APPENDIX 8:
ENGINEERING INFRASTRUCTURE REPORT

TABEC
Civil Engineering Consultants

EAST WANNEROO – PRECINCT 7

Engineering Infrastructure Report

December 2023

CLIENT: **HESPERIA**

PROJECT: **EAST WANNEROO – PRECINCT 7**

TITLE: **EAST WANNEROO – PRECINCT 7: ENGINEERING INFRASTRUCTURE REPORT**

DOCUMENT REVIEW				
Revision	Date Issued	Written By	Reviewed By	Approved By
DRAFT	01/12/2021	JBSMALL	JBSMALL	CCBITMEAD
1	08/12/2021	JBSMALL	JBSMALL	CCBITMEAD
2	27/04/2022	JBSMALL	JBSMALL	CCBITMEAD
4	20/12/2022	JBSMALL	JBSMALL	CCBITMEAD
5	01/12/2023	JBSMALL	JBSMALL	CCBITMEAD
6	05/12/2023	JBSMALL	JBSMALL	CCBITMEAD
7	02/12/2023	JBSMALL	JBSMALL	CCBITMEAD
8	15/12/2023	JBSMALL	JBSMALL	CCBITMEAD

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1 INTRODUCTION

This report has been prepared by TABEC Pty Ltd to provide broad servicing and infrastructure advice for the proposed subdivision of various lots contained in Precinct 7 at East Wanneroo.

This report is based on the civil engineering aspects of residential related land uses and summarises the availability of existing infrastructure assets in proximity to the landholding and the potential engineering infrastructure requirements to support urban development within the study area.

The investigation and preparation of the report includes the advice from various service authorities, specialist consultants with relevance to the planning and concept designs prepared to date. Notwithstanding that some temporary delivery of the servicing infrastructure will be required based on a staged construction, the advice addresses the overall development requirements for the Precinct.

The information is subject to change as further detail is resolved during the design phases. The report is supported by reports and sketches where appropriate as listed in the references. The information is current as of December 2023.

Figure 1 illustrates the location of Precinct 7 addressed in this report, bounded on the aerial image which encompasses Mariginiup Lake.

Figure 1 – Site location and aerial image (MNG Access)

2 THE STUDY AREA

The total Local Structure Plan (LSP) area is approximately 395ha, which is located east of Pinjar Road, north of Caporn Street and south of Lakeview Street. The LSP area is bounded by existing residential development to the west and Jandabup Lake to the immediate south east. South of Caporn Street are existing rural residential properties.

The Precinct is accessible from the various boundary roads, including a number of existing roads within the LSP area. In addition, some road reserves exist without formalised road pavements.

There are various Bush Forever sites identified within the proposed LSP concept plan which includes an 8.9ha site to the south-west, a 1.7ha site between Pinjar Road and Mariginiup Lake and the areas within Mariginiup Lake boundary are also mapped.

The current land holdings within the LSP area is currently under various ownership of up to approximately 80 different entities. The existing land use is generally rural-residential with some market gardening and other rural type local business uses. Generally each lot contains an existing house, and various sheds, and other improvements.

Generally large portions of the existing land holdings, outside the Bush Forever sites have been cleared, however vegetation commonly remains along lot boundaries, road verges and around the boundaries of Mariginiup Lake. The elevated areas located east of Mariginiup Road contain more significant vegetation, however it is also acknowledged that various land uses have introduced planted species.

Of the total LSP area, approximately 149ha is identified for P&R Reserve and various other land uses including proposed transit corridor along the eastern boundary, two primary schools located to serve the future residential catchments either side of Mariginiup Lake, a high school site, a Local Centre on Caporn Street, conservation areas, POS and a net subdivisible area of approximately 199ha, or generally half of the total LSP area. The maximum east-west dimension of the LSP area is approximately 2.8km and 1.6km in a north-south direction.

An extract of the current concept subdivision plan as prepared by Burgess Design Group is included in Figure 2. This plan identifies the various site features with an estimated yield for the total LSP area between approximately 2,500 and 3,000 residential lots, based on average lot sizes of 450m2 and 375m2 respectively.

2.1 Landform / Topography

The existing surface elevations shown as contour banding included in Figure 3.

The image shows Mariginiup Lake forming a low point and a general bowl shape for surrounding contours. The existing ground levels rise from the lake in generally all directions at varying grades. The highest elevations are in the south-western areas of the Precinct, where existing ground levels are at approximately 67mAHD. There are other localised high points around Mariginiup Road and Rousset Road at approximately 57mAHD to 59mAHD. There are localised low points in the landform between Mariginiup Road and Rousset Road at approximately 48mAHD and otherwise, the boundaries around Mariginiup Lake form a consistent low point for the LSP area at an elevation of about 43mAHD.

Level differences throughout the LSP area therefore exceed 20m. As the broad landform falls toward Mariginiup Lake, there are steep sections in locations where existing grades up to approximately 9 to 10%.

Existing levels along Caporn Street vary, from a high-point at the Pinjar Road intersection of 68mAHD, to a low point near the intersection with Garden Park Drive of about 47mAHD before rising back toward the intersection of Rousset Road. The landform south of Caporn Street continues to rise.

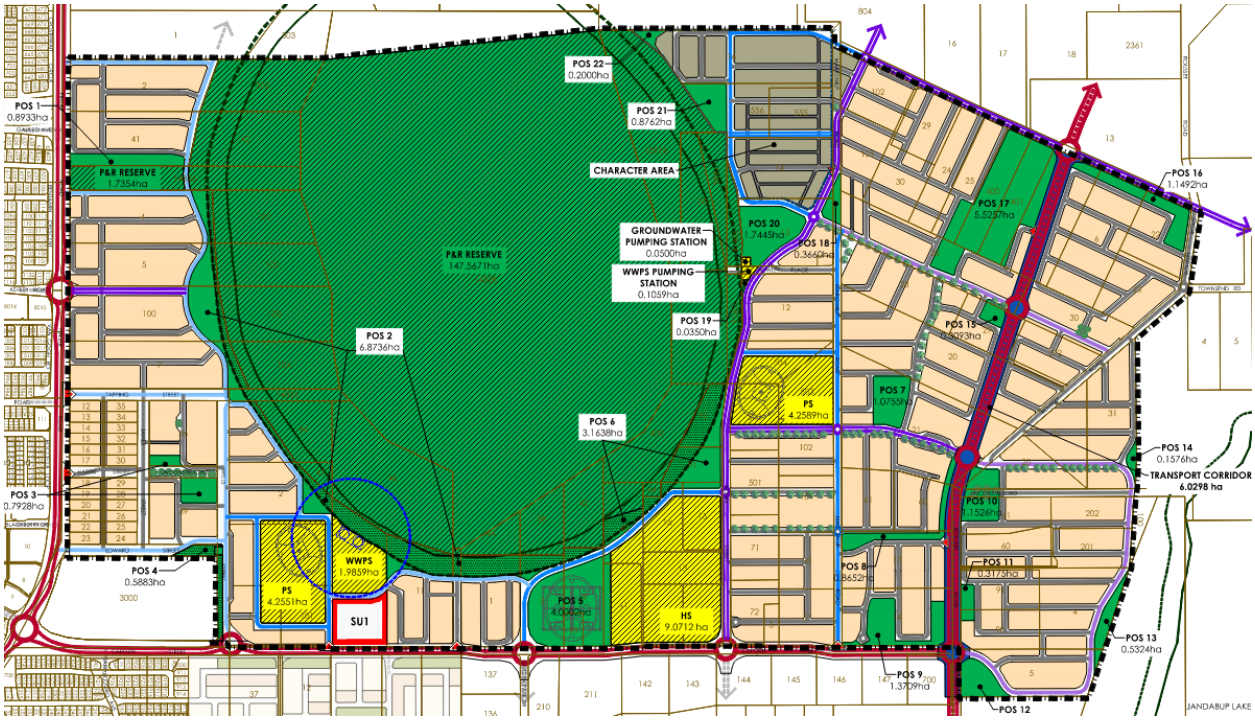

Figure 2 – East Wanneroo – Precinct 7 Extract from Concept Structure Plan (Burgess Design Group)

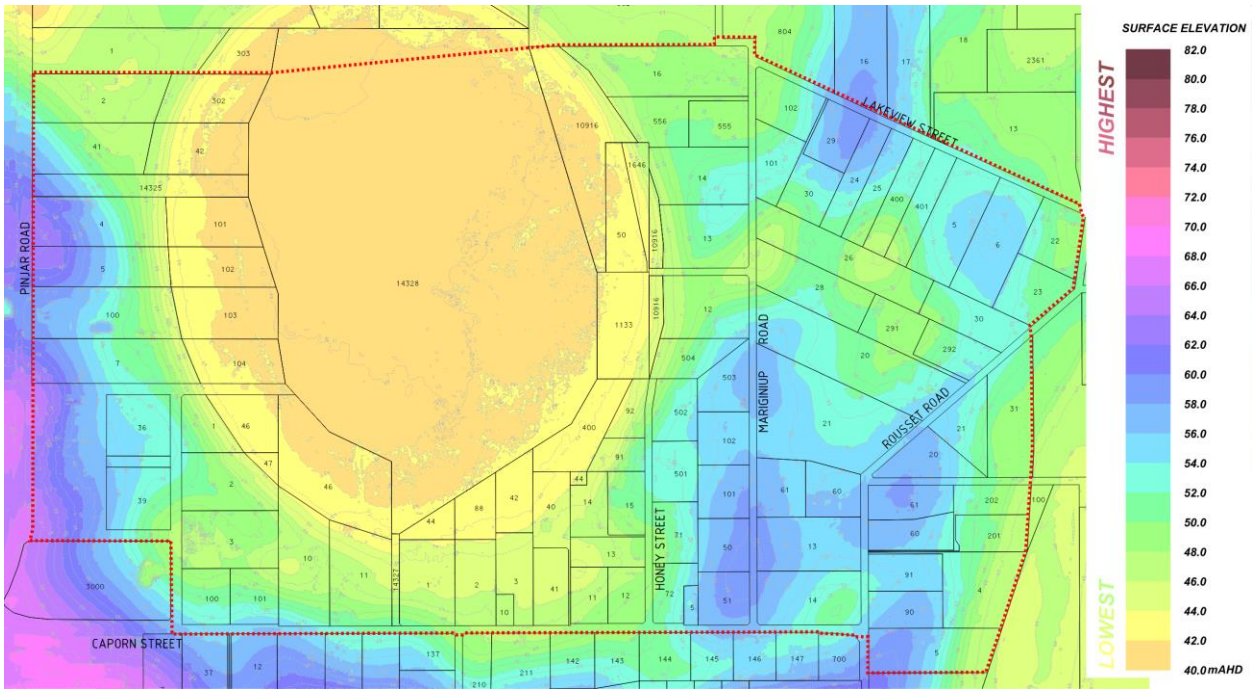

Figure 3 – Existing surface levels and contour banding (TABEC)

2.2 Groundwater and Acid Sulphate Soils

Douglas Partners undertook a geotechnical investigation over the LSP area in June 2021, though did not encounter the groundwater within any of the CPTs, test pits or boreholes, which extended to depths of up to 10m. The Department of Water and Environmental Regulation (DWER) however has published the historical maximum groundwater levels, which is shown in Figure 4.

The Control Groundwater Levels (CGL) have been determined by the project hydrologist, which is based on the AAMGL between 1986 and 1995 as recommended in the District Water Management Strategy. The contours are shown in Figure 5, which have been determined based on several DWER bores with long term data within the site.

The determined CGL levels vary across the site by about 7m, with contours grading to the east. Around Mariginiup Lake, which is the low point in the landform, the CGL levels are between 42 and 43mAHD.

Given the future proposed finished earthworks levels throughout the Precinct will be elevated well above the CGL, the majority of the site will not require sub-soil drainage to control post-development groundwater contours to the CGL levels and achieve adequate freeboard.

The eastern portion of the LSP however, may possibly require installation of a subsoil drainage network to control CGL levels and prevent post development groundwater from rising above these levels. It is proposed by the hydrologist to install subsoil drainage where the post-development groundwater rise may be within 3.0m of the future finished levels. The potential extent of these works is further described in the Local Water Management Strategy (LWMS).

Mechanisms to control the future potential groundwater rise throughout the Precinct is also explored further in the LWMS and the areas of proposed subsoil drainage including location, level and sizing along with any other requirements such as collection and pumping facilities will be detailed through the Urban Water Management Plan. The management requirements and ongoing governance structure to manage any future predicted groundwater level rise, and the control through a subsoil drainage network and possible pumping is supported by an extensive groundwater model, managed by the project hydrologist and documented in the LWMS.

In terms of acid sulphate soils, DWER mapping identifies the Mariginiup Lake as being at high risk of encountering these materials, within 3m of the surface. The risk mapping is included in Figure 6, which also shows that areas outside the immediate wetland area associated with the Lake, are at no known risk.

The high risk are within Mariginiup Lake is not unexpected, as the risk of encountering acid sulphate soils generally increases in water-logged, high groundwater table environments.

Excavations and dewatering will be required for some services installation and therefore, further detailed investigations for acid sulphate soils will be necessary. This will be most relevant for excavation and dewatering works associated with the Waste Water Pump Station (WWPS), which is proposed to be located near the southern boundary of Mariginiup Lake.

Subsequent management plans including an Acid Sulfate Soils Dewatering Management Plan will be prepared to the satisfaction of the DWER to enable dewatering licenses to be requested and to ensure appropriate treatment of excavated material and dewatering effluent is carried out during site works.

It is anticipated that construction activities required to address the ASS risk will involve pH testing of the dewatering effluent, treatment and neutralising of excavated material.

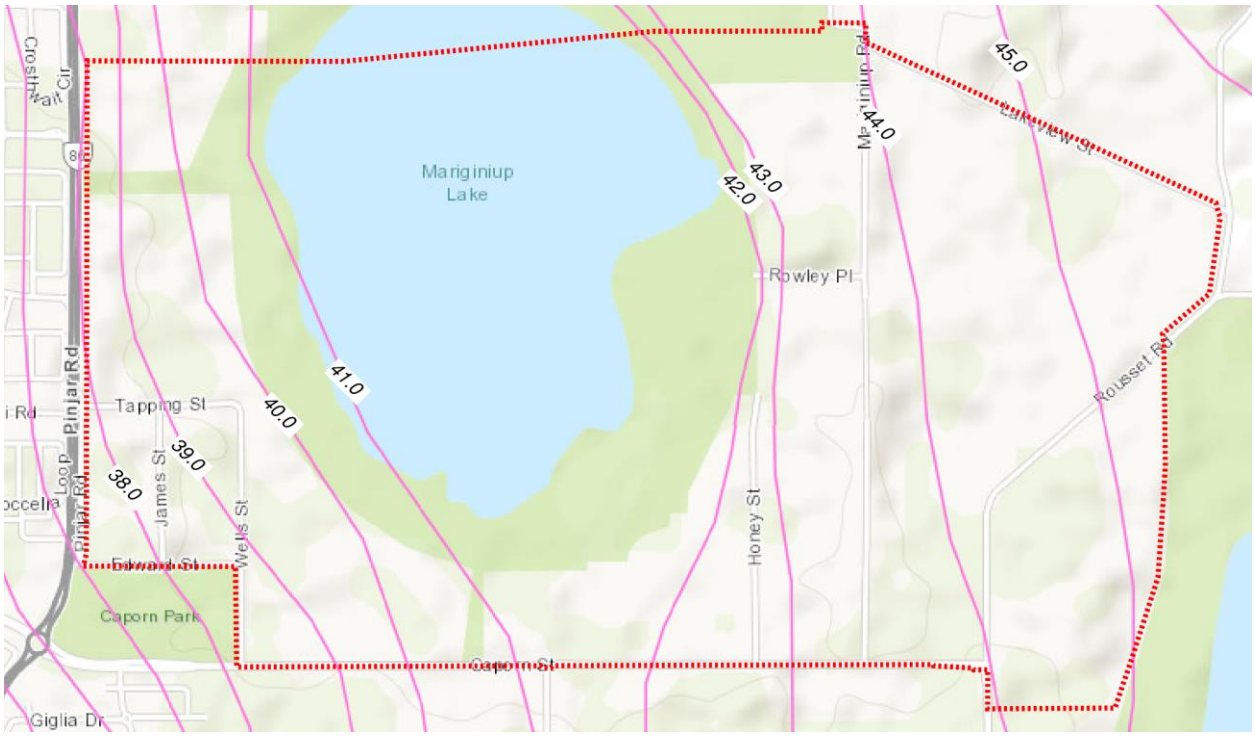

Figure 4 – Historical Maximum Groundwater Contours (DWER)

Figure 5 – Control Groundwater Levels (Waterinsight)

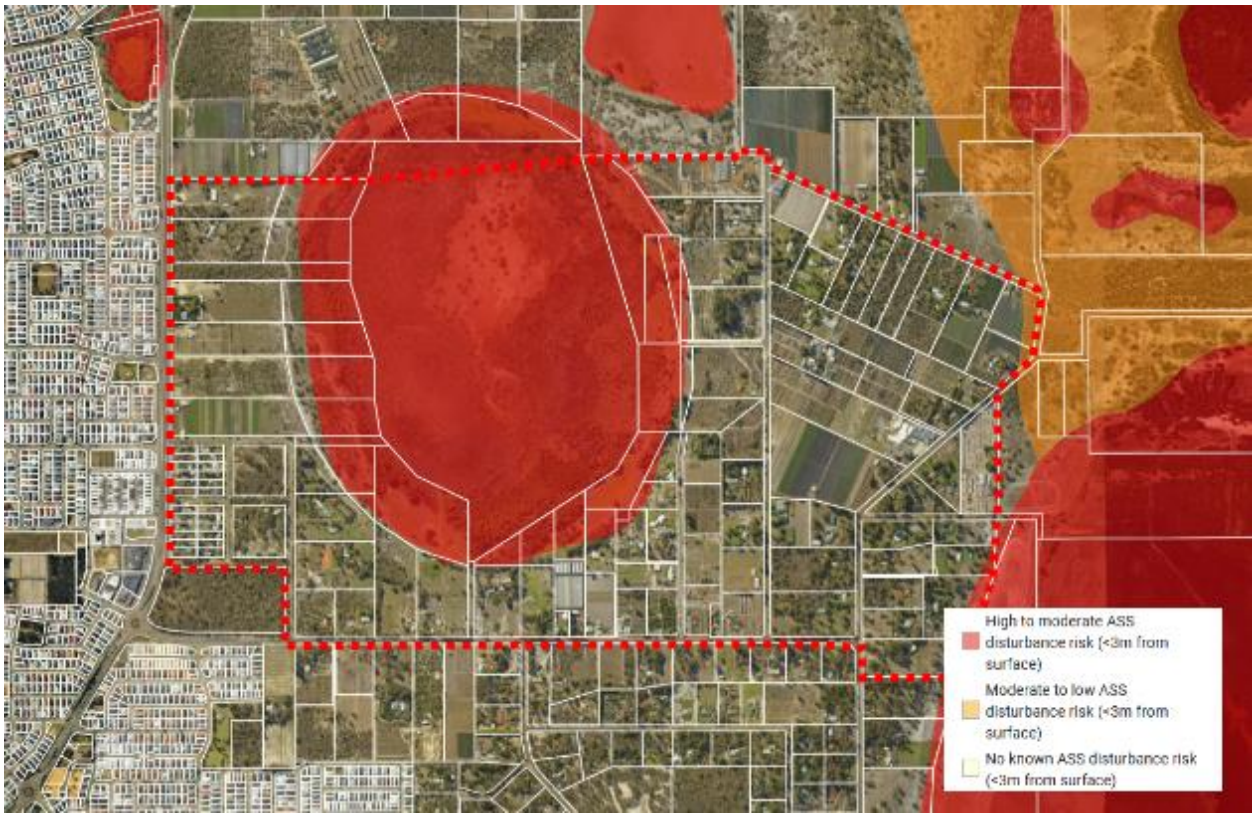

Figure 6 – Acid sulfate soil risk map (MNG Access)

3 SITEWORKS

In order to prepare the site for the proposed urban development, the site will be cleared of existing fences, sheds, buildings, houses, redundant pavements and other structures in order to facilitate the subdivision plan. Demolition licenses will be sought from the City of Wanneroo for this purpose and to remove all relevant improvements currently onsite.

Following this, areas will be cleared of existing vegetation where necessary with grubbing out of the roots to remove all deleterious material. Topsoil will be stripped to remove any shallow organic and root matter, which is generally present onsite in varying depths, at approximately 100mm.

Any tree roots remaining however from clearing operations within the proposed development area should be completely removed to a depth of 0.6 m, and the excavation backfilled with material of similar geotechnical properties to the surrounding ground and suitably compacted.

As detailed in the geotechnical report by Douglas Partners, the topsoil found within the Precinct at East Wanneroo is generally considered suitable for re-use, provided that the topsoil is suitably prepared and blended with clean sand, which is likely to be at a ratio of 2:1 (clean sand:topsoil) so that it forms a generally homogenous material. The topsoil can then be used for structural purposes.

The organic content of this material is likely to be reduced following screening and refinement of the topsoil preparation requirements will be addressed in further detail as construction of each stage is more closely defined.

3.1 Tree Protection

Given the nature of the current land uses and size of the Precinct, various groups of large trees exist across the landholdings, with strands of significant vegetation.

Prior to more detailed arborist reports being completed, the project surveyor has provided tree stratification mapping for the majority of the LSP area to identify vegetation heights, and Figure 7 demonstrates where groups of existing vegetation are located.

The LSP concept plan has responded to this mapping and nominated POS locations in areas of significant vegetation. The development intention is to retain significant vegetation as a positive environmental outcome and in recognition of the existing character of the site.

Preliminary earthworks plans respond to the tree mapping and as far as practical, earthwork levels are proposed to match existing natural ground levels in the areas of retained vegetation, for this purpose.

It is considered that typically, vegetation within ±150mm earthwork band and outside the service trenching requirements can readily be retained. In addition, POS areas that don't have a drainage function can also generally provide opportunities for the retention or incorporation of significant vegetation into their design. There may also be opportunity for widened road reserves to ensure a high level of tree retention through the development and road grades may be designed at maximum allowable grades in some locations to minimize cut and fill requirements, for the purpose of tree retention. Some services installations are expected to require boring and trenchless techniques to ensure Tree Protection Zones (TPZ) are not impacted. Where works are proposed in close proximity to existing trees, the TPZ will be fenced to ensure access is limited.

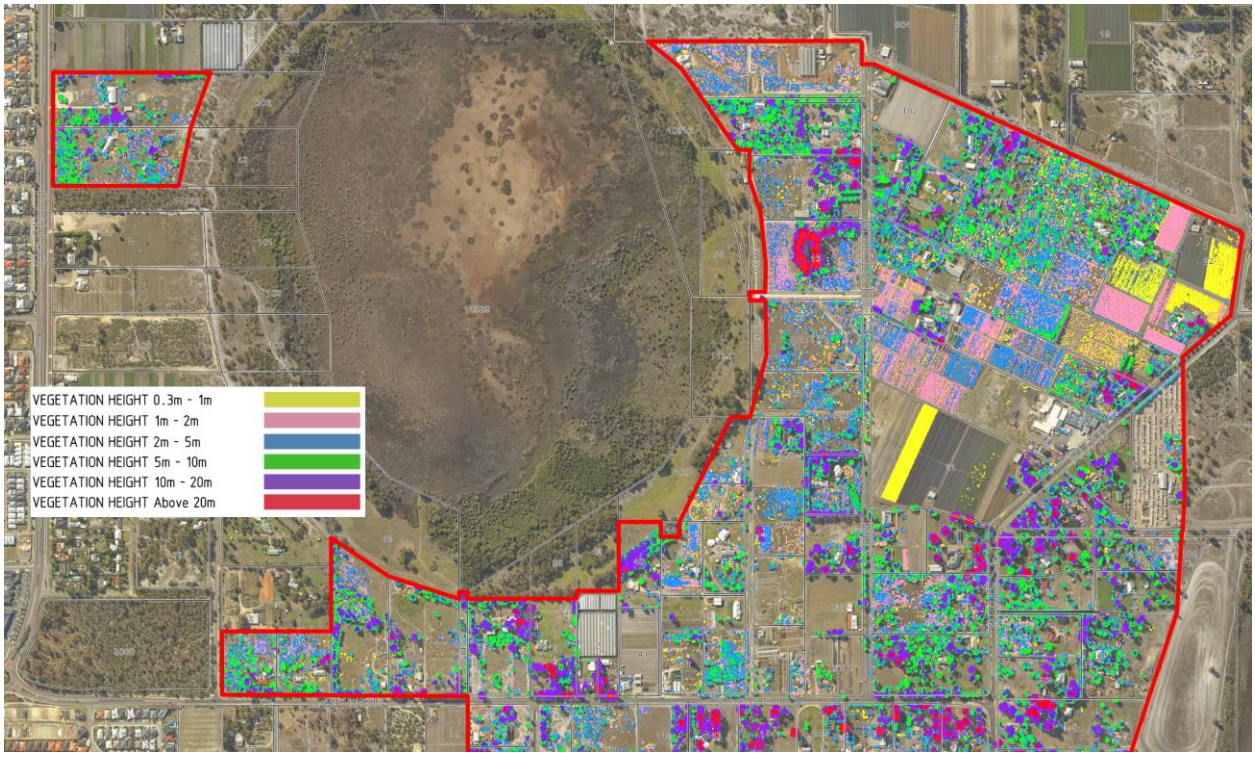

Figure 7 – Tree Stratification Survey (MNG)

3.2 Demolition

As development progresses throughout the LSP area, existing homes, buildings, sheds, hard stands, fences and other improvements will need to be demolished and removed off site. It is expected some hazardous materials may be encountered, which will be assessed in detail by an appropriate environmental consultant with respect to each lot, with material testing and inspections accordingly.

Environmental investigations will be undertaken, and targeted based on the former land use purposes. In addition to the above ground works, reporting will also address below-ground uncontrolled fill or potential contaminants that should be treated and managed.

In due course, detailed materials registers will be prepared for each area where demolition is proposed to ensure a thorough understanding and appropriate measures are in place to manage the works.

Demolition licenses will be sought from City of Wanneroo for this purpose, and notwithstanding the appropriate disposal for any contaminated or hazardous material, opportunity will be sought to recycle and reuse material where possible. This may involve some crushing of pavement materials and other inert demolition waste such as concrete, brick and roof tile which can be re-used for example as recycled road base, used for emergency bushfire access tracks, drainage aggregates and other purposes.

The intention is to promote sustainability and to minimise the required import of materials where there is opportunity to utilise existing materials onsite.

An Unexpected Finds Protocol will be maintained during all demolition works to ensure management procedures are in place. This will also help ensure cross contamination is avoided and any material that was not anticipated is treated accordingly.

Material tracking registers, with confirmation of disposal locations and volumes would form part of the Quality Assurance plan with environmental monitoring and review for compliance purposes.

4 EARTHWORKS

4.1 Ground Conditions

A preliminary geotechnical investigation has been completed by Douglas Partners, for the purpose of assessing the subsurface ground conditions, provide guidance on the site preparation requirements to support residential development and to provide advice on the suitability of re-using existing ground material for filling. The report also provides guidance on the anticipated site classifications.

The existing geological mapping for the East Wanneroo area indicates sub-surface conditions are generally derived from Tamala Limestone, however the eastern portions of the LSP area intersect Bassendean Sand. The central portion of the site obviously is expected to contain swamp deposits, potentially comprising of peaty clay, in vicinity of Mariginiup Lake.

Douglas Partners site investigation comprised of various CPTs, excavated test pits, bore holes and Perth sand penetrometers. The locations of the test locations is demonstrated in Figure 8, with a general spread across the LSP area.

Topsoil was encountered generally at 0.1m thick. Some locations were found to have sand fill, with material that varied including some silty sand and sandy gravel. Beneath these layers, fine to medium

grained generally pale grey or yellow-brown sand was found to the depths of investigation which was generally in a loose or loose to medium dense state.

Douglas Partners described that such ground conditions are generally considered suitable for the proposed purpose of residential development and will not impose any significant geotechnical constraints. This is subject to appropriate site preparation being undertaken, which should include the removal of any uncontrolled fill, removal or blending of surface topsoil and proof rolling to compact loose material. Class A lots are expected to be achieved as a result as set out in AS2870-2011.

Given the sandy nature of the existing ground, it is considered geotechnically suitable for reuse as structural fill material provided it is free from organic matter and particles greater than 150 mm in size. The natural sand with silt is also considered suitable for re-use as structural fill, however placement at depth or possible blending may be appropriate to mitigate any reduced soil permeability.

Uncontrolled fill is likely to be encountered at various locations within the LSP Precinct. Douglas Partners advice is that any uncontrolled fill be assessed in further detail determine re-use potential as it may vary considerably.

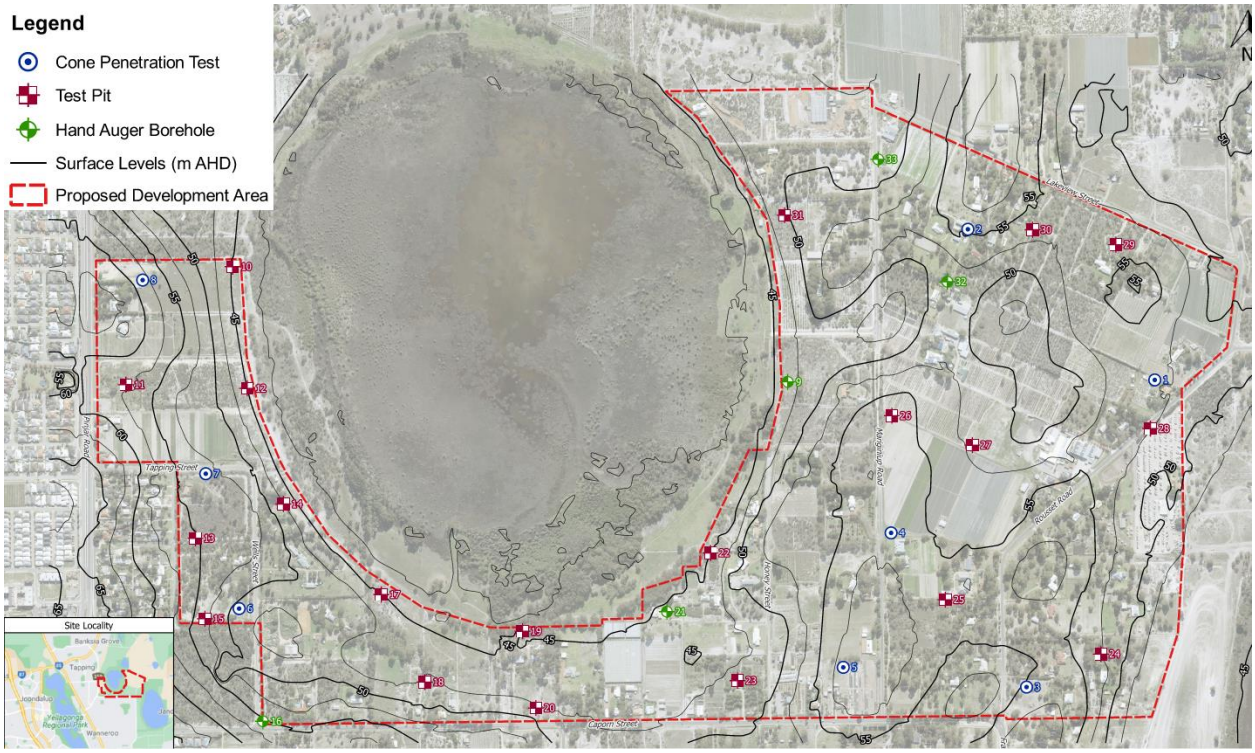

Figure 8 – Geotechnical Test Pit Locations (Douglas Partners)

4.2 Site Works

A concept earthworks design has been undertaken to demonstrate how the proposed subdivision plan will accommodate existing level changes and the development form, with potential depths of cut and fill illustrated in Figure 9.

The concept earthworks plan ensures that maximum allowable design road grades are not exceeded and determines a catchment plan for stormwater drainage planning.

Across the LSP, significant earth working of the site will be required. Generally, the greatest re-contouring will occur around the boundaries of Mariginiup Lake, and also in the higher areas, where cut and lowering of existing levels is proposed to address the intended development form.

Finished earthworks designs will need to account for the existing levels at the project interfaces. While an earthworks plan is prepared over the broad LSP area, given the fragmented land ownership it is anticipated that temporary batters or modifications to the plan may be required to address potential restrictions across various land holdings. The overall concept illustrates an overall coordinated outcome.

The earthworks plan maintains existing levels along Pinjar Road and also the majority of Caporn Street. Where existing homesteads may need to be retained, proposed finished levels will not be modified significantly in those locations either.

Existing levels will also be maintained where significant trees and areas of retained vegetation are proposed. Due to the undulating nature of the LSP area, there is some flexibility in the earthworks design, though some non-standard design outcomes may be proposed at a detailed stage to maximise tree retention. This is seen as a project opportunity to maintain the existing character of the site. It is expected that some negotiation with City of Wanneroo will be necessary to ensure positive outcomes are delivered in this respect. Earthworks designs will also respond to the landscape intent and some contouring of POS areas may be included with site works.

Due to the varying ground levels across the LSP, retaining walls will be required in order to achieve a development form and particularly as the average lots size is expected to be 375m2 to 450m2. Retaining walls will also assist in maintaining pre-development landform and other features across the site.

Earthworks will be completed under dust, noise and vibration management plans which shall be approved by City of Wanneroo. Completion reports will also be provided for each stage of subdivision.

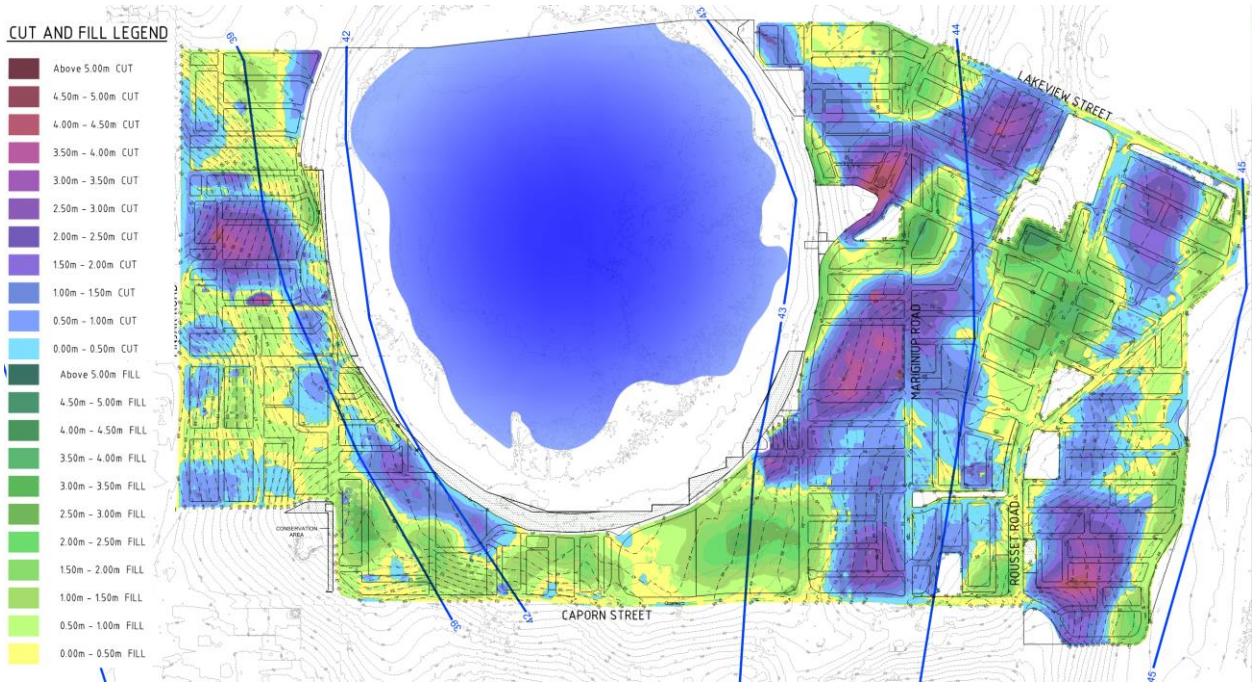

Figure 9 – Depths of Cut and Fill (TABEC)

5 ROADS AND TRAFFIC

5.1 Existing Road Network

The LSP area is accessible from the various existing boundary roads, including Pinjar Road, Caporn Street, Rousset Road and Lakeview Street. In addition, a number of roads within the LSP study area exist such as Honey Street and Mariginiup Road on the eastern side of Mariginiup Lake, while Tapping Street, Edward Street and Wells Road are located to the west of the lake. These roads are currently considered local access roads.

There are also other existing road reserves which don't have a formalised road pavement which includes Rowley Place, Wade Street and section of Mariginiup Road, as examples. The LSP for Precinct 7 maintains and adopts the existing road reserves into the concept plan.

Pinjar Road is currently identified as a Distributor A, with dual lanes in each direction and median separated with a posted 70km/hr speed limit. Pinjar Road also has an adjacent Principle Shared Path. There is currently a slip road running parallel with Pinjar Road, between Tapping Street and Edward Street to service existing localised development.

Access into the various landholdings is available with direct cross-over access generally from all internal roads within the LSP area. Access is also currently taken off Pinjar Road to existing properties along the western boundary.

5.2 Proposed Roads

The LSP nominates a logical road network with road hierarchy as outlined by the Liveable Neighbourhood requitements. In addition, Stantec have prepared a Traffic and Transport review to support this LSP.

The current concept plan shows future intersections with Pinjar Road along the western boundary of the LSP in a number of locations. This includes a major roundabout at the intersection of Ashley Road. Two other new road access locations are shown which are nominated as left-in left-out movements. Ashley Road is shown as a Neighbourhood Connector A with a 25m road reserve between Pinjar Road and Mariginiup Lake.

According to Main Roads WA mapping, Caporn Street is currently considered a Local Distributor, however as a result of this LSP, the concept plan indicates an upgrade to the hierarchy and Caporn Street would become an Integrator A with a 35m road reserve.

On the concept plan, four roundabouts are proposed along Caporn Street, in addition to the existing at Pinjar road. These are located at the intersections with Wells Street, Garden Park Drive, Honey Street and Franklin Road. Honey Street and Lakeview Street are also identified as proposed Neighbourhood Connector A.

The road along the future transit corridor is also identified as an Integrator A, with the location and alignment consistent with the District Structure Plan.

The proposed road hierarchy and reserves widths throughout the LSP will also follow City of Wanneroo requirements. Access Streets with varying road reserve widths between 17.9m are shown around the primary and high school sites. In addition, other Access Streets with 15m wide road reserves are shown, which may be reduced to 13m in width adjacent to POS reserves.

There is a limited number of four-way intersections throughout the LSP map, however where shown, it is anticipated a roundabout may be constructed. Roundabouts would be appropriately line marked, with lot boundaries truncated to maintain verge widths and footpath access.

Roads would be designed with maximum 6% grades, and to minimise cut and fill requirements as far as practical. Consideration may be given to permeable pavements and other WSUD treatments to ensure appropriate treatment of the minor rainfall events. Road reserves will also accommodate the major stormwater flow paths and be utilised to convey flows to stormwater detention facilities.

It is anticipated that car bays and footpaths would be included with road construction adjacent POS, school sites and higher areas of density. Coordination will be required with the landscape architect to ensure intended street tree planting is achieved.

All road works plans are subject to the approval of City of Wanneroo's engineering department. The road hierarchy plan is shown on the Burgess Design Group Structure Plan Map.

6 STORMWATER DRAINAGE

Based on the concept earthworks plan, drainage catchments have been determined which are included in the Local Water Management Strategy (LWMS), prepared separately by SLR.

Broadly, the drainage catchments follow the natural terrain and from the elevated areas, the site will grade toward various low points which are located around the boundaries of Mariginiup Lake. There are however two minor ridges in the landform generally following both Mariginiup Road and also along Rousset Road. The area between these two roads forms a localised low area, and therefore a stormwater drainage sub-catchment is located in the north-eastern portion of the LSP area. The landform east of Rousset Road, in the area subject to future planning grades toward Jandabup Lake.

The drainage catchment plan is included in Figure 10 which shows proposed drainage flow paths along with high and low points in the concept earthworks model.

Douglas Partners undertook permeability testing onsite, which indicated a field permeability value of between 8 m/day and greater than 20 m/day for the sand encountered beneath the site.

It was concluded that the observed ground conditions and permeability results indicate that on-site stormwater disposal using soakwells and sumps is feasible where ground conditions at the base of such systems comprise sand and there is sufficient clearance above groundwater. A minimum clearance of 0.5m is recommended between the base of drainage systems and maximum groundwater levels, which is expected to be readily achieved.

Given that the sand at the site is generally loose or loose to medium dense near surface, a design permeability value of 5 m/day is adopted for flood storage areas where estimated groundwater separation is at least 6m. An infiltration rate of 3 m/day is nominated for bioretention basins.

Design allowances in the stormwater modelling to date, prepared by Pentium Water and SLR has been coordinated with City of Wanneroo and adopted the 5m/day recommendation.

The District Water Management Strategy (DWMS) states that Mariginiup Lake can receive runoff from the 20% AEP and 1% AEP events. Therefore, catchments that flow toward Mariginiup Lake will provide retention for the 1EY event, and then the 20% AEP and 1% AEP events will overflow to the Lake. Where stormwater drainage catchments are 'trapped' and there is no overland flow path available toward

Mariginiup Lake, then the stormwater drainage facility will be required to accommodate runoff up to the 1% AEP within POS reserves.

The DWMS also states that cross-connections between precincts must be maintained post development. Stormwater catchments from two locations south of Caporn Street are shown with overland flow paths connecting into the Precinct 7 LSP area. The most practical flow path would be via overland through road reserves to provide a discharge to Mariginiup Lake. The flows generated external to the LSP area will largely be dependent on the developments upstream, though given the sandy and elevated nature of the landform, it is recommended that the DWMS advice in relation to this be thoroughly reviewed.

Where Mariginiup Lake is to receive post development stormwater runoff, the modelling shall assess the impacts of the lake levels. The rise in the top water level of Lake Mariginiup will be calculated in the LWMS based on the total assumed inflow in the 1% AEP event.

Stormwater modelling in the LWMS is based on retention of the 1% AEP being contained on residential lots which are greater than 300m2, which is consistent with current City of Wanneroo policy. The runoff coefficients adopted for residential lots is therefore zero for lots greater than 300m2 and 0.95 for lots smaller than 300m2. This has been agreed with the City for the purpose of the stormwater modelling by the hydrologist and is documented in the LWMS.

The structural controls for stormwater management in POS, road reserves and outside the buffer to Mariginiup Lake will include vegetated swales with appropriate bio-retention facilities. These are conceptually sized as being 500mm deep with 1:3 side slopes. Where necessary, larger drainage basins to cater for the 1% AEP are nominated in the LWMS as being 0.7m deep, or 1.2m including the bio-retention areas with 1:6 side slopes.

Stormwater runoff collected within the site will be conveyed via the road network to a conventional pit and pipe drainage network, prior to discharging into the bio-retention facilities.

More detailed stormwater modelling and management measures are identified through the Local Water Management Strategy, prepared by SLR. And ultimately, the detailed drainage design will be documented in an Urban Water Management Plan (UWMP) for submission to the City of Wanneroo. A UWMP will be a Western Australian Planning Commission (WAPC) condition of subdivision as stages are developed.

6.1 Subsoil Drainage

The DWMS indicates that subsoil drainage must be installed at invert levels based on the determined controlled groundwater level (CGL) in areas where the predicted future groundwater level is within 2m of the future design surface.

For the Precinct 7 groundwater modelling assessment, a conservative subsoil drainage plan has been adopted by the hydrologist, and nominated in areas where the CGL is within 3m of the earthworks design surface level.

As advised however by Pentium Water who has undertaken the groundwater model, it is not anticipated that subsoil drainage is a significant design constraint, given the separation between the design surface and proposed controlled groundwater level is generally 2.5m and greater.

Installing subsoil drains at the CGL may not be practical, given the significant depths required, and therefore it is recommended by Pentium Water that in areas identified, subsoil drains may be considered at 1.5m below road pavement level.

A detailed groundwater model, including assessment of post-development groundwater contours and generated flows is further explored by Pentium Water, together with SLR Consulting through the Local Water Management Strategy.

Where installed, subsoil drains will be graded at a minimum grade of 1:500 where possible. Free outfalls will be provided at the boundaries of Mariginiup Lake. The network will be designed and constructed in accordance with the City of Wanneroo engineering guidelines.

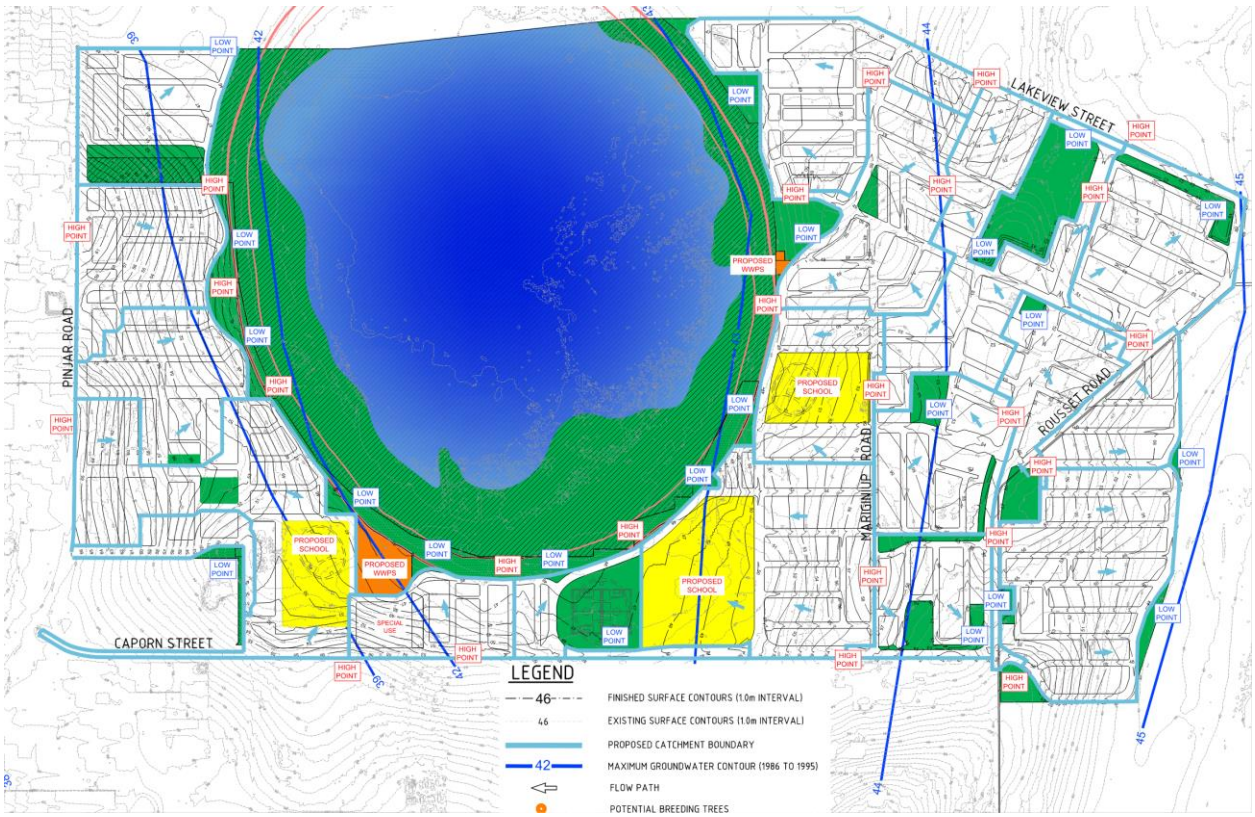

Figure 10 – Stormwater Drainage Catchment Plan (TABEC)

7 WASTEWATER

Water Corporation has completed waste water scheme planning that covers Precinct 7 and demonstrates the long-term ultimate planning for the area. Following the natural terrain, gravity sewers are generally shown around the boundary of Mariginiup Lake on Figure 11, which grade toward a proposed WWPS near the southern boundary of the lake.

The scheme planning shows proposed large dual 800L/s waste water pump stations, with 25m diameter wet wells and four buried 3,000m3 emergency overflow storage tanks that are 43m diameter and 2m deep. The total land area nominated to house these future assets is approximately 2ha, with the wet wells located at the boundary of the Mariginiup Lake buffer, with overflow tanks located closer to Caporn Street. This asset is referred to as Jandabup WWPS 'A'.

The ultimate WWPS is large, as it would receive incoming flows various other areas, with proposed connections that include a DN1200mm gravity sewer from the east, along with a DN1350mm gravity flow from the south. In addition, smaller DN375mm connection from the west is also proposed.

Jandabup WWPS 'A' would have a future proposed buffer of 150m, generally centred around each wet well. The LSP concept plan has addressed this future requirement with land uses within the buffer that are appropriate, such as non-habitable purposes including car parking facilities, playing fields, and road reserves. School buildings and any other odour sensitive uses on the school land must also not encroach into the buffer. The ultimate WWPS is proposed to discharge through a large pressure main around the western boundary of Mariginiup Lake and through Galileo Avene, to the west of Pinjar Road.

In the interim, a Type 90 WWPS, known as the Jandabup Interim WWPS 'A' will be constructed in the ultimate 2ha site, in a position which can be graded out in the future by the incoming collector sewers when the ultimate WWPS is constructed. It is anticipated the ultimate Jandabup WWPS 'A' will be constructed in stages, commencing in approximately 2035 with a second stage more likely for about 2050. As part of the interim WWPS works, a section of the DN1350 is proposed to be pre-laid due to future depths and access restrictions. This is documented in the Scoping Report for the Jandabup Interim WWPS 'A' along with the site layout requirements of both the interim and ultimate assets.

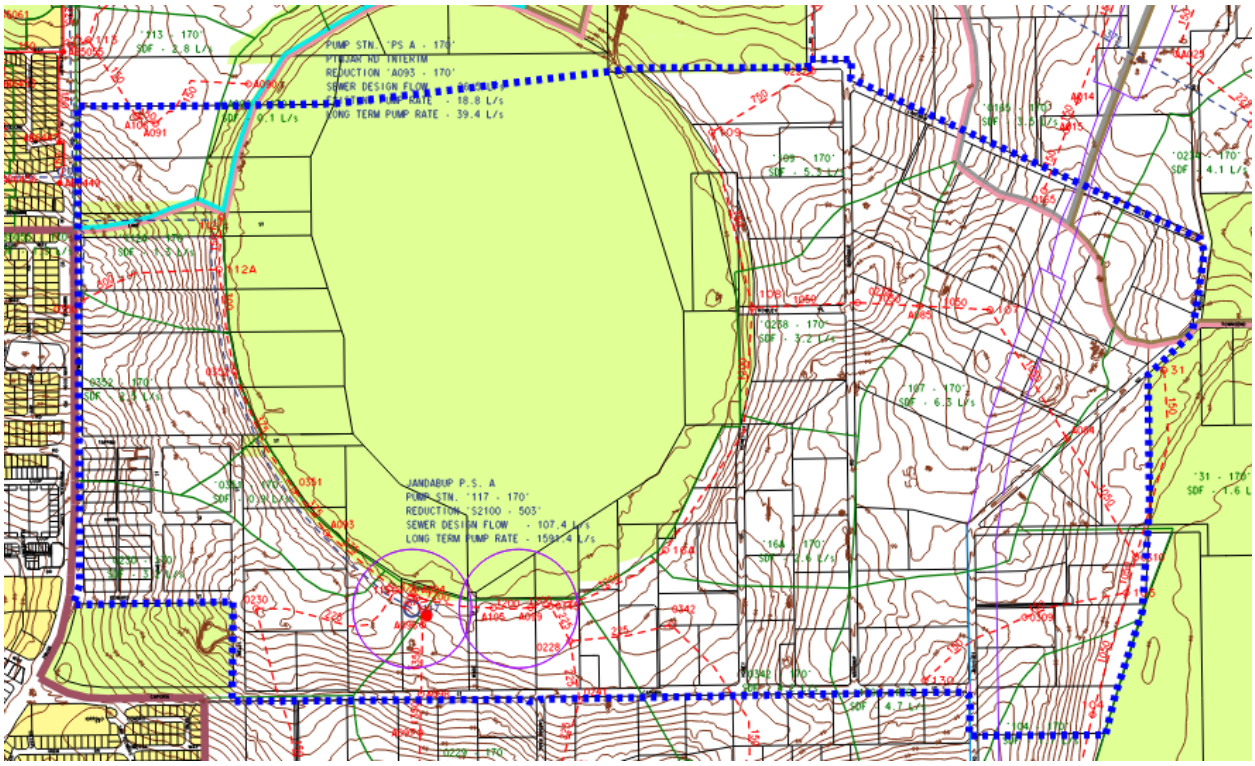

Figure 11 – Waste Water Planning (Water Corporation)

The Jandabup Interim WWPs 'A' will rely on a pressure main outlet to the north-west of Precinct 7. Similarly to the ultimate planning, a pressure main is proposed to be located around the western boundary of Mariginiup Lake, avoiding high points in the landscape, around Da Vinci Park to the west of Pinjar Road, along Castledene Way and discharging near the intersection of Joondalup Drive. The total length of proposed pressure main for the interim WWPS is approximately 3.35km in length with approximately 1.5km to be constructed in existing road reserves.

For the discharge, a separate 535m extension of the DN300mm gravity sewer in Joondalup Drive will also be required, to provide a discharge point at sufficient elevation. Water Corporation advises the current maximum, pumped discharge rate to access chamber AB1756 on the Neerabup DN375 collector sewer in

Joondalup Drive at this discharge location is 28 L/s. After which, separate upgrades will be completed by Water Corporation for ultimate flows to be transferred to the Alkimos WWTPS via the Quinns Main Sewer.

Depending on the staging and timing of initial stages of development, a smaller temporary WWPS may be required in the eastern areas of Precinct 7, if the ultimate long-term gravity outfall sewer is not available.

The interim WWPS is proposed to be constructed concurrently with Stage 1 subdivision works. The developer will be responsible for funding reticulation extensions to service proposed lots with gravity connections, which shall be designed and constructed in accordance with to Water Corporation specifications. Standard Water Corporation infrastructure contributions will apply on a per lot basis.

8 WATER SUPPLY

The area is serviced by the Wanneroo Reservoir elevated water supply which is located off Franklin Road, approximately 2km south of Caporn Street. From elevated tank supply, there is a DN1000mm steel distribution main which is located in western verge of Garden Park Drive. The steel water main is also located in the northern verge of Caporn Street to the west of the intersection with Garden Park Drive, and is then follows Wells Street, Tapping Street and Pinjar Road. There are various other distribution main connections to this asset at the boundary of Precinct 7, however land holdings generally within the LSP area are not serviced with reticulated scheme water supplies.

Water Corporation also has two existing large steel bore water mains in Rousset Road, which are DN1200mm and DN915mm respectively.

Water Corporation's overall Wanneroo Gravity and high-level water scheme planning was reviewed in 2021 and Figure 12 has been prepared based on this advice, which illustrates a conceptual plan for future distribution mains within the LSP area. The Figure demonstrates Water Corporation's ultimate planning for water supply services in relation to the greater East Wanneroo area.

The conceptual water distribution main planning by Water Corporation indicates the requirement for a DN375 main along Caporn St running west to east approximately 460m.

Depending on the staging of development within Precinct 7, the area located west of Mariginiup Lake could be served in the short term by extension of the 250P main along Caporn Street for the initial subdivision stage. There may be a need to implement the larger DN375 as part of the initial development stages if the projected development rate and demand is sufficiently high at the western end of the precinct.

In terms of the land holdings to the east of Mariginiup Lake, there may be an opportunity to provide water reticulation connections to the DN1000mm distribution main.

It is acknowledged that Water Corporation's long term planning indicates a DN800mm distribution main in Mariginiup Road with connection to the DN1000mm distribution main, however it is understood that this project is currently not intended to be constructed until about 2050.

Water Corporation has not undertaken more localised reticulation level planning for Precinct 7, which would more appropriately undertaken in response to confirmation of the location, stage size and rate of development indicated in advertised LSPs.

It is anticipated that at subdivision level, some larger main extensions consisting of DN200-250mm mains may be required through the LSP area, along with a network of smaller DN100-150mm mains within the local road reserve network to provide water reticulation services to each proposed residential lot.

Water mains within the proposed subdivision are to be designed and constructed according to the Water Corporation specifications. Installation will occur based on the staged development and funded by the developer. Standard infrastructure contributions will also be included.

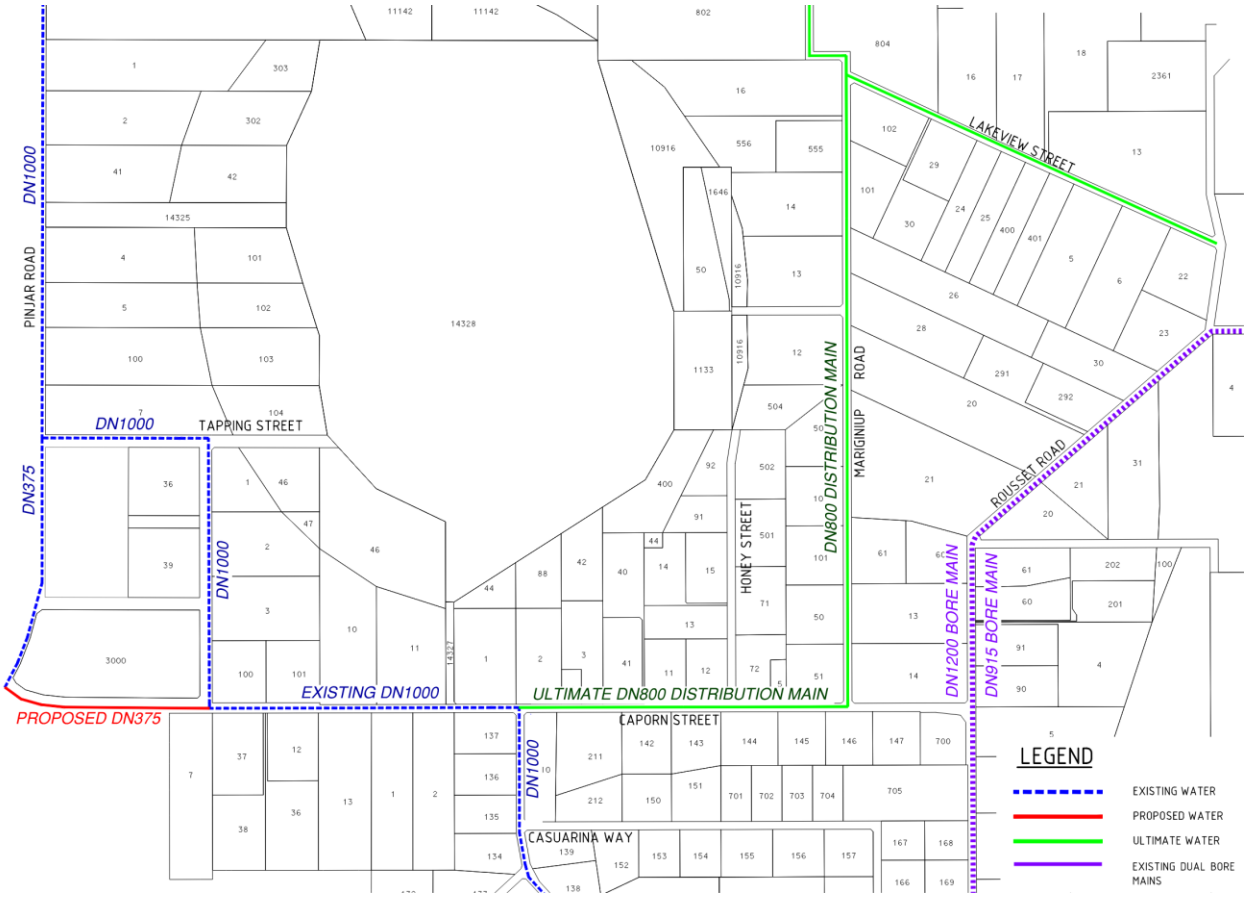

Figure 12 – Water Distribution Main Planning (TABEC)

9 POWER SUPPLY

9.1 Existing Power Infrastructure

Power supply to the Precinct 7 area is fed from the Western Power Wanneroo Zone Substation located on Wanneroo Road, south of Joondalup Drive. The existing HV distribution network servicing East Wanneroo includes a mixture of underground HV cables to the west of Pinjar Road, and the overhead pole network to the east of Pinjar Road.

Western Power's network mapping tool is included in Figure 13, which demonstrates the available capacity of the high-voltage feeder to the locality is 10 to 15 MVA.

The existing Western Power network is 22kV 3 phase. The HV network mapping tool indicates there is a HV back bone feeder in Caporn Street with an overhead power line in the southern verge. There are

multiple HV spur lines emanating from this feeder cable and development in Precinct 7 will need to extend power from this line to traverse through the development to form HV rings to the other HV spur lines.

Within Precinct 7, there is an existing HV spur line in the eastern verge of Honey Street with LV overhead reticulation. In Mariginiup Road, there is LV overhead in the eastern verge off Caporn Street and at the northern end, there are both HV and LV overhead networks. Lakeview Street also contains an HV spur line on the northern side of the road, along with a mixture of LV overhead power supplies. Roussett Road contains a HV feeder running north on the western side, which supplies the area east, toward Jandabup Lake.

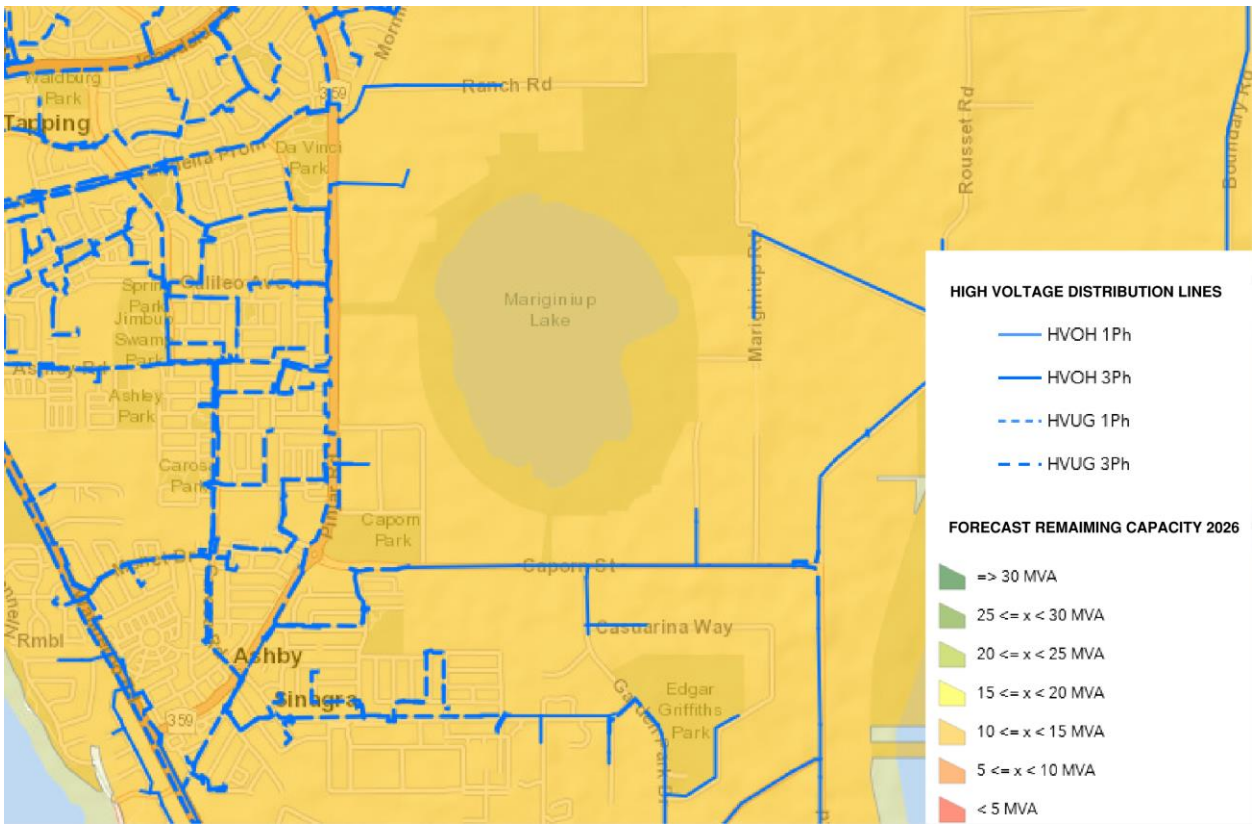

Figure 13 – Western Power network mapping tool. November 2021 (Western Power)

9.2 Proposed Power Infrastructure

Based on the Western Power requirement, the loads are calculated based on 4.7kVA per residential lot with a total load requirement greater than 7MVA anticipated. This power load would be connected to the network logically as development progresses over multiple stages.

As part of the subdivision power supply, various power transformers and switchgear sites will be provided throughout the LSP area. The sizing and locations of transformers remains to be confirmed during detailed phase.

In terms of LV power supply to the subdivision, connections to existing roads will need to be provided with adequate street lighting. It is anticipated that modification to the existing street light arrangement on all boundary roads will be required. All lots with otherwise be provided with power connections during the subdivision works, with street lighting provided throughout, as required by City of Wanneroo policy.

The effects of earth potential rise (EPR) issues will require investigation. Due to the significant large steel water mains on the site boundaries, site testing and earth resistivity shall be assessed. EPR reporting will be necessary prior to subdivision works commencing to determine any mitigation requirements that may be necessary.

Confirmation of Western Power servicing of the development is subject to a formal request being lodged. A Design Information Package (DIP) will be requested in order to commence that process.

10 COMMUNICATIONS

NBN Co is responsible for the installation of fibre in all broad acre developments within the long-term optic fibre footprint, to which this LSP area qualifies.

As shown in Figure 14 below, the NBN rollout has commenced and is available in the East Wannneroo area, with a large portion of existing residential areas already served. The developer is responsible for providing pit and pipe infrastructure throughout the subdivision for the fibre to be installed. NBN Co will install fibre infrastructure in the development and backhaul requirements, if any shall be confirmed.

As part of the developer agreement conditions, NBN will take over ownership of the assets upon completion and ensure that fibre is ready 3 months prior to the first occupancy for a new development. NBN Co levy two infrastructure charges, a Deployment Charge of $600/dwelling for single residential services and often, a backhaul charge where there is insufficient infrastructure. Backhaul charges are not anticipated for the subdivision of Lots 1 and 621 Harlequin Street given the proximity of existing network.

As part of the developer agreement conditions, NBN will take over ownership of the assets upon completion and ensure that fibre is ready 3 months prior to the first occupancy for a new development.

There is opportunity however for communications to be supplied through an alternate provider. There are extensive networks owned by private suppliers in close proximity of this LSP area.

Consideration may be given to high speeds available from alternate suppliers, which enables the connection of other data services over their network to deliver Smart Cities solutions, without such devices having a physical address, for example POS free Wi-Fi, CCTV cameras and smart poles.

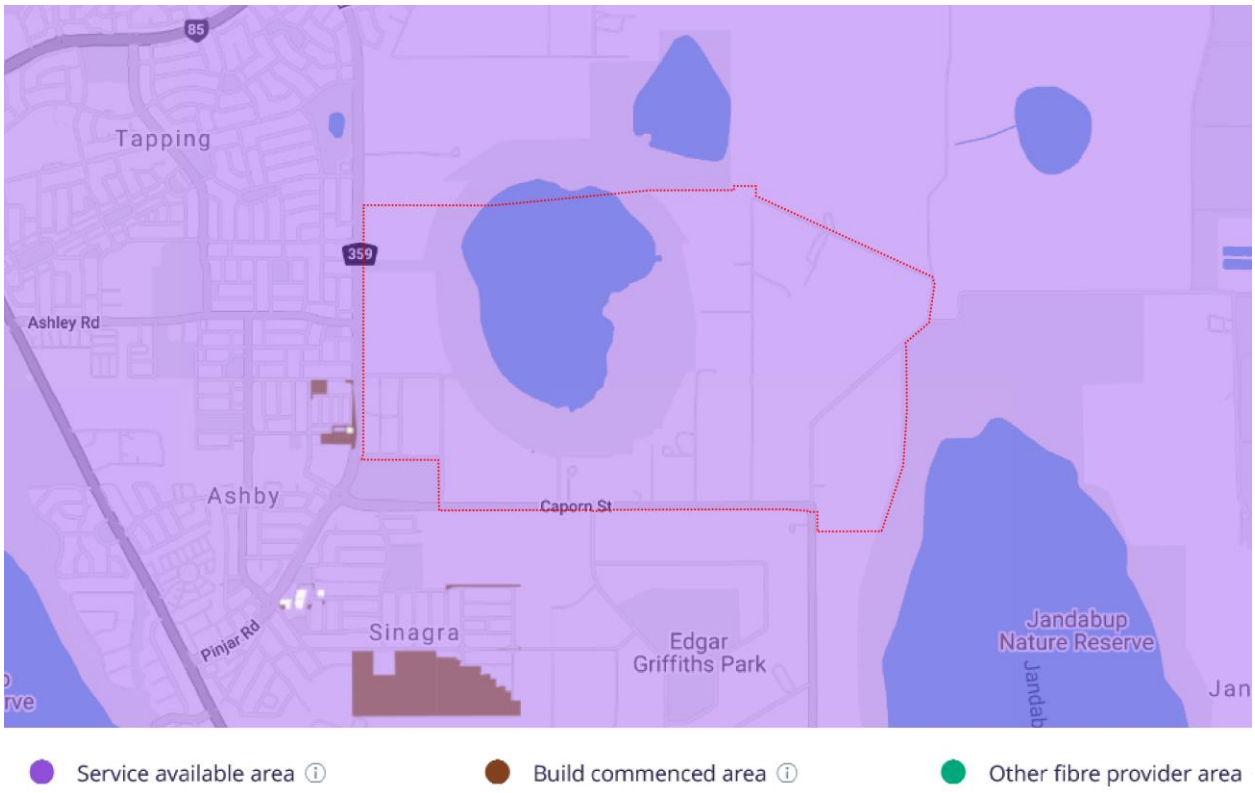

Figure 14 – NBN Rollout Map (NBN website)

11 GAS SUPPLY

There are no existing reticulated gas mains within the LSP Precinct, and therefore existing homes are likely to be serviced using bottled gas. ATCO Gas does however have existing gas services in adjoining areas of development with mains located west of Pinjar Road and south-west of Caporn Street. High pressure gas mains are located in Wanneroo Road and Neaves Road reserves. The extent of the existing PE gas mains is shown in Figure 15 below which is extract from ATCO's network maps.

If there is an intention by the developer to provide gas services to the areas of development within Precinct 7, there may be a requirement to extend services off-site in order to provide connections to the existing gas network. Ordinarily, offsite trenching beyond development stages would be at the developer's cost, however there is opportunity for a negotiated outcome with ATCO Gas given the significant number of future dwellings that are able to be serviced. ATCO Gas may potentially contribute to the cost associated with 'offsite' works.

Internal gas supply would be provided to each lot through common trenching at no additional cost to the project as it is laid in the common services trench. It is expected that ATCO GAS would logically propose to extend the existing PE network along Caporn Street to the location of initial stages of development.

There may be a requirement to provide a bored connections to minimise disruption, or beneath trees which are intended to be retained. Extension of the gas network would be coordinated where possible with other offsite works.

The supply of gas is not a WAPC subdivision condition and there is no obligation on the developer to install gas networks as part of subdivision. Further consideration may be given to the broader sustainability of

utilising gas, as a non-renewable and the impact on future home owners before electing to proceed by the developer.

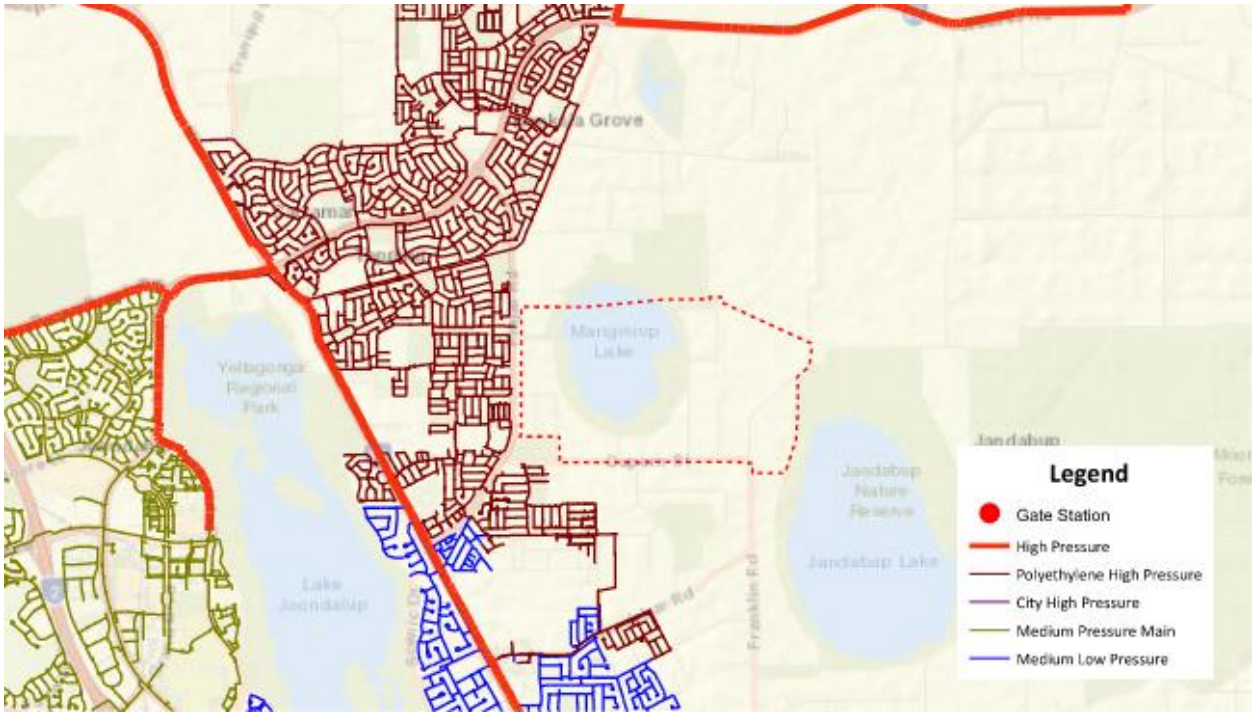

Figure 15 – Existing ATCO Gas Network map (ATCO Gas)

12 CONCLUSION

Based on the servicing infrastructure review, there does not appear to be engineering related constraints preventing development of Precinct 7 in the East Wanneroo.

From concept planning to date, information received and discussion with various Authorities it appears the intended subdivision plan is able to be supported by network extensions, upgrades and installations of new infrastructure as appropriate. Notwithstanding the servicing extensions and required new works required up-front are of a considerable nature, they are common in terms of land development requirements.

Following the submission of the Local Structure Plan, subdivision approval will be sought from the Western Australian Planning Commission. Formal detailed engineering design and approvals will be completed in order to satisfy the subdivision conditions that are anticipated to be issued.

As this report is based on the preliminary servicing advice and investigations completed to date, it is recommended that each Authority be kept informed as the planning progresses and concept engineering designs are refined. Communicating the proposed time-frames for the staged development is also important to inform and coordinate designs and approvals from all relevant Authorities.

13 REFERENCES

- ATCO Gas, Metro North Gas Distribution network map. November 2021
- Burgess Design Group, East Wanneroo – Precinct 7 Structure Plan Area Concept Plan. Plan No. HES MAR 03-05f-02. November 2023
- Department of Water and Environmental Regulation, Perth Groundwater Map. November 2021
- Douglas Partners, East Wanneroo Precinct 7. Preliminary Geotechnical Investigation. Project 202866.01. June 2021
- MNG Access, online map viewer. November 2021
- MNG, Tree Stratification Plan. 103637 OPC-004. July 2021
- NBN Rollout Map, online Map Viewer. November 2021
- TABEC, East Wanneroo Preliminary Drainage Catchment Plan. 2449-SK-003D Revision B. December 2023
- TABEC, East Wanneroo Cut to Fill Plan. 2449-SK-004D Revision B. December 2023
- Pentium Water, East Wanneroo Precinct 7 – Stormwater Modelling. December 2023
- UPD, email: East Wanneroo Cell 7 UPD Servicing Report. 13 August 2021
- Urbaqua, East Wanneroo District Structure Plan, District Water Management Strategy. March 2021
- WAPC, Liveable Neighbourhoods, Draft. 2015
- Waterinsight, Email: East Wanneroo CGL/AAMGL. 15 September 2021
- Waterinsight, Control Groundwater Contours, Figure 1 Local Water Management Strategy, 4450 F01 AAMGL 1986 to 1995. September 2021
- Water Corporation, email: Wanneroo water planning, November 2021
- Water Corporation, email: East Wanneroo – Precinct 7, May 2021
- Water Corporation, ESInet mapping. November 2021
- Western Power, Network Capacity Mapping Tool. November 2021
- 360 Environmental / SLR, Precinct 7, East Wanneroo District Structure Plan. Local Water Management Strategy. 4450AB_Rev1. May 2023