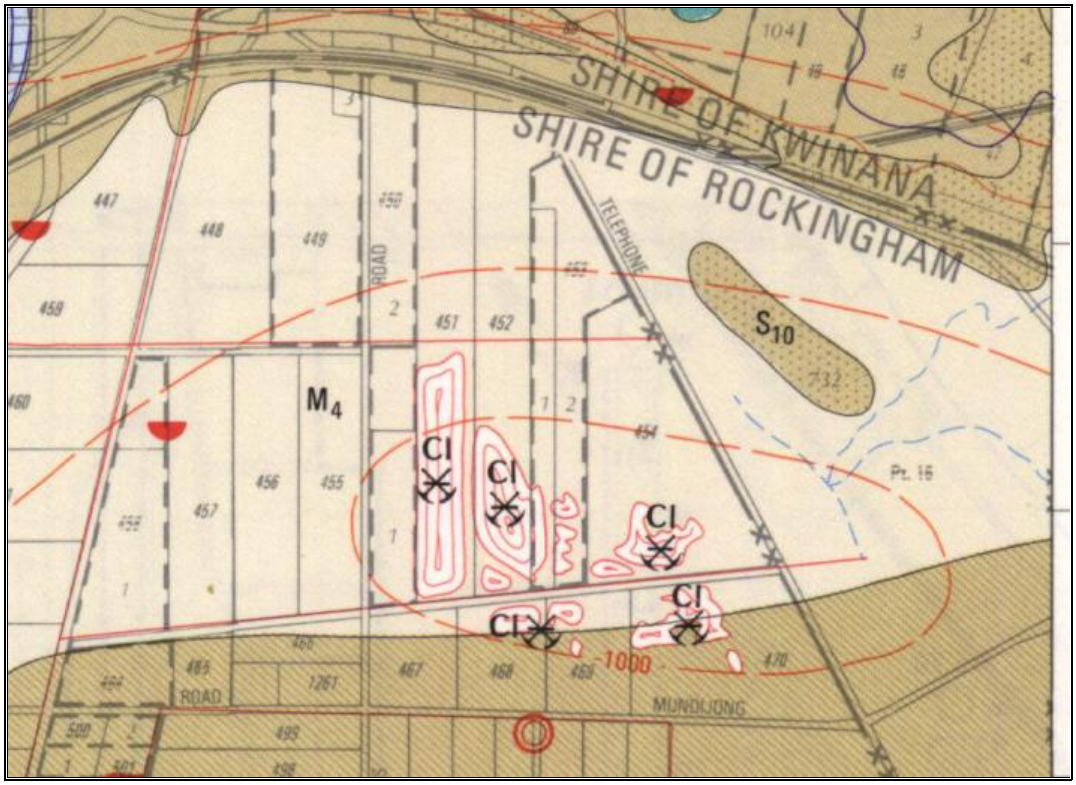


Figure 1 - Site Plan (CLE, 2022)

2. SITE DESCRIPTION

2.1 Geology

The site is generally clay, with sand overlay along the southern boundary adjacent to Mundijong Road, and a pocket of sand in the north east corner of the site, as per Figure 2 below. The clayey condition of the site will likely require some period of preloading to increase the strength of the foundations. Alternative housing typologies may be investigated which can suit the possible differential movement over the development. This may lead to lightweight home construction, or increased strength footings.



M4	**SILT**—Very pale brown silt, soft when moist, firm when dry, low clay content, of alluvial origin. Low permeability; Low corrosion potential, Low to medium slope stability; High ease of excavation; Low to medium shrink-swell potential; Low to medium bearing capacity.	Challenging to develop subject to the depth of the silt layer or depth to silt layer. Typically requires preloading of the site with over 3m of material over a prolonged period of time prior to placement of SAND. Class M or P subject to anticipated settlement.

Figure 2 – Geological Mapping over the District Structure Plan Area

2.2 Landform

The site is generally flat, with a very gentle grade from west to east. The western boundary of the site, adjacent to the Freeway, is at RL5m. The eastern edge of the site, is at RL9m (a grade of 0.1% over the site). The existing groundwater lakes on site and proposed to be retained in the final design and used for stormwater detention.

The majority of the site is cleared, and was previously used as farmland. There are some rows of trees along existing road reserves and tracks, which will be incorporated into the final design where possible.

2.3 Acid Sulphate Soils

The Department of Water and Environmental Regulation regarding potential for acid sulphate soils (ASS) shows moderate to low risk of ASS present for the proposed Site. We don't consider this issue will be a constraint to development.

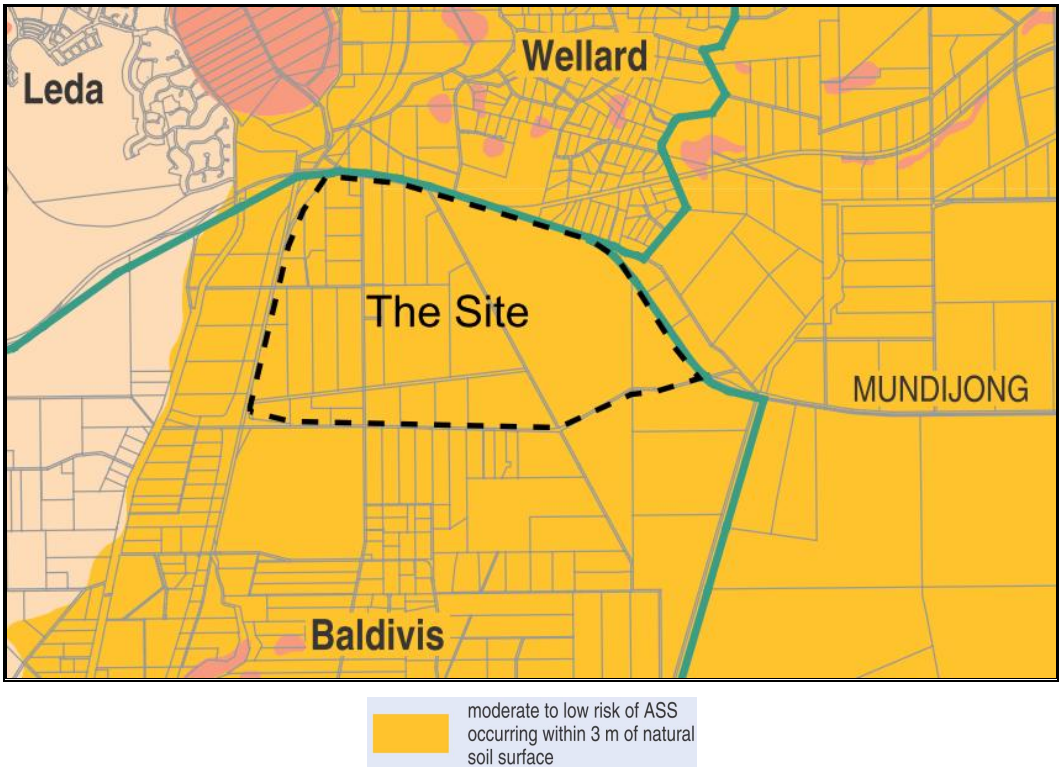


Figure 3 - ASS Mapping

3. EARTHWORKS

3.1 Design

A site responsive earthworks approach is proposed to integrate development into the existing landform. The general intent is to minimise the fill to the site, whilst ensuring drainage, roadworks and sewer reticulation requirements are met.

As a general principle it is proposed to construct just sufficient earthworks for the purpose of constructing roads with suitable gradients and cross fall, and sufficient earthworks across each of the development precincts such that the precinct can be developed for their intended use.

The District Structure Plan area requires a similar quantity of imported fill per square metre of development as many current developments in Perth's north east, south east and south west corridors. As examples; the land around Brabham, West Swan, High Wycombe, Southern River, Forrestdale, Harrisdale, Martin, Armadale, Mundijong and West Pinjarra typically require a range in fill depth of between 1.0m and 2.0m. Development within the DSP can be delivered for the same relative construction costs per dwelling.

Figure 4 – Site Photo, The Site (Telegraph Lane)

3.2 Import Fill

There are large untapped and developed sources of fill material within an economical distance from the District Structure Plan area. Quarry Industry representatives have confirmed sand quarries in the Karnup and Baldivis area have magnitudes more fill material than the Site will ever require. These quarries are currently in use and material is being hauled to sites many kilometres beyond the Site at market competitive rates proving fill could be delivered today at a cost per unit comparable with developing land in Baldivis.

The housing yield over the DSP is approximately 6,000 lots over a period of approximately 15 to 25 years. The rate at which fill material will be delivered to site will be no different to operations currently underway on many different sites in Perth.

Where feasible, some cut-to-fill will be undertaken on-site, minimizing imported fill requirements.

Once rezoning has occurred, the project is committed to undertaking a "value-engineering" investigation to minimize imported fill requirements. This will include a review of servicing requirements, but will also investigate alternative built-form methodologies and alternative servicing strategies.

We understand the environmental implications for sites requiring imported fill, both for the fill site, and the sand mining site. We note the following in relation to this:

- The Site is predominantly cleared, and a concerted effort will be made through the detailed design phase to retain existing trees.
- As discussed above, there is sufficient sand resource in existing mining tenements proximate to the Site, which have already been cleared, or will be cleared under their existing mining licences.

The ongoing supply of sand to the site will be managed over the long period of the development.

4. ROADS AND FOOTPATHS

In order to appropriately understand the road infrastructure upgrade requirements, the road hierarchy needs to be defined for the indicative District Structure Plan area (DSP). PJA has provided a technical note which discusses the existing road network capacity and upgrade requirements based on urbanisation of the subject site as shown in Figure 5.

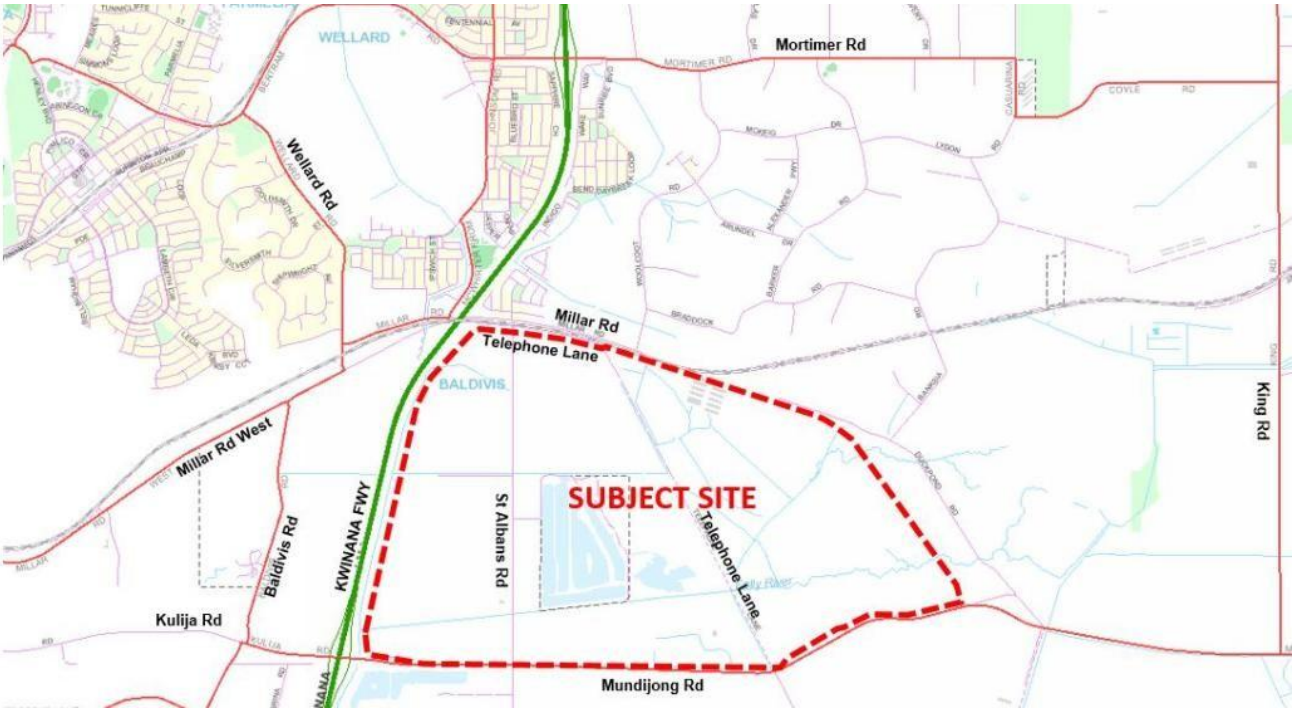


Figure 5 – Road Network

We note that PJA's traffic modelling is based on 2051 traffic figures. This is a 30 year time horizon to enable the developments within the DSP to be fully realized. Road upgrades are required due to traffic flows generated from development of the DSP. It is most likely that these will be funded as part of a Developer Contribution Scheme.

Main Roads WA has developed concept plans for future upgrading of the Kwinana Freeway / Mundijong Road systems interchange to a standard similar to the recently constructed Tonkin Highway / Roe Highway interchange. This interchange will be a responsibility of Main Roads, and will require additional land at the south west corner of the site which has currently been reserved under the MRS.

All internal roads through the Site will be sealed and built to an urban standard. Kerbing will be incorporated on road sections and pedestrian footpaths provided for walkable traffic.

Mundijong Road

Currently Mundijong road is a single carriageway regional distributor designated as an 'Other Regional Road' in accordance with the MRS with a current theoretical maximum capacity of 15,000 vpd. The road currently sits within a 20m wide road reserve. The posted speed limit varies from 100km/h east of St Albans Rd, changes to 80km/h at this point, then changing to 70km/h at the Kwinana Fwy interchange.

Projected 2051 traffic figures, detailed in the PJA Report (2023) for the extent of Mundijong Road fronting the DSP area ranges from 40,000vpd on the eastern end (of which 9,300vpd is DSP generated traffic) to 55,900vpd near Kwinana Freeway (of which 19,600vpd is DSP generated traffic). These figures were derived following close

consultation with Main Roads WA and Department of Planning, Lands and Heritage who have provided expected background (non-DSP development) traffic on Mundijong Road upon ultimate development of the surrounding Planning Investigation Areas. Due to current insufficient capacity, Mundijong Road will require upgrading, anticipated to Integrator A standard with ultimate six lanes between the freeway and the high school site, and four lanes for the remainder. The road reserve will be widened to the north by 20m, for a total of 40m wide road reserve, which has been taken into consideration for the DSP.

The DSP will not prejudice the State Government's ultimate upgrade to Mundijong Road (which could be 4 or 6 lanes in the future) however, DSP traffic would only generate the need for a 4-lane road along the majority of the DSP frontage.

St Albans Road

St Albans Rd is a single carriageway rural road providing a link between Telephone Ln to the north and Mundijong Rd to the south. The existing intersection with Mundijong Rd forms a four-way priority controlled intersection, with stop signs on St Albans Rd.

Based on the results of traffic modelling St Albans Rd needs to be upgraded to Integrator A (four lanes) from Mundijong Rd for an extent of approximately 360m then transitioning to Integrator B standard (two lanes) for the remaining 2.1km to Telephone Ln. The anticipated 2051 daily flows on St Albans Rd is 12,000vpd and ranges considerably from 3,000vpd on the northern end to 21,000vpd on the southern end. The reconstruction of St Albans will result in a diversion of the road reserve and pavement at Mundijong Road to avoid a 4-way intersection, and significantly reduce the intersection works required.

An example of the intersection between St Albans Road and Mundijong Road is shown below in Figure 6.

Figure 6 – Typical Intersection St Albans (Ghostgum Ave, Armadale Rd)

Telephone Lane

Telephone Lane forms the northern boundary of the site as a single carriageway rural road before veering south through the site along the Western Power easement as an unsealed road to an intersection with Mundijong Rd. The sealed portion of Telephone Ln extends to the west under the Kwinana Fwy underpass as a 2-lane road and forms the eastern leg of the intersection with Wellard Rd and Baldivis Rd. This section of road cannot be widened due to the bridge abutments, nor does it require it. This section of Telephone Lane under the bridge will carry less than 15,000vpd (~12,500vpd).

Telephone Ln is to be upgraded to Integrator B (2 lanes) standard from just east of the Kwinana Freeway bridge to Duckpond Road. The Integrator B along the northern boundary of the DSP will function adequately as a 22.0m wide road reserve due to it abutting a railway reserve. Similarly, Duckpond Road as an Integrator B without on-street cycle lanes and on-street parking can function as a 22m wide road reserve. It is unlikely that this upgrade can be completed via widening and overlay of the existing pavement, so it is expected that this upgrade will require reconstruction of the road.

The north-south alignment of Telephone Lane is adequate as a Neighbourhood Connector with 2051 flows estimated to be nor more than 7,000vpd (it carries no background traffic).

The intersection of Telephone Lane is also proposed to be offset, to avoid a 4-way intersection with Telephone Lane to the south. An example of the T Intersection, with the 4 lanes in Mundijong Road, is shown below in Figure 7.

Figure 7 – Typical Intersection Telephone L:ane (Wharton Rd, Armadale Rd)

Pug Road

Pug Road is currently an Access Rd to rural standard with 7.5m seal width.

Pug Road as this road will provide access to the northern portion of the Lot 456-457 St Albans Rd where the primary school is proposed to be located. Due to the condition of the existing pavement, it is not reasonable to expect that this upgrade can be completed via widening and overlay of the existing pavement.

Cossill & Webley considers that this upgrade will involve full reconstruction of the road.

5. STORMWATER DRAINAGE

The Wellard Farms development forms part of a study area encompassing 760 ha of the North-East Baldivis region, and in particular forms part of the floodplain of the Birrega Main Drain. The site is currently drained by a combination of deep and narrow rural drains. The land use surface is typically farmland, with grassed pastures covering a vast majority of the land.

Currently the lands are protected from flooding by a levee along the western bank of the Birrega Main Drain, located to the east (up-gradient) of the site. The North-East Baldivis flood modelling and drainage study, developed by the Department of Water (DoW) (Marillier, 2015), reports that levee overtopping is possible in large storm events:

"levee failure should be considered as a realistic possibility for events close to and above the 100 yr event in size. The Duck Pool location will overtop in a 100 yr event, and is therefore the most likely location of levee failure"

Overtopping of the levee at Duck Pool is by design, with the *Birrega and Oaklands flood modelling and drainage study,* developed by the Department of Water and Environmental Regulation (Hall, 2015), describing how the Birrega Main Drain was designed intentionally to overtop in this location:

"The breakout of large flood events at Duck Pool is a deliberate feature of the Birrega drainage design, as specified in the Public Works Department's Rural Drainage Manual."

However, more significant overtopping along a broader section of the main drain (between Duck Pool and Mundijong Road) due to failure of the levee structure has also been identified as a possibility by DWER.

"The western levee banks along the Birrega and Oaklands Main Drains in the event of failure introduces a potential flood hazard to the adjacent landholders. The levees on Birrega and Oaklands drains are not regularly maintained to a standard that would protect from significant flooding, so it is important that the flood modelling includes a 'levee banks fail' scenario to examine the potential flood extent."

Likely as a function of the scope, the analysis undertaken by the DoW as part of the both the flood studies did not include any geotechnical or structural assessments of levee banks along the Birrega Main Drain. Instead, it was concluded that, because the levee is not regularly maintained, that there exists the potential that the levee could fail. The extent of the levee that could impact on the lands relates to a 1.2km extent of the western bank between Duck Pool and the Mundijong Road bridge.

In accordance with the *North-East Baldivis flood modelling and drainage study* a levee failure scenario was modelled for the 100 year event which shows very significant flows into the site. More recent flood modelling undertaken by DWER to inform the East-of-Kwinana Planning Investigation Area assessments adopted this levee failure scenario as the base-case scenario for the land west of the main drain (including the subject site) in a 1% AEP (100 year ARI) event. In this scenario 73 m3/s is considered to flow from upstream through the study area to the Peel Main Drain.

Pentium Water have been commissioned to undertake flood modelling of the District Structure Plan area to investigate the flood and flow behavior prior and post urban development. The objectives of the tasks undertaken was to assess various development scenarios and determine flood storage requirements within the DSP area, to maintain the up- and downstream flood regime in line with DWER's regional flood model. The modelling informed the DSP layout, flood corridor design and concept design of infrastructure to control water levels and discharge across the study area and through the Peel Main Drain, which is the major, local waterway receiving flows from the study area. Furthermore, water level afflux was calculated to ensure that any proposed development does not cause impacts upstream and downstream of the study area.

The breakdown of tasks to achieve these objectives is as follows:

- Develop a detailed local-scale model of the DSP area and adjacent up- and downstream land, based on key parameters / outputs from the Department of Water and Environmental Regulation's (DWER) regional flood model.
- Refinement through the addition of surveyed structures, such as culverts and levees/bridges across the

study area and surrounding land.

- Investigate the impact of development on flood levels and flows through the Peel Main Drain and upstream land owners through the addition of a post-development design surface and updated hydraulic parameters based on a proposed structure plan.
- Establish updated flood criteria for post-development flow rates and flood storage.

Post- development modelling showed that urban development in the region causes no significant increase in flood levels upstream of the study area and that pre-development flows in the downstream part of the Peel Main Drain can be maintained, provided sufficient flood storage is provisioned through the DSP area.

Cossill & Webley have worked closely with Pentium Water to establish an earthwork strategy to create corridors of flood storage and conveyance through the site. Within these corridors, and potentially through parts of the developed area, living streams will convey the frequent storm events and provide the discharge point for subsoil drainage. The finished product is covered in more detail in the Landscape Report. Please see below Figure 8 which shows the flood storage and conveyance corridors and indicative living streams alignments through developed areas. Further detail of the management of the stormwater through the site is contained within the District Water Management Strategy (2023) prepared by Pentium Water.

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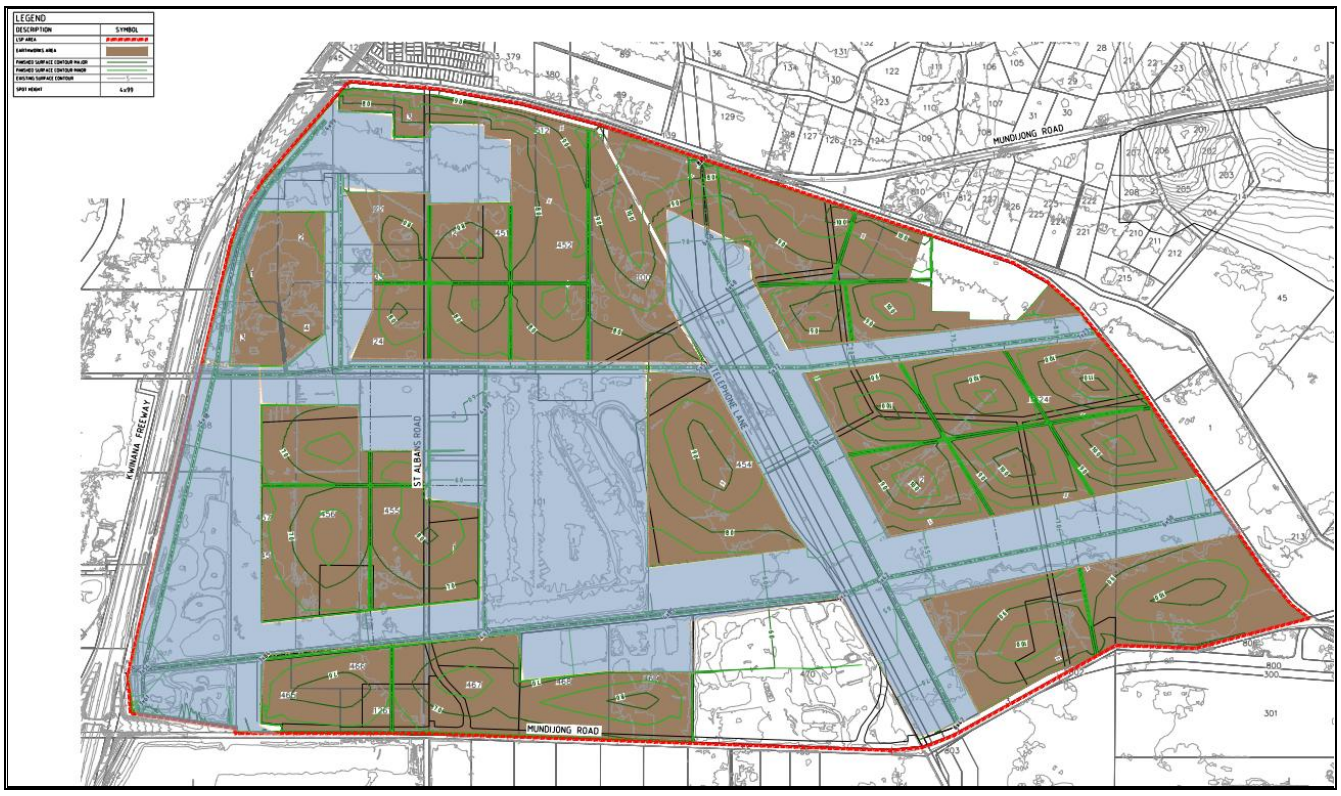

Figure 8 - Overland Stormwater Swale Paths

6. WATER RETICULATION

The Water Corporation is currently reviewing water supply planning for the Site.

Cossll & Webley has conducted a desktop study advise on the likely water servicing requirements for this site. There is a DN250 PVC water main located in Bertenshaw Road which will likely have capacity to service the Site in the initial stages. The closest connection point is at the intersection of Bertenshaw Road / St Albans Road.

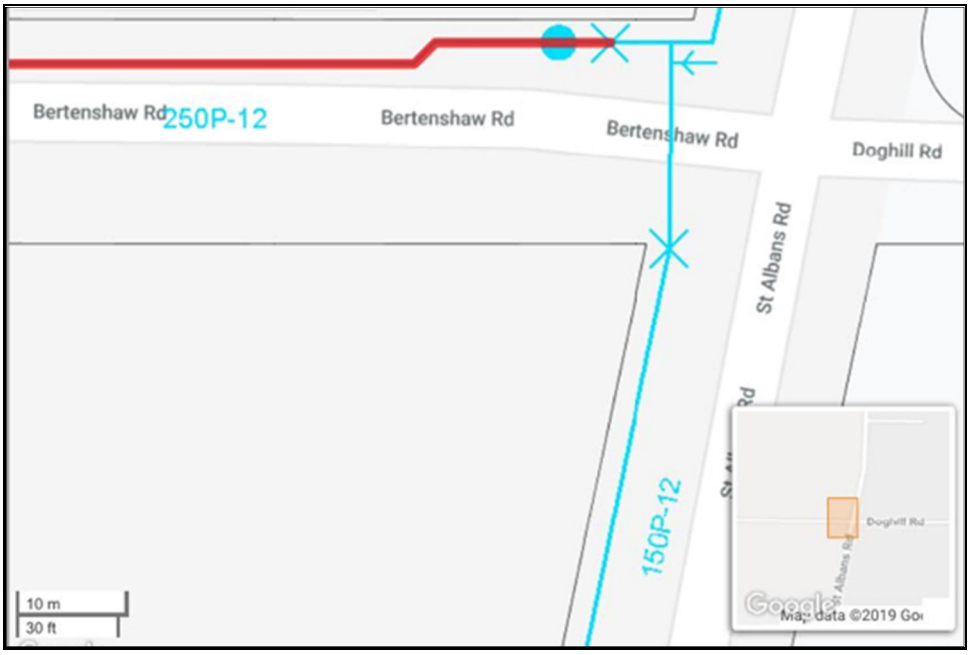

Figure 9- Water Supply Connection

We note that more extensive upgrades may be required depending on the timing of development and capacity of Water Corporation capacity in the surrounding areas at that time. The Water Corporation may require more extensive upgrades based on their strategic planning to upgrade and reinforce their infrastructure to meet the demands of the wider area.

Based on the available information, it is likely that a DN250 water main extension would be required to extend from the intersections of Bertenshaw Rd and St Albans Rd as shown in Figure 9. This will replace the existing DN150 water main which extends north along St Albans Rd to Wilford Rd, and extend a total distance of 4km to service the site.

Once the development area is covered by the Water Corporation's Water Supply Scheme, the Developer will be required to construct this extension on behalf of the Water Corporation through a Developer Constructed Headworks Asset Process. The Developer will be asked to prefund the design and construction of the asset, with the Water Corporation recouping the funds in accordance with the scheduled funding in this program.

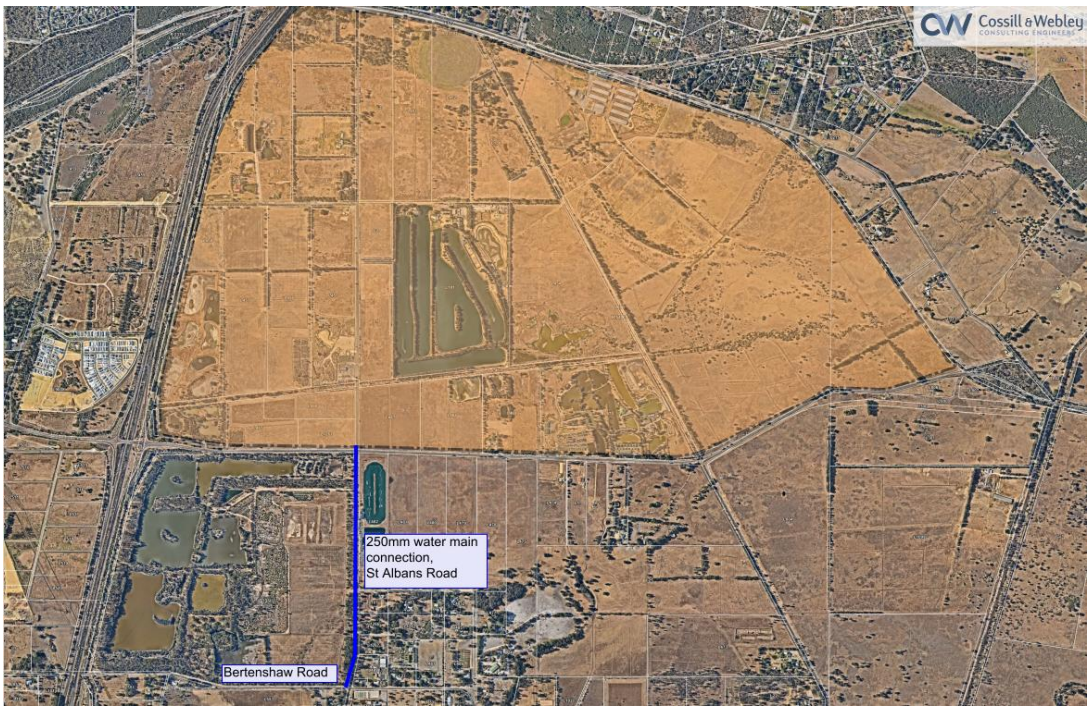

Figure 10- Water Supply Route Stage 1

7. WASTEWATER RETICULATION AND DISPOSAL

The Water Corporation has not commenced forward planning of the site, and they are not currently in a position to provide a solution regarding the waste water servicing requirements for this site

Cossill & Webley has conducted a desktop study to present our view on the likely wastewater servicing requirements for this site. The completion of the East Rockingham Wastewater Treatment Plant has expanded sewer capacity in the Baldivis area with significant sewer infrastructure. There is a long term proposal for a Type 180 Waste Water Pump Station on Kerosene Lane, planned to service the East Baldivis District Structure Plan area however the Water Corporation has advised the timing for this pump station is currently long term.

Without formal advice from the Water Corporation, we have assumed the indicative flows from the Site will be discharged to the west, and ultimately to the East Rockingham Wastewater Treatment Plant. The offsite flows for this area is estimated at 101 L/s, which would require a design pump flow of 134 L/s (1.33 * the GSDF). Initial waste water design flows have been estimated in accordance with Water Corporation design standards

1.1 Required Infrastructure

As a basis preliminary planning, strictly in accordance with the Water Corporation's design standards, we propose that a centrally located Type 180 pump station would service the site supplemented by a Type 40 pump station in the south east corner of the site to facilitate the earthworks strategy. Waste water is proposed to be discharged offsite via approximately 5.6km of pressure main to the future Type 180 Main Transfer WWPS in Kerosene Lane, Baldivis. The waste water servicing strategy is illustrated below in Figure 11.

As sewer master planning advances, Cossill & Webley will investigate the value of deviating from the design standard in terms of waste water pump station (WWPS) depth. DS51 stipulates that the invert level of the inlet pipe shall not exceed 6m in depth at the connection to the wet well unless specific approval is obtained from the Water Corporation. However, there is potential to eliminate the need for the Type 40 WWPS if the Water Corporation gives approval to deepen the Type 180 WWPS.

Note that the sewer design is subject to change following the completion of future planning over the area by the Water Corporation. Once the Water Corporation has completed this future planning, it is likely that the on-site WWPS's and associated pressure mains will be included in Water Corporation's Capital Works Program. This would likely result in these works being funded by the Water Corporation depending on development timing.

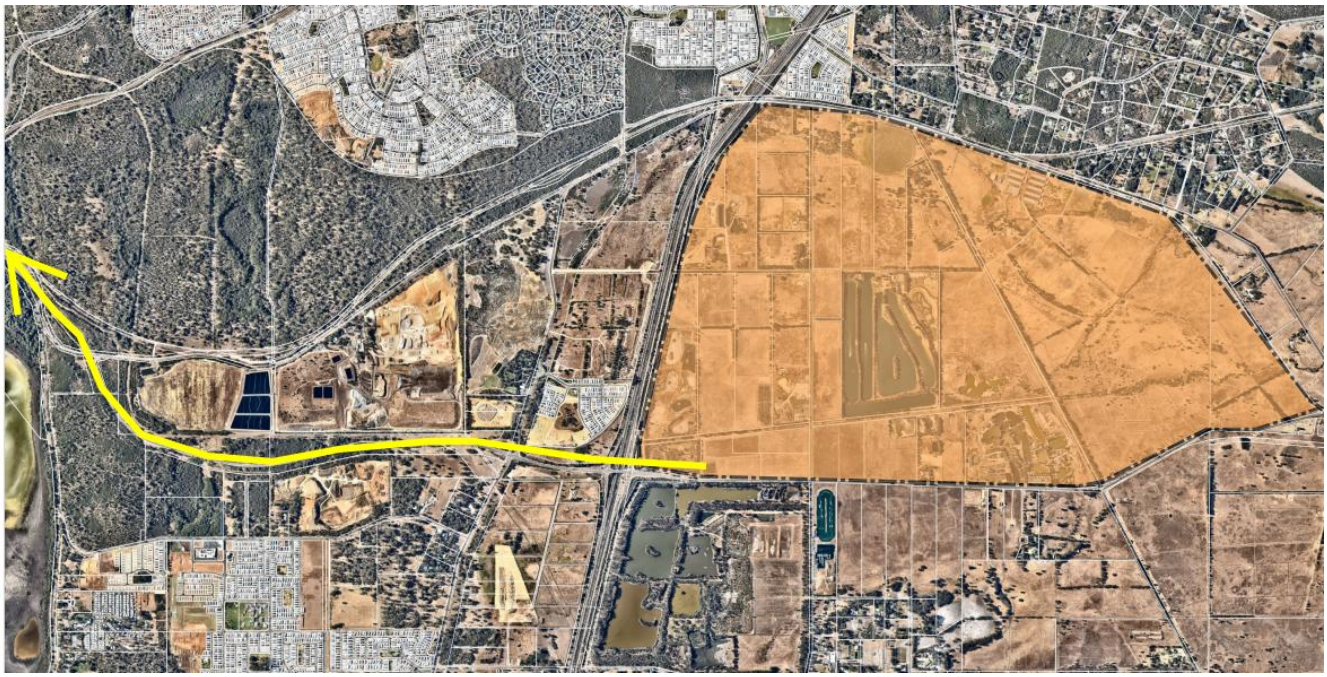

Figure 11- Waste Water Pressure Main Route Stage 1

8. CONSTRUCTION WATER REQUIREMENTS

It is anticipated that construction water will be required at each stage of development to facilitate the civil and building works, including dust suppression.

High level estimates assume this demand is likely to be in the order of 25,000-40,000KL, which is proposed to be supplied via groundwater. This would be a temporary water use, and would be applied for separately at the detailed design stage. Further discussion on groundwater licences is provided in the Wellard District Water Management Strategy.

9. POWER

The forecast networks capacity shown on Western Power's Network Capacity Mapping tool indicates that this development's power requirements will exceed the forecast remaining network capacity from 2026 onwards (noting that this tool compares existing infrastructure capacity to project demand).

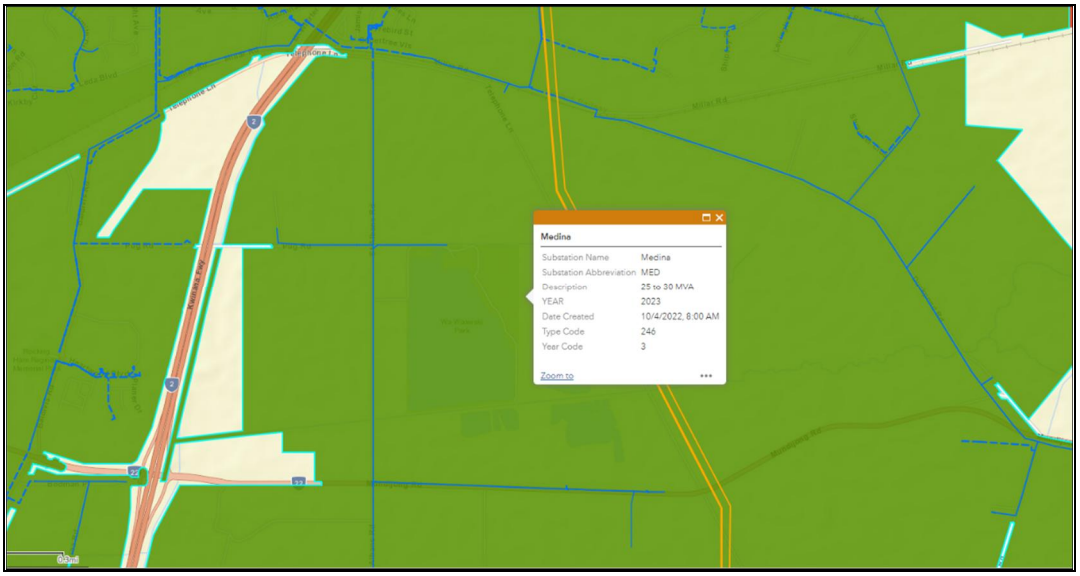

Figure 12- Western Power Mapping – Extract 2022

Western Power consider 250 lots/year to be natural growth and should not trigger a capital works project to reinforce the HV in the area. Western Power generally have options to reconfigure their network to support natural growth. There is a possibility that an initial feeder me be required for the site, given the power demand at that point will not be economically viable for Western Power.

Based on a yield of 6,000 Lots and four school sites with an area of 3.5Ha each, the power requirements for the District Structure Plan is estimated to be 32MVA.

At this stage it is likely that a HV feeder will be required at some point during the life of this project. This feeder would most likely be required to extend 8km to the nearest substation in the Medina Subdivision on Thomas Road, Kwinana as shown in Figure 13.

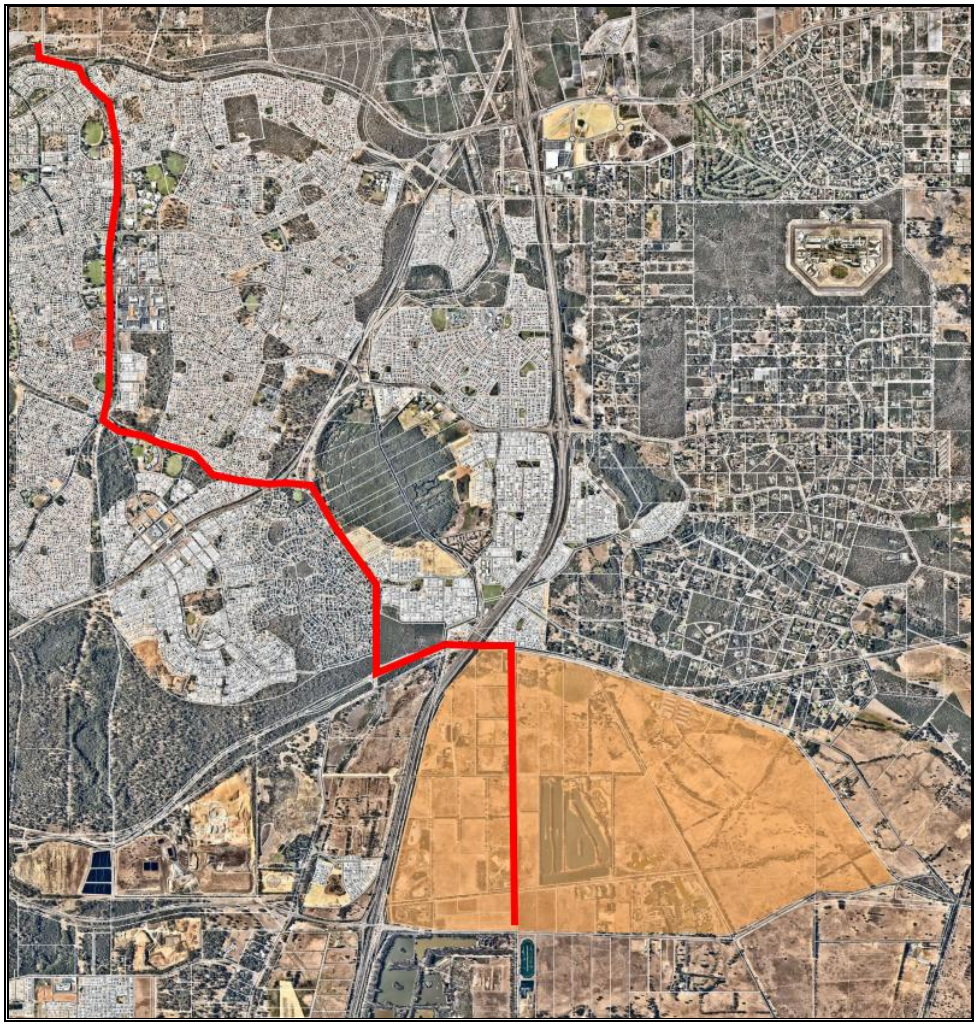

Figure 13 Power Connection to Medina Substation

The overhead lines will need to be removed from the site, and relocated to an underground HV. Underground power will be provided to all new sites and via a network of cables. These works will be designed at the time of development. The existing overhead HV lines will be able to support the first stages of development.

10. GAS SUPPLY

Reticulated gas is not proposed within the development.

11. TELECOMMUNICATIONS

We anticipate the Site will be serviced via an extension of the existing NBN network. Under the current NBN scheme, the developer is required to enter into an agreement to provide infrastructure which is handed over free of charge to NBN Co upon completion. The installation of the communication service to the resort would be funded through NBN, with developers responsible for funding the internal pit and pipe and a contribution to the backhaul costs (through existing network or via satellite receiver).

Capacity of the existing NBN Co and any potential backhaul costs will be finalised through the submission of a formal application with NBN.

An alternative to NBN would be through private communication supplies such as Opticom. These are expected to be available adjacent to the District Structure Plan area and will provide alternatives to the NBN network.

12. IMPLEMENTATION & STAGING

It is anticipated the Site will be developed over a period of 15-25 years, depending on the development rate. This is currently proposed to be staged over 4 Local Structure Plans, and many subdivision stages.

The provision of engineering infrastructure will be developed as part of the construction process over this time as it, followed be development of the built form. The indicated Local Structure Plan stages are shown below in Figure 14, with the first area to be developed in the south west corner of the site, east of St Albans Road and adjacent to the freeway access at Mundijong Road.

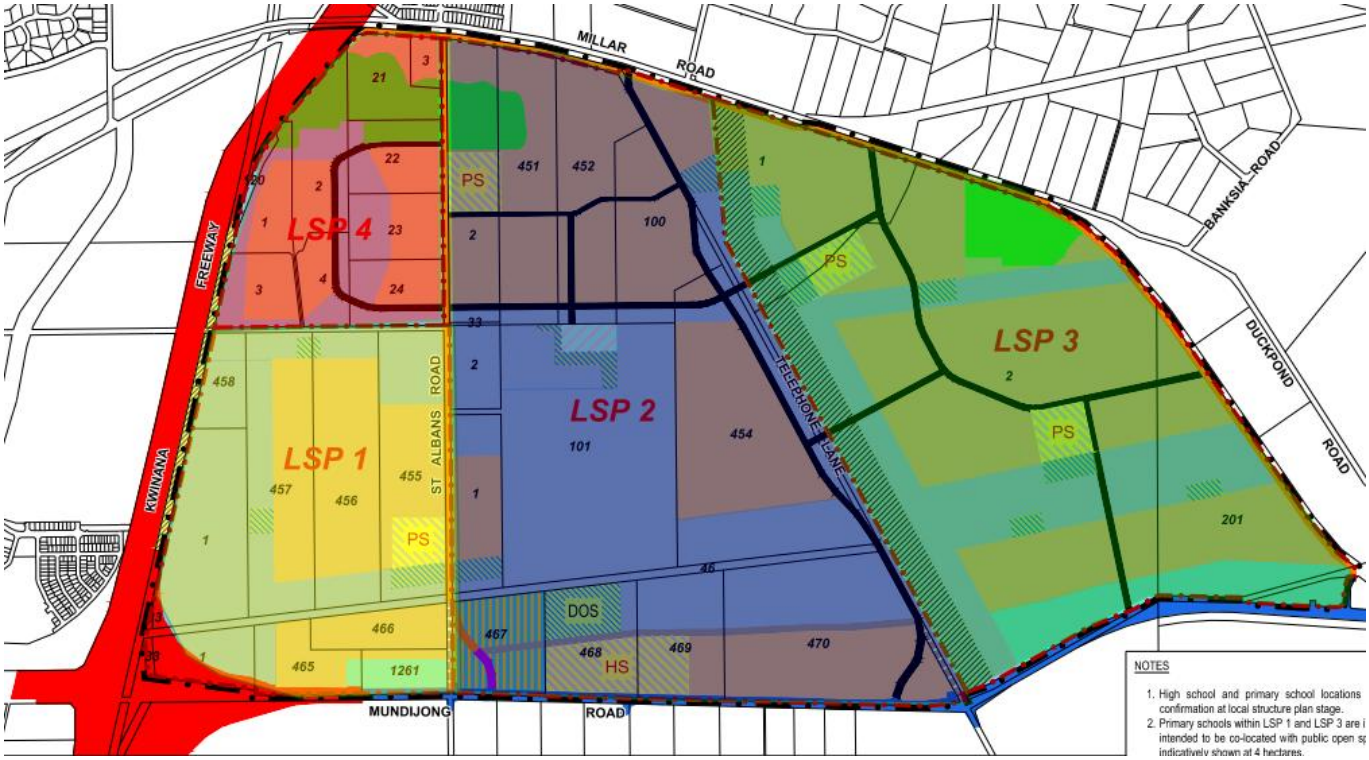

Figure 14 Local Structure Plan - Staging

13. CONCLUSION

Based on the current information available, it is considered feasible and achievable to provide all the required servicing infrastructure to the proposed Mundijong Road DSP as follows:

> Sewerage reticulation will be provided with strategically located pump stations to facilitate the earthworks strategy. The waste water will be discharged offsite to the East Rockingham Waste Water Treatment Plant, either via Type 180 WWPS on Kerosene Lane, or directly pumped to the treatment plant.

> Water supply will most likely be provided by an extension of the existing DN250 water main at Bertenshaw Rd in the first instance. Ultimate water demand may be serviced with through connection to the Water Corporation main distribution system.

> It is considered most likely that the developer will be required to construct the initial HV feeder to the Medina Substation to provide sufficient power supply to the site (estimated at 32MVA). Ultimate development of the DSP may require a new Zone Substation.

> Pentium has undertaken refined flood modelling of the District Structure Plan area to investigate the flood and flow behaviour prior and post urban development. Following analysis, the DSP region has the ability to support urban development without affecting surround land uses.

> Communications will be provided to this development. Based on the extent of the NBN network constructed to date, this will most likely be an extension of the cable from Millar Rd.

> It is not expected that that the ATCO Gas network will be extended through the development area.

APPENDIX A
Bulk Earthworks Strategy
6489-00-SK01 (Rev H)

LEGEND

DESCRIPTION	SYMBOL
LSP AREA	
EARTHWORKS AREA	
FINISHED SURFACE CONTOUR MAJOR	
FINISHED SURFACE CONTOUR MINOR	
EXISTING SURFACE CONTOUR	5
SPOT HEIGHT	4x99

REV	DATE	DRN	CKD	APP	AMENDMENT
H	28.03.23		-		ISSUED FOR INFORMATION
F	06.09.22	ARH			LAYOUT AND EARTHWORKS MODEL (REV'D') UPDATED
E	15.07.22	ARH			UPDATED LOT LEVELS
D	26.05.22	ARH			UPDATED PLANNING LAYOUT AND LEVELS
C	07.05.22	ARH		M. WALLIS	EARTHWORKS LEVELS UPDATED

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This plan shall only be printed in full colour. If this plan is printed in black and white or grey scale it is not to be used for construction

This plan is not to be used for construction unless issued as revision 0 or higher

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CLIENT Stockland

APPROVED

DESIGNED AMC

SCALE AS SHOWN

PROJECT WELLARD FARMS

TITLE 000 - GENERAL EARTHWORKS CONCEPT

WAPC No.

DRAWING No. 6489-00-SK01

REVISION H

ORIGINAL SIZE A0

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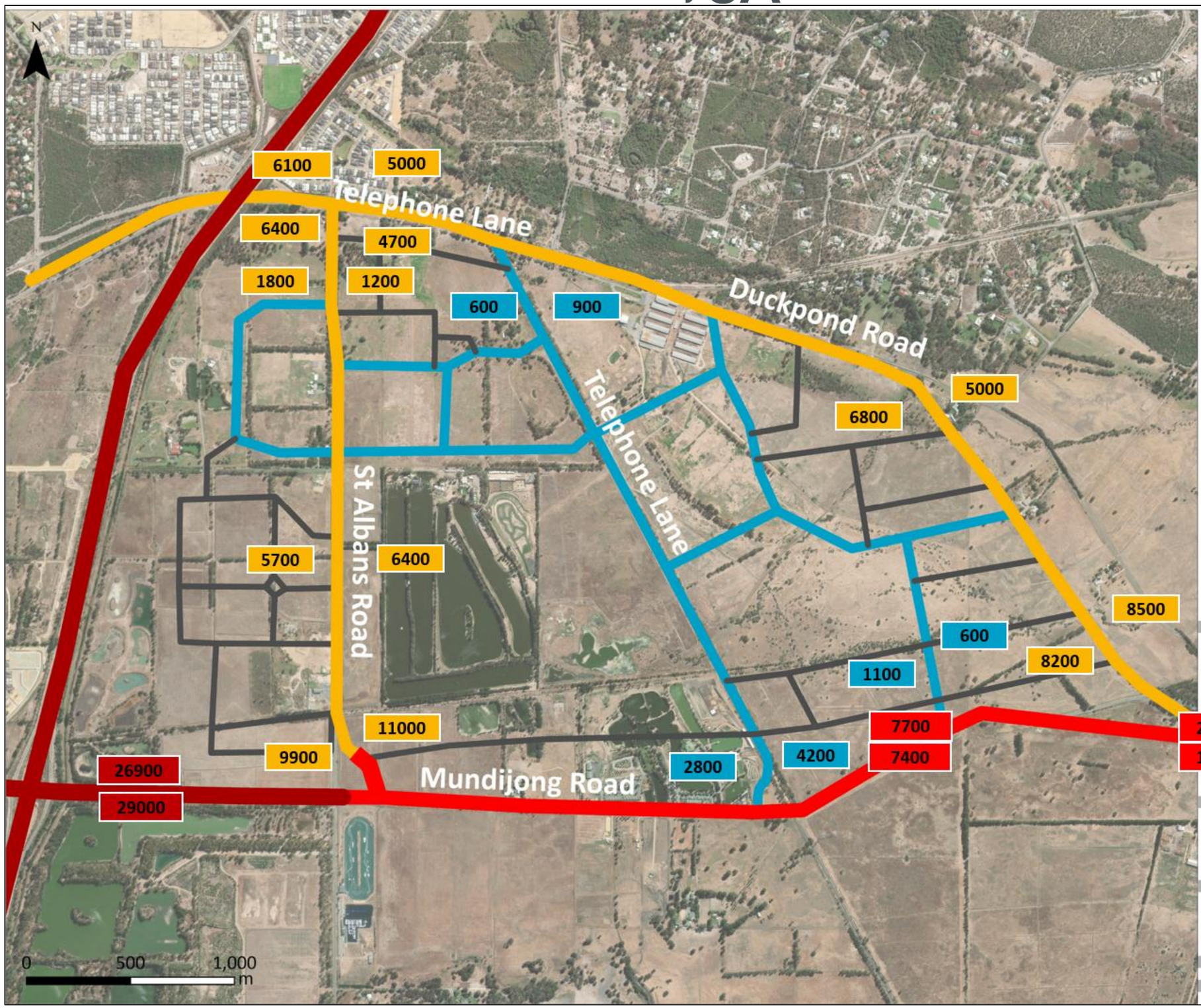
APPENDIX B
Proposed Internal Ultimate Road Network
(PJA 2023)

PJA



Primary Distributor
Integrator A
Integrator B
Neighbourhood Connectors A
Access Streets

Maxar

PJA
Level 27
St Martins Tower
44 St Georges Terrace
Perth
WA 6000
Australia

CLIENT
STOCKLAND

PROJECT
WELLARD DSP

TITLE
Proposed Internal Ultimate Road Network

FIGURE NUMBER	REVISION
01	B

SCALE	DRAWN	REVIEWED	DATE
A3 @ 1:16,480	MW	LB	14/06/2023