Cossill & Webley
CONSULTING ENGINEERS

Structure Plan Engineering Report

Lots 9003, 1000, 809, 805, 9001, 200, 117, 1001 & 9002
Wattleup Road, Wattleup

November 2022

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Contents

1. EXECUTIVE SUMMARY

This report has been prepared by Cossill & Webley Pty Ltd (CW) to inform the engineering requirements for the proposed development of Lots 9003, 1000, 809, 805, 9001, 200, 117, 1001 & 9002 Wattleup Road, Wattleup.

This report summarises the results of a review of the civil engineering issues which have influenced the form of the Plan as they relate to future servicing of the developed land and provides details of each major infrastructure type and a servicing strategy for implementation required for the development of the area. The level of detail is consistent with the requirements of a structure plan and acknowledges further, more detailed, work will be required at the time of subdivision.

The engineering review covers siteworks, roadworks, stormwater drainage, sewerage, water supply and utility services.

The investigation has found the land is suitable for development in accordance with the proposed Plan with logical progressive extension of infrastructure and base capacity.

The ground conditions and past uses are well suited to future urban development.

The available road access via Wattleup Road, and the future extension of Rowley Road, adjacent the development will provide excellent connectivity to the external arterial road system, and we anticipate will be progressively upgraded to accommodate the expected regional traffic demand.

Sewer infrastructure will be provided via connection to the Water Corporation pump station within Lot 74 via extension of the proposed gravity network, which is under construction and is expected to be complete in 2023.

Water supply, electrical supply, telecommunications and gas will all be available via the existing network in Wattleup Road. There is capacity within the existing infrastructure for servicing development of this site.

The investigation for this report is largely based on preliminary advice from the various service authorities, and is current as at July 2022.

2. INTRODUCTION

This report has been prepared by Cossill & Webley Pty Ltd (CW) to confirm the servicing requirements for Lots 9003, 1000, 809, 805, 9001, 200, 117, 1001 & 9002 Wattleup Road, Wattleup. The Structure Plan for these lots was endorsed by the Western Australian Planning Commission in April 2021.

This report summarises the results of a review of the civil engineering issues which have influenced the Plan as they relate to future servicing of the developed land. Figure 1 below presents the Hammond Park Structure Plan.

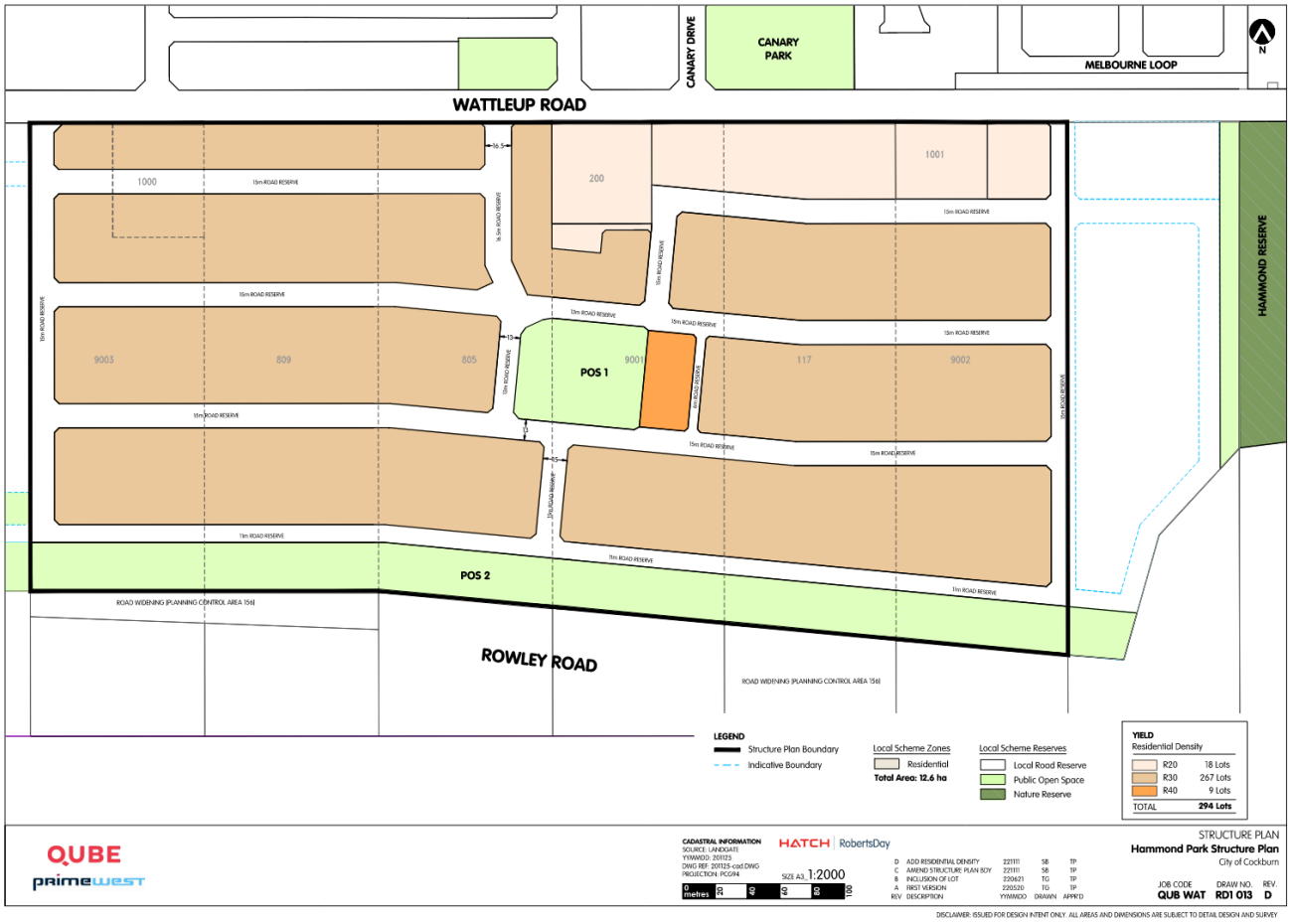


Figure 1: Hammond Park Structure Plan (Hatch Roberts Day, 2022)

The Site is bound by the existing Wattleup Road to the north, future residential lots to the west and east and the future Rowley Road Planning Control Area to the south.

The location of the Site will require a coordinated approach to development with neighbouring properties, for the connection of roads and services.

3. SITE DESCRIPTION

3.1 Site Vegetation

The Site is located within the City of Cockburn. Historically, development has consisted of a mixture of semi-rural and agricultural uses resulting in the clearing of majority of the site as presented below in Figure 2. The balance of the Site is cleared, with the exception of Lot 809 as presented below, which is covered with trees and shrubs. There are existing structures located adjacent to Wattleup Road which will require demolition as part of the future development works.

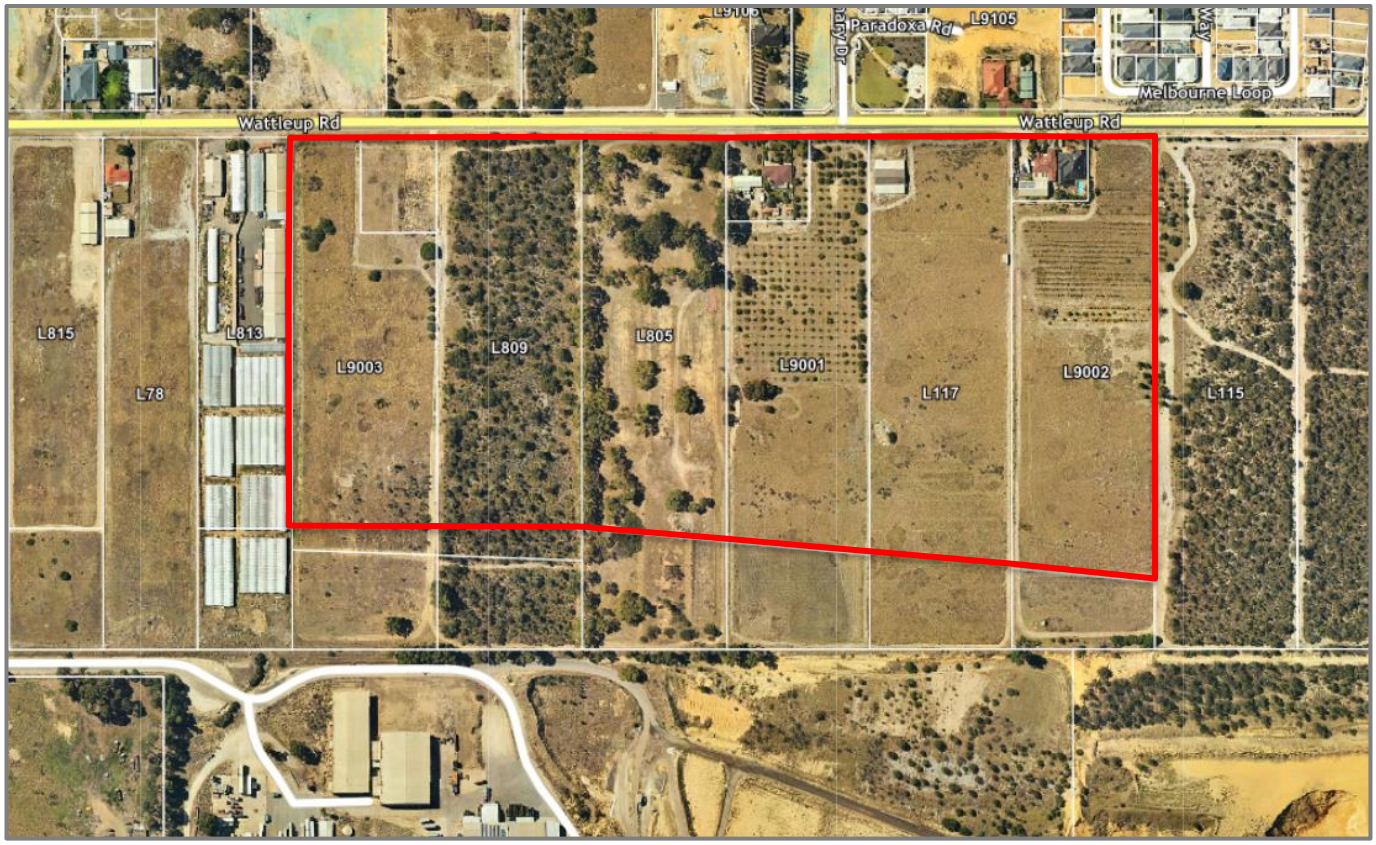


Figure 2: Aerial Photography (MNG Maps 2022)

3.2 Geology

The Geological Survey of Western Australia Perth Metropolitan Region soils maps for Fremantle (part 2033I & 2033IV) indicates that the majority of the site is generally characterised by Sand derived from Tamala Limestone (Refer Figure 3 below). These soil types are well suited to urban development, with very good permeability anticipated.

A site-specific geotechnical investigation will be undertaken at the detailed design stage to outline requirements for residential development and provide feedback on works required to obtain the desired site classification.

Based on experience east and west of the Site, we anticipate a Site Classification A will be provided in accordance with Australian Standard AS2870: “Residential Slabs and Footings”.

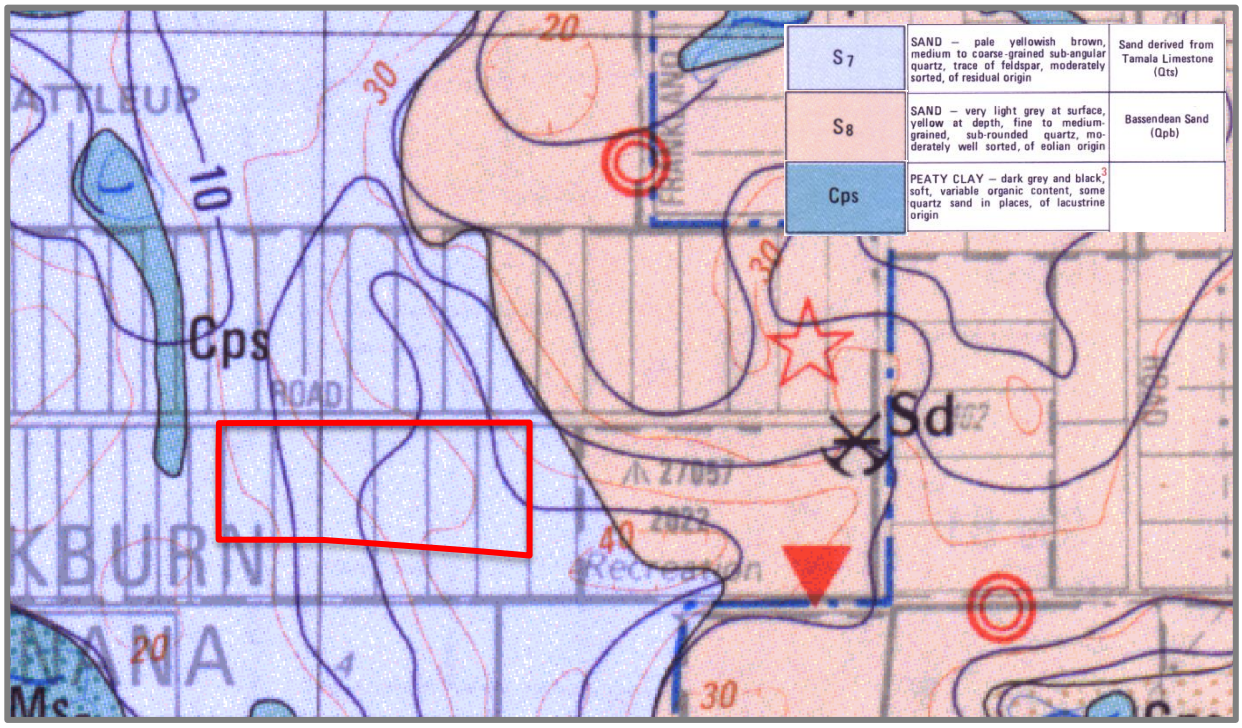


Figure 3: Geotechnical Information (Geological Survey of WA)

The Site is steeply graded, with levels generally ranging from approximately RL 44.0mAHD at the eastern boundary to RL 19.0mAHD at the south-west corner as presented below in Figure 4.

Figure 4: Existing Topography (MNG Maps 2022)

3.3 Groundwater

The Annual Average Maximum Groundwater Levels (AAMGL) vary from approximately RL15.5mAHD on the western boundary to RL18.5mAHD in the north-east corner of the Site as presented below in Figure 5. We anticipate that preliminary earthworks levels will provide at least 4 metres clearance to groundwater, hence we do not anticipate groundwater will restrict or influence the development of the Site.

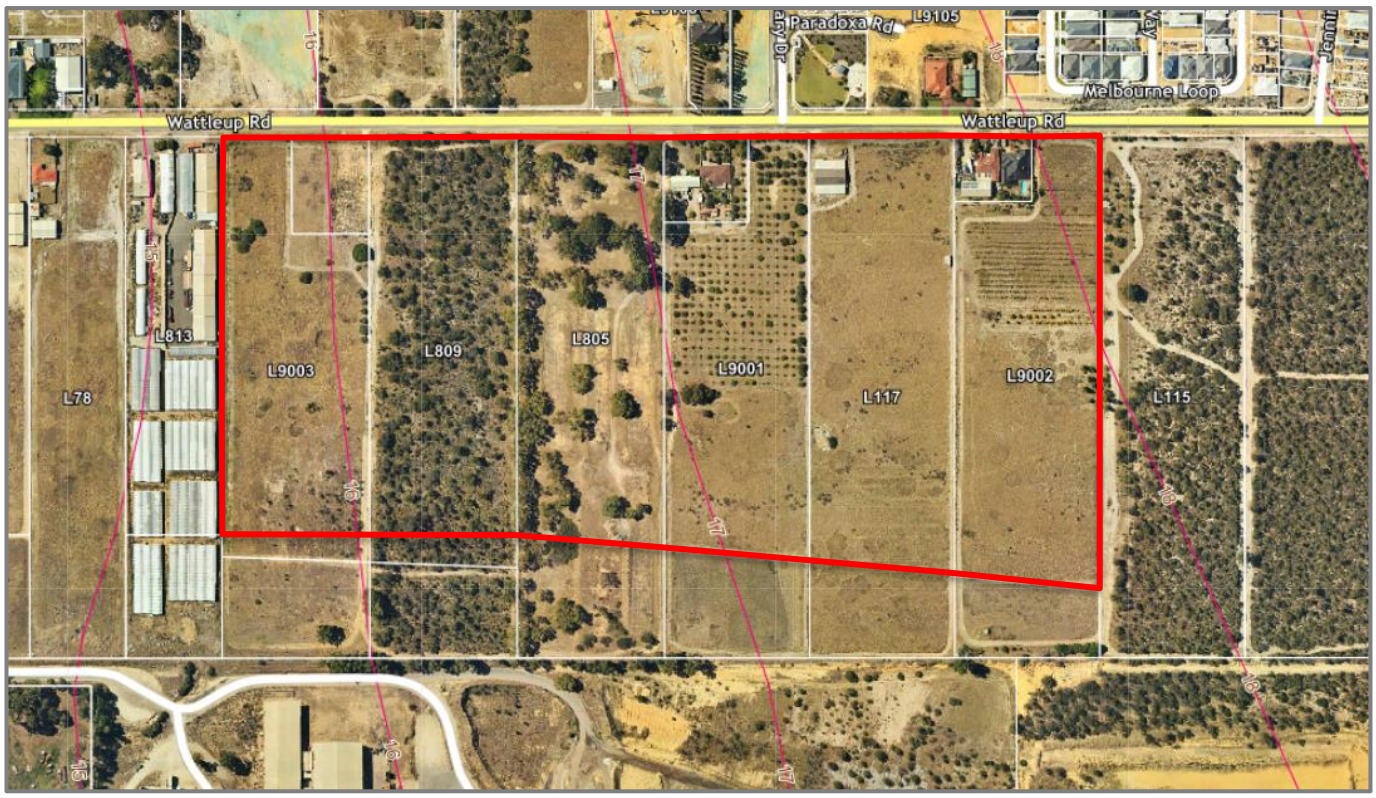


Figure 5: Department of Water Maximum Groundwater Levels (MNG Maps 2022)

3.4 Acid Sulphate Soils

A desk top review of the Department of Environment and Conservation's ASS Risk Map for the South Metropolitan Region for potential acid sulphate soils (ASS) indicates the majority of the Site is classed as having a no risk of ASS potential within 3m, or deeper from the natural surface as presented below in *Figure 6*.

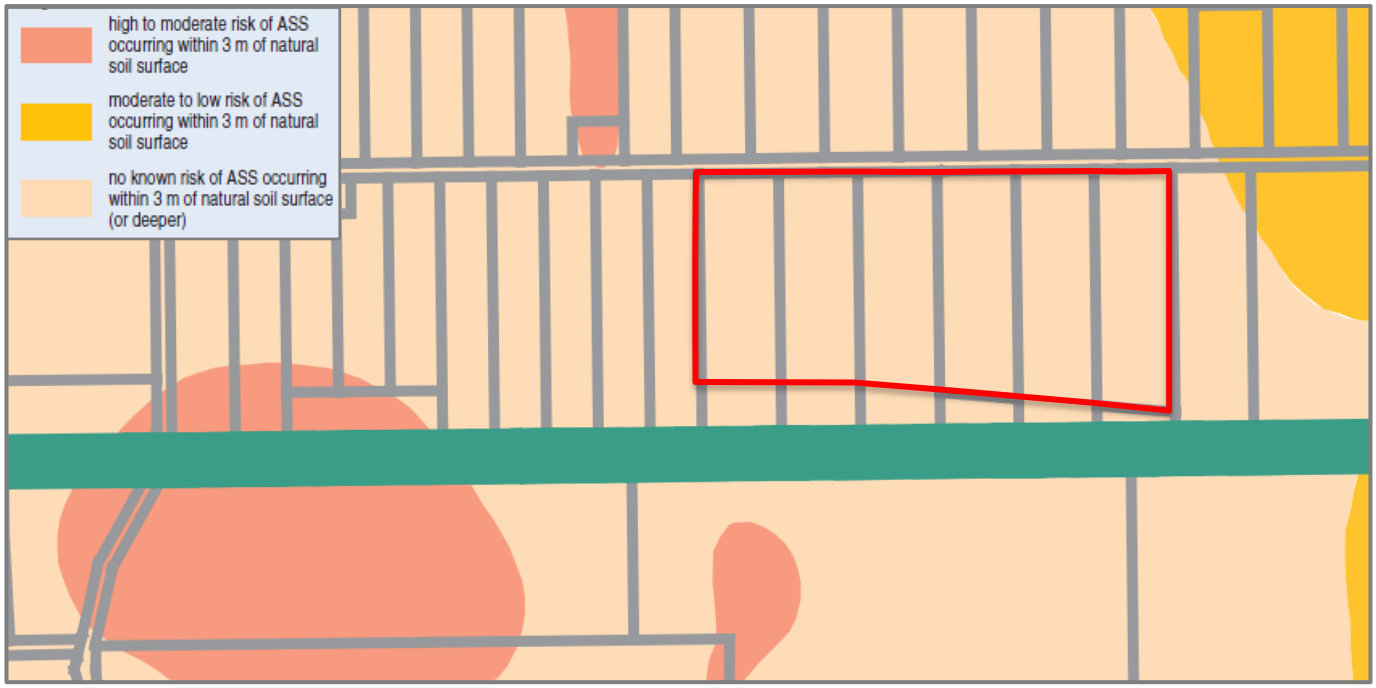


Figure 6: Acid Sulphate Soils Risk Mapping (July, 2022)

4. SITEWORKS & EARTHWORKS

Siteworks for urban development will generally comprise clearing of existing vegetation and, where necessary, earthworking the existing ground, to facilitate the required form of the development.

The extent of siteworks will be dictated by the density and nature of development. Increased densities and decreasing lot sizes has led to a current trend for the development areas to be fully earthworked to create level lots which are terraced between retaining walls.

This approach provides a number of positive outcomes:

- It reduces house building costs,
- It rationalises retaining wall layouts and designs consistent with Local Authority specifications,
- It enables lots to be terraced up natural slopes to maintain elevation and views.

What is doesn't allow for, however, is the retention of existing vegetation and topography within the lot areas. Existing vegetation will be retained within POS areas wherever possible.

Given the very steep grades across the Site, the following will be considered as part of the earthworks design process:

- To maximise the preservation of the significant topographic features;
- Ensuring grades across the site are within typical tolerances for roads, drainage and sewerage reticulation, particularly entering Wattleup Road;
- Allow for roads and development sites to be graded to best follow the existing topography and to best reflect the existing landscape;
- Ensure grades adjacent to future road infrastructure meet the requirements of Main Roads;
- Ensuring the Water Reticulation Limit of Supply Height is met (see the Water Reticulation section of this report for further information on this item);
- Provide suitable batter interfaces with proposed future development to the west and east.

A preliminary earthworks plan has been prepared for the site, and is presented in Appendix A for reference.

5. DRAINAGE AND GROUNDWATER MANAGEMENT

The landform through the area is generally steep with good separation from the groundwater table.

An Urban Water Management Plan (UWMP) has been prepared by Water Technology. The UWMP confirms the proposed storage and disposal strategy for stormwater runoff generated from the proposed development of the Site.

5.1 Stormwater Management

Groundwater recharge will be maximised through the adoption of 'Best Management Practices' that promote the dispersion and infiltration of run off as close to source as possible. This will include incorporation of inter-allotment drainage soakwells to infiltrate runoff from building roofs and private open space areas and the disposal of road runoff into infiltration basins within POS areas. The use of road-side swales will be challenging given the steep grades across the site, but may be incorporated on side boundaries if this can be accommodated.

5.2 Water Quality Management

Recharge water quality will be improved through the adoption of 'Best Management Practices' which promote the disposal of runoff via water pollution control facilities (including vegetated swales and basins, detention storages and gross pollutant traps) and the implementation of non-structural source controls (including urban design, street sweeping, community education, low fertiliser landscaping regimes, etc).

5.3 Stormwater Collection & Disposal

Drainage from public roads and lanes would be collected via conventional gullies or open swales depending on the nature of the adjacent land uses and the extent of traffic and pedestrian activity.

The drainage collection and conveyance system will be designed to cater for the runoff from storms with up to a 20% Average Exceedance Probability (AEP). A series of detention basins will be designed to store runoff to the pre-development peak flow rates for the 20%, 10% and 1EY AEP events in accordance with the UWMP. In all cases roads and POS would be designed to cater for the surface overflow for more severe storms with building pad levels set at least 300 millimetres above the 1% AEP level in roadways and 500 millimetres above the 1% flood level for storage detention basins.

The dispersion of stormwater disposal throughout the site will maximise the area of recharge down through the soil profile to the shallow aquifer, thereby maximising the potential for nutrient stripping and water quality improvements.

6. WATER RETICULATION

The subject land is located within the current boundary of the Water Corporation's Water Supply Scheme and overall planning for the scheme has made provision for residential development over the subject land.

The current planning indicates the Site will be serviced via the extension of an existing 610mm distribution main in Hammond Road that currently terminates at the intersection of Hammond Road and Gaebler Road. The extension of this main further south to Wattleup Road will be a Water Corporation capital project, as demand requires, however the Water Corporation has advised that the implementation of the project is in part dependent upon the extension and upgrade south of Hammond Road along Frankland Avenue, as the alignment and profile of the main will be dictated by final road levels and embankments.

The Water Corporation has confirmed the Site can be serviced off the existing DN150 main in Wattleup Road.

The Water Corporation has also advised that the existing system is able to service lots up to RL 38.00m AHD. This will dictate the highest lot levels across the development which will require lots along the eastern end of the development to be cut down substantially (up to 6 metres).

7. SEWERAGE RETICULATION

The Site forms part of the Water Corporation's Thompson's Lake Waste Water Reticulation System and preliminary planning has been undertaken to develop strategies for providing reticulated sewerage to all proposed urban land within the subject area. An excerpt of the Water Corporation's catchment plan for the area is presented below in Figure 7.

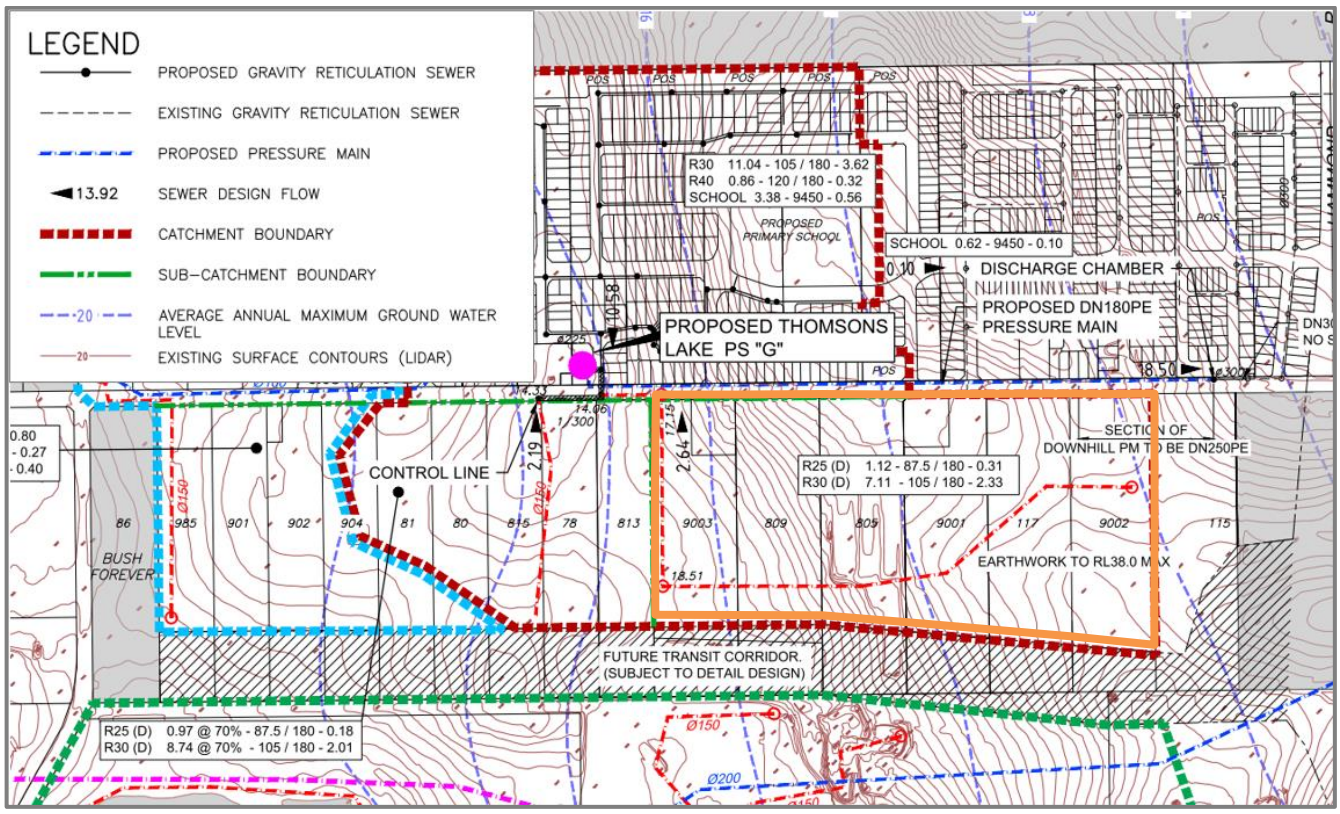


Figure 7: Sewer Reticulation Planning (Water Corporation 24 Aug 2021)

The Site is proposed to be serviced by connection to the reticulation sewer that runs along the Wattleup Road north of the Site. This new line grades to a future Type 40 Waste Water Pumping Station (WWPS) "Thomsons Lake Pump Station G", located at the natural low point within Lot 74, as depicted in Figure 7 above. Installation of the pump station is due to commence in late 2022, with completion scheduled for mid 2023. There are no impediments to the provision of sewerage infrastructure to service the Site.

8. POWER

The Site can readily be serviced via the existing overhead high voltage cable located on the southern side of Wattleup Road.

Based on Western Power's predicted Network Capacity in July 2022, there is sufficient capacity in this existing network to support the proposed development. All power to the proposed development will be underground and fed from transformers located strategically within the development.

Figure 8: Western Power Network Capacity Mapping (Western Power, July 2022)

9. GAS SUPPLY

ATCO Gas has advised the existing network has the capacity to supply the development from the existing frontal main in Wattleup Road.

10. TELECOMMUNICATIONS

10.1 NBN

The Site is within the fixed line footprint of the NBN, and hence can be serviced with optic fibre under their roll-out scheme for greenfield developments via connection to the existing network in Wattleup Road.

Under the Federal Government's Telecommunications in New Developments Policy, developers are 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 (civils and any backhaul required) as well as a $600 per lot deployment change.

The current design practice for road reserves, pavement and verge provisions will make adequate allowance for services including broadband in accordance with the agreed Utilities Service Providers handbook. There will be some local land requirements for equipment sites, similar to current provisions which will be accommodated at detailed subdivision stage.

10.2 Existing Telecommunications Infrastructure

Telecommunications providers Optus, Telstra and TPG have been consulted on the coverage, capacity and quality of the existing infrastructure surrounding the Site and its ability to service the proposed development.

Telstra has advised the development is not likely to significantly impact on the coverage, capacity and quality of the existing Telstra Wireless services in the area, all of which are currently well within normal KPIs. Further to this, Telstra has advised no Telstra Wireless infrastructure upgrades are likely to be required as a result of the development.

Optus has advised the existing infrastructure has adequate coverage and capacity to service the Site from existing network sites and have confirmed they do not require any additional network infrastructure sites to provide coverage/capacity to the proposed subdivision. It is also noted that Optus are planning on coverage and capacity improvements as part of their new P0955 Wandi North infrastructure, which is forecast for completion in March 2024.

TPG were contacted for comment however have not provided a response.

11. ROADWORKS & FOOTPATHS

11.1 Abutting Roads and Access Points

The Site will be well serviced with good transit options to the broader regional network. Wattleup Road abuts the Site to the north, and a transit corridor for the future extension of Rowley Road abuts the southern boundary.

Wattleup Road is currently constructed to a rural standard, with a sealed and un-kerbed single carriageway pavement. Wattleup Road has been identified by Main Roads WA as a "Regional Distributor Road" and forms part of the MRWA RAV network for heavy vehicles and is currently being upgraded to an urban standard including kerbing drainage, paths and lighting. We note that the existing vertical geometry of Wattleup Road cannot be amended due to tying in with existing dwellings that will be retained, and the existing k values do not comply with Austroad Standards for Safe Stopping Distance for the current speed zoning.

The Subdivision Approval requires connections to Wattleup Road along the eastern and western boundaries, and an additional intersection has been included in the middle of the Site to improve permeability. The location of this intersection has been determined based on site-lines, which are very restricted based on the existing vertical geometry.

The City of Cockburn requires developers contribute to, or undertake, the upgrade of Wattleup Road where it abuts individual developments. These costs are currently being carried by the developers involved in subdivision works on the north side of Wattleup Road. These costs will be extended to development south of Wattleup Road via S159 claims as appropriate.

Rowley Road will be extended across the south boundary of the Site in the future, and will provide improved transport route options between Kwinana Freeway and the coast, as well as relieving the traffic burden from Wattleup Road.

11.2 Internal Road Network

Internal road designs will comply with Liveable Neighbourhoods and the City of Cockburn Standards.

In all cases the road cross-sections will be designed to cater for utility services, on standard verge alignments, street trees, parking embayments where appropriate and footpaths. Where roads abut public open space, verges can be reduced to a minimum of 0.5m if no parking is required.

The internal road network has deliberately been established to favour east-west roads due to the very steep grades across the Site, and to minimise the height of inter-allotment retaining walls. Long stretches of east-west roads may require some speed control devices to be installed to encourage slower traffic. These may include treatments such as plateaus, blister islands, narrow pavement throttles or chicanes which will be determined at the detailed design stage in collaboration with the City of Cockburn.

The lower speeds on local roads will also support initiatives to adopt narrower road pavements, smaller street truncations and associated intersection curve radii where suitable.

11.3 Footpaths

Footpaths will be provided in accordance with *Liveable Neighbourhoods* and the City of Cockburn standards and will consist of one path in every road.

12. STAGING

It is anticipated that development will begin at the western boundary, for ease of connection to the existing sewer network. Stages will progress eastwards as per market demands.

A preliminary staging plan has been prepared for the site, and is presented in Appendix B for reference.

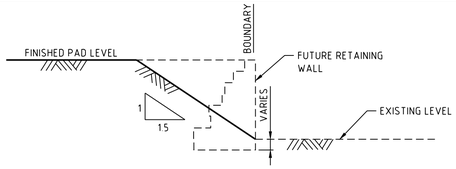
13. CONCLUSION

Based on the advice received from various servicing authorities, consultants and the City of Cockburn, we consider there are no impediments to the development of the Site. The ground conditions and past uses will not limit the proposed urban development, and the Site can be easily incorporated into the existing and planned future road network. Water supply, sewerage and other public utility services are available and are currently being upgraded along Wattleup Road.

The investigation for this report is largely based on preliminary advice from the various service authorities, and is current as at July 2022.

APPENDIX A

Draft Earthworks Plan



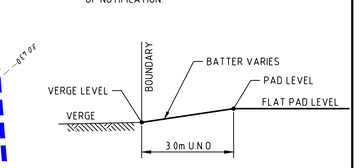
PROPOSED BOXOUT AND BATTER DETAIL FOR FUTURE RETAINING WALLS

SCALE N.T.S

LEGEND	
DESCRIPTION	SYMBOL
LIMIT OF WORKS BOUNDARY	
FINISHED SURFACE CONTOUR	25.0
EXISTING SURFACE CONTOUR	23.0
FUTURE SURFACE CONTOUR	25.0
FINISHED LOT PAD LEVEL	25.00
FUTURE RETAINING WALL HEIGHT	Ht 1110

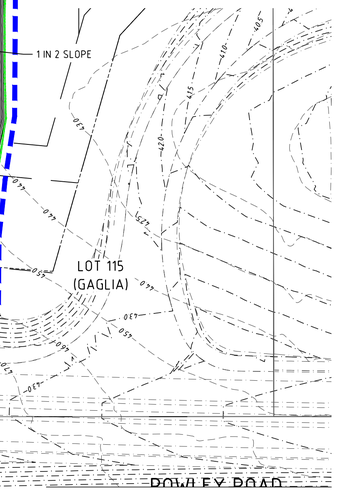
NOTES

1. ALL LEVELS IN METRES TO AHD. SURVEY BY MNG.
2. BATTERS TO EXISTING SURFACE AT 1:3 (CUT) 1:3 (FILL) UNLESS NOTED OTHERWISE.
3. BATTER POSITION FOR FUTURE WALLS TO ENSURE CUT TO FILL EARTHWORKS BALANCE.
4. ALL UNSUITABLE MATERIAL TO BE REMOVED BY THE CONTRACTOR TO APPROVED TIPPING SITE PRIOR TO COMMENCEMENT OF CONSTRUCTION. ALL FEES TO BE PAID BY CONTRACTOR.
5. EXTENT OF CLEARING AND EARTHWORKS TO BE LIMITED TO THE STAGE CLEARING BOUNDARY UNLESS AGREED WITH THE SUPERINTENDENT.
6. ALL CLEARED MATERIAL TO BE MULCHED AND STOCKPILED ON SITE AS DIRECTED BY THE SUPERINTENDENT.
7. CONTRACTOR TO LOCATE ALL EXISTING SERVICES PRIOR TO COMMENCEMENT OF WORKS ON SITE.
8. CONTRACTOR TO GRADE EVENLY BETWEEN DESIGN CONTOURS AND MATCH INTO EXISTING SURFACE AT LIMIT OF EARTHWORKS BOUNDARY WHERE APPROPRIATE.
9. EXCESS CUT FROM EARTHWORKS SHALL BE PLACED ON SITE AS DIRECTED BY THE SUPERINTENDENT.
10. WHERE LIMESTONE IS WITHIN 600mm OF THE FINAL SURFACE LEVEL THE CONTRACTOR SHALL TREAT THE SITE IN ACCORDANCE WITH THE SPECIFICATION.
11. DESIGN LEVELS SHOWN SHALL BE ON THE FINISHED SURFACE INCLUDING TOPSOIL WHERE SPECIFIED.
12. THE CONTRACTOR SHALL LIMIT THE MOVEMENT OF EQUIPMENT AND MANPOWER TO THE MINIMUM AREA NECESSARY AND PROTECT ALL VEGETATION AND EXISTING SERVICES ON SITE.
13. ADJACENT RESIDENTS TO BE NOTIFIED OF THE WORKS AT LEAST TWO WEEKS IN ADVANCE. CONTRACTOR TO PROVIDE MOBILE NUMBER FOR SUPERVISOR AS PART OF NOTIFICATION.



TYPICAL BATTER TO FRONT OF TRADITIONAL LOTS

SCALE N.T.S



REV	DATE	DRN	CKD	APP	AMENDMENT
L	27.10.22	MTW	ZP		DESIGN CONCEPT AMENDED
K	13.07.22	DPM	LAD	A. THOMSON	LAYOUT AMENEDED THROUGH FORMER WAPC LAND, SECTION E ADDED
J	18.05.22	DPM	AT	A. THOMSON	LAYOUT AMENDED
H	15.02.22	DPM	LAD	A. THOMSON	SOUTHERN VERGE TO 4M
G	11.02.22	DPM	LAD	A. THOMSON	DRAINAGE BASIN AMENDED

N

DIAL BEFORE YOU DIG www.1100.com.au

1:1000 0m 20 40 60

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CLIENT: QUBE / PRIMEWEST

APPROVED: AVRIL THOMSON

DESIGNED: DPM

SCALE: 1:1000

PROJECT: WATTLEUP ROAD

TITLE: PRELIMINARY EARTHWORKS FINISHED SURFACE LEVEL PLAN

WAPC No.: REFER PLAN

DRAWING No.: 5910-00-202

REVISION: L

ORIGINAL SIZE: A1

P:\5910 Wattleup\5910-00\Cadwork\5910-00-202.dwg, 27/10/2022 10:29:46 AM, michaelw, Digital Signing PDF.pc3, 1:1, - CW Reference

APPENDIX B

Preliminary Staging Plan

Stages 1 & 2 complete by December 2023

Stages 3 & 4 complete by December 2024

Stages 5 & 6 complete by December 2025

PUBLIC OPEN SPACE

PUBLIC OPEN SPACE

WATTLEUP ROAD

+10 LOTS

15m ROAD RESERVE

15m ROAD RESERVE

15m ROAD RESERVE

13m ROAD RESERVE

15m ROAD RESERVE

6m ROAD RESERVE

15m ROAD RESERVE

15m ROAD RESERVE

11m ROAD RESERVE

11m ROAD RESERVE

11m ROAD RESERVE

11m ROAD RESERVE

EARTHWORKS BUFFER

EARTHWORKS BUFFER

RESERVE FOR RECREATION 3644m²

POS 1290m

POS 3255m²

POS 19.431 ha in total

EXISTING LOT 9003 2.9220ha

EXISTING LOT 809 3.3634ha

EXISTING LOT 9001 2.8592ha

EXISTING LOT 117 4.0494ha

EXISTING LOT 9002 3.1895ha

ROAD WIDENING [PLANNING CONTROL AREA 156] 4311m²

ROAD WIDENING [PLANNING CONTROL AREA 156]

Stage 1 46 Lots

Stage 2 57 Lots

Stage 3 47 Lots

Stage 4 44 Lots

Stage 5 58 Lots

Stage 6 51 Lots

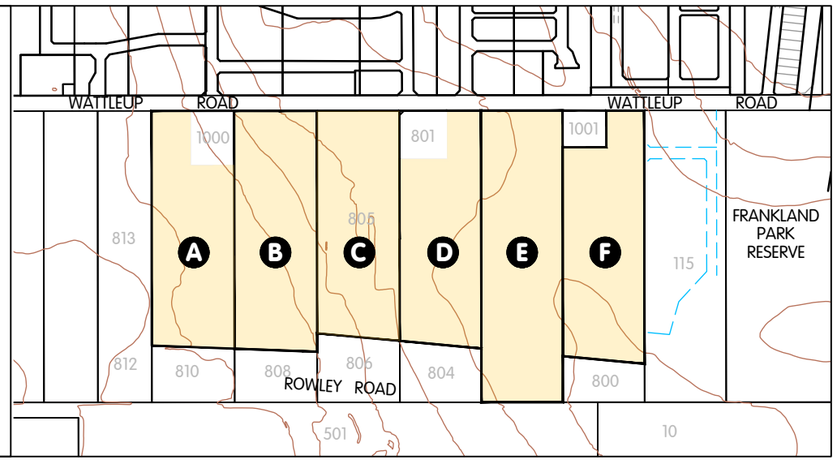
FRANKLAND PARK RESERVE

4.7m

30m

N

LOCATION PLAN - EXISTING LOTS



- EXISTING LOTS
- A LOT 9003 (2.9220ha)
- B LOT 809 (3.3634ha)
- C LOT 805 (3.1816 ha)
- D LOT 9001 (2.8592ha)
- E LOT 117 (4.0494ha)
- F LOT 9002 (3.1895ha)

LEGEND

- EXISTING LOT BOUNDARY - COMBINED
- PROPOSED LOT BOUNDARY
- EXISTING LOT BOUNDARIES
- EXISTING LOT BOUNDARIES TO BE REMOVED
- INDICATIVE FUTURE LOT BOUNDARIES
- PUBLIC OPEN SPACE
- PROPOSED TREES ON SLOW POINTS
- 53 EXISTING CONTOURS
- 804 EXISTING LOT NUMBERS

QUBE primewest

CADASTRAL INFORMATION
SOURCE: LANDGATE
YYMMDD: 201125
DWG REF: 201125-cad.DWG
PROJECTION: PCG94

HATCH | RobertsDay

SIZE A3_1:2000

0 metres 20 40 60 80 100

REV	DESCRIPTION	YYMMDD	DRAWN	APPR'D
I	STREET DESIGN MOD	220610	TG	DW
H	STREET DESIGN MOD	220610	TG	DW
G	DESIGN MOD, LOT YIELD	220609	TG	DW
F	UPDATE NORTHERN AREA	220601	TG	DW

SUBDIVISION CONCEPT PLAN

Lots 117, 809 9001-9003 Wattleup Road - Hammond Park

City of Cockburn

JOB CODE	DRAW NO.	REV.
QUB WAT	RD1 011	I