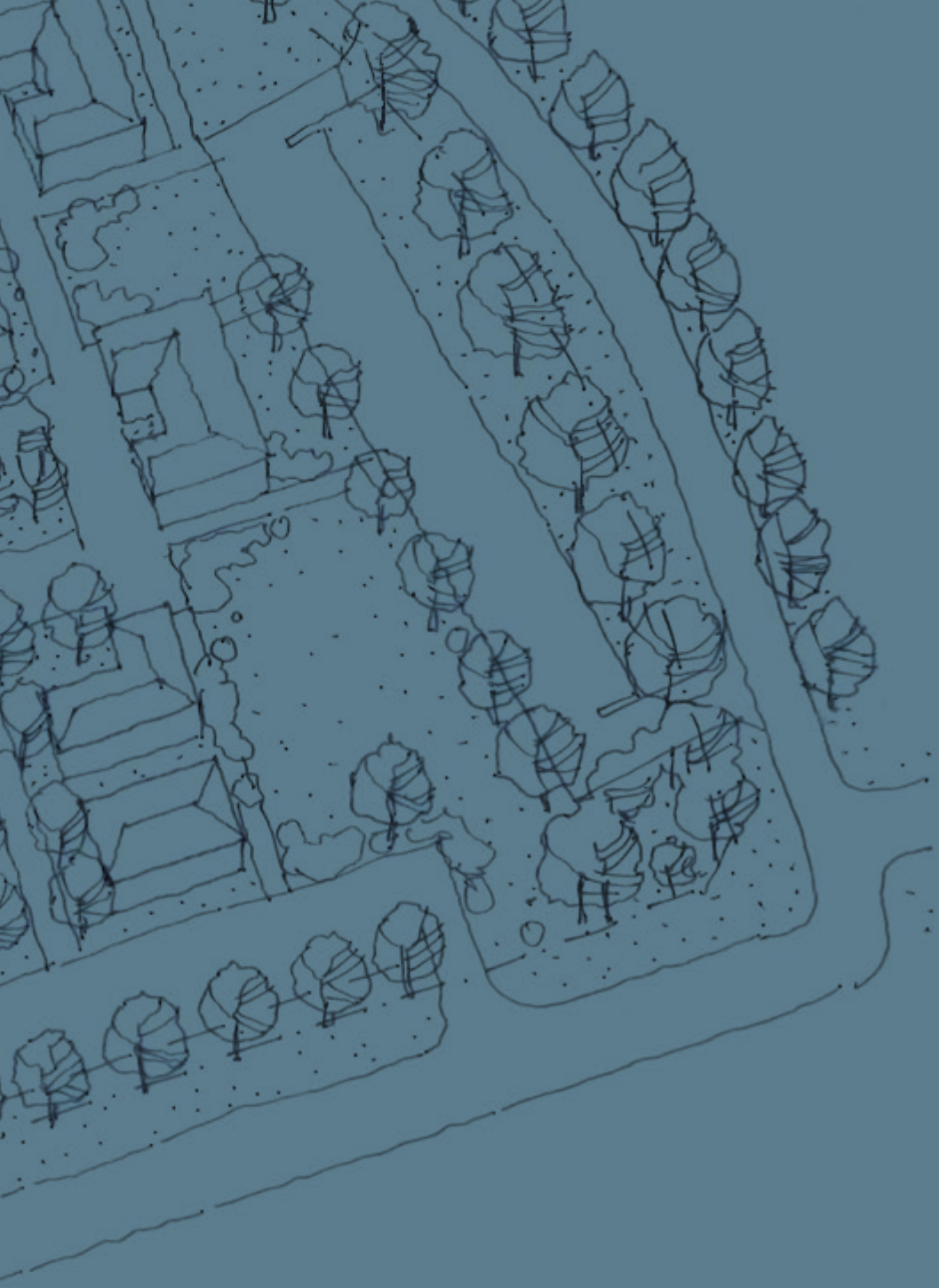

APPENDIX 3

ENGINEERING SERVICING REPORT

McDowall Affleck
CONSULTING ENGINEERS | PROJECT MANAGERS
Responsive. Reliable. Results.

Cossill & Webley
CONSULTING ENGINEERS

Lot 48 Stoneville Road, Stoneville
Structure Plan (SP34) - Engineering Servicing Report
Satterley Property Group Ltd
November 2022

Level 2, 431 Roberts Road,
Subiaco WA 6008.
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Contents

APPENDICIES

1. EXECUTIVE SUMMARY

This report has been prepared by Cossill & Webley Pty Ltd (C&W) and McDowall Affleck Pty Ltd (MAPL) to accompany the lodgement of Amendment No. 1 to the Shire of Mundaring Structure Plan No. 34 Lot 48 Stoneville Road, Stoneville. A majority of the landholding has recently been rezoned according to the Perth Metropolitan Regional Scheme (MRS) from "Urban Deferred" to "Urban". This report summarises the results of our review into the civil engineering matters which are related to the future servicing of the proposed development and these inputs have been used by our Client (Satterley) and the Consultant Team in the preparation of the Structure Plan.

This report provides details of each major infrastructure type and a servicing strategy for implementation required for the development of the area. The engineering review covered siteworks, earthworks, roadworks, stormwater drainage, sewerage, water supply and utility services. It is acknowledged that detailed civil design work will be required at the time of land subdivision.

The investigation has found the land is capable of development with the logical and progressive extension of existing infrastructure to the site and within the extents of the proposed development area.

The geology of the Site and previous land use does not pose an impediment to urban development. Access to the Site via existing Roland Road to the west will provide connectivity to the external arterial road system. Wastewater will be managed on-site through the use of a Wastewater Treatment Plant and pressure main system which involves effluent being pumped to the treatment plant through the use of macerator pumps on an individual lot basis.

Potable water will be supplied via a ~7km trunk main extension from the Zamia Water Tank, ground level tanks and an elevated water tank to provide sufficient water pressure to proposed lots above RL 295m AHD.

Electrical supply can be provided by an extension of the existing high voltage feeders from adjacent roads as there is sufficient capacity in Western Power's network from the existing nearby Darlington and Sawyers Valley zone substations.

Telecommunications by way of NBN optic fibre are available via extensions from the existing surrounding network and we understand there is capacity in the existing network to service the proposed development.

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

Photo: North Stoneville Landholding - Aerial view west from the north-eastern side of the development area

2. INTRODUCTION

The following report has been prepared by Cossill & Webley Pty Ltd (C&W) and McDowall Affleck Pty Ltd (MAPL) and summarises the engineering considerations and aspects for the proposed development of Lot 48, Stoneville Road, Stoneville (referred herein as the Site). The Site is identified by the below Figure 1 and is bound by Roland Road to the west, Hawkstone Street (previously known as Cameron Road) to the North and existing rural-residential properties to the south and east.

The Project is unique for a Development of this size and presents engineering challenges that are characteristic of the Hills region. The driving constraints are borne of the Hills topography and hard geology, and as a result, require a carefully considered approach to earthworks and stormwater drainage management.

An integrated Planning and Engineering approach is necessary to respond to the unique engineering challenges of the site and result in optimal, well-balanced outcomes. Part of the collaboration includes the use of a Transect approach to establish an organising framework to guide the various consulting disciplines. The project is organised in 5 Transects that transition from Rural Transects to the Village Core Urban Transects and guide the most appropriate engineering response for each area.

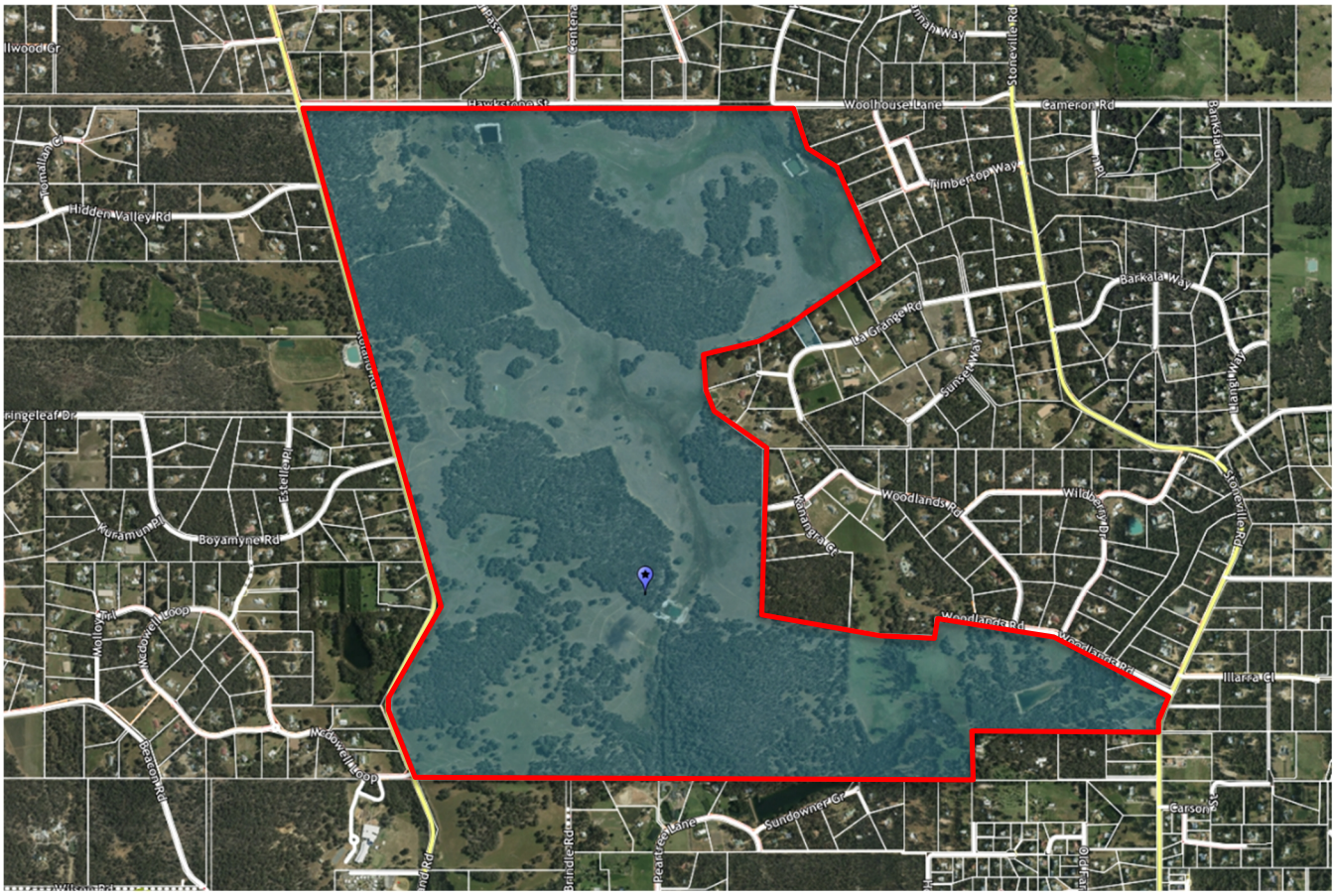


Figure 1: Site Plan (MNG 2022)

3. SITE DESCRIPTION

3.1 Existing Buildings and Land Uses

The Site has historically been used for rural purposes and has predominantly been cleared for agriculture. The site is free from significant improvements and large structures, with existing sheds present on the site which will be demolished prior to development.

3.2 Natural Topography

Based on survey information, the site ranges in height from approximately 247m AHD at the southern end of the site to approximately 316m AHD near the centre of the Site. Clutterbuck Creek diverts into the Site on the southern boundary and extends upstream / north towards the centre of the Site to form a valley. The existing watercourse is intended to be re-purposed as the main drainage conveyance mechanism to attenuate and store stormwater runoff through the existing natural low-lying area of the Site.

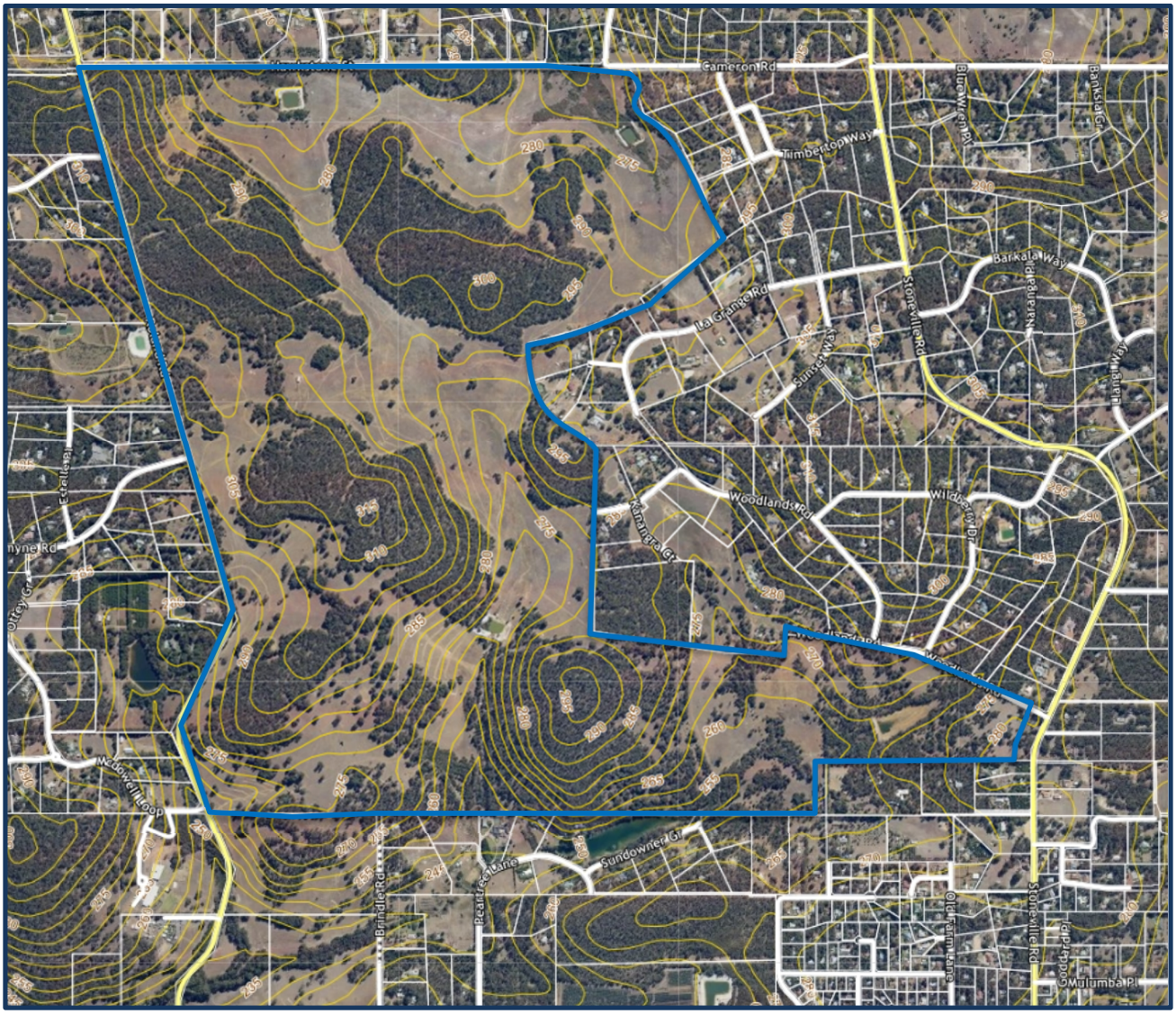


Figure 2: Elevation 5m Contours (MNG Access 2022)

3.3 Geology

The Geological Survey of Western Australia Perth Metropolitan Region Soils Maps indicates the majority of the Site is generally characterised by Laterite (LA1) massive, hard and cemented up to 4m thick with an overlying layer of Gravel (G2) yellow-brown to reddish brown, loose, fine to coarse-grained on a portion of the Site. There are also areas of Gravelly Silty Sand (Smg), Gravel deposits (Gr) and inactive quarries or pits.

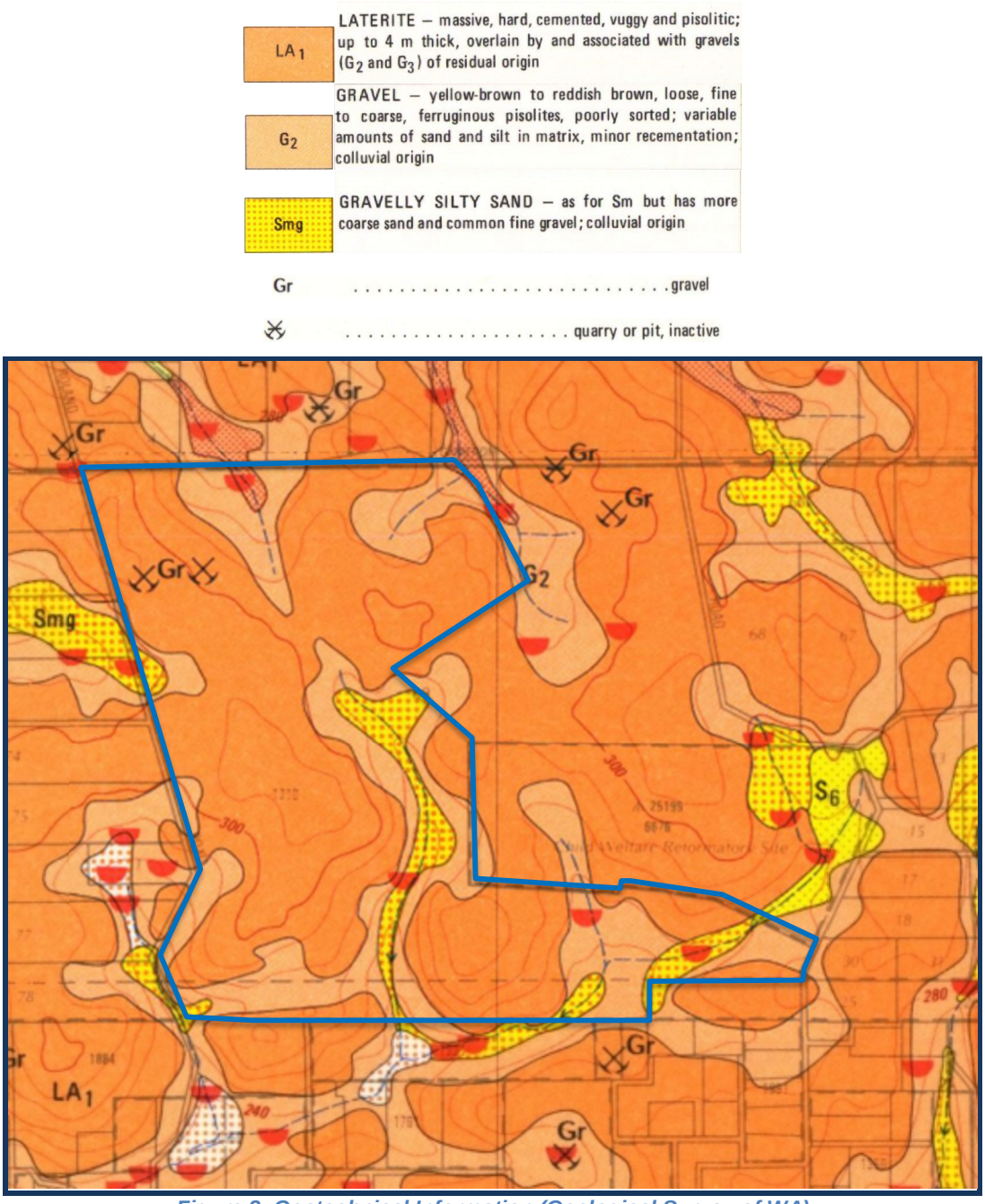


Figure 3: Geotechnical Information (Geological Survey of WA)

A Geotechnical Site Investigation was carried out in 2017 to further assess subsurface soil and groundwater conditions. Fieldwork consisted of 101 test pit excavations using a 28 tonne tracked excavator equipped with a rock bucket. The test pits were evenly distributed across the urban zoned areas of the site and are representative of the total area expected to be disturbed from development.

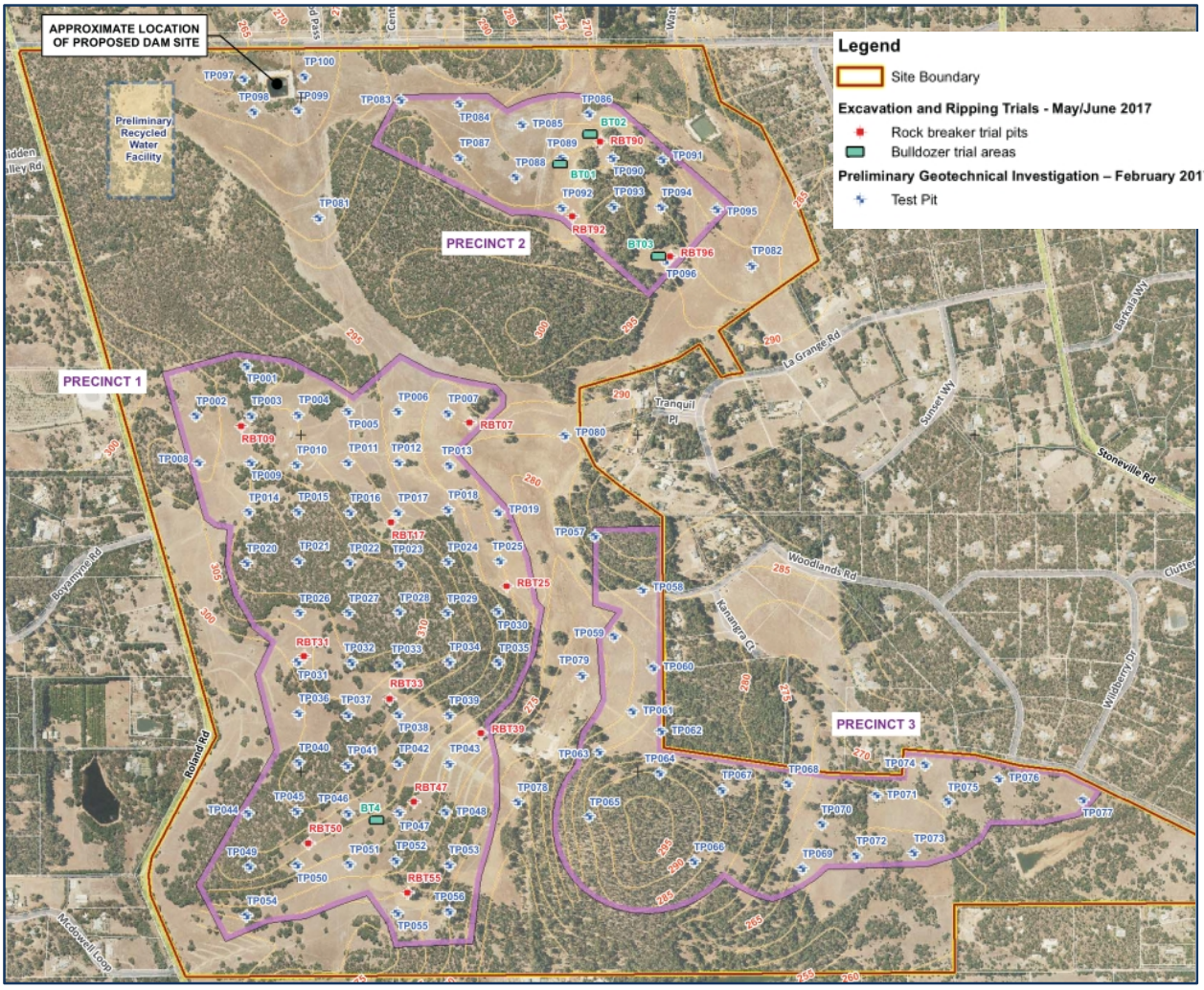


Figure 4: Extent of Geotechnical Investigation (Galt Geotechnics 2017)

A soil profile comprising of gravelly sand over well-cemented hardpan laterite was encountered across most of the test pits and caused excavation refusal at shallow depths. Reactive clayey soils were observed below impermeable hardpan laterite, and are expected to soften if exposed to moisture through excavation or penetration of the protective hardpan layer.

Additional Geotechnical fieldwork was carried out to determine the excavatability and rippability of the shallow hardpan laterite for earthworks and excavation for services. Ripping trials were conducted with a 50 tonne CAT D9T bulldozer over a period of two days and 4 trial areas. Rock breaking trial excavations were carried out over another period of 2 days at 13 locations within readily accessible and open areas of the site underlain by well cemented shallow hardpan.

Figure 5 28T tracked excavator with rock breaking attachment (left). Hardpan Laterite (right)

Very low machine productivity in both ripping and excavation was observed due to the hardness of the shallow hardpan laterite. As a result, and with consideration of underlying reactive clays, an earthworks strategy that prioritises filling of the site in favour of cut and excavation into the hardpan layer is anticipated.

Figure 6: CAT D9T Bulldozer carrying out tipping trials

Despite the extensive hardpan laterite and underlying reactive clays present, the Site is considered suitable for development with an earthworks strategy that maintains the natural landform as best as possible to minimise cut within the hard rock and exposure of underlying clay.

According to the Galt Geotechnical investigation, Class A site classifications in accordance with AS2870-2011 are expected to be achieved where a minimum of 1.8m thickness of inert material is placed above any reactive clayey soils. If site levels within the proposed lots are lowered via earthworks, in order to create a flat building pad, it is likely that the site classification would be Class S.

3.4 Surface Water

The site conveys a reasonable amount of surface water during the wet season due to the steep terrain, gravelly surface and low permeability soil and laterite. Stormwater runoff congregates into natural water courses across the site, the most prominent runs north to south through the central area and flows south towards Clutterbuck Creek, ultimately flowing into Jane Brook towards the south-west. Refer to Figure 7 below.

Four main man-made pastoral dams also exist throughout the Site near the end of each watercourse before it leaves the site (Figure 8). Each dam is situated outside of the urban zoned areas and provides an opportunity to form part of the overall drainage strategy as an efficient form of stormwater detention.

Figure 7: North to South Water Course to Clutterbuck Creek (Left and Centre). Location of Photo facing South (Right)

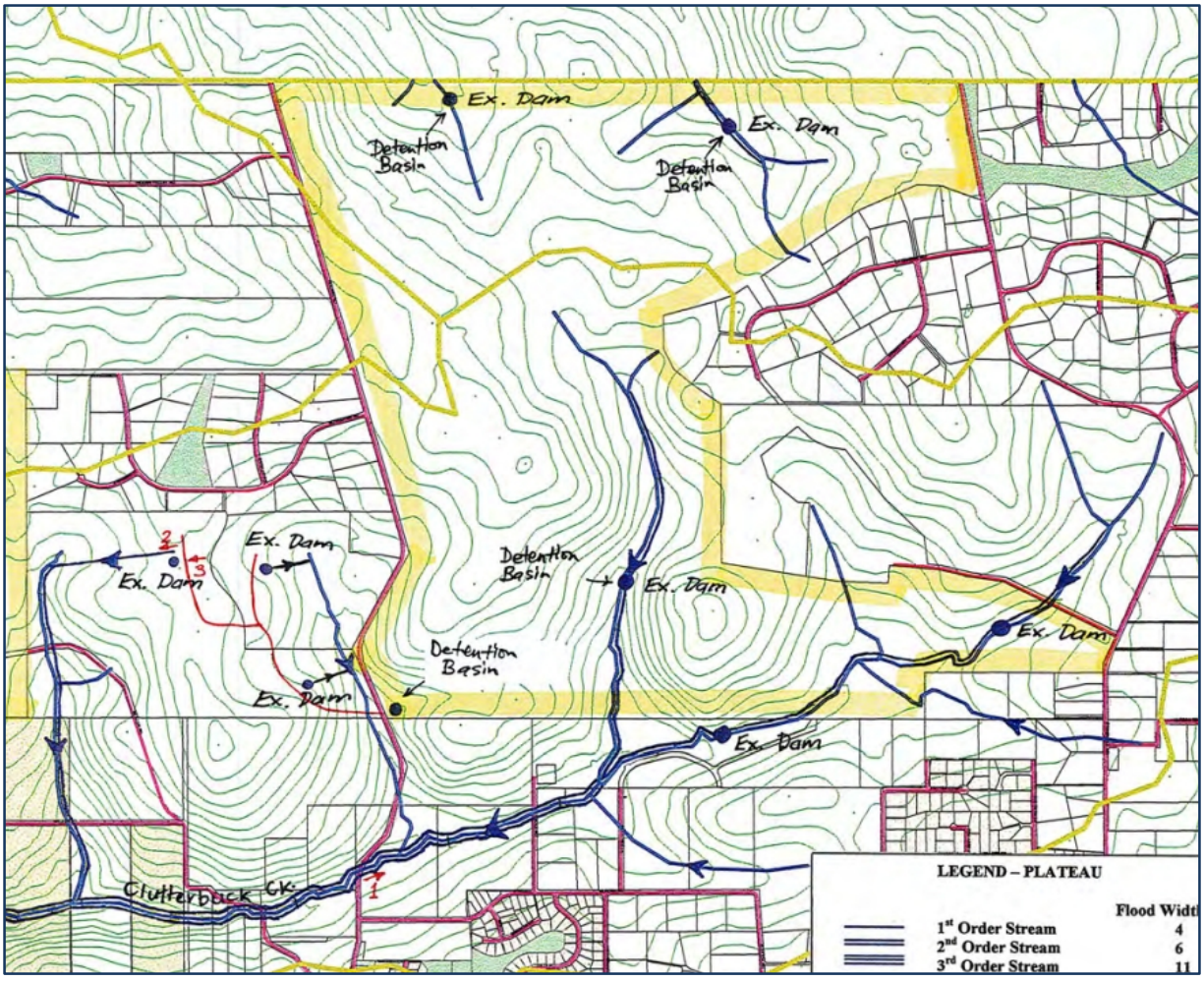


Figure 8: Existing Water Courses and Dams within the Site
(Extract from JDA Urban Stormwater Drainage Strategy Study, Map 9.7)

The existing surface water, watercourses and dams provide an indication of what the drainage management strategy will need to replicate in order to safely convey stormwater in the urban-rural environment.

Photo: Existing Dam Located in the centre of the Site

3.5 Groundwater and Surface Elevation

The Site is beyond the extent of the Department of Waters Perth Groundwater Atlas. Based upon the soil types and experience in other nearby areas it is anticipated there is likely to be a variable and perched system above the laterite layer. Groundwater may exist in the form of fractured rock aquifers at some locations but no evidence of such has been encountered on site. Groundwater is not expected to represent a constraint to development.

3.6 Acid Sulphate Soils

Acid Sulphate Soils (ASS) were not encountered during the two recent Geotechnical Site Investigations undertaken by Galt. There is no known risk of ASS occurring within 3m of the natural soil in the surrounding area, including the John Forrest National Park, so it is highly probable that the site will contain a similarly low level of ASS risk. The risk associated with ASS is further reduced by the proposed earthworks strategy which favours importing or generating clean sand for filling over excavation into in situ material due to the presence of hardpan laterite.

4. EARTHWORKS

A preliminary earthworks strategy has been developed with a focus to retain the natural landform as best as possible. The Site is steep, with undulations of up to 60m across the site and underlain by the hardpan laterite. An integrated Planning and Engineering is essential to create an efficient earthworks strategy that optimally positions and align each road to produce reasonable grades and minimum cut into the natural ground.

The majority of the proposed road network is oriented along or oblique to the natural surface contours to achieve grades between 2-4%. Steeper grades around 8-10% are limited in certain areas consistent with existing slopes. The final earthworks design will be informed by continual slope analyses to ensure a planning layout that best suits the existing topography. An example of the slope analysis prepared to inform the proposed road network is included in Appendices 1 and 2.

Subdivision roads will be set to match centrelines with natural surface levels. As most of the roads are aligned along or oblique to natural surface contours, the majority of the cross-sections consist of cut on the uphill side and fill on the downstream side of the road (Figure 9). The fill would consist of both imported clean sand and cut from the local earthworking operations. Locating the services on the downhill verge in imported fill minimises the extent of excavation required into the hard natural ground.

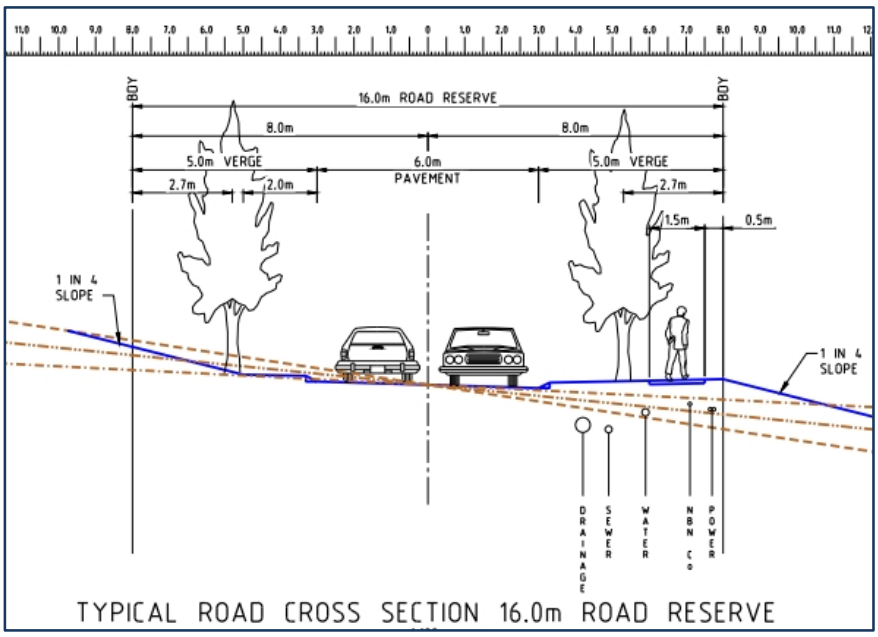


Figure 9: Typical Road Earthworks Cross Section

Most of the earthworks on the Site will be related to the formation of the road network. Earthworks to new lots are limited to building pads and the connected service trenches. Building pads of clean fill will be provided for all lots with the exception of the large lots so a flat building envelope is provided, with the balance of the lot to remain in its natural state. Ground improvements in the form of rock ripping will be provided beneath each pad to assist builders with excavation and installation of services.

5. ROAD NETWORK

5.1 External Road Network

The Site is surrounded by an established network of rural style roads comprising of Roland Road and Hawkstone Street directly abutting to the west and north, lower order roads such as La Grange Road and Woodlands Road to the east and Brindle Road to the south. On a district level, the Site is located between Toodyay Road to the north and Great Eastern Highway to the south, both of which are orientated in an east-west direction.

Figure 10: Extract of LSP Locality Plan (Transcore Traffic Impact Assessment 2018)

Great Eastern Highway 4km south of the Site and is a four-lane divided road with a large 10m vegetated median. It is classified as a Primary Distributor Road State Road under the care and control of Main Roads WA. Any future

intersection upgrades on Great Eastern Highway are therefore expected to be carried out by Main Roads.

Toodyay Road is 2.3km north of the Site and is a single carriageway rural road. It is also identified as a Primary Distributor Road and is expected to be upgraded to a dual carriageway as part of the "Orange Route" for the future Perth-Adelaide National Highway which runs through the Toodyay Road corridor. The intersection of Toodyay Road and Roland Road is planned to be upgraded by Main Roads.

Figure 11: Roland Road – south view

Roland Road is a north-south link road between Toodyay Road and Great Eastern Highway and is a recently upgraded 7.2m wide un-kerbed single carriageway with gravel shoulders. Roland Road continues as Seaborne Road at the southern end where it intersects with Great Eastern Highway. It is classified as a Regional Distributor Road in the Main Roads Metropolitan Functional Road Hierarchy and is under the care and control of Shire of Mundaring. Three new intersections consisting of two roundabouts and a T intersection are expected to be constructed as part of the Stoneville development to serve as the main entry points into the Site.

Stoneville Road is a north-south link road between Toodyay Road and Great Eastern Highway and is an unkerbed single carriageway, 7m wide pavement with gravel shoulders. It is classified as a Regional Distributor Road and is maintained by Shire of Mundaring. A small portion of the Site fronts Stoneville Road directly and will provide the eastern-most access to the Site in the form of a Tee intersection.

Hawkstone Street (previously known as Cameron Road) is an east-west link road between Roland Road and Stoneville Road and abuts the northern boundary of the Site. It is an unkerbed, 6m wide single carriageway rural road with gravel shoulders, but remains unmade for a 200m section immediately west of the intersection of Waterford Drive and Hawkstone Street.

Figure 12: Existing Hawkstone Street

5.2 Transport Impact Assessment

A Transport Impact Assessment was carried out by Transcore in November 2018 to evaluate the likely traffic volumes that will be generated within or attracted to the North Stoneville LSP area, the proposed road hierarchy and assess the suitability of the existing road network and intersections. The assessment concludes the Site is well serviced via the surrounding Distributor Roads and the initial subdivision concept plans provide sufficient permeability and efficient traffic distribution between Roland Road, Hawkstone Street and Stoneville Road.

Transcore's assessment includes the development of a traffic model for typical weekday traffic flows from the North Stoneville area. Neighbourhood Connector B, Access Street C and D road cross-sections as defined by Liveable Neighbourhood 2009 are suitable for the estimated traffic flows and will form the basis of the road cross section types throughout the Site. The main east-west link between Roland and Stoneville Road, and north-south to Hawkstone Street, will be derived from a Neighbourhood Connector B cross-section. Transcore's traffic model is included below for reference.

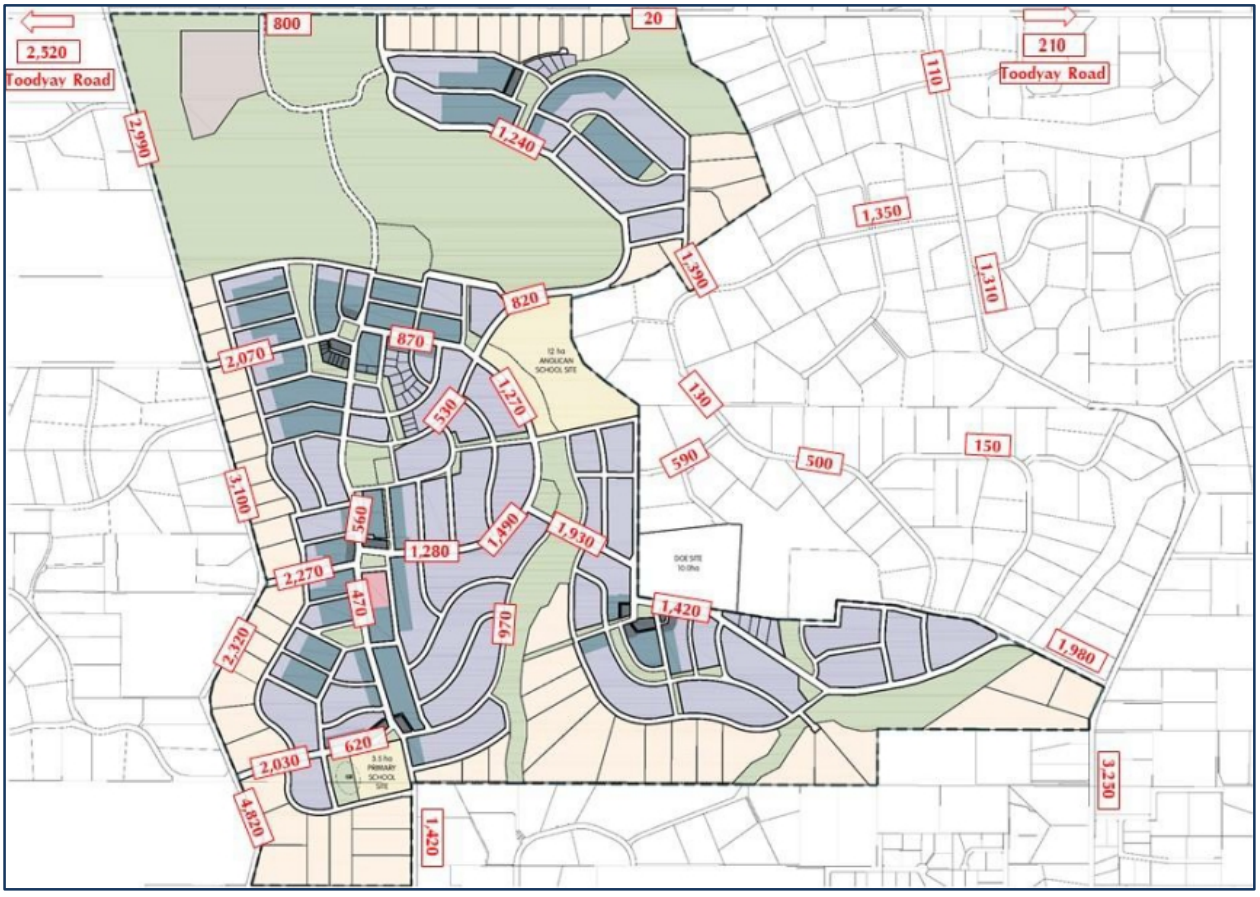


Figure 13: Extract from Transcore Transport Impact Assessment

Roland Road, Hawkstone Street and Stoneville Road were considered in Transcore's assessment to have sufficient capacity in their current form as Regional Distributor Roads to service the expected increase in traffic volumes to be generated from the project. With regard to key district intersections at Toodyay Road and Great Eastern Highway, the existing intersections at Roland Road/Toodjay Road, Stoneville Road/Toodyay Road and Stoneville Road/Great Eastern Highway did not require specific improvements to accommodate the Stoneville development.

Transcore's traffic model indicates the intersection with Seaborne Road (southern extension of Roland Road) and Great Eastern Highway will require upgrades in order to provide additional capacity for future traffic flows. A dual lane roundabout is expected to be the most suitable type of intersection and is expected to be carried out by Main Roads as part of their works to upgrade Great Eastern Highway.

Road upgrades to Toodyay Road, at both Stoneville Rd and Roland Road, are necessary to facilitate emergency bushfire evacuation. Preliminary engineering drawings reflecting conceptual upgrades are presented in Appendix 5.

5.3 Expected External Road Infrastructure Upgrades

Transcore's traffic assessment confirms there is sufficient capacity in Roland Road, Hawkstone Street and Stoneville Road to service the development of the North Stoneville LSP area. Therefore, external infrastructure road upgrades are expected to be limited to the new intersections on Roland Road and the 200m unmade section of Hawkstone Street to the north.

Three new intersections to the Site from Roland Road are planned and comprise of additional legs to the existing intersections on Boyamyne Road and McDowell Loop. Transcore recommends upgrading the existing intersections to roundabouts as the preferred option over full movement Tee-intersections. A new, controlled Tee-intersection is expected to be constructed at the central Roland Road intersection between Boyamyne Road to the north and McDowell Loop to the south.

Hawkstone Street is an existing 6m wide sealed road with gravel shoulders and abuts the northern boundary of the Site for approximately 2.0km. The 200m unmade section of Hawkstone Street exists at the north-eastern boundary of the Site and sits in a valley, with both ends of Hawkstone Street grading towards it from the west and east, as well as the natural valley from the south. Extension of Hawkstone Street through this section is expected to be completed as part of the Stoneville development and will likely include drainage culverts to safely accommodate stormwater runoff to replicate pre-development flows.

5.4 Internal Road Network

The internal road network has been developed in accordance with the organising principles from Hatch's "Transect Design Guide". The Design Guide organises higher densities around Village Core Transects to provide walkable catchments of 400m, and larger lots with lower densities towards the periphery of the Site near Conservation areas. The transition between Urban and Rural transects are depicted in Figure 14 below.

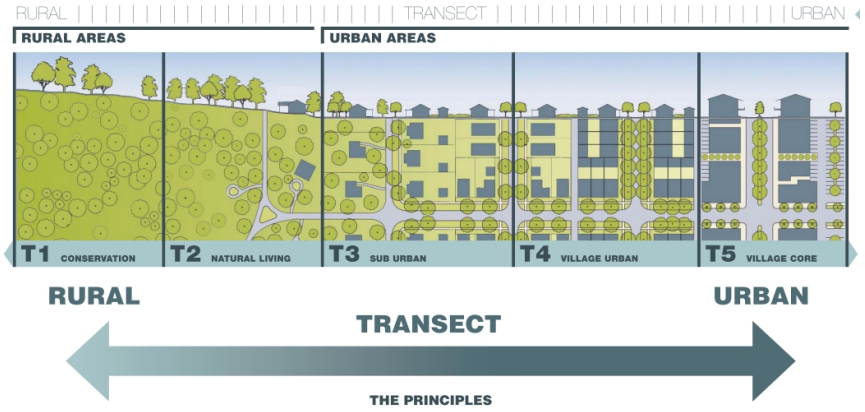


Figure 14 - Extract from RobertsDay Transect Design Guide Aug 2018 (Original Image Source: Duany Plater-Zyberk & Company)

Further information regarding the design intent and objectives of the overall street network are provided in Hatch's Transect Design Guide.

A select number of roads will be designed with the Department of Transport's Safe Active Street design initiative. The intent is to design a road environment that encourages low vehicle speeds up to 30 km/hr. Safe Active Streets will generally be adopted in Village Urban and Village Core Transects and will represent a small but important proportion of the overall street network as shown in Figure 15. Safe Active Streets are only proposed for streets carrying less than 750 vehicles per day and will not be provided in lower density areas where a pedestrian focus is not required. A combination of road geometry, surface treatments, on-street car parking bays and design elements that create "friction" will likely be employed to establish a pedestrian-focused low-speed environment.

The road network beyond the Village Core and Village Urban Transects transitions to rural road standards. Raised kerbs and drainage pits are reduced, with a greater focus on flush kerbs or shoulders for sheet runoff into roadside swales,

culverts and retained vegetation along one side of the road.

Cross sections have been prepared to illustrate the intended road reserve widths. As a principle, road pavements are kept as narrow as possible to maximise the potential to retain existing vegetation and allow battering. Because the majority of the roads will be formed on a side slope, vegetation retention is expected to be concentrated on the high side with services congregated on the low side the verge where fill is required to form the road batters.

Larger verges and off-set road centrelines (to allow one verge to be larger than the other) may be provided where possible to allow mature trees to be retained or enable footpaths, or even the pavement itself, to meander through existing vegetation deemed worthy of retention.

Figure 14: Examples of meandering road pavements (left) and footpaths to retain existing trees (right)

The design considerations for the road layout and cross sections are further expanded below as they are integral to the overall earthworks strategy for the Site. Refer to Appendix 4 for Typical Engineering Road Cross Sections.

Figure 15 : Example of non-standard verge grades to facilitate tree retention

As reflected in Drawing 6198-00-SK20 Rev A located in Appendix 2, the internal road grades are expected to be within the grades required for emergency vehicle access.

5.5 Pedestrian and Bicycle Path Network

A dedicated pedestrian and bicycle path network is integrated within the proposed road network and comprises of 1.5m and 2.5m wide concrete footpaths. The typical Liveable Neighbourhoods Access Street and Neighbourhood Connector road cross sections include 1.5m wide footpaths on one side of each Access Street and Neighbourhood Connector, and potentially a wider 2.5m shared use path on the other side of each Neighbourhood Connector. A combination of single and shared use paths will, therefore, exist on each road throughout the development, with the 2.5m shared path to be included in each Neighbourhood Connector and between each Village Core to create a comprehensive network.

The central watercourse and expanses of conservation areas between Village areas present an opportunity to bring the community closer to nature. A Bike and Hike trail through these areas is being considered to enhance the Hills lifestyle experience.

In addition, Safe Active Streets are expected to make an important contribution to the overall pedestrian and cycle network.

The alignment of each path will follow the typical road cross sections where possible but are likely to meander around existing trees based on the overall earthworks and tree retention strategy for the Site.

The pedestrian and bicycle path will predominantly be internal to the Site due to limited footpath infrastructure in Roland Road and Hawkstone Street (formally Cameron Road). New 2.5m wide shared use paths are therefore proposed to be constructed along the eastern and southern sides of Roland Road and Hawkstone Street respectively.

Transcore's assessment refers to WAPC Transport Impact Assessment Guidelines Vol 2 (2016) to provide guidance on the level of traffic volumes that are likely to affect the ability for pedestrians to cross various types of roads. Based on these guidelines, traffic volumes up 1,100 vph and 2,800 vph for undivided and median divided roads should be acceptable for pedestrian crossings. None of the proposed roads within the Site are expected to reach these volume thresholds, and with the implementation of Safe Active Streets limiting road speeds to 30 km/hr on a few selected roads, the project is expected to deliver a comprehensive and efficient pedestrian and bicycle path network throughout the Site.

6. STORMWATER DRAINAGE

Stormwater will be infiltrated at source where practicable, but it is expected to be challenging due to the steep terrain, hardpan laterite and low permeability. As a result, the safe conveyance of stormwater runoff throughout the road network and into designated stormwater detention areas and natural water courses are a priority. A preliminary drainage catchment plan has been developed to identify indicative overland flow paths and inform the Local Water Management Strategy (LWMS).

On an individual lot basis, conventional on-site storage will be adopted in the Sub Urban and Urban Transects. On-site swales and detention basins are also expected to manage runoff from larger rural lots. Conventional kerbs on the edge of a one-way cross fall road carriageway, accompanied by a pipe and pit network will be used to manage street drainage in the Village Core. Roadside swales and culverts will attenuate and convey stormwater runoff for all "sub-urban" and "natural living" transect areas.

Stormwater runoff and conveyance velocity within roadside swales will be managed through the use of rock armour and check dams to temper channel flow to velocities that prevent scour and minimise mobilisation of sediment. Storage of stormwater runoff across the overall Site is anticipated to be managed through the use of the existing dams.

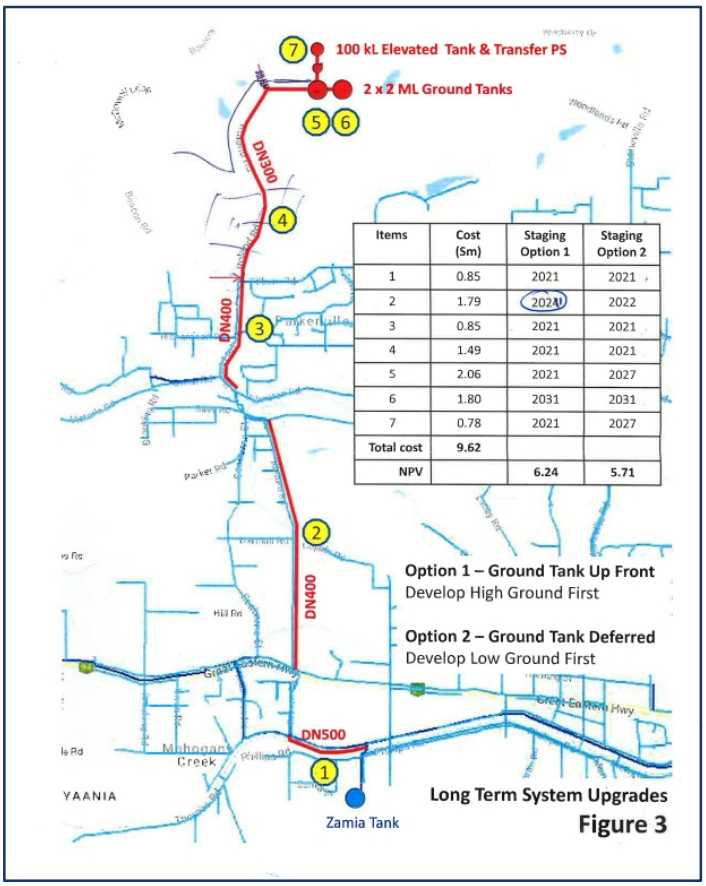
These dams will be upgraded to provide the required storage requirements and engineered to modern-day standards with consideration of clearly defined water levels and public safety as a priority. Re-use of these dams is preferred as the dams are an efficient structure for storage of large volumes of water.

Water Sensitive Urban and Living Stream design principles will be implemented primarily through the use of bio-retention basins where practical to treat runoff before discharge into the dams and the watercourse running north-south through the Site.

Figure 16: Existing Dam Located near Hawkstone Street at the northern end of the site (left). Example of rock armoured roadside swale (right)

7. WATER RETICULATION

The current potable water strategy was formed in collaboration between Water Corporation and Worley Parsons in 2009 and identifies both the Parkerville (Eastcourt Property Group) and Stoneville developments as being serviceable via an extension of the existing water main network from the Zamia Water Tank source, some 7km south of the site. The current Water Corporation water reticulation strategy for the proposed Stoneville Development in isolation is consistent with the 2009 concept and involves a trunk main extension from the Zamia Water Tank to the site. Two 2.0ML ground level tanks and a 100 kL elevated tank, along with a pump station to transfer water from the ground tanks to the elevated tank is required and will be located at the existing topographical high point on the Stoneville Development area.



Items	Cost ($m)	Staging Option 1	Staging Option 2
1	0.85	2021	2021
2	1.79	2021	2022
3	0.85	2021	2021
4	1.49	2021	2021
5	2.06	2021	2027
6	1.80	2031	2031
7	0.78	2021	2027
Total cost	9.62		
NPV		6.24	5.71

Figure 17: Water Strategy for North Stoneville (Water Corporation 2018 – Appendix 7)

The water trunk main extension comprises of new DN300 and DN400 pipelines to be extended from Great Eastern Highway north towards the Site at Roland Road. An extensive review of the proposed DN300/DN400 water main extensions has been carried out to identify practical alignments in existing roads that avoid existing vegetation and infrastructure where possible.

The tanks and pump station(s) will be constructed progressively to match the staged development plan. A single 2ML groundwater tank set at an elevation of 314m AHD will initially be required to service the first stage of development provided all new lots are below 295m AHD. The single 2ML tank is expected to have sufficient capacity to service the first stages of development, with the second 2ML tank constructed to support further stages as required. Development of residential lots above 295m AHD will require construction and operation of the 17m high 100kL elevated tank at 327m AHD and construction of the pump station to service the elevated tank.

Suitable provision of a dedicated site will be allowed for in the subdivision plan to accommodate the elevated and ground level tank and pump station infrastructure.

8. WASTEWATER RETICULATION

The Site is outside the Water Corporation's Wastewater Servicing Area and at this stage is unlikely to be serviced by Water Corporation. An alternative Wastewater solution has been developed in conjunction with Water West, private-sector water utility and licenced wastewater provider, who will act as the operator of a local reticulated sewerage scheme for Stoneville under a Water Services Operating License.

This wastewater management strategy comprises of a Membrane Bio-Reactor (MBR) Sewerage Treatment Plant, macerator pumps for each lot and an internal pressure main system throughout the road network. The MBR Sewerage Treatment Plant will be located at the north-west corner of the Site near Hawkstone Street and be fully serviced. Preliminary considerations towards the feasibility of a solar array located within the site are also being explored to meet the electrical requirements of the MBR Sewerage Treatment Plant.

The reticulated sewerage strategy includes a scheme to recycle sewerage for reuse as greywater irrigation. An 84,000 kL capacity storage dam is planned to be constructed adjacent to the MBR Sewerage Treatment Plant to store treated wastewater over the winter period for irrigation of public open spaces. The final capacity of the dam will be determined by the water balance required to store the expected volume of treated effluent produced throughout the year and the irrigation demand for public open spaces throughout the drier months.

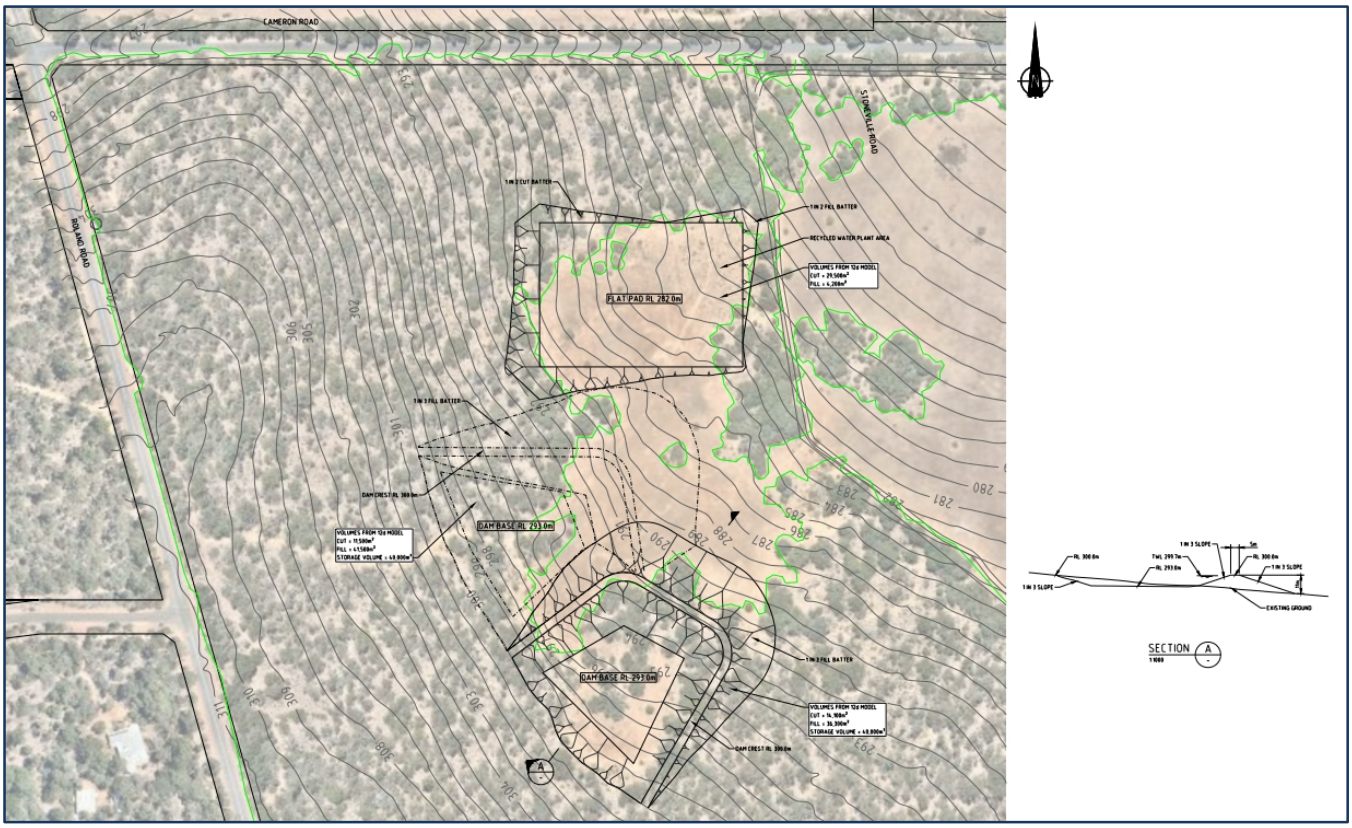


Figure 18: Concept Earthworks Design for 40,000 kL Storage Dam (Appendix 3)

A pressure pipe sewerage system has been selected to satisfy the design aspiration of retaining the natural landform as best as possible. The pressure pipe system does not require significant earthworks to re-grade natural topography to flow towards the Treatment Plant, a pre-requisite for most gravity systems common throughout urban development in the Swan Coastal plain.

The pressure system involves the use of macerator pumps on each lot, centrally controlled to produce consistent flows through a network of pressure mains to the Treatment Plant. The pressure mains will be situated in standard sewer alignments within the road reserves. The pressure pipe network and macerator pumps are intended to be owned and operated by Water West.

9. UNDERGROUND POWER AND STREET LIGHTING

Western Power has sufficient network capacity to service the Site, with power and street lights expected to be distributed via underground cables within the internal road network. An extension of Western Power's 22 kV High Voltage feeder cables will be required to connect to Western Power's Darlington network from Roland Road to the west, and to Sawyer's Valley to the east through the existing rural-residential areas. The 22 kV feeder cables will be extended through the site to form a high voltage "backbone" network within the Site. Transformers will be positioned throughout the site to step down high voltage power to a low voltage reticulation network for service to individual lots.

The advent of micro-grid technology, improving battery and PV cell prices is likely to offer feasible alternatives for a de-centralised power generation network in the near future. The aspirational model is likely to involve power generation from individual homes by means of PV rooftop solar systems (as currently available), a peer to peer trading platform to allow surplus energy to be traded, possibly a communal battery storage facility and backup power system.

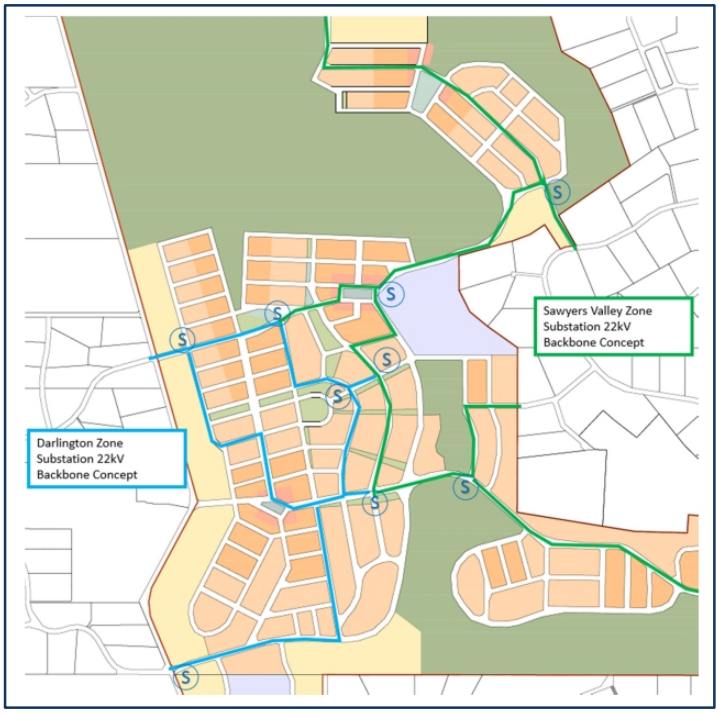


Figure 19: Proposed HV Backbone Network (APD 2017)

Each element is still in its infancy and requires a detailed assessment of options and potential costs for implementation in this project and current legislative and economic environment. A feasible private-sector utility would also need to be established to manage and operate the micro-grid infrastructure required to support a de-centralised renewable power generation system. However, Stoneville's low urban density, vast areas of cleared land outside the Urban zone boundaries, and project aspirations to offer a modern, technologically advanced flavour of the Hills lifestyle positions the Project as an ideal candidate to pioneer the future of sustainable power generation.

10. GAS SUPPLY

No gas infrastructure currently exists near Stoneville with the nearest gas reticulation infrastructure located in excess of 10km from the Site. As a result, reticulated gas is not intended to be provided for the Stoneville development in line with changing household preferences towards solar powered electrical stove tops and hot water systems.

11. TELECOMMUNICATIONS

Telecommunications and high-speed internet are expected to be provided through the expansion of NBN's optic fibre network to Site. A minor backhaul upgrade is required to extend optic fibre to the site as confirmed by NBN and will continue to be rolled out throughout the development on a stage by stage basis.

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 Provider's handbook. There will be some local land requirements for equipment sites, similar to current provisions which will be accommodated at detailed subdivision stage.

12. STAGING

Development of the Site will be carried out in stages, with staging anticipated to commence from Roland Road to the west and focus around the establishment of the first Transect Village Core. Stage 1 is likely to include infrastructure for essential services including potable Water Tanks, the Wastewater Treatment Plant and associated Pressure Mains, High Voltage Transformer and 22 kV High Voltage Backbone Feeder extension.

Construction of the supporting infrastructure may also be established in stages to provide services with a capacity commensurate with the initial demand.

13. CONCLUSION

Based on the advice received from various servicing authorities, sub-consultants and the Shire of Mundaring, C&W and MAPL consider the Site free of major impediments to development. The ground conditions can be managed with a considered strategy to retain much of the natural landform and to build up the existing ground, therefore minimising the extent of excavation into existing ground. The presence of extensive hardpan laterite across the site does not inhibit the proposed development.

Wastewater services are intended to be supplied by a licensed private-sector utility to manage a local wastewater scheme that reuses treated wastewater for greywater irrigation. Potable Water can be supplied to the Site from the Zamia water tank once the DN400 & DN300 trunk mains are extended to the Site.

Underground power and telecommunications services are available or require only minor upgrades to extend infrastructure to the Site. The investigation for this report is largely based on preliminary advice from the various service authorities and is current as of November 2022.

References

1. Stoneville Concept Design Assessment - Water West June 2017
2. Stoneville Local Structure Plan, Lot 48 Stoneville Road Roland Road Transport Impact Assessment – Transcore June 2018
3. Stoneville Development Feasibility Assessment – APD July 2017
4. Stoneville Transect Design Guide – Hatch

APPENDIX 1

Preliminary Earthworks

Existing Slope Analysis 6198-00-SK19 Rev A

EXISTING SURFACE SLOPE LEGEND

- 0% - 1%
- 1% - 2%
- 2% - 3%
- 3% - 4%
- 4% - 5%
- 5% - 6%
- 6% - 7%
- 7% - 8%
- 8% - 9%
- 9% - 10%
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- 19% - 20%
- 20% - 21%
- 21% - 22%
- 22% - 23%
- 23% - 24%
- 24% - 25%

0m 120 240 360m

1:6000

REV	DATE	DRN	CKD	APP	AMENDMENT
A	03.03.22	AC	-	-	ISSUED FOR REVIEW

N

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

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CLIENT: SATTERLEY

APPROVED: CHECK PRINT

DESIGNED: AC

SCALE:

PROJECT: STONEVILLE

TITLE: PRELIMINARY EARTHWORKS EXISTING SURFACE SLOPE ANALYSIS

WAPC No. ######

DRAWING No. 6198-00-SK19

REVISION A

ORIGINAL SIZE A1

APPENDIX 2

Preliminary Earthworks

Road Slope Analysis 6198-00-SK20 Rev A

EXISTING SURFACE SLOPE LEGEND

- 0% - 1%
- 1% - 2%
- 2% - 3%
- 3% - 4%
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- 22% - 23%
- 23% - 24%
- 24% - 25%

0m 120 240 360m

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REV	DATE	DRN	CKD	APP	AMENDMENT
A	03.03.22	AC	-	-	ISSUED FOR REVIEW

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DESIGNED: AC

SCALE:

PROJECT: STONEVILLE

TITLE: PRELIMINARY EARTHWORKS ROAD SLOPE ANALYSIS

WAPC No.: ######

DRAWING No.: 6198-00-SK20

REVISION: A

ORIGINAL SIZE: A1

APPENDIX 3

Recycled Water Storage Dam 6198-00-SK6_B

CAMERON ROAD

ROLAND ROAD

STONEVILLE ROAD

1 IN 2 CUT BATTER

1 IN 2 FILL BATTER

RECYCLED WATER PLANT AREA

VOLUMES FROM 12d MODEL
CUT = 29,500m²
FILL = 4,200m²

FLAT PAD RL 282.0m

1 IN 3 FILL BATTER

DAM CREST RL 300.0m

VOLUMES FROM 12d MODEL
CUT = 11,500m²
FILL = 41,500m²
STORAGE VOLUME = 40,000m³

DAM BASE RL 293.0m

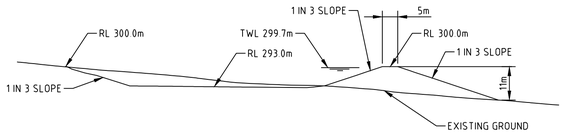
1 IN 3 FILL BATTER

DAM BASE RL 293.0m

VOLUMES FROM 12d MODEL
CUT = 14,100m²
FILL = 36,300m²
STORAGE VOLUME = 40,000m³

DAM CREST RL 300.0m

A
-



SECTION A
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0m 20 40 60m
1:1000

REV	DATE	DRN	CKD	APP	AMENDMENT
B	22.05.17	AAD	TB		FUTURE SECOND DAM ADDED
A	18.05.17	AAD	TB	T. BOEKEMAN	ISSUED FOR INFORMATION

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CLIENT: SATTERLEY

APPROVED: TROY BOEKEMAN 18.05.17

DESIGNED: AAD

SCALE: 1:1000

PROJECT: STONEVILLE

TITLE: PRELIMINARY RECYCLED WATER FACILITY

WAPC No.: WAPC No.

DRAWING No.: 6198-00-SK6

REVISION: B

ORIGINAL SIZE: A1

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APPENDIX 4

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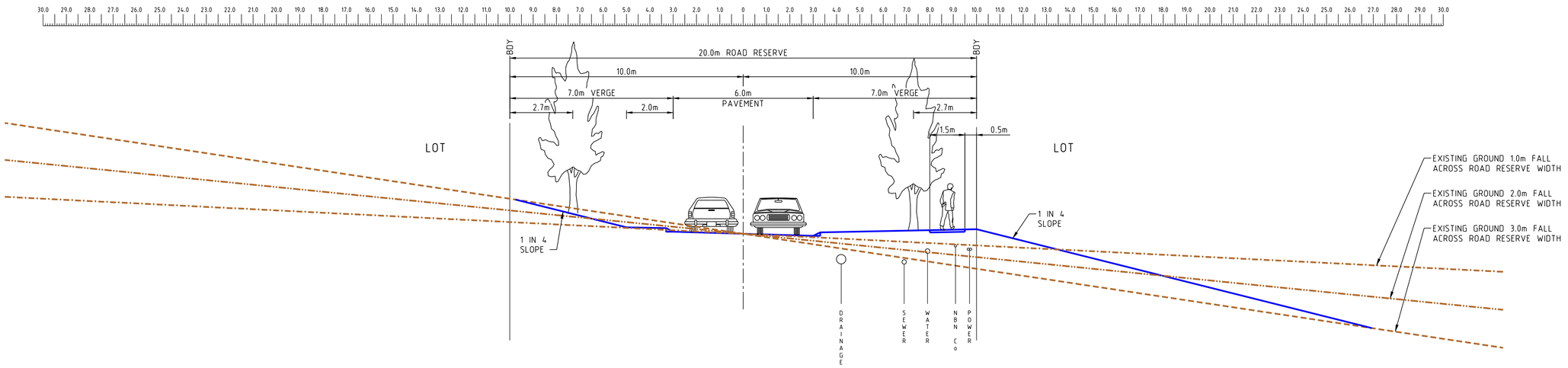
Drawing 6198-00-SK8_A



TYPICAL ROAD CROSS SECTION 20.0m ROAD RESERVE
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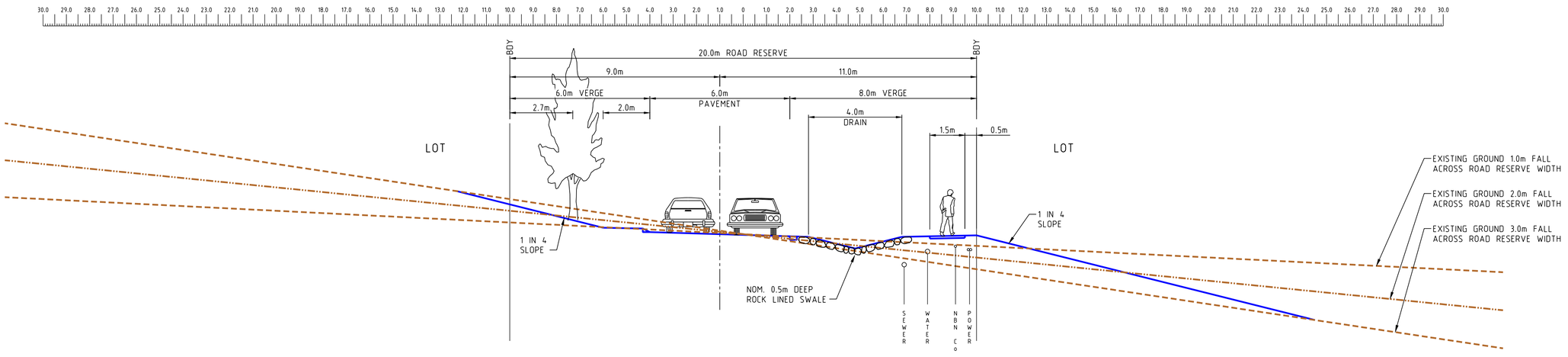

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1:100

TRANSECT 1/2

REV	DATE	DRN	CKD	APP	AMENDMENT
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APPROVED: 19.06.18

DESIGNED: AAD

SCALE: 1:1000

PROJECT: STONEVILLE

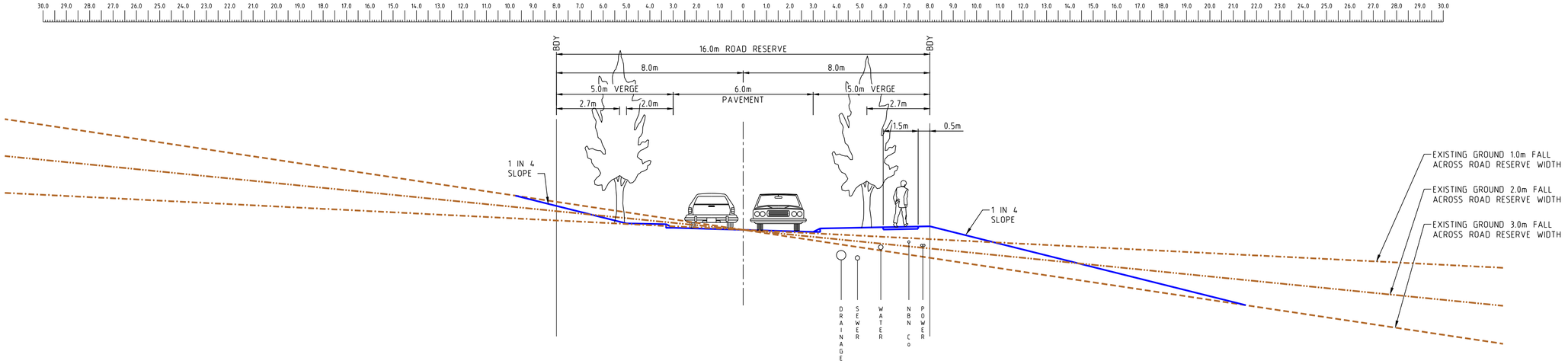
TITLE: TYPICAL ROAD CROSS SECTIONS

WAPC No.: WAPC No.

DRAWING No.: 6198-00-SK7

REVISION: A

ORIGINAL SIZE: A1



TYPICAL ROAD CROSS SECTION 16.0m ROAD RESERVE
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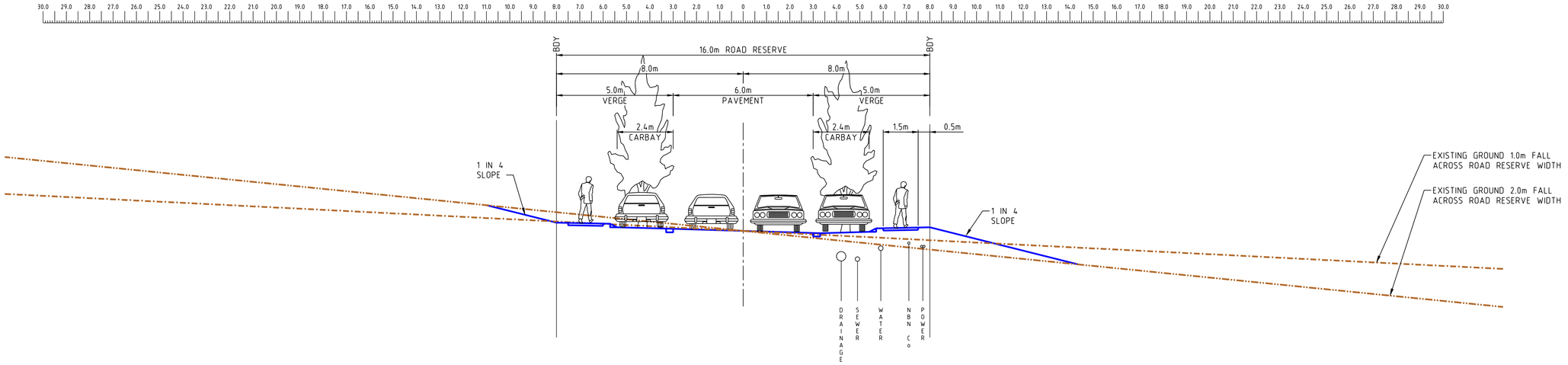
TRANSECT 3



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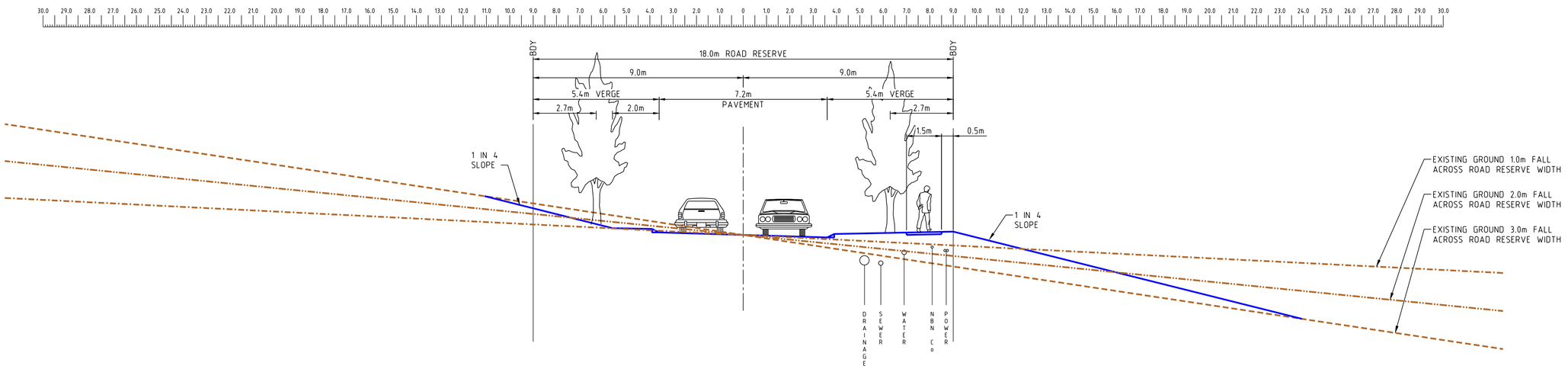

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TRANSECT 4

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A	19.06.18	AAD	TB		ISSUED FOR INFORMATION

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APPROVED: 19.06.18
DESIGNED: AAD
SCALE: 1:1000
PROJECT: STONEVILLE
TITLE: TYPICAL ROAD CROSS SECTIONS
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APPENDIX 5

Drawing 6198-00-SK16_A
Drawing 6198-00-SK17_A

PRELIMINARY

REV	DATE	DRN	CKD	APP	AMENDMENT
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DESIGNED: AC

SCALE: 1:500

PROJECT: STONEVILLE

TITLE: STONEVILLE ROAD & TOODYAY TOAD INTERSECTION UPGRADE CONCEPT PLAN

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DRAWING No.: 6198-00-SK16

REVISION: A

ORIGINAL SIZE: A1

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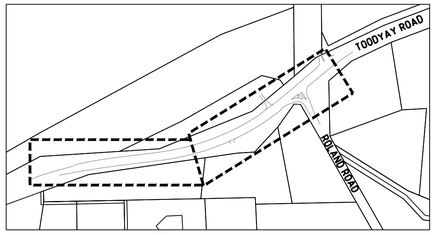
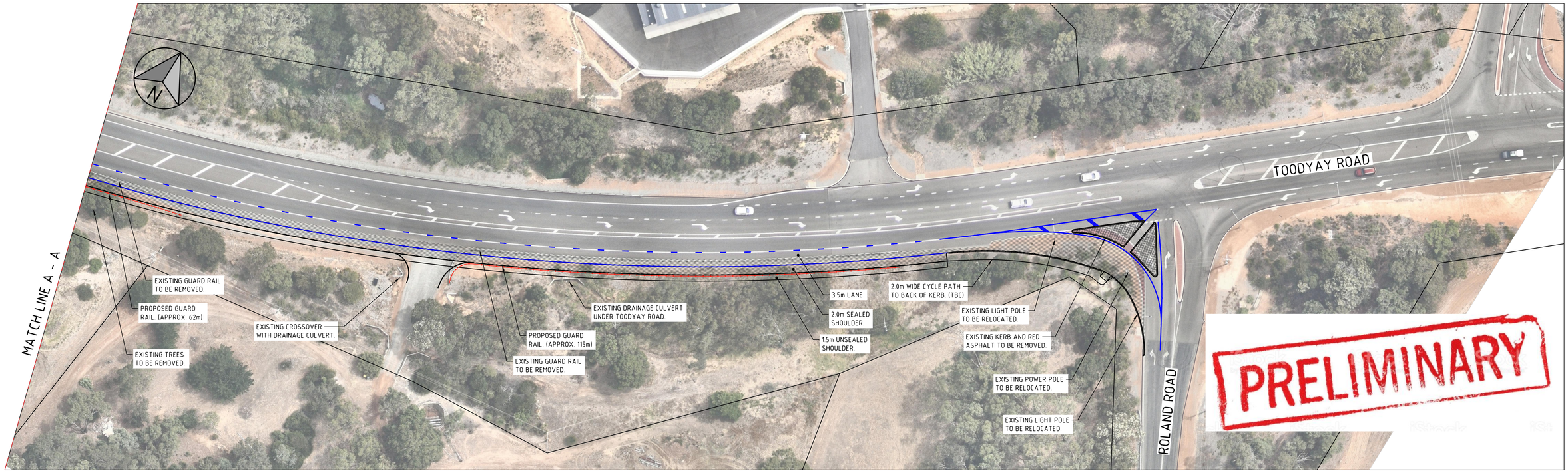


LOCALITY PLAN



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DESIGNED: AC

SCALE: 1:500

PROJECT: STONEVILLE

TITLE: ROLAND ROAD & TOODYAY TOAD INTERSECTION UPGRADE CONCEPT PLAN

WAPC No.: WAPC No.

DRAWING No.: 6198-00-SK17

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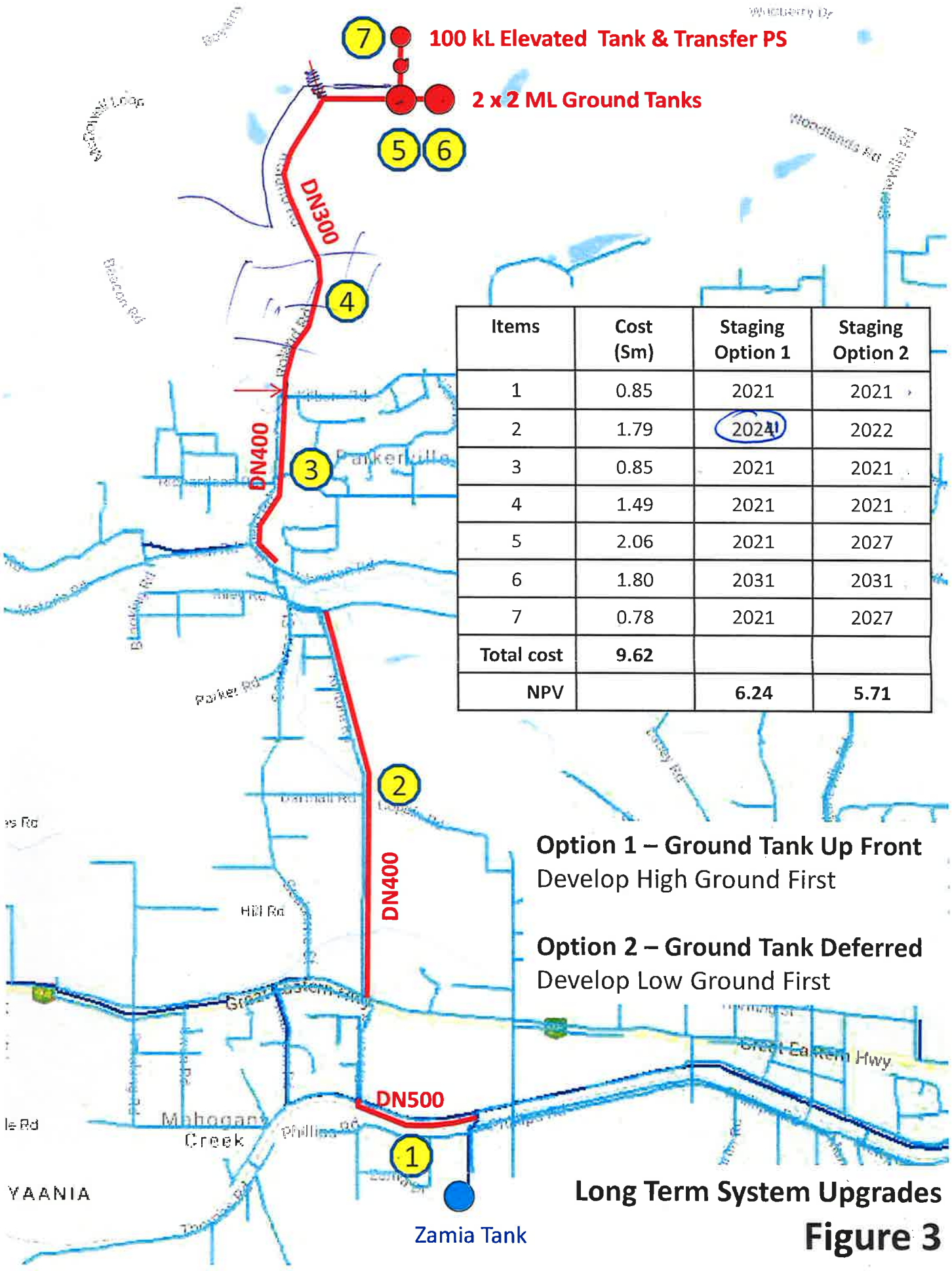
APPENDIX 6

Water Corporation Potable Water Strategy



Items	Cost (Sm)	Staging Option 1	Staging Option 2
1	0.85	2021	2021
2	1.79	2021	2022
3	0.85	2021	2021
4	1.49	2021	2021
5	2.06	2021	2027
6	1.80	2031	2031
7	0.78	2021	2027
Total cost	**9.62**		
NPV		**6.24**	**5.71**

Option 1 – Ground Tank Up Front
Develop High Ground First

Option 2 – Ground Tank Deferred
Develop Low Ground First

Long Term System Upgrades

Figure 3

Water Corporation
Mark Busher

1/18