Cossill & Webley
CONSULTING ENGINEERS

Robinson Grove – Phase 2
Structure Plan Engineering Servicing Report
September 2025

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1. Executive Summary

This report has been prepared by Cossill & Webley Consulting Engineers (CW) to support a proposed Local Structure Plan (LSP) for Robinson Grove Stage 2 located on Lot 9000 Katharine Street, Bellevue. The report summarises civil engineering servicing considerations for the future urban development of the Site.

This report provides details for each major infrastructure type and a servicing strategy for implementation. The level of detail is consistent with the requirements of an LSP submission. The engineering review covers earthworks, roadworks, stormwater drainage, sewerage, water supply and utility services.

The investigation has found the land is capable of development and will be supported by the progressive extension of critical infrastructure from existing development in the Stage 1 area. The ground conditions and previous land uses will not limit the proposed urban development of the Site and methodologies have been developed to manage earthworks and stormwater to allow for urban development to occur. This includes providing wetlands along the Helena River interface for stormwater treatment, and earthworks to consider appropriate setbacks to flood levels of the Helena River and consideration for groundwater levels.

Access to the Site shall be from Wilkins Street and the existing Stage 1 development area.

Additional reticulation sewer infrastructure can be provided via gravity connections to the existing sewer pump station within the Site. The supply of potable water can be provided via the extension of the existing water reticulation network from the existing development area.

Electricity supply, Opticomm telecommunications and gas supply are available from the existing Stage 1 development to extend into the Stage 2 development area.

The investigations and preparation of this report are largely based on preliminary advice from the various service authorities. The information is current as of July 2025.

2. Introduction

This report has been prepared by Cossill & Webley Pty Ltd (C&W) and summarises the results of an engineering assessment to support a proposed Local Structure Plan (LSP) for Robinson Grove Stage 2 located on Lot 9000 Katharine Street, Bellevue. The subject is outlined in blue in Figure 1 below and is herein referred to as the Site.

The Site is currently zoned as "Urban" under the Metropolitan Region Scheme (MRS). The report covers the engineering infrastructure requirements (siteworks, roadworks, stormwater drainage and utility services) to support future residential development within the Stage 2 areas.

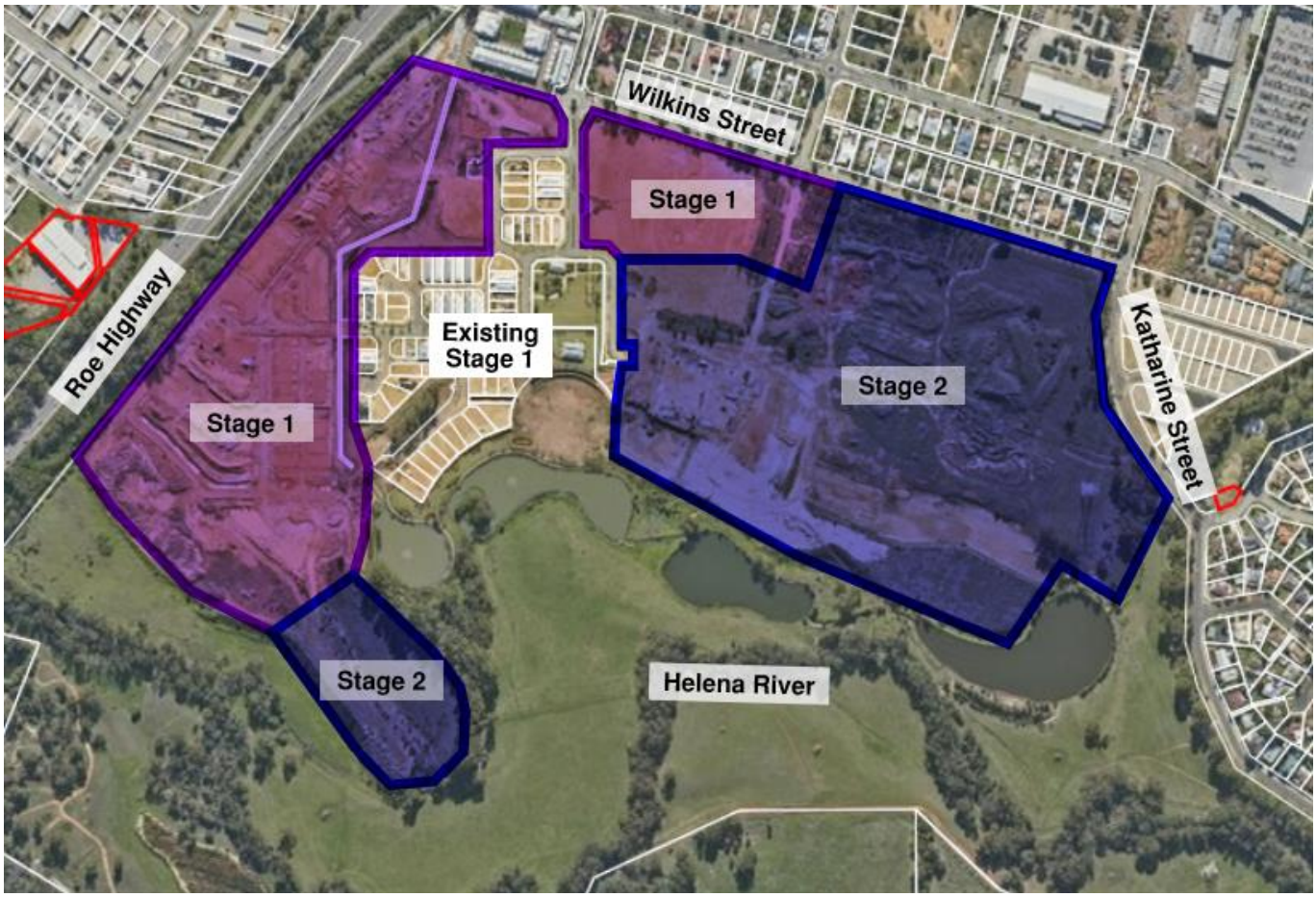

Figure 1: Subject Site (Metromap, May 2025)

Referring to Figure 1 above, the Site is located approx. 16 km west of the Perth CBD. The Site is bounded by Wilkins Street to the north, Katharine Street to the east, the Helena River to the south and the Roe Highway to the west. A portion of development has occurred within the Site for Stage 1 already.

The Site has been mostly cleared of vegetation, with some clusters of low-lying vegetation and mature trees near the river frontage. Remnant vegetation within the Site shall be removed to facilitate development. Existing mature trees located within proposed public open space (POS) areas shall be retained where practical.

Existing stockpiles are located within the Site used for the development occurring in Stage 1. These existing stockpiles are to be removed prior to development or reused as fill material as part of the Stage 2 development.

3. Geotechnical Considerations

3.1 Geology

The Geological Survey of Western Australia's Perth Geology Map is depicted in Figure 2 below, which shows the following soil characteristics for the subject Site:

- Pebbly Silt (Mgs1)
- Clay (Cm2)

Mgs1 Pebbly Silts are part of the Guildford Formation. The ground conditions in these areas are expected to be silty materials with weathered granite pebbles and some fine to medium grained sand of alluvial origin. This soil type typically has low permeability, medium-high bearing capacity, low corrosion and medium-high slope stability.

Cm2 are alluvium clays which can be found in floodplain areas as sediment deposits from rivers. Clays in this area will be hard when dry and soft when wet, with variable silt content and no sand. These soils have low permeability, low to medium bearing capacity, low corrosion potential and medium slope stability. It is expected that the Cm2 alluvial clay layers will be underlain by Mgs1 pebbly silt layers.

Given the proximity to groundwater, and potential shrink-swell potential, imported fill may be required if a Class A Site Classification under AS2870 'Residential Slabs and & Footings' is desired.

Ground conditions on the Site are favorable for urban development with the introduction of imported clean fill material and appropriate management of Site drainage throughout construction and post-construction.

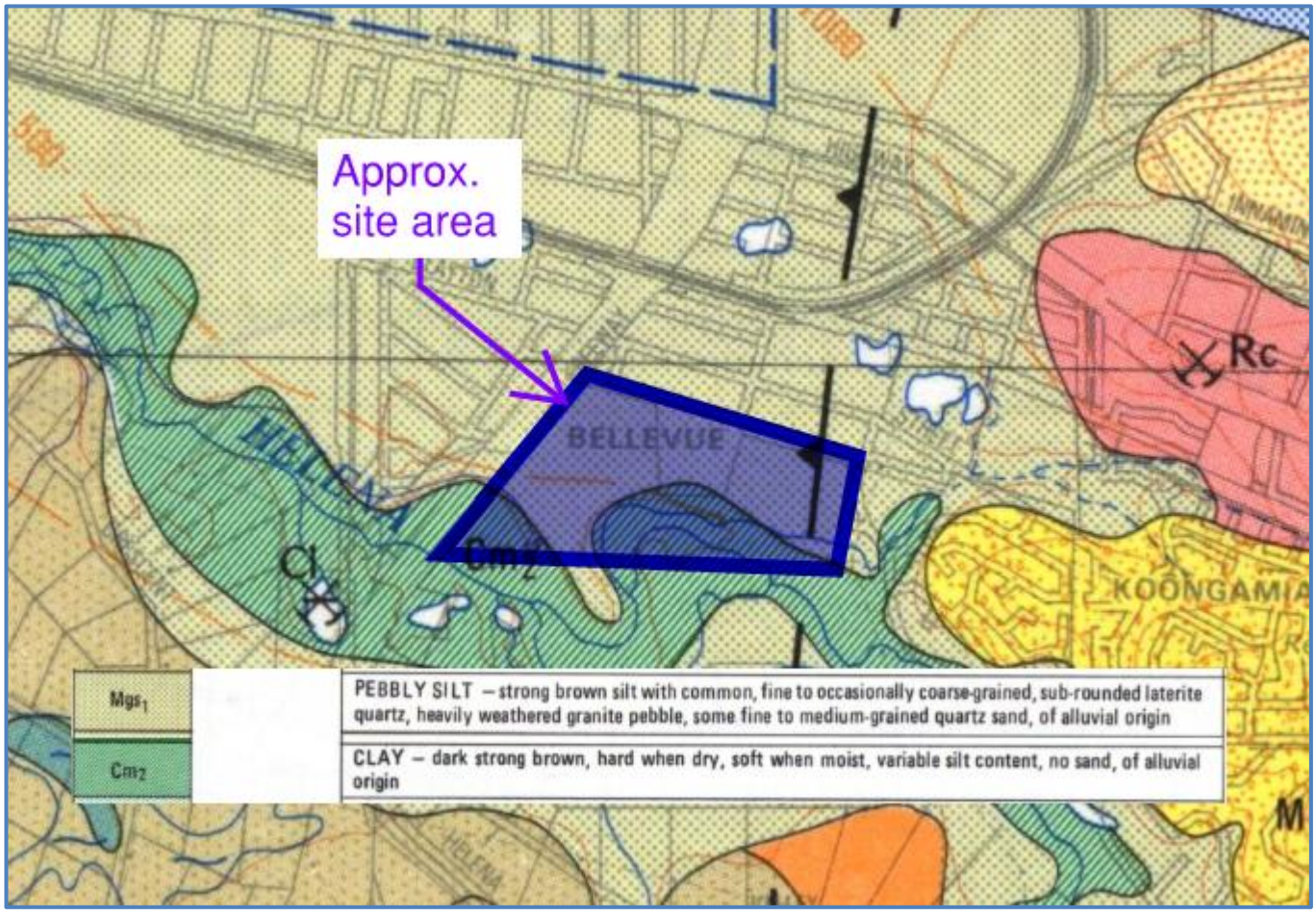

Figure 2: Geological Information {Geological Survey of WA)

A geotechnical report prepared by Douglas Partners for the Site in 2015 recommends the following for each soil profile:

- Alluvium materials are not suitable for reuse due to difficulty in handling and compaction during construction. These materials should be either disposed from the site or used for landscaping purposes.
- Sandy clay and clayey sand materials from the Guildford Formation should be suitable for re-use as structural filling, and is recommended to be carried out during the dry season.
- In situ sand was encountered in a limited amount, and it is anticipated that import fill should be utilised.
- Topsoil is not suitable for reuse as structural filling due to high organic content, unless suitably blended with clean sands.
- Due to the dense materials on site and anticipated slow rate of excavation, heavy excavators are recommended for excavation purposes.

3.2 Topography

The western portion of Stage 2 grades towards the creek surrounding the area. There is a crest that runs along the east side of the area, making the eastern side slope down to the creek bed steeper (at approx. 1-in-2 to 1-in-3) than the western side (around 1-in-10 grade).

The eastern portion of Stage 2 grades towards the creek area along the southern boundary. The majority of the Stage 2 area is relatively flat (1-in-200 grade). There is a steep decline down to the creek bank (between 1-in-5 and 1-in-10 grade).

During detailed earthworks modelling, utilizing cut material from the existing undulating landform could be an internal source of fill material for some of the development construction works and to ensure the Site is suitable for urban development.

Figure 3 below shows the existing topographical features of the Site as described above.

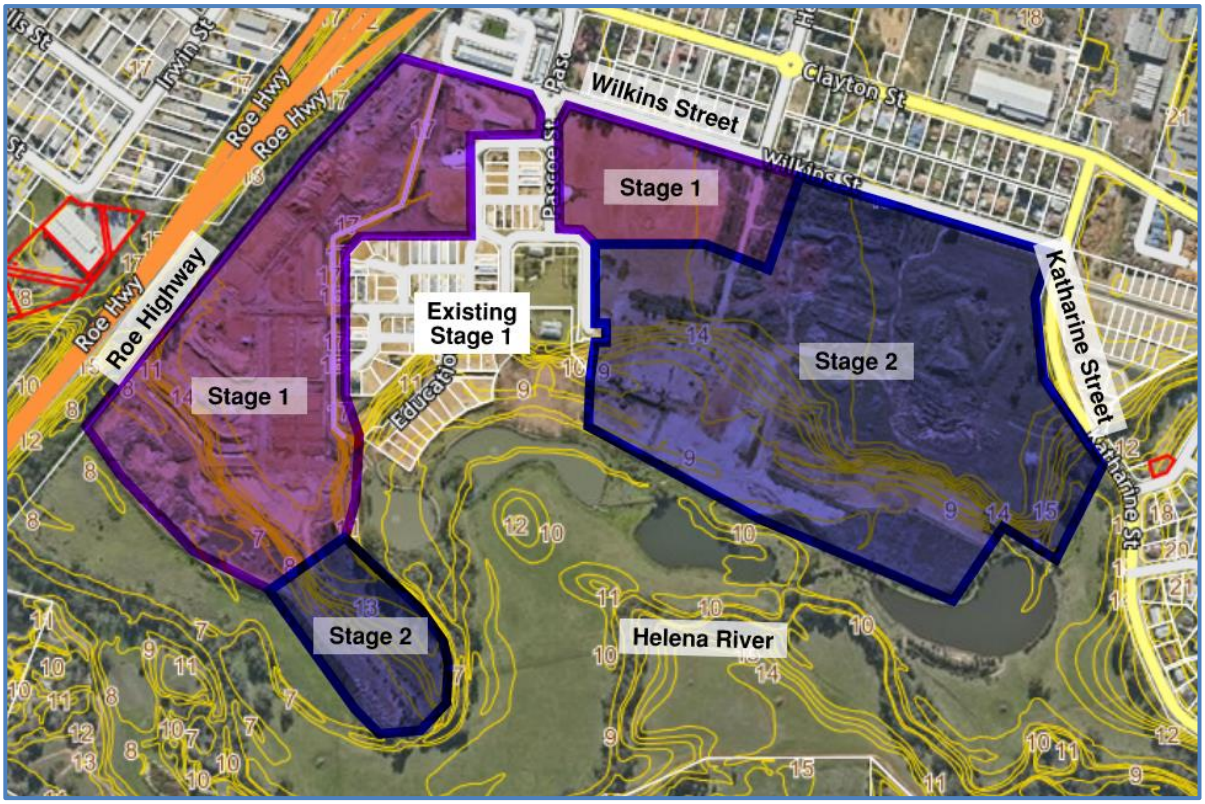

Figure 3: Topography (MNG Access, 2025)

3.3 Groundwater

Coterra have prepared a Local Water Management Strategy (LWMS) for this development. The maximum groundwater levels based on monitoring between 2012 and 2014 across the Stage 2 areas are between 7.72m and 10.84m AHD, with an outlier sitting at 14.75m AHD. Generally, the groundwater table depth below ground level is between 0.17m and 5.16m deep. Bores located next to the floodplain recorded maximum groundwater levels between 7.72m and 9.42m AHD. This does indicate that there may be evidence of groundwater perching, which can be common in ground conditions that consist of several different material profiles.

There are a few pockets where the depth to groundwater suits development away from the creek bed. The majority of the areas closer to the creek in the south have low depth to groundwater levels. These areas will require imported clean fill material for them to be suitable for urban development.

Fill material has been imported to site to lift local areas of the site and achieve suitable freeboard to maximum groundwater levels. Subsoil drainage has also been utilized within the site to manage groundwater where necessary, though its primary function is to drain subsurface flows towards appropriate drainage area. We do not anticipate the existing groundwater levels or the effective disposal of runoff generated from the newly created lots or roads on-site will pose an impediment to development of the Site.

3.4 Acid Sulphate Soils

A desktop review of the Department of Environment and Conservation's ASS Risk Map for the Central Metropolitan Region for the potential of Acid Sulphate Soils (ASS) indicates the Site is generally classified as a moderate to low risk of ASS occurring within 3m of the natural soil surface along the riverbanks. Acid Sulphate Soils are expected to be encountered and treated in accordance with well-established and accepted lime dosing and agricultural lime mixing practices. Areas affected by ASS are shown in Figure 4 below.

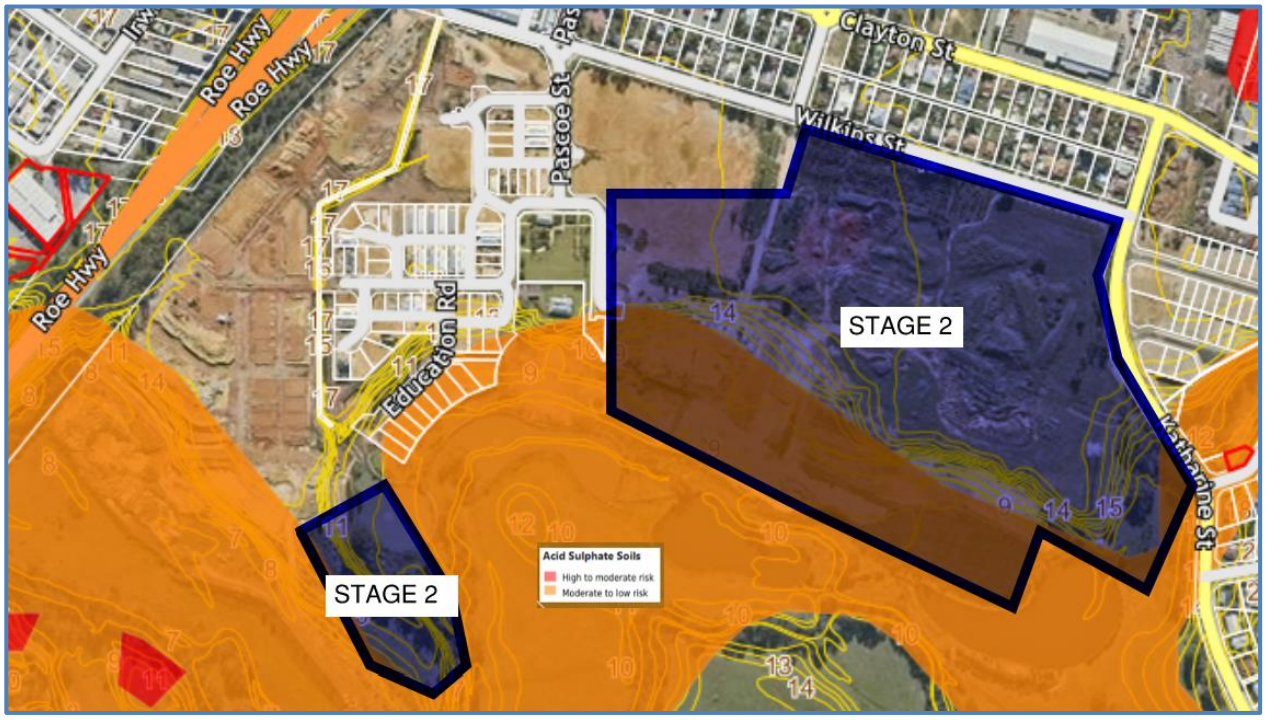

Figure 4: Acid Sulphate Soils Risk Mapping (MNG Access, 2025)

3.5 Contamination Remediation

An internet search of the Contaminated Sites Database (https://www.der.wa.gov.au/your-environment/contaminated-sites) confirms that contaminated land is not located within the Site.

4. Siteworks & Earthworks

Siteworks for residential development of the Site will generally comprise the clearing of existing vegetation, earthworks, importation of fill to raise levels and cut to form swales for the attenuation and conveyance of stormwater runoff and management. Clean structural fill will be required to achieve minimum levels for sewer serviceability, cover to drainage pipes and minimum separation to post-development groundwater levels.

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 Developers to provide fully earthworked level lots which are terraced with retaining walls between lots. This approach provides a number of positive outcomes:

- House building site work costs are reduced,
- Retaining wall layouts are rationalised and designs are consistent with Local Authority specifications,
- It enables lots to be terraced up natural slopes to maintain elevation and views.

The Site will be designed in accordance with the following objectives:

- Provide adequate separation to groundwater and freeboard to 1% AEP storm event flood levels with consideration of expected post-development groundwater rise;
- Provide minimum levels required for drainage and sewer serviceability;
- Provide appropriate siteworks to achieve a Class A site classification. This may require removal of peat-rich soils expected in some parts of the Site;
- Allow roads and earthwork levels to be graded to best follow the existing topography and reflect the natural landscape where possible;
- Maintain suitable interface levels at the periphery of the Site.

The earthworks strategy for the site takes into account existing road networks surrounding the Site, proposed future upgrades of these networks and provides for the design of infrastructure in accordance with industry standards and specifications.

5. Drainage

5.1 Integrated Urban Water Management

Coterra have prepared a Local Water Management Strategy (LWMS) for the precinct to address urban water, drainage and groundwater objectives.

A Water Sensitive Urban Design (WSUD) approach will be adopted to manage Stormwater Drainage. The objectives of WSUD will include:

- Detention of stormwater rather than rapid conveyance;
- Use of stormwater to conserve potable water;
- Use of vegetation for filtering purposes; and,
- Water efficient landscaping.

The main WSUD practices that should be incorporated with the progressive development of the Site are as follows:

Stormwater recharge should be maximised through the adoption of 'Best Management Practices', which promote the dispersion and infiltration of runoff as close to the source as possible. These may include the use of porous paving for roads and car parks, diversion of runoff into available road medians (where road grades permit), road-side swales, drainage soakwells to infiltrate runoff from buildings and private open space areas and the disposal of road runoff into infiltration basins within areas of public open spaces (POS).

Water quality will be implemented through the adoption of Best Management Practices, which promote the disposal of runoff via water pollution control facilities such as vegetated swales and basins, detention storage, gross pollutant traps. Non-structural source controls such as urban design, street sweeping. Community education and low fertiliser landscaping regimes may also be implemented to improve water quality across the development.

5.2 Stormwater Collection and Management

All runoff within future residential allotments are connected to the subdivision drainage system via on-site lot connection pits, to avoid hydraulic surcharge of retaining walls within lots due to the low permeability of the existing geology.

Runoff from storms events with a 20% AEP would be conveyed via an underground pipe system to various wetlands along the edge of the development footprint at the interface of the Helena River. Roads and POS would be designed to cater for the surface overflow for more severe storms with building pads constructed at least 300 millimetres above the 1% AEP flood or storage level at any location.

For rainfall events that generate stormwater runoff up to the 15mm first flush event, stormwater will be piped to dedicated bioretention basins for treatment prior to discharge into downstream Lake areas and Helena River. Stormwater events exceeding the 15mm after the first flush will overtop the bioretention basin via overflow weirs and outfall directly into the ROS Lake bodies. Given the existing flood extents and volume of the river in these events, it is anticipated that the impact of post-development flows from the stage 2 area will have no material impact on flow conditions in these events.

The LWMS assessed the flood risk posed by the Helena River on the development. The maximum 1% AEP flood level adjacent to Stage 2 will be approx. 10.78m AHD, with the finished floor levels of residential dwellings required to be a minimum 500mm above this flood level. Therefore, the lowest possible floor level for any lot in Stage 2 shall be 11.28m AHD. The lowest lot pad based on the CW earthworks model is expected to be at 11.47m AHD.

6. Roadworks & Footpaths

6.1 Site Access

For the south-western portion of Stage 2, the local road network for Stage 1 shall provide access to the development. These roads shall be existing or under construction at the time that Stage 2 commences.

For the eastern portion of Stage 2, access will be provided from both Stage 1 and Wilkins Street. No access shall be provided from Katharine Street. Wilkins Street is already constructed, other Stage 1 development road which are not built shall either be existing or under construction at the time that Stage 2 commences.

Overall Site access is from the Roe Highway, which has an interchange with Clayton Street. Clayton Street connects to Wilkins Street through various perpendicular roads, namely Pascoe Street and Henkin Street.

6.2 Subdivision Roads

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 and with the requirements of the Shire of Mundaring. Roadworks will generally consist of kerbed and asphalted pavements.

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, off-street and on-street cycling lanes in accordance with the overall pedestrian and cycling network.

In particular, it is proposed that the development roads be designed to suit lower vehicle operating speeds to ensure safer operation and improved pedestrian movement. The lower speeds on local roads will also support initiatives to adopt smaller street truncations and associated intersection curve radii where suitable.

6.3 Footpaths

Footpaths will be provided in accordance with Liveable Neighbourhoods and the Shire of Mundaring standards and will generally consist of one path in every road as a minimum and an additional shared path on Boulevard Roads.

6.4 Noise Attenuation

Projected traffic volumes on Roe Highway exceed 20,000 vehicles per day, and in accordance with State Planning Policy 5.4 "Noise Considerations", require noise mitigation strategies at this interface in the form of noise walls and in-house acoustic (quiet house design package) mitigation techniques. Construction of the noise wall is coordinated with Main Roads WA as part of the Roe Highway upgrades.

7. Water Reticulation

Preliminary discussions with Water Corporation suggest the site can be serviced from existing infrastructure around the site and that planning for the area shall be revised once the demands are known through the LSP submission. Water Corporation notes that headworks for water could be required. The servicing strategy below shall be updated as part of the structure planning process and scheme review.

There are existing water reticulation pipes within the development surrounding the Site. This includes a 100mm dia. main along Wilkins Street, a 200mm dia. main along Katharine Street. Clayton Street also has existing 200mm dia. water pipes in the eastern end between Henkin Street and Katharine Street, and a 400mm dia. water pipe near the interchange with the Roe Highway.

An existing 150mm dia. pipe leads into the development from Pascoe Street. This connects to a 200mm dia. main along Armstrong Approach. It is anticipated that this water main would be extended along Armstrong Approach through the Stage 2 development area to provide water supply.

Given there are 27 lots within the south-western portion of the Site, it is anticipated that a 100mm dia. water main extended from the existing network to service this area. Assuming the Stage 1 area adjacent to the proposed stage 2 development area is either built or under construction.

There are 273 lots and a local town centre within the eastern portion of the Site. It is anticipated that the 200mm dia. main along Armstrong Approach will be the primary supply, with 150mm dia. and 100mm dia. offtake reticulation pipes servicing the development.

Should external water connections be required, this shall be determined by Water Corporation planning advice.

The existing water network is shown below in Figure 5.

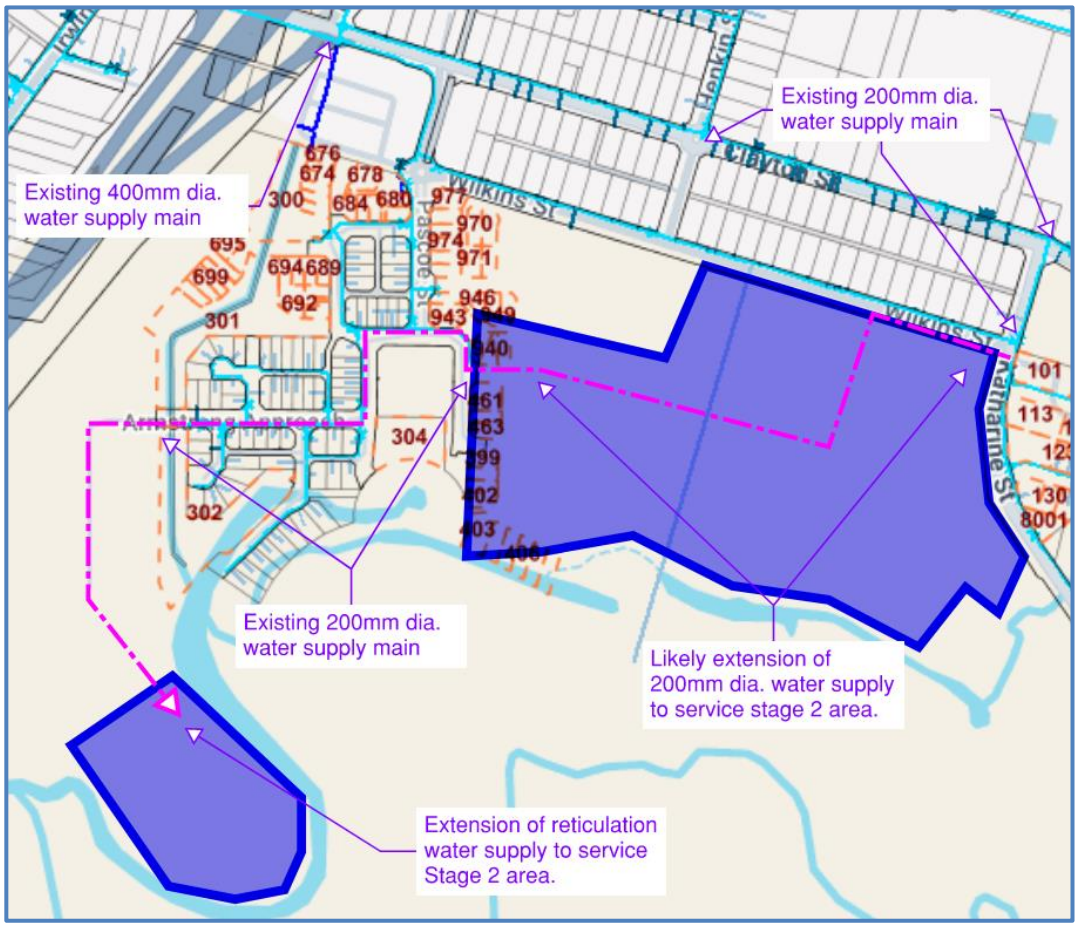

Figure 5: Esinet Existing Water Reticulation (Water Corp, November 2024)

8. Wastewater Reticulation

CW have prepared a sewer master plan for the Stage 2 areas of the Site to determine the controlling lines. An updated wastewater concept based on the proposed Phase 2 concept plan will be prepared as part of the detailed sewer strategy for the Phase 2.

The south-western portion of the Site gravity outfalls towards the north and shall connect into an existing gravity sewer in Stage 1 of the development.

The eastern portion of the Site gravity outfalls towards the west and shall connect into an existing gravity sewer in Stage 1 of the development.

Both of these portions of the development connect to a gravity sewer which reticulates sewage to the Education Road Pump Station. Where sewage is then send in a pressure main through Stage 1 of the development.

There will be a short section of 225mm diameter sewer at the Henkin Street site entrance which will be the outfall for the sewage from the Education Road Pump Station and pressure sewer main. Property connections along this length of sewer will require boundary traps to be installed on property connections.

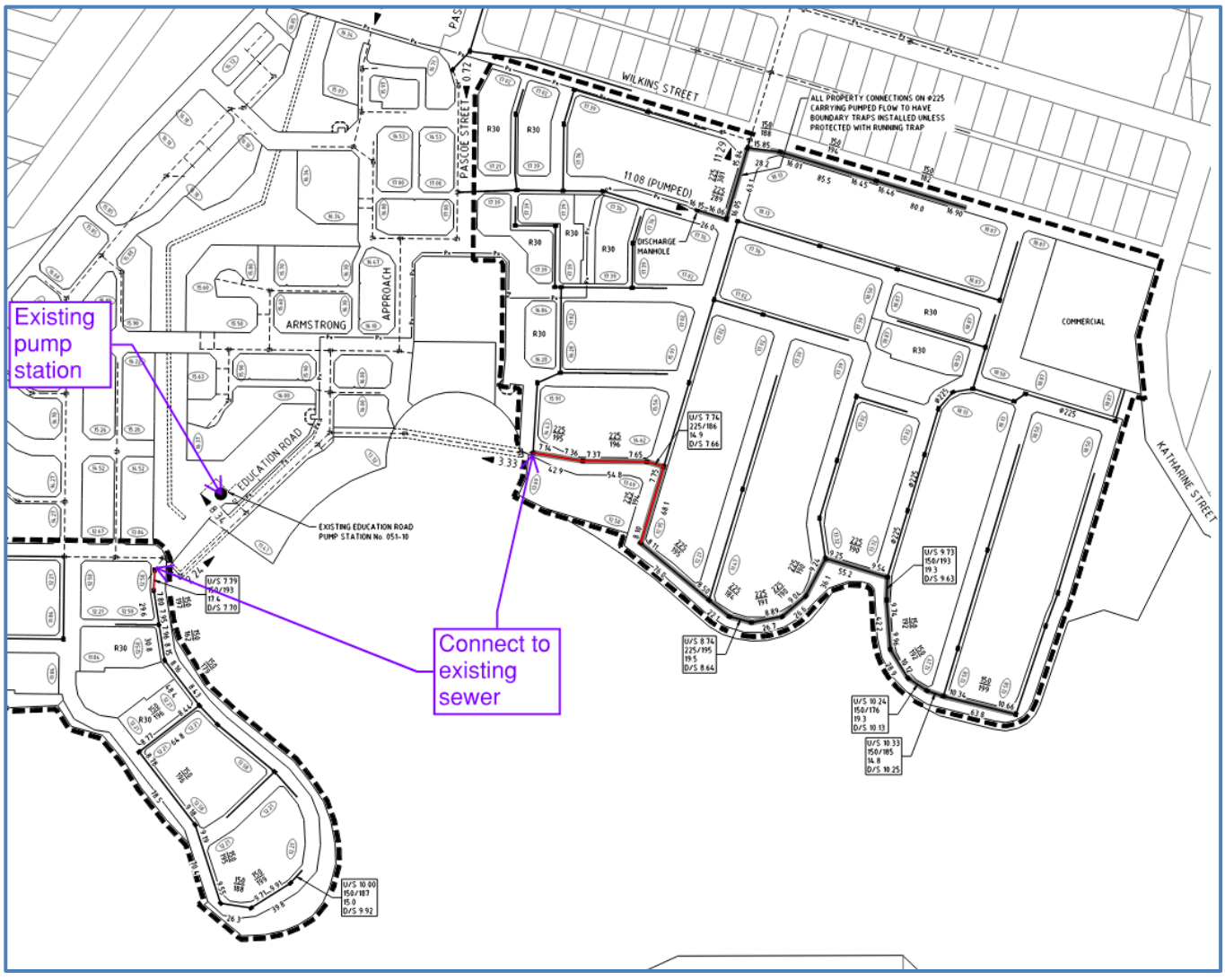

Figure 6: Sewer Reticulation Masterplanning (CW, 2024)

9. Electrical Power Supply

The Western Power (WP) network mapping tool indicates the availability of HV feeders within the Stage 1 area. Care is to be taken during design and construction of the subdivision to ensure that other existing properties serviced by these electrical distribution lines can maintain power supply. According to the WP mapping tool, the Midland Junction substation has 20 to 25 MVA of available capacity for the 2031 forecast to supply the area.

Based on the residential dwelling counts for Stage 2, the total power requirement is calculated as follows:

- Residential lots: Approx. 1.5 MVA
- Local centre: Approx. 0.5 MVA

This equates to a total requirement of approx. 2.0 MVA, which is within the available capacity of the Midlands Junction substation. Should additional HV feeders be required to support development, these can be extended from Wilkins Street or Clayton Street along Pascoe Street and Henkin Street. All power to the proposed development will be underground and fed from transformers located strategically within the Site.

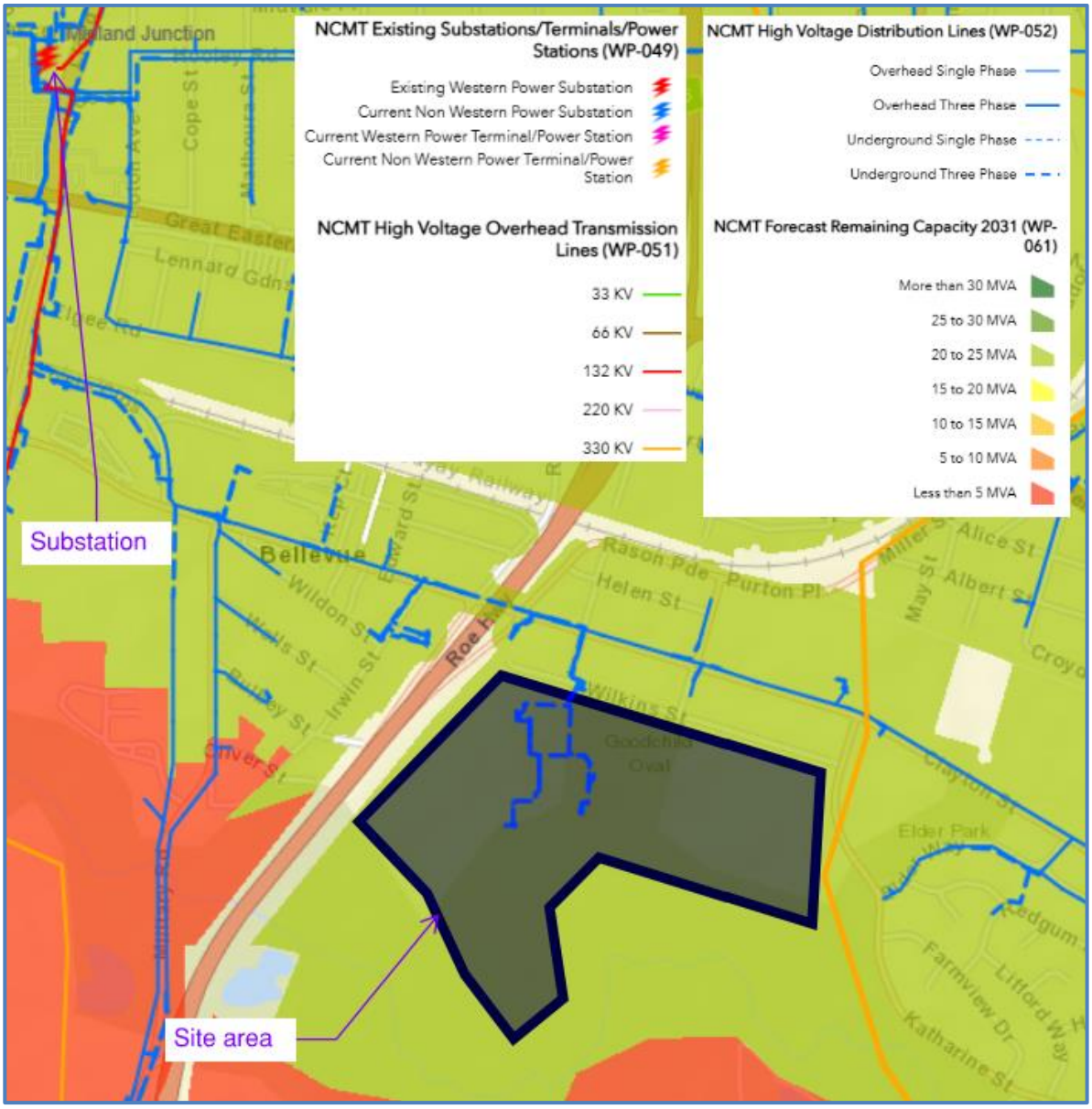

Figure 7: Western Power Network Mapping Capacity Tool (Western Power, 2025)

10. Gas Supply

The Site is to be serviced with gas supply by Atco. It is anticipated that the existing gas network will be extended to provide a service to the development. There are existing gas mains within the Stage 1 area which provides supply to the existing development. The exact location which gas supply will be sourced shall be determined through detailed design of the Stage 2 development area, however it is anticipated that the existing gas from the Stage 1 area and along Wilkins Street will be utilised for gas supply.

11. Telecommunications

Stage 1 of the development area is currently serviced by Opticomm. It is anticipated that Opticomm shall also provide telecommunications services for the Stage 2 area and will be readily available for extension at the time which Stage 2 shall commence.

12. Summary

The Site is developable given its location and zoning to support urban residential development. Earthworks, drainage and servicing works required to develop the Site are consistent with other urban development projects in the surrounding area.

Earthworks are required for the management of potentially unsuitable soils, with fill being required to replace these areas. The earthworks also informs the drainage strategy, which requires multiple wetlands at the interface of the Helena River. Generally all services can be extended from the existing Stage 1 development area or Wilkins Street.

The LSP amendment area has planned strategies for public utility services which are available or can be extended to service the proposed residential development of the Site as required. Based on information available as discussed through this report, there are no engineering impediments to the development of the Site, though co-ordination and co-operation with the relevant Service Authorities will be required as development progresses.

The report has been prepared based on available information and is current as of September 2025.