APPENDIX G
ENGINEERING SERVICING REPORT

Cossill & Webley
CONSULTING ENGINEERS

Ingham Sinagra
STOCKLAND
MRS Amendment - Engineering Servicing Report
15 April 2019

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1. EXECUTIVE SUMMARY

General

Cossill & Webley Consulting Engineers (CW) have been engaged by Stockland to provide an Engineering Servicing Report as part of the MRS Amendment required to rezone the Ingham Chicken Site - Lot 1665 Wanneroo Road Sinagra (henceforth to be referred to as "the Site") to Urban. This report presents a summary of Cossill & Webley's investigation into the engineering servicing requirements based on a range of residential densities, the Urbis Development Concept plan contained in the Appendix and our knowledge of the Site as of April 2019.

The Site is located adjacent to Wanneroo Road in the suburb of Sinagra in City of Wanneroo. The Site is bound by urban residences and vacant land along the northern and southern boundaries. The eastern and part of the northern boundary abuts an existing Benara Nurseries site. The Site is within the adopted Structure Plan No 4 – East Wanneroo Cell 2 and includes future Public Open Space (POS) and a Primary School.

This report provides the current infrastructure provision and strategies for servicing the Site area as communicated to CW by the relevant regulatory and servicing authorities.

The key observations and findings of this report are as summarised below.

Geotechnical Conditions

Based on the natural topography, there is a significant existing elevation difference across the site from east to west. At a min level of RL29 in the northwestern corner and max level of RL80 on the east, there is a level difference of 51m. The geotechnical conditions encountered on the site by Galt Geotechnics are consistent with the regional geology of the area. This generally comprises of well graded sand which is well suited to urbanisation and has been tested to be very permeable. Limestone pinnacles at the surface and limestone rock at depth were also identified in the geotechnical investigation.

Most of the subdivisional works will require cut-to-fill earthworks of in-situ sand. The finished levels across the Site are dictated by the levels at the Site boundaries and the necessity to grade the finished levels into the two independent sewer catchments. Reasonable efforts will be made to retaining existing trees.

The Galt Geotechnical report completed based on geotechnical investigations completed across the site confirms a Class A site classification according to AS2870-2011 will be achievable.

Road Infrastructure

Vehicular access to the Ingham Chicken operations is currently via Wanneroo Road, which is a two way, four-lane dual carriageway road with a posted speed limit of 60km/hr. Wanneroo Road is a classified a Primary Distributor and is under care and control of Main Roads WA (MRWA).

Wanneroo Road provides excellent connectivity for the proposed development to regional hubs north and south of the Site. MRWA have confirmed that a road connection to Wanneroo Road, near the existing operations intersection is consistent with their long term planning and a road connection is also reflected in City of Wanneroo's Town Centre Structure Plan (2012).

Current traffic volumes for Wanneroo Road exceed 20,000 vehicles per day, and in accordance with State Planning Policy 5.4 "Noise Considerations", it is likely that some noise mitigation strategies will be required for this interface.

All roads and footpaths within the development will need to be constructed in accordance with *Liveable Neighbourhoods* and the City of Wanneroo standards.

Wastewater and Water Reticulation

The Site is generally unconstrained with regards to the management of wastewater. There are two future 225mm sewer mains which will need to be constructed to convey wastewater to the north of the site. One wastewater retic main is required through the centre of the Site, in a north-south alignment and another within the Wanneroo Road reserve graded north. The Water Corporation has confirmed that the proposed flows to the east of the

development area can only be fully accommodated when the Neerabup Main Sewer, located further north of the site, is completed. Construction of the Neerabup Main Sewer is currently underway.

The Site is unconstrained with regards to the provision of reticulated water. The Water Corporation has confirmed that the water reticulation requirements of the Site can be supplied from the water main located in Wanneroo Road.

An existing 1000mm diameter collector water main runs parallel to the southern boundary (within the adjacent land holding) which will need to be protected during construction.

Power

Power is currently being supplied to the Site from the existing overhead powerlines in Wanneroo Road. These are 22kV distribution mains and it is anticipated these will have sufficient capacity for the development. It is not anticipated that any augmentation will be required to the 22kV network to accommodate the load requirements of the proposed development.

A number of substation sites (transformer and switchgear) will be required for the high voltage (HV) power network within the Site.

Gas Reticulation

There are two high pressure gas mains running within the Wanneroo Road reserve, one high pressure and one medium/low pressure. ATCO Gas Australia has confirmed the Site can be served from the existing high pressure gas reticulation in Wanneroo Road.

Communications

Two existing communications cables run within Wanneroo Road (Optus and NBN). As the Site is within 1km of existing NBN Co. infrastructure no offsite headworks charges will be applicable. The developer will be required to enter into an agreement with NBN Co., installing compliant pit and pipe infrastructure and paying the NBN Co's. "Deployment Charge".

Photo 1 – Westerly view of the existing service access road

2. THE SITE

2.1 General

The Site is located approximately 30 km north-west of the Perth CBD within the suburb of Sinagra in the City of Wanneroo, West Australia and is approximately 40.5 hectares. The Site is within the adopted Structure Plan No 4 – East Wanneroo Cell 2 and includes a future POS and Primary School (Appendix A).

The Site is bound by Wanneroo Road to the west, urban residences and vacant land to the north and south and an existing nursery to the east (Benara Nurseries). There are number of existing buildings, sheds, hardstand areas as required for the operations associated with the Ingham Chicken processing facility located on the Site. These are shown below in Figure 1 below.

Figure 1 – Aerial Photography (Spookfish - 08 April 2017)

A number of large good quality mature trees are scattered across the Site as reflected in Photo 2– Mature Trees Located on Site.

Photo 2– Mature Trees Located on Site

2.2 Geology and Landform

The Geological Survey of Western Australia Perth Metropolitan Region Soils Maps (Figure 2) indicates the majority of the Site is generally characterised as Sand (S_7) pale and olive yellow, medium to course grained. This soil type is well suited to urbanisation, and is generally very permeable, allowing for the on-site disposal of runoff from newly created roads and lots.

A geotechnical investigation was completed over the Site in Oct 2017 by Galt Geotechnics. This investigation generally confirms the desktop study. The following points summarises the findings of the geotech investigation;

1. Under the topsoil, the subsurface conditions are SAND with a consistent geology across the Site. Limestone pinnacles at the natural surface were detected in parts as well as limestone rock at a depth exceeding 5.0m
2. The Site is suitable for residential development and likely to obtain a Class A site classification according to AS2870-2011 following the completion of earthworks to the finished level.
3. Groundwater was not encountered within 8.2m of the existing surface (the maximum depth of investigation).
4. The results of permeability and sand laboratory testing indicate that stormwater can be readily managed via infiltration into the natural ground.
5. Limestone pinnacles were evident at the surface along the southern boundary as shown in the Galt Geotechnical Report contained in the Appendices. The exposed limestone pinnacles are readily removed using a small backhoe and should be able to be relocated with standard earthmoving equipment.

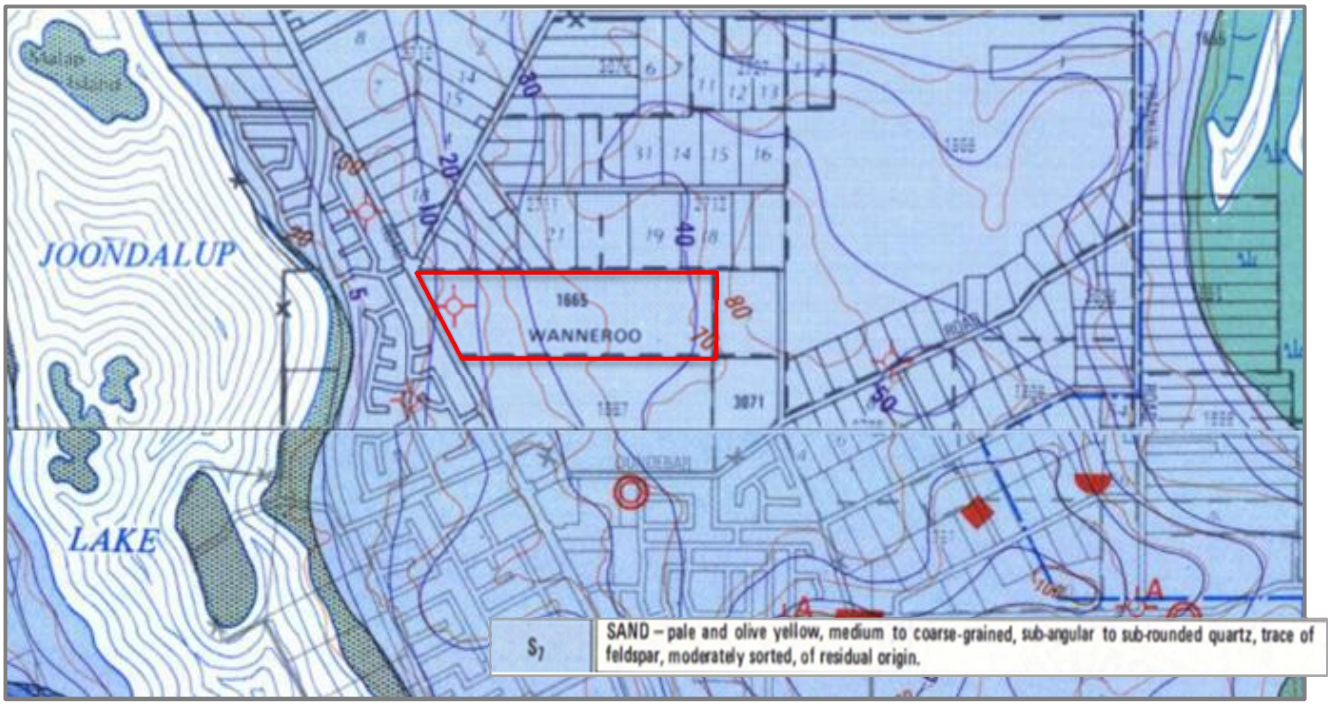


Figure 2 - Geotechnical Information (Geological Survey of WA)

2.3 Contamination and Acid Sulfate Soils

A desk top review of the Department of Environment and Conservation's ASS Risk Map for the South Metropolitan Region for potential for acid sulphates soils (ASS) indicates the Site is classified as having no known risk of ASS potential.

According to a detailed Contamination Site Investigation completed by Strategen in Oct 2017, there was "no widespread or gross soil or groundwater contamination identified".

Photo 3- Vegetation beyond the extents of the existing Chicken Infrastructure

2.4 Topography

Based on topographical information, the Site ranges in elevation from RL 80m AHD at the north-east corner to RL29m AHD at the north-western corner as presented in Figure 3. There is a small depression midway along the northern boundary at a level of RL 60m AHD. The current earthworks design maintains this grade across the site, to minimise earthworks and create a suitable interface to the existing levels adjacent to the perimeter of the site.

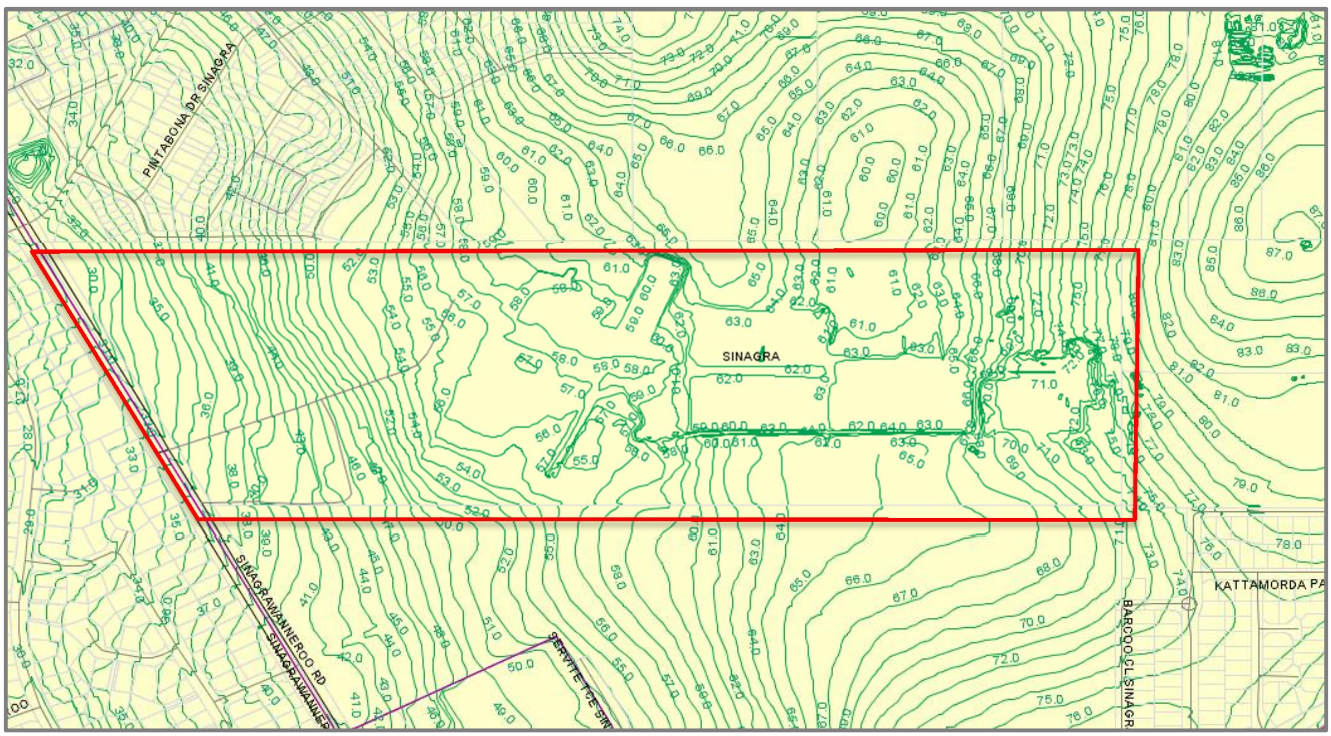


Figure 3- Elevation Contours (1m) (Department of Water 2017)

2.5 Groundwater

A desk top review of the Department of Waters' Perth Groundwater Atlas indicates the Historical Maximum Groundwater Levels vary from RL 40m AHD at the eastern boundary of the site to RL 27m AHD at the western boundary, as presented in below in Figure 4. Given the natural ground levels are substantially higher than this, it is anticipated that ground water levels will have no impact on proposed earthworks design levels and infrastructure installation.

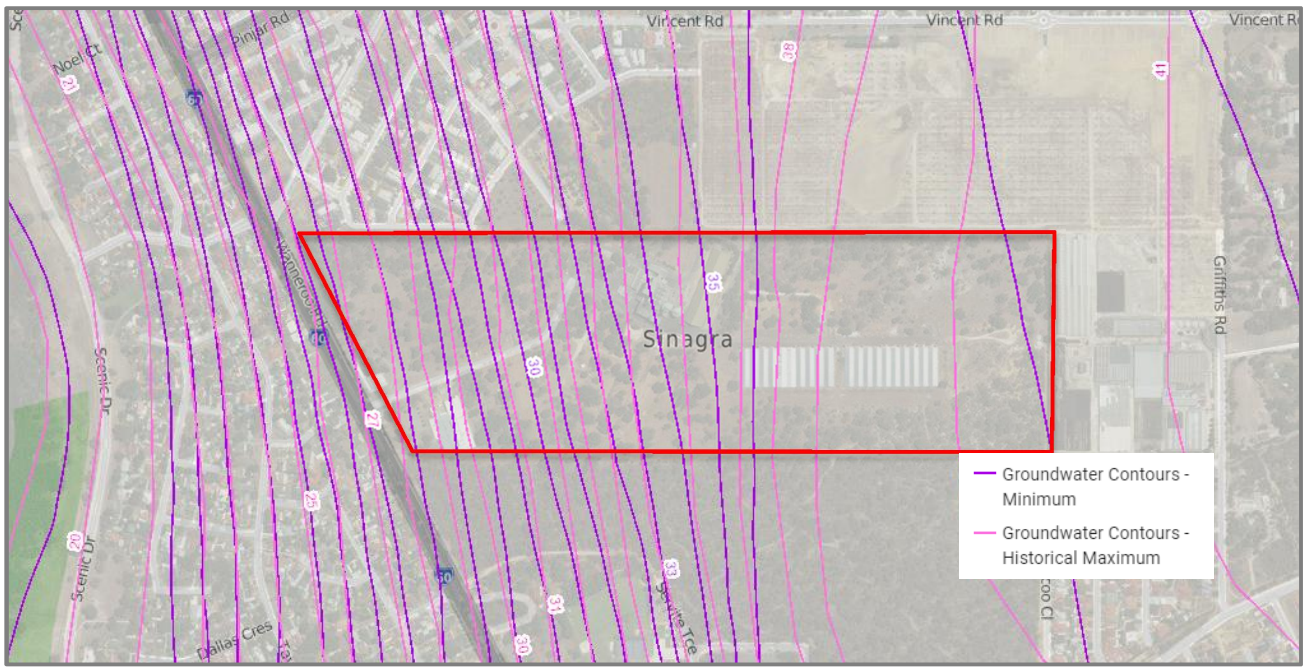


Figure 4 - Ground Water Contours (Department of Water 2017)

3. STORMWATER

3.1 Existing Stormwater

As reflected in Figure 5 below, there are two existing fenced drainage sumps located off Wanneroo Road.

Figure 5- Existing Drainage Sumps (off Wanneroo Road)

These sumps are located at the topographical low point of the landownership boundary.

Figure 6- Southern Existing Drainage Sump (off Wanneroo Road)

The Site consists of free draining sand with substantial cover to the prevailing groundwater. As such, it expected that stormwater from the proposed development will readily infiltrate into the insitu ground.

3.2 Stormwater Collection and management

It is anticipated that stormwater runoff within proposed residential allotments will be contained within their property; with stormwater disposed via soakwells or other infiltration facilities which form part of the building. In areas of high urban density, allowance may be made to manage a proportion of the runoff in the City of Wanneroo controlled street drainage network which will ultimately discharge into the Public Open Spaces. This would provide a more practical response for higher density sites and allows the runoff from larger storms to be managed away from the built form.

Given the geology and high permeability soils, where practical storm events up to 1 in 1 year – 1 hr Average Recurrence Interval (ARI) would be infiltrated in swales and where permitted gully pits with permeable bases. Tree wells and flush kerbing will be designed where practicable (subject to City of Wanneroo approval). Where stormwater from the 1:1 year event cannot be infiltrated at source, the stormwater will be conveyed to the local low points where stormwater runoff infiltration areas will be co-located within public open space.

Roads and POS would be designed to cater for the surface overflow for more severe storms with building pads constructed at least 300mm above the 1 in 100 year ARI flood or storage level at any location.

Where practicable, and assuming there is sufficient capacity available in the existing fenced sump off Wanneroo Road, to maximise active recreational space, additional stormwater should be conveyed to this sump. According to the infiltration testing completed during the geotechnical investigation, seven of the eight tests returned permeability results exceeding 15m/day.

Figure 7- Proposed location of drainage infiltration area (Central POS)

4. ROADWORKS AND FOOTPATHS

A preliminary assessment of the traffic and transport planning for the Site has been completed by a Cardno which is summarised below.

4.1 Regional Roads

Road access to the Site is currently via Wanneroo Road. Wanneroo Road is a Main Roads WA (MRWA) Primary Distributor and exists as a four-lane divided road, fully kerbed and drained adjacent to the Site. This road provides excellent connectivity for the future development to regional hubs north and south of the Site.

There is an existing right-turn deceleration lane or turn pocket for vehicles travelling north on Wanneroo Rad. This turn pocket currently services the Ingham Chickens site and is approximately 90 meters long

Figure 8 – Existing Wanneroo Road Site Access

4.2 Development Roads

The planning layout across the Site includes key linkages to surrounding roads. It has been assumed the road running east-west between Wanneroo Road and Canna Place and the road running north-south between Messina Drive and Servite Terrace will be higher order. A network of local access roads and laneways connects into higher order roads traversing the Site. In all cases the road cross-sections should be designed to cater for utility services, on standard verge alignments, street trees, parking embayment's where appropriate, off-street and on-street cycling lanes in accordance with the overall pedestrian and cycling network.

The engineering design of roads will be carried out to comply with the Department of Planning's Liveable Neighbourhoods recommendations for design speeds and sight distances. Roadworks will generally consist of kerbed and asphalted pavements. Where adjacent to Public Open Spaces and subject to the road grades, flush kerbing will be used to facilitate infiltration of stormwater "at source".

Figure 9 – Wanneroo Road (Photo taken from within the site)

4.3 Footpaths

Footpaths will be provided in accordance with *Liveable Neighbourhoods* and the City of Wanneroo standards and will consist of one path in every road and dual use paths in Neighbourhood Connector roads.

New roads constructed as part of the development will include cycling facilities generally in accordance with the requirements of Liveable Neighbourhoods. These links will provide convenient walking and cycling connections.

4.4 Noise Attenuation

Because existing traffic volumes for Wanneroo Road exceed 20,000 vehicles per day, in accordance with State Planning Policy 5.4 "Noise Considerations", it is likely that some noise mitigation strategies will be required for this interface and could consist of noise bunds, noise walls and in-house acoustic mitigation techniques. A full acoustic study based on the proposed finished earthworks levels will be required as part of the subdivision design process.

5. SERVICES

5.1 Wastewater

The Site is located within the Water Corporation's Neerabup sewer district. The Water Corporation has confirmed there is sufficient capacity in the existing system (subject to the extension of the Neerabup Main Sewer to the north of the site) to cater for the proposed future development yields. Standard Water Corporation sewerage headworks will apply.

The Water Corporation long term scheme planning allows for the Site to be serviced via two future 225mm diameter mains as depicted in Figure 10. The proposed 225mm diameter sewer that traverses the middle of the Site will need to be accommodated within the road reserve. The extension of the 450mm diameter Neerabup Main Sewer is required to the north of the site (beyond the extent of the Site perimeter) is required for catchment north of the site. This extension is near the City of Wanneroo Depot and according to the Water Corporation, the construction of this sewer main extension is currently underway.

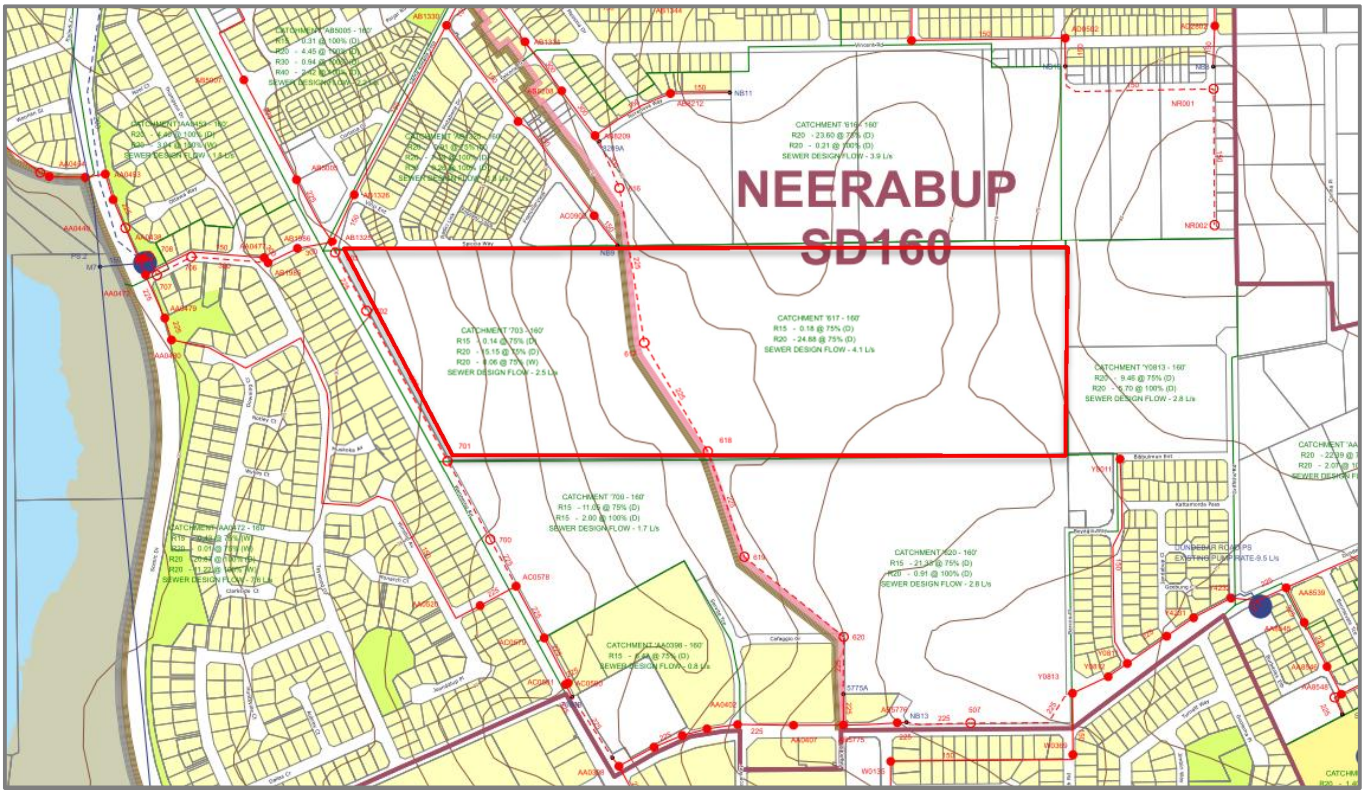


Figure 10 – Conceptual Long Term Wastewater Scheme Planning (Water Corporation, 2016)

5.2 Water Reticulation

The Site falls within the Water Corporation Wanneroo Reservoir catchment (Figure 11) and can be serviced off the existing network from Wanneroo Road. Standard Water Corporation water headworks will apply to the development.

There is a 1000mm dia collector main located immediately south of the Site (within Lot 9000) as presented in Figure 12, which is protected by a 5 metre wide easement. This will need to be contained in the future in Lot 9000 within road reserve or future public open space.

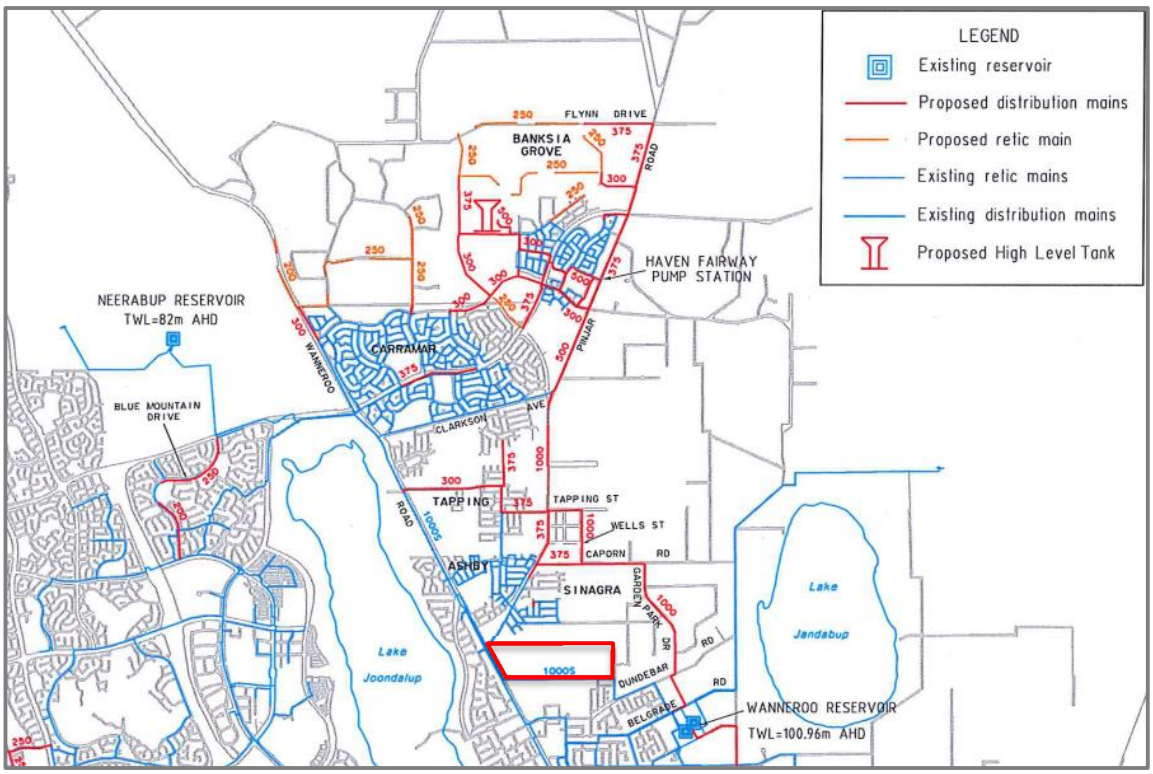


Figure 11 – Conceptual Long Term Water Scheme Planning (Water Corporation, 2016)

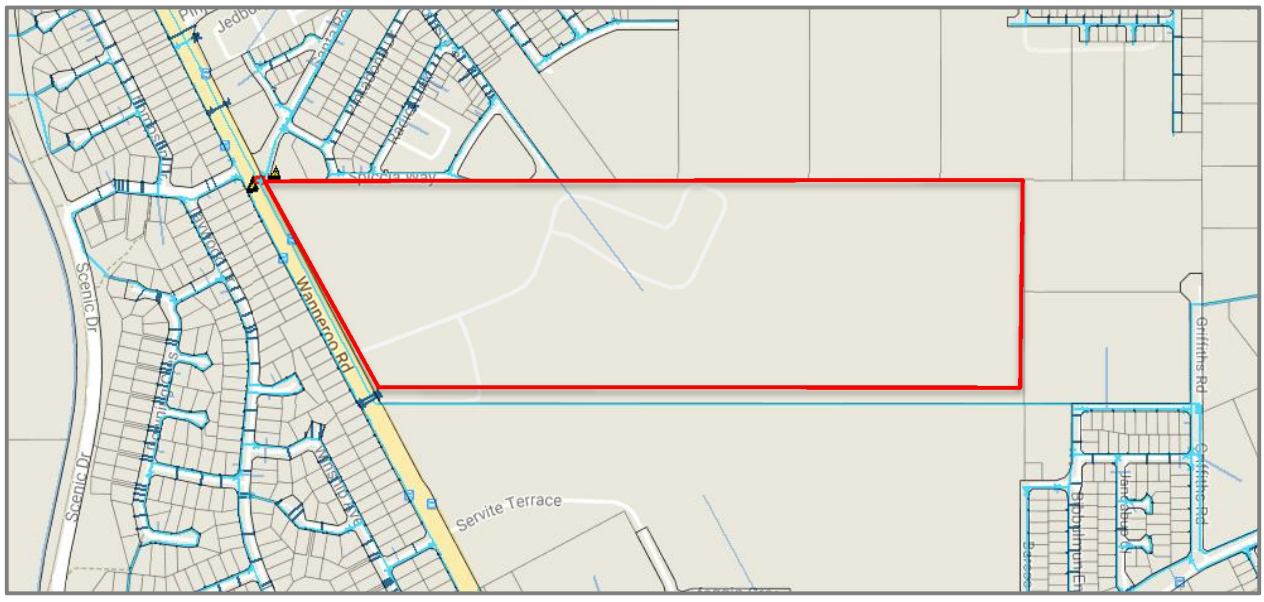


Figure 12 - Location of Existing Water Infrastructure (Water Corporation 2017)

5.3 Underground Power

There is an existing 22kV high voltage overhead cable in Wanneroo Road abutting the Site (within the eastern verge) as shown in Figure 8. This feeder, as well as another on the western side of Wanneroo Road emanate from the Wanneroo 132kV/22Kv Zone Substation on Clarkson Ave.

The Western Power Network Mapping Tool confirms there is 15-20MVa capacity remains in the network. Based on power demand of 4.7kVa per dwelling, the total power requirement for the residential development is approximately 3.5MVa, well within the available remaining capacity.

It is anticipated that any offsite HV upgrades would be undertaken by Western Power under normal natural load growth conditions. A series of HV feeds, switch stations and transformers will be required throughout the development to meet the Site requirements.

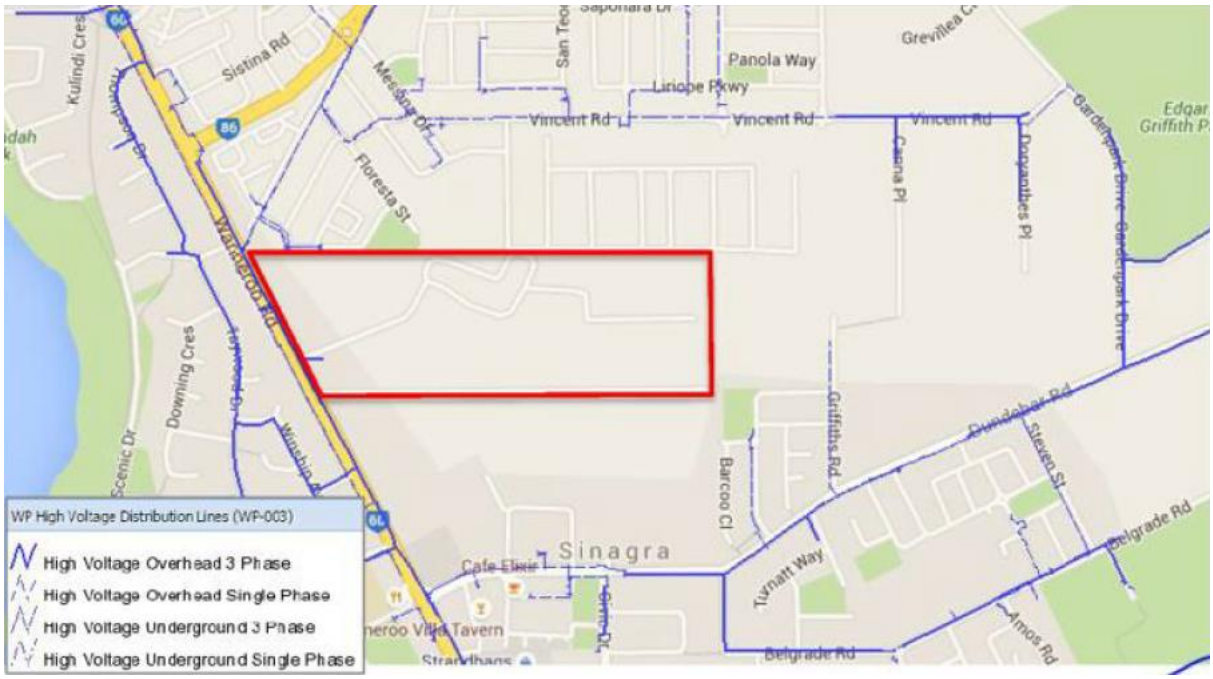


Figure 13 - Existing Power Infrastructure (Wester Power May 2017)

5.4 Internal Gas Reticulation

There are two existing gas mains in Wanneroo Road, a 155mm diameter Medium Low Pressure (MLP) in the western verge and a 150mm High Pressure (HP) in the eastern verge abutting the Site as shown in Figure 14. ATCO Gas has confirmed that the Site can be serviced via a connection to the existing MLP and no off-site upgrades are required.

Gas reticulation will be supplied and funded by ATCO Gas and installed by the Contractor concurrent with other service installation.

Figure 14 - Existing Gas Infrastructure (ATCO Gas 2016)

5.5 Communications

The Site is within NBN Co's fixed line footprint, and hence can be serviced with optic fibre under their roll-out scheme for greenfield developments. There are existing NBN and Optus optic fibre mains in Wanneroo Road in the western road reserve as depicted in Figure 15.

NBN Co has confirmed there is a network within 1 kilometer of the south-west corner of the Site, and therefore no backhaul charges would apply. The developer is responsible for contributing to the cost of delivering the nbn™ network in new developments, this includes contributing to part of the costs of the build (installing pit & pipe) as well as a $600 per lot deployment change (or $400 per group housing dwelling).

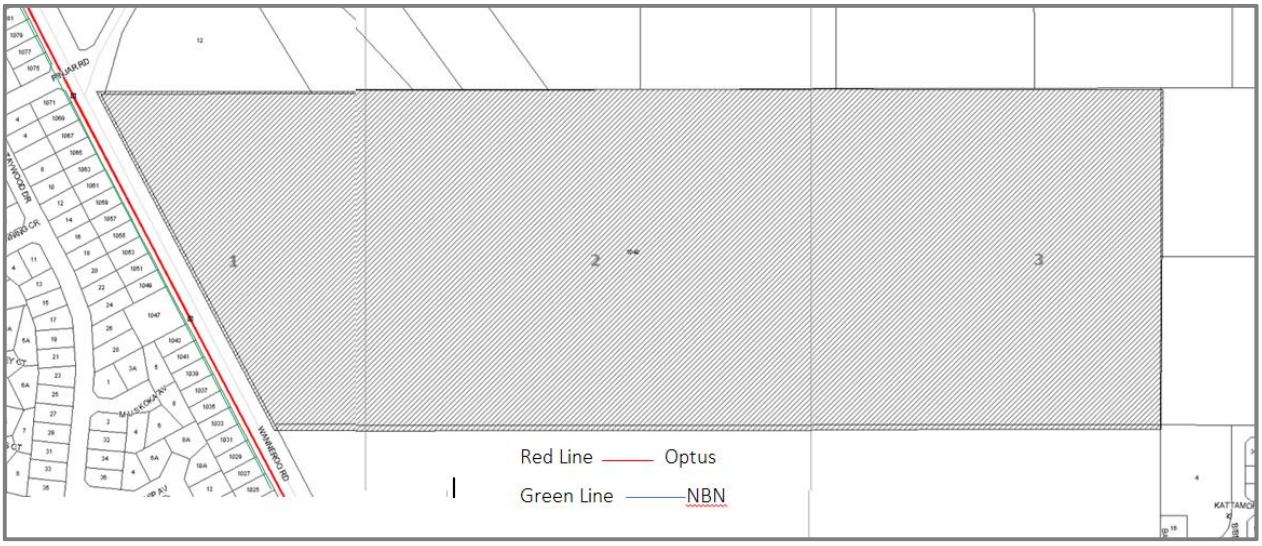


Figure 15- Telecommunications Infrastructure (DBYD 2016)

Figure 16- Existing DN1000 Water Main Alignment

6. SUMMARY

Based on the advice received from various servicing authorities, sub-consultants and the City of Wanneroo; Cossill & Webley consider there are no major impediments to the development of the Ingham Sinagra Site. The ground conditions do not inhibit the proposed development of the site for residential and public purposes and the Site can be easily incorporated into the existing road network.

Water supply, wastewater, underground power and other public utility services are available or can be extended to service the proposed urban area.

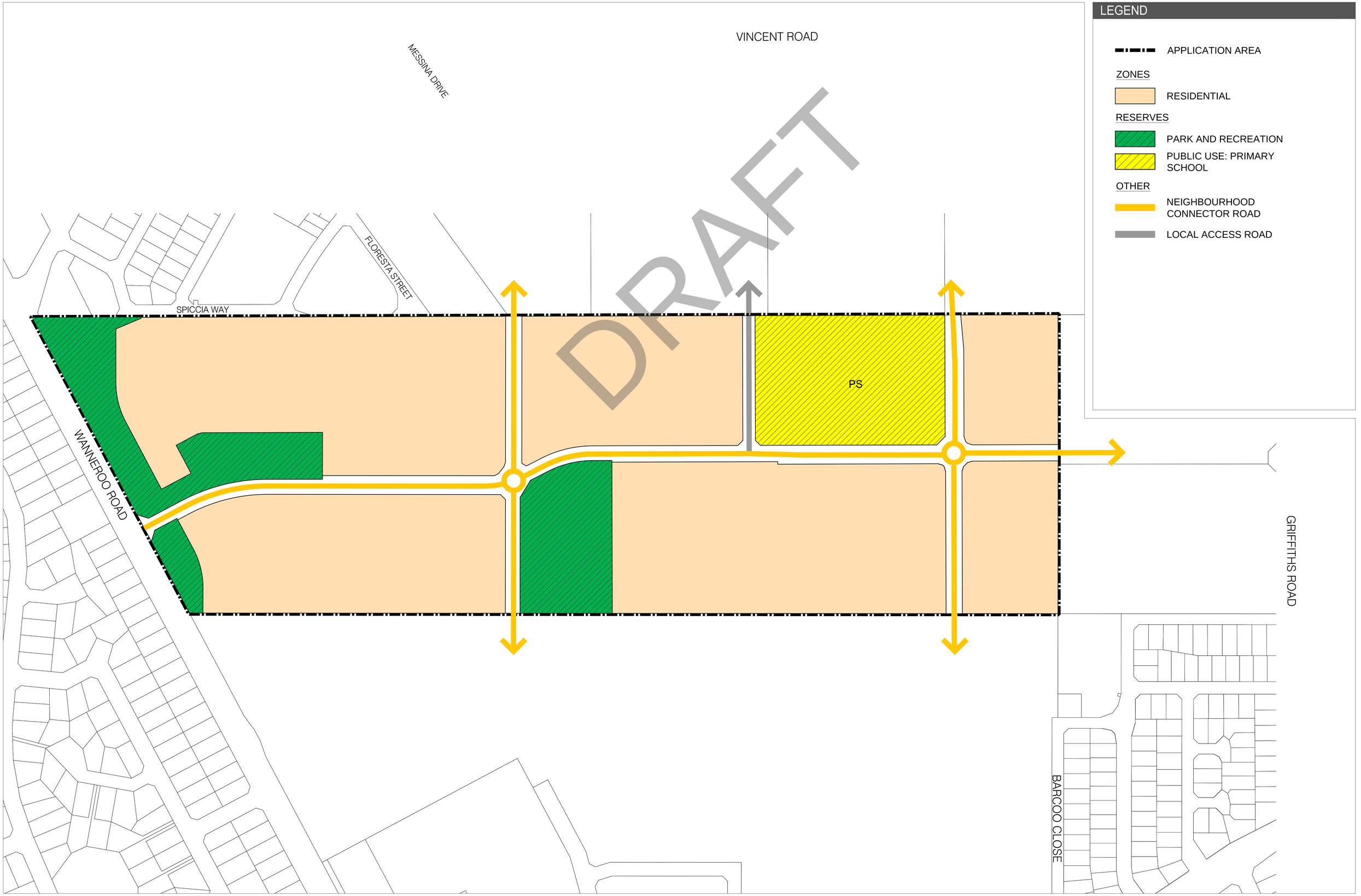
The investigation for this report is largely based on preliminary advice from the various service authorities and is current as at Apr 2019.

Photo 4 – View north easterly from near Wanneroo Road

APPENDICES

APPENDIX A - STRUCTURE PLAN CONCEPT LAYOUT

Urbis Project No ND2271 Dwg 05 Rev C dated 29-03-2019



Structure Plan Concept Layout

Lot 1665 Wanneroo Road, Sinagra

Level 14, The Quadrant, 1 William Street | Perth WA 6000 Australia | +61 8 9346 0500 | URBIS Pty Ltd | ABN 50 105 256 228

DATA SOURCE
MNG

PROJECTION
PCG94

CLIENT
Stockland

1:2000 @ A1 1:4000 @ A3
0 20 40 60 80 100m

PROJECT NO.
ND2271

DRAWING NO.
05

DATE
29.03.19

REVISION
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