

# Appendix M

## Engineering Services Report

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# Alkimos Central Precinct Plan

## Engineering Servicing Report

DevelopmentWA

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## 1. EXECUTIVE SUMMARY

This report has been prepared by Cossill & Webley Pty Ltd (CW) for the Alkimos Central Precinct Plan (ACPP). It summarises the results of a review of the civil engineering issues which have influenced the form of the Precinct Plan and which are related to the future servicing of the developed land within the Precinct Plan area.

This engineering servicing report provides details for each major infrastructure type and a servicing strategy for implementation required for the development of Alkimos Central. The level of detail is consistent with the requirements of a Precinct Plan and acknowledges further more detailed work will be required at the time of land subdivision.

The engineering review covers siteworks, roads, stormwater drainage and utility services.

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

The ground conditions and past uses will not limit the proposed urban development.

The existing road access, via Marmion Avenue will provide initial road access and can be progressively upgraded to accommodate traffic signalled controlled 4-ways at both Romeo Road and Brindabella Parkway.

The Yanchep Rail Extension has been accommodated and the future planning layout, development levels and servicing requirements of adjoining land has been coordinated with the Public Transport Authority and the NEWest Alliance Contractor responsible for delivering the Alkimos Train Station and Alkimos Bus Interchange.

CW has prepared a sewer strategy which meets the conveyance requirements of the Water Corporation. Sewerage reticulation for the development will be provided via the extension of reticulation sized gravity mains which ultimately discharge to the Alkimos Waste Water Treatment Plant. A portion of the Alkimos Central catchment cannot be connected through gravity sewers, which will require construction of a permanent waste water pump station in accordance with the Water Corporation's waste water scheme. The south eastern portion of the Site will discharge to the existing sewer reticulation within the Trinity development south of Alkimos Central.

CW has prepared a water strategy which meets the conveyance requirements of the Water Corporation. Initial water supply can be provided from the existing pipe infrastructure in Marmion Avenue, with the balance of the proposed development serviced through progressive staged expansion of the trunk water main network.

The Water Corporation has planned headwork sized infrastructure within Alkimos Central as follows:

- 1500dia gravity sewer main;
- 900dia water main to be installed in Romeo Road (construction due for completion late 2022);
- 1400dia trunk water distribution main to take water from the future Alkimos Desalination Plant to the broader north-western metropolitan region; and a
- 900dia pressure main to take treated water from the future Alkimos Reclamation Plant to Carabooda.

Initial electrical supply can be provided from the existing high voltage HV underground infrastructure in Marmion Avenue, with the balance of the proposed development serviced through progressive staged expansion of the trunk electrical network. It is likely within approximately ten years (subject to individual dwelling loads and rate of development) the capacity of the Romeo Road (Yanchep) Zoned Substation will be exceeded and a new substation will be required to be constructed in Eglinton as planned through the Alkimos Eglinton District Precinct Plan. A 132kV overhead line is proposed by Western Power along the eastern boundary of the development abutting the Mitchell Freeway reserve to provide supply to the new Eglinton Zoned Substation. Our team is working with Western Power to determine if this infrastructure is still required, and if so, whether it can be more efficiently provisioned for within the Freeway reserve to de-constrain developable land and utilise infrastructure corridors more effectively.



## Alkimos Central Precinct Plan Engineering Servicing Report

Telecommunications and gas are readily available from existing services in Marmion Avenue which have capacity to service the proposed development.

The investigations and preparation of the report are largely based on preliminary advice from the various service authorities. The information is current as of October 2021 and is subject to change as development proceeds in the Perth north-west corridor resulting in the extension of service infrastructure and the creation of new capacity.



## 2. INTRODUCTION

This report has been prepared by Cossill & Webley Pty Ltd (CW) for the Alkimos Central Precinct Plan (ACPP). It summarises the results of a review of the engineering infrastructure coordination, servicing and staging in relation to the Precinct Plan area.

The ACPP has been prepared by Urbis on behalf of DevelopmentWA. The Land Use & Density Plan for the ACPP is presented in **Figure 1**.

The engineering review covers siteworks, earthworks, roads, stormwater drainage and utility services, and has been carried out to ensure the Precinct Plan responds as necessary to the engineering constraints and is capable of being serviced with common infrastructure. The level of detail provided is consistent with a Precinct Planning context and is not intended to provide all of the detail required at final land subdivision stage.

### 2.1 Regional Context

The Site is located within the north-west region of the Perth metropolitan area and is approximately 17 kilometres north of the Joondalup Strategic Metropolitan Centre and 8 kilometres south of the Yanchep Strategic Metropolitan Centre.

### 2.2 District Context

The Site is located within the central portion of the Alkimos-Eglinton District. The Alkimos-Eglinton District Precinct Plan (DSP) was prepared to guide development of the 2626-hectare District which will ultimately yield over 23,000 dwellings and house a population of approximately 57,000 residents. The DSP has been approved by the City of Wanneroo and endorsed by the WAPC.

### 2.3 Local Context

The land abuts Regional Open Space to the north, the future Mitchell Freeway extension to the east, Marmion Avenue to the west and proposed public open space and the existing Trinity development to the south.

### 2.4 Area and Land Use

The Site has a total land area of 203 hectares and is currently vacant and unimproved.

## 3. YANCHEP RAIL EXTENSION

As part of the State's Metronet commitment, the Public Transport Authority (PTA) are delivering the Yanchep Rail Extension from Butler to Yanchep, with completion anticipated by late 2023.

Within Alkimos Central, this will include the construction of the Alkimos Train Station and the Alkimos Bus Interchange.

DevelopmentWA also proposes to construct bridge crossings at Brindabella Parkway and Tuart Drive, as well as a capping "lot" that will enable construction of an up to three-storey "liner" building south of the train station abutting Tuart Drive. Part of the PTA works will also involve the construction of a bridge at Romeo Road, which is discussed later in this report.

The PTA works will also include Kiss & Ride facilities east of the rail and Park and Ride facilities east and west of the rail corridor, north of Brindabella Parkway.



The proposed PTA facilities located within Alkimos Central are presented in **Figure 2**.

As part of our liaison with the PTA and the NEWest Alliance Contractor responsible for delivery of the Yanchep Rail Extension project, NEWest Alliance, CW has ensured that planning, earthworks, road design and servicing requirements of the proposed PTA infrastructure aligns with the surrounding development.

## 4. SITEWORKS & EARTHWORKS

### 4.1 Topography

The existing topography within the ACPP area is depicted in **Figure 3**.

There is a prominent parabolic shaped dunal ridge that surrounds the Site with high points up to RL 59m AHD, providing good views west to the coast and east to the scarp. This distinctive landform has had a major influence on the layout and form of the Precinct Plan land uses. The general intention of the SP is to preserve this dune as far as practically possible.

The balance of the landform consists of shallow graded undulating dunes varying in height from RL 53m AHD to RL 29m AHD.

### 4.2 Ground Conditions

The Geological Survey of Western Australia's Perth Metropolitan Region Soils Maps indicates the parabolic dune consisting of underlying weakly cemented limestone with sand overlying limestone at varying depth in the remainder of the land holding.

Based on a number of geotechnical investigations carried out over the broader Alkimos area by various geotechnical companies, the ground conditions within the ACPP are expected to be as follows:

The ACPP is within an area of coastal Quindalup sand dunes extending inland from the coastline. They are geologically younger than the Tamala Limestone which occurs at depth further inland. The dunes are comprised of fine to medium grained, light brown to white, calcareous sand. The natural density of the sand is predominantly medium dense to dense, however loose surface sand can occur on the lee (eastern) sides of dunes. The sand has comparatively high permeability (typically 2m/day to 20m/day), high void ratio, no shrinkage and low bearing capacity.

Areas of rock outcrop occur and are comprised of well cemented cap rock zones formed by the dissolution and re-precipitation of calcium carbonate within the weathering profile to form calcrete deposits. The well cemented high strength calcrete layers are relatively less developed within the Quindalup Dunes and generally less than 0.5m thick.

Surface rock is anticipated to occur predominately as cemented limestone cap rock outcrops along ridge lines within the Quindalup Dunes. Below the cap rock layers the limestone is generally of lower strength. Within the Quindalup Dunes, limestone is generally weakly cemented to form a low strength rock.

Excavation conditions within the areas of rock are highly variable and are largely affected by the thickness of cap rock development. Within the Quindalup Dunes where cap rock development is thin (~0.5m) it is generally easily ripped with a large dozer (~D10) and the underlying, weakly cemented material can often be excavated with a large excavator (~40t).



In very general terms excavation conditions are potentially more difficult with increasing age of the formation as the cap rock layers have had a greater length of time to develop. As a generalisation the potential for encountering difficult excavation conditions increases with further distance from the coast and with increasing depth of excavation due to the potential for encountering older cap rock formations.

### 4.3 Karstic Formations

Karstic ground formations are known to occur in the limestone rock in a band running north-south east of Wanneroo Road, well clear of the ACPD area.

The Alkimos Water Alliance, the contractors for the Alkimos Wastewater Treatment Plant constructed between 2009-2010, had previously excavated an area for the Treatment Plant west of the ACPD area. The excavation extends down to levels of 3 metres AHD in limestone rock and there has been no evidence of karstic ground conditions. Similarly, we are unaware of any karstic evidence experienced in excavation at Lendlease's Alkimos Vista project (to the north) or in the past works of Brighton, Trinity and Jindalee to the south of the ACPD area.

Based on this evidence it is considered very unlikely that the ACPD area contains karstic ground formations.

Notwithstanding this, provision will be made in the construction specifications for earthworks at the time of subdivision for progressive inspections of the works by qualified geotechnical engineers to confirm the adequacy of the land to support future development.

### 4.4 Unexploded Ordnance (UXO)

The Site falls within the overall former WWII Eglinton training area. The Department of Fire and Emergency Services has advised that the Precinct Plan is located in an area where the UXO category is 'Slight' which means there is a history of military activities that have resulted in residual UXO.

A possibility exists that dangerous items of UXO may still be found on this site, however, there is no requirement to assess or search the site for UXO. A standard UXO Advice Note will be included at the subdivision stage stating:

*"This property is on a site where records confirm there is a history of military activities that have resulted in residual UXO. A possibility exists that dangerous items of UXO may still be found on this site. Contact police if a suspicious item that may be UXO is found. Visit [www.defence.gov.au/uxo](http://www.defence.gov.au/uxo) for further information."*

### 4.5 General Siteworks & Earthworks

Siteworks for urban development typically comprises the identification of areas of vegetation for conservation, protecting these areas (during and after construction) and in areas identified for commercial and residential development, clearing and earthworking the existing ground to accommodate the required form of development.

In Perth it is often the case that the extent of siteworks is dictated by the density and nature of development and by the finished ground shape required for future building purposes. Increased densities and decreasing lot sizes has led to the typical practice of fully earthworking development areas to create level lots, terraced between retaining walls.

This approach has provided a number of positive outcomes in the past including:

- Reduction in the total house building cost;
- Rationalisation of retaining wall layouts and designs consistent with Local Authority specifications;



- Enables lots to be terraced up natural slopes to maintain elevation and views while providing certainty between boundaries.

## 4.6 Siteworks Controls

There are a number of factors which have been considered in reviewing the anticipated finished levels of the development of the Alkimos Central Precinct. These are summarised as follows:

- Retention of the parabolic dune, by minimising clearing and matching levels at the vegetation retention boundary as closely as possible;
- Matching proposed development levels of the Yanchep Train Station, Bus Interchange, parking facilities and bridges;
- Matching existing levels of the newly upgraded Marmion Avenue;
- Matching levels of the proposed Mitchell Freeway Extension and Romeo Road;
- Provide suitable grade across commercial, residential and mixed-use sites to support the future development requirements; and
- Grading roads to cater for proposed gravity services and meet the standards of the required approval agencies. The ACPP promotes the adoption of lower speeds, in accordance with Liveable Neighbourhoods objectives, through the road layout and the urban design of streetscapes. The engineering design standards which suit these lower speeds provide greater flexibility to follow the existing topography through the adoption of steeper grades and shorter sight distances.

In practice the final choice of subdivision siteworks and building typologies will depend on a range of factors including, affordability, product mix and economics.

It is considered, however, that the Alkimos Central Precinct Plan, as proposed will provide flexibility for a range of options to maintain the landowner's objectives for the project.

A preliminary earthworks plan has been prepared and is presented in **Figure 4** for reference.

## 5. STORMWATER DRAINAGE

### 5.1 Integrated Urban Water Management

The Alkimos Central Local Water Management Strategy (LWMS) has been prepared by Emerge Associates. This provides a basis for ongoing development to ensure that appropriate allowances are made for total water management including the minimisation of scheme water use and the maximisation of recharge of stormwater runoff.

Stormwater drainage management is proposed by adopting a Water Sensitive Urban Design (WSUD) approach. 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.





We anticipate the main WSUD practices which are likely to be incorporated into the ongoing implementation of the site as follows:

### 5.2 Stormwater Management

Stormwater recharge of the shallow aquifer should be maximised through the adoption of 'Best Management Practices', which promote the dispersion and infiltration of runoff. These include the use of porous paving for roads and car parks, the diversion of runoff into road medians and 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 space (POS).

### 5.3 Water Quality Management

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

### 5.4 Stormwater Collection and Management

The Site consists of free draining sand with substantial cover to the prevailing groundwater. Overall, therefore, the land is highly suited to the implementation of the WSUD management practices outlined above.

It is anticipated that runoff within future development allotments will be contained on-site. Stormwater disposal will be via soakwells or other infiltration facilities which form part of the building and private open space development. In areas of high urban density, allowance has been made in the stormwater model to manage a proportion of the runoff in the council-controlled street drainage network. This provides a more practical response for higher density sites and allows the runoff from larger storms to be managed away from buildings in areas of public open space.

Drainage from public roads and lanes can be managed in a number of ways depending on the nature of the adjacent land uses, the extent of traffic and pedestrians and the objectives for drainage management. Infiltration may be via swales within or adjacent to road reserves, gully pits with permeable bases, slotted drainage pipes, porous road pavements or under road storages subject to the City of Wanneroo approval and consideration of whole of life costs including the ongoing maintenance.

Runoff from storms up to the 10%AEP for commercial areas and 20%AEP for residential areas would typically be conveyed via an underground pipe system to low point infiltration basins within POS areas.

Roads and POS will be designed to cater for the surface overflow for more severe storms with building pads constructed at least 300 millimetres above the 1%AEP ARI flood or storage level at any location.

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

The LWMS prepared by Emerge details the stormwater drainage strategy for the Alkimos Central Precinct Plan. The LWMS shows the approximate location of stormwater disposal sites based on a preliminary assessment of finished development levels. A drainage catchment plan depicting the post-development watersheds is presented in **Figure 5** for reference.



## 6. ROADWORKS

### 6.1 Traffic and Transportation

A Traffic Report has been prepared by GTA Consultants and accompanies the ACPP.

The results of this investigation include a recommended hierarchy for the roads within the ACPP and the future subdivision development together with recommendations for public transport services, pedestrian and cyclist facilities.

In all cases the engineering review has taken account of the above recommendations.

### 6.2 Regional Roads

Marmion Avenue has recently been upgraded by the City of Wanneroo to a 4-lane road (2 lanes in each direction) abutting the Site. Future upgrade to 3 lanes in each direction between Romeo Road and Brindabella Parkway has been designed and provisioned for in the Marmion Avenue road reserve.

The Marmion Avenue duplication works have also provisioned for future traffic signal-controlled intersections at Romeo Road and Brindabella Parkway.

Main Roads WA has programmed completion of the Mitchell Freeway extension from Hester Avenue to Romeo Road by late 2022. These works will also include the construction of Romeo Road between Wanneroo Road and Marmion Avenue.

Romeo Road will be constructed as a 4 lane (2 lanes in each direction) "Other Regional Road" to City of Wanneroo standards.

Herring Storer has provided an Acoustic Report as part of the Precinct Plan addressing the requirements of State Planning Policy 5.4 Noise Considerations for the above roads, as well as the Yanchep Rail extension.

### 6.3 Development Roads

The ACPP comprises a network of development roads including district distributor roads, neighbourhood connector roads and local access roads and laneways.

The Traffic Report includes an urban design hierarchy and proposed intersection forms for the development roads to reflect the intended functions of the road network and their corresponding streetscape characters.

In all cases road cross-sections will be designed to cater for utility services, street trees and parking embayments as required.

The engineering design of roads will be carried out to comply with the Liveable Neighbourhoods recommendations for design speeds and sight distances and with the requirements of the City of Wanneroo and Main Roads WA where applicable.

In particular, it is proposed that the development roads be designed to suit lower vehicle operating speeds to ensure safer operation and to provide more flexibility to better follow the existing topography with road alignments and grades. Lower speeds on local roads will also support initiatives to adopt smaller street truncations and associated intersection curve radii.



The ACPP includes some short sections of development roads adjacent to the boundary of the dunes and Regional Open Space network. The existing topography along these sections is such that to achieve appropriate road alignment it may be necessary to extend the earthworks batters into parts of the reserve. The extent of this would be minimised as an objective of the road design and would be detailed through relevant environmental approval processes.

## 7. WASTEWATER

### 7.1 Wastewater Collection and Treatment

The ACPP area falls within the Water Corporation's licence area for the provision of sewerage reticulation.

The planned sewer strategy conveys flows from Alkimos Central to the Water Corporation's Alkimos Wastewater Treatment Plant (AWWTP) west of the Site as presented in **Figure 6**.

### 7.2 Ultimate Wastewater System

The Alkimos Central sewer strategy is presented in **Figure 6**. Flow calculations for the land within the City Centre are subject to detailed design and will be refined accordingly.

The ultimate sewer strategy for Alkimos Central includes the extension of a 1500mm diameter gravity branch sewer from the Quinns Main Sewer near the AWWTP under the future Brindabella Parkway, Yanchep Rail and Road NS2. This main sewer will capture flows from the potential future development of Carabooda, east of Wanneroo Road and the Trinity development south of the Site.

The alignment of the 1500dia branch sewer has been agreed with the WC, and final designs for the first stage of this infrastructure are currently underway. The Water Corporation intends to install an interim pump station west of Marmion Avenue prior to the connection of the branch sewer to the AWWTP.

The majority of the Site will be serviced with reticulation sized gravity sewer mains discharging to the 1500dia main sewer, with a small catchment in the south-east corner proposed to discharge to the existing Alkimos PS2 within the Trinity development.

### 7.3 Initial Wastewater System

The Water Corporation has advised that the 1500dia main sewer will not be connected to the Quinns Main Sewer or the AWWTP in the short term due to the low flows anticipated for an extended period of time.

As part of the first stage of development and to service the proposed train station and bus interchange, it is proposed that an interim pump station is constructed near the intersection of Brindabella Parkway and Pectoral Promenade (west of Marmion Avenue) to take early flows from the Train Station, Bus Interchange and first stages of development.

### 7.4 Alternative Wastewater Treatment and Reuse

The Water Corporation is reviewing alternative options for the potential reuse of treated waste water effluent at the Alkimos Waste Water Treatment Plant.

We understand Water Corporation's preference is to pursue the indirect reuse of treated effluent. One method being considered is the recharge of ground water aquifers via direct injection of treated effluent as per the scheme implemented at the Beenyp Waste Water Treatment Plant.



We are currently in negotiations with the Water Corporation in relation to consideration of diverting some of the proposed treated effluent to Alkimos Central for either irrigation purposes or further, as a third-pipe non-potable scheme within the private realm. On-going liaison is currently underway to confirm Water Corporation's position on this.

## 8. WATER SUPPLY

### 8.1 Water Resources

The ACPP area is located within the Water Corporation's future Eglinton ground water source area for potable water supply. Provision has been made for some time for the development of this ground water resource.

Water supply to the ACPP area will ultimately be via a series of groundwater bores, located throughout the Alkimos–Eglinton area, linked by collector water mains to a central treatment plant and reservoir. Areas of urban development will be serviced by a network of distribution water mains, from the reservoir, connected to reticulation systems within those areas.

Alkimos Central is near the boundary of the existing Neerabup treatment and reservoir scheme and the Carabooda reservoir service areas and at ultimate development may receive water from either source at different times in the demand cycle although most likely will ultimately be from the Carabooda reservoir.

A second ground water treatment plant (Eglinton Ground Water Treatment Plant) is proposed to be developed at the Alkimos Wastewater Treatment Plant site.

### 8.2 Initial Water Supply Network

Supply to Alkimos Central will initially be via a connection to an existing 250mm water main in the eastern verge of Marmion Avenue abutting the Site. There is also an existing 800dia water distribution main co-located in this verge. There is existing capacity in this infrastructure to service the development.

### 8.3 Ultimate Water Supply

The Water Corporation's proposed water distribution network is presented in **Figure 7**.

The Water Corporation has a long term distribution network plan that includes construction of a 900mm dia water main in Romeo Road between Marmion Avenue and the Mitchell Freeway. This main is due to be constructed as part of the Romeo Road construction works, with completion anticipated by early 2023.

Additionally, the Water Corporation has planned for a 1400mm dia water trunk distribution main to take water from the proposed Alkimos Desalination Plant located within the Wastewater Treatment Plant site to top up the Carabooda and Wanneroo Reservoirs. The alignment of this main has been agreed to follow the northern boundary of the Site, diverting south via the road reserve NS2 and east in Romeo Road as depicted in **Figure 7**. The proposed alignment has been provisioned for in the Precinct Plan, and within the Romeo Road and NS2 cross-sections. Water Corporation propose to construct a service bridge for this infrastructure as part of the Yanchep Rail Extension works.



An 800dia treated effluent pressure main is also proposed to convey treated water from a proposed Reclamation Plant also located within the Wastewater Treatment Plant land east of the Site. The 800dia pressure main will follow the 1400dia trunk water main alignment through Alkimos Central. The Water Corporation has not confirmed the timing for the construction of the Reclamation Plant, nor have they determined the likely final use of the treated effluent water, although they are considering a number of options, including public drinking supply, aquifer recharge, horticultural irrigation or public open space irrigation.

The balance of the trunk water main network (mains greater than 250mm in size) as shown on **Figure 7** will be progressively expanded by the Water Corporation directly or through Developer Constructed Works with negotiated pre-funding arrangements.

## 9. ELECTRICAL POWER SUPPLY

### 9.1 Existing Electrical Power Network

Alkimos Central has an existing 22kV high voltage underground cable in Marmion Avenue (eastern verge) for its full western frontage. This feed has been used to supply the initial developments from the Yanchep Zone Substation in Romeo Road to all existing land development projects north of Alkimos Central up to Yanchep.

There is a second independent 22kV high voltage feed in Marmion Avenue (western verge) installed as a dedicated supply for the Alkimos WWTP.

The two 22kV cables in Marmion Avenue follow an alignment within an existing Water Corporation access track near the southern boundary of the Site. These cables will be re-installed within the Romeo Road reserve as part of the Romeo Road construction works.

The Yanchep Zone Substation is a three-phase transformer outdoor 132/22 kV zone substation. There are currently six 22 kV feeders out of this Substation. These feeders supply residential developments to the north along the coast and semi-rural loads north and to the east of the substation. We understand the substation is expected to be able to supply some 9,500 allotments in the Alkimos Eglinton area.

It is expected that the new Eglinton zone substation proposed in the Alkimos District Precinct Plan south of Eglinton Drive will need to be established within the next 10 years to accommodate the growth of existing loads in the region.

### 9.2 Initial Electrical Power Supply

We expect the local network will be incrementally extended from the 22kV HV feed in Marmion Avenue and Romeo Road into the ACPP area.

A series of HV feeds, switch stations and transformers will be required throughout the development to meet individual site requirements.

### 9.3 Ultimate Electrical Power Network Requirements

The preliminary overall ultimate power network requirements for Alkimos Central is presented in **Figure 8**. Minor changes to reflect the location of transformers and other infrastructure will be incorporated at the detailed design stage to suit development requirements.



As the available capacity in the 22kV high voltage feeders in Marmion Avenue are exceeded additional feeds from the Romeo Road (Yanchep) Zone Substation will be required. Preliminary advice from Western Power suggests up to six 22kV feeds may be required ultimately in the Romeo Road reserve to service the north-west catchment.

Western Power is finding recent trends in housing types (smaller individual buildings with less load per household) and uptake of solar panels is reducing the average power demand per dwelling by as much as 50%. Hence, as the power demand per dwelling is better understood for the Alkimos Eglinton area, Western Power may find the number of dwellings it can supply per feed and from the Romeo Road (Yanchep) substation may increase substantially.

The Water Corporation has planned for a dedicated 132kV cable to be installed from the Romeo Road Zone Substation to the future Alkimos Desalination Plant. The Romeo Road reserve has been designed to cater for all of the known power distribution mains.

### 9.4 Future 132kV North-South Feeder

Depending on the actual power demands per dwelling experienced in Alkimos - Eglinton and the rate of development, Western Power expects the new Eglinton zone substation (proposed by the Alkimos District Precinct Plan to be south of Eglinton Drive and between the Railway reserve and the Mitchell Freeway reserve) to be required in approximately ten years.

A 132kV overhead line is proposed by Western Power along the eastern boundary of the development abutting the Mitchell Freeway reserve to provide supply to the new Eglinton Zone Substation. The anticipated width of the power line corridor is 24 metres, however this may vary if Western Power confirm the detailed design requirements prior to construction of the subdivision.

The requirement for the HV feeder was incorporated into the Alkimos Eglinton District Precinct Plan (AEDSP) when it was first approved in 2008. At the time Western Power requested provision be made for the feeder based on anticipated future demand in the northern corridor, with a new zone substation also proposed to be constructed in the AEDSP area.

The timing and potential need for the provision of this infrastructure has varied since the AEDSP was prepared. Following the implementation of the AEDSP, several Local Structure Plans (LSPs) have been prepared, and development has commenced on several fronts within the AEDSP area. Discussions were held with Western Power in 2011 whereby Western Power advised the feeder would likely be required within the next 10 years. The feeder has not yet been required nor constructed in this timeframe.

In more recent discussions with Western Power they have indicated that the planning surrounding the need for the transmission line was based on anticipated load requirements from the time that the AEDSP was prepared in 2008. In the past decade there has been considerable take up and implementation of a number of energy conserving measures at both residential and commercial level, including the take-up of solar power. This has seen the load demands placed on Western Power's network vary significantly such that Western Power has no program for the installation of this line, and anticipate it could be some 15 to 20 years away at this stage, or potentially not required. Further network modelling would be required to confirm this.

Western Power has advised they would be amenable to an alternative alignment of the transmission line outside of the ACPP area, taking it away from residential land use areas. Alternative alignments of the transmission line could include utilising the Mitchell Freeway corridor, or placing the line east of the Freeway, including utilising the existing Wanneroo Road reserve, which is the current alignment of the existing feeder south of Romeo Road.



Given the uncertainty regarding the timing of the need and construction of the HV feeder, the potential utilisation of the Mitchell Freeway reserve is a logical potential alternative for the future delivery of the HV infrastructure. There is certainty regarding the status of the freeway corridor from a planning perspective, and locating the asset in this reserve would ensure the feeder does not encumber developable land. Placing key power infrastructure within the freeway reserve would achieve a more consolidated urban form and adopt a more “all-of-government” approach promoted by the North-West Sub-Regional Planning Framework and Infrastructure WA’s Draft Strategy, which considers social and economic aspects of the relationship between future urban land and infrastructure. The North-West Sub-Regional Planning Framework confirms the expectation that servicing agencies will work collaboratively to maximise future shared infrastructure corridors and sites. Utilising the existing freeway reserve for the future delivery of the 132kV feeder provides an excellent opportunity in this regard if managed appropriately, and moves the infrastructure out of the less compatible residential area.

If an alternative alignment cannot be confirmed, there is still the option of placing the HV feeder underground if required in future. This would not only align with the objectives of the AEDSP which requires that all utility services be installed underground to maximise amenity, but also provides greater protection to the feeders. It is noted that it is mandatory for all new power infrastructure delivered at development level to be provided underground for this reason. If the new feeder were to be provided underground, at least through proposed residential areas, this would eliminate the need for an easement.

Given the potential timing, and indeed need for this infrastructure still remains uncertain, further investigation is required to finalise the 132kV reserve.

### 9.5 Telecommunications

There is existing optic fibre in Marmion Avenue which can be readily extended to service the proposed Alkimos Central development.

The Site is within nbn’s fixed line footprint, and hence can be serviced with optic fibre under their roll-out scheme for greenfield developments.

Under the Federal Government’s Telecommunications in New Developments Policy, developers are responsible for contributing to the cost of delivering the nbn™ network in new developments. This includes contributing to part of the costs of the build (civils and any backhaul required) as well as a \$600 per lot deployment charge.

Through the nbn, the ownership issues of delivering the wholesale fibre to the home system have been transferred to the Government with a number of retail service providers offering services over the network. There are other private telecommunication providers that can also offer similar services.

Developers of new Estates have the option to pay nbn or an alternative service provider for provision of a high-speed broadband network. In either case the developer will install pit and pipe infrastructure that can accommodate a future high speed broadband network.

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



## 9.6 Gas

The existing high pressure gas network has been extended from Butler to Yanchep by Atco Gas. Atco Gas has confirmed the main installed in Marmion Avenue will have capacity to service the development with no off-site headwork upgrades required.

DWA is still investigating whether gas reticulation will be extended through the Site, but we note there is capacity to extend the existing network through Alkimos Central if required.

# 10. INFRASTRUCTURE COORDINATION SERVICING AND STAGING

As part of the Yanchep Rail Extension, the Alkimos Central Train Station Construction and the Alkimos Central Bus Interchange, DevelopmentWA has coordinated infrastructure strategies with the PTA, Main Roads WA, the Water Corporation, Western Power and the City of Wanneroo.

Within the next 5 years, it is anticipated the following infrastructure will have been installed:

- Yanchep Rail Extension, including the Alkimos Train Station, Alkimos Bus Interchange, Kiss & Ride facilities, and Park and Ride facilities;
- Romeo Road connecting the Mitchell Freeway Extension to Marmion Avenue. This will include the installation of traffic signals at Romeo Road/Marmion Avenue and Romeo Road/Benenden Avenue;
- The interim construction of Brindabella Parkway to the Yanchep Rail Extension, including traffic signals at Marmion Avenue/Brindabella Parkway;
- The 900dia water reticulation main in Romeo Road;
- Some of the internal road network extensions to service Day 1 Opening of the PTA facilities, including the bridge crossings at Brindabella Parkway and Tuart Drive and the capping "lot" south of the train station abutting the Tuart Drive bridge crossing;
- First stage retail within the Alkimos Central development between Romeo Road, the Yanchep Rail Extension, Marmion Avenue and Brindabella Parkway; and
- A Town Square and Community Hub facility adjacent to the Rail Station.

Following the first stage, it is anticipated that headwork infrastructure will be installed as part of the subdivisional works, with the general construction front being from west to east across the Site.

# 11. CONCLUSION

The Site has planned strategies and readily available services which can be extended to service the Site. No substantial off-site upgrades will be required to key infrastructure.

The Alkimos Central Precinct Plan prepared by Urbis generally accords with the engineering requirements of a Precinct Plan, the City of Wanneroo standards and utility provider servicing strategies for the area.

There are no engineering impediments to the development, though co-ordination and co-operation with the relevant Service Authorities will be required as the development progresses.



# Figure 1

## Land Use & Density Plan

# LEGEND

PRECINCT PLAN AREA  
CITY CENTRE CORE  
INDICATIVE LAND USE & DENSITIES

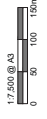
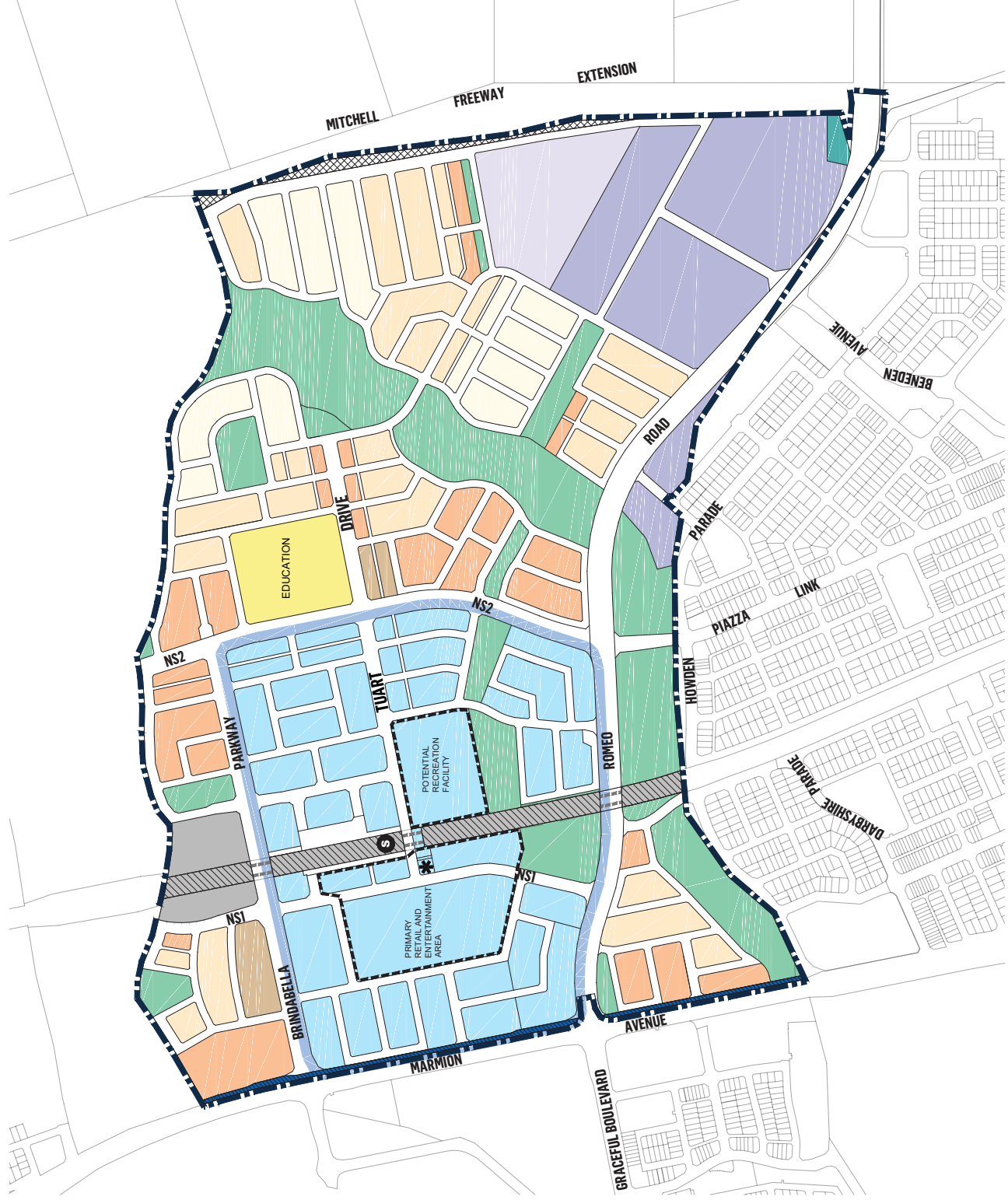
RESIDENTIAL - R20  
RESIDENTIAL - R25  
RESIDENTIAL - R30  
RESIDENTIAL - R40  
COMMERCIAL (RAC-0)  
BUSINESS  
SERVICE INDUSTRIAL  
PUBLIC PURPOSE  
PUBLIC OPEN SPACE  
DRAINAGE  
PTA CARPARK

OTHER

RAILWAYS  
FUTURE WESTERN POWER CORRIDOR  
TOWN SQUARE  
FUTURE MARMION AVENUE ROAD WIDENING  
INDICATIVE ROAD LAYOUT  
RAILWAY ALIGNMENT  
ALKIMOS TRAIN STATION

## NOTE

- 1) R-Code densities are indicative. Refer to Plan 1 in Part 1
- 2) For land within RAC-0 built form controls are guided by the provisions of Part 1
- 3) Land uses within the Commercial Zone shall be in accordance with the land use permissibility in DPS2 (including a mix of retail, commercial, entertainment, food and beverage, recreational, civic, cultural and some residential land uses)



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# Figure 2

## Alkimos Station & Precinct Site Plan





# Figure 3

## Existing Topography





# Figure 4

## Earthworks Concept



LEGEND	
DESCRIPTION	SYMBOL
FINISHED SURFACE CONTOUR MAJOR	— 25 —
FINISHED SURFACE CONTOUR MINOR	— 10 —
EXISTING SURFACE CONTOUR	— 10 —

PROJECT: ALKIMOS CENTRAL - STRATEGIES

TITLE: EARTHWORKS STRATEGY

CONCEPT C - EARTHWORKS PLAN

DATE: 13/09/21

SCALE: 1:3000

APPROVED: APRIL THOMSON

DESIGNED: JAE

CLIENT: Cossill & Webley CONSULTING ENGINEERS

PROJECT ADDRESS: 8122 LORRAINE ST, ALKIMOS, WA 6163

PROJECT NO: 2021/0001

CONTACT: T: (08) 9422 9001 F: (08) 9422 9001 E: info@cossillwebley.com.au

13000

0m 60 120 180

B	08/11/21	JAE	TT	UPDATED TO SUIT REFINED LAYOUT
A	13/05/21	JAE	TT	ISSUED FOR INFORMATION
REV	DATE	BY	CHK	APP



# Figure 5

## Drainage Catchment Plan

LEGEND	
DESCRIPTION	SYMBOL
PROPOSED DRAINAGE BASIN	①
OUTLET LOCATIONS	↑



REV	DATE	BY	CHK	APP	DESCRIPTION
D	08.11.21	JAE			UPDATED TO SUIT REVISED LAYOUT
C	19.05.21	JAE	TT	A. THOMPSON	MINOR AMENDMENTS TO CATCHMENTS
B	26.04.21	JAE	TT	A. THOMPSON	CATCHMENT AREAS REVISED TO SUIT EARTHWORKS CONCEPT
A	17.04.21	JAE	TT	T. THAM	ISSUED FOR INFORMATION



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**CLIENT**  
DevelopmentWA

**PROJECT**  
ALKIMOS CENTRAL - STRATEGIES

**TITLE**  
DRAINAGE STRATEGY CONCEPT 3

**DESIGNED**  
JAE

**SCALE**  
1:5000

**DATE**  
15/04/21

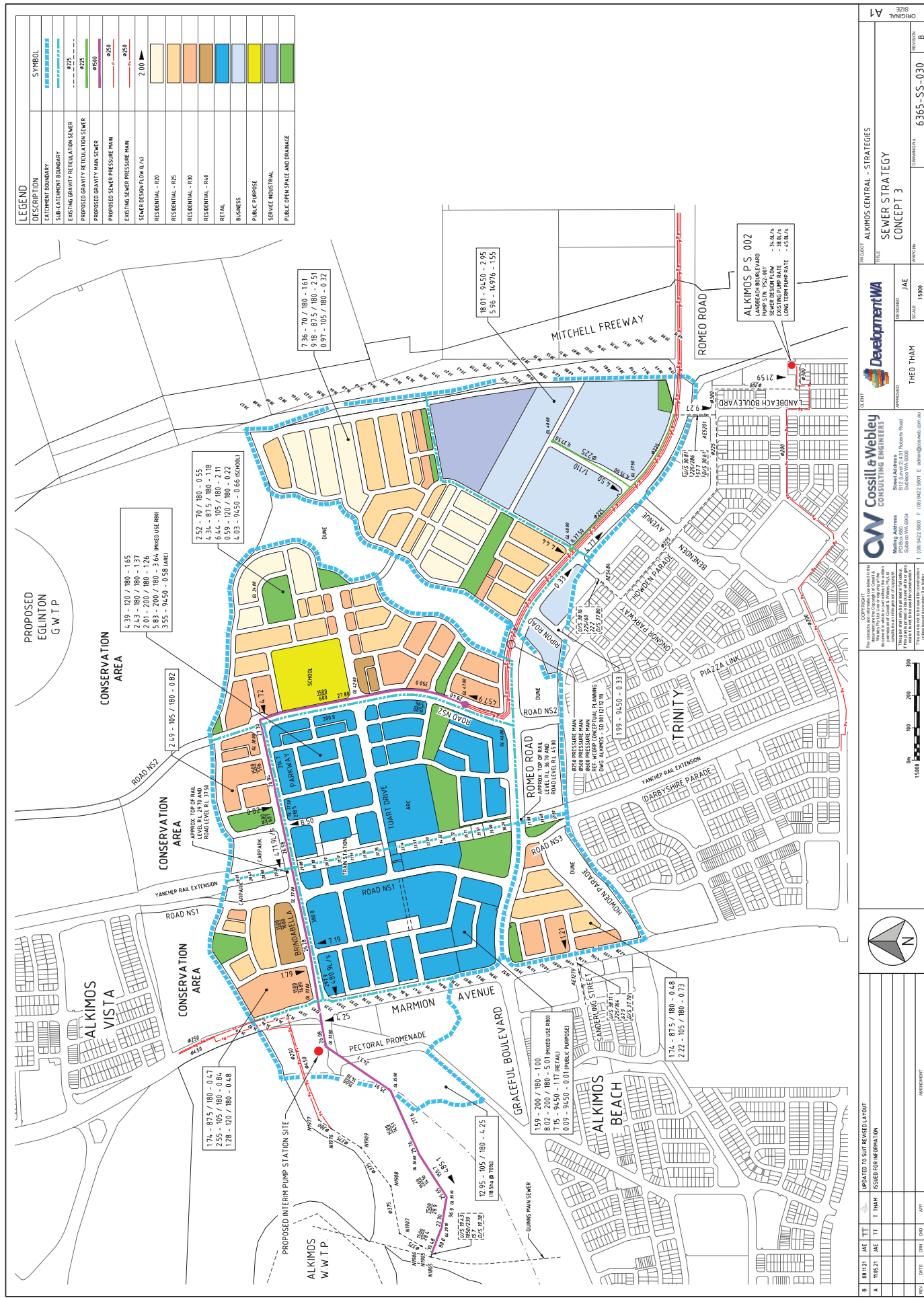
**PROJECT NO.**  
6365-DS-030

**REVISION**  
D



# Figure 6

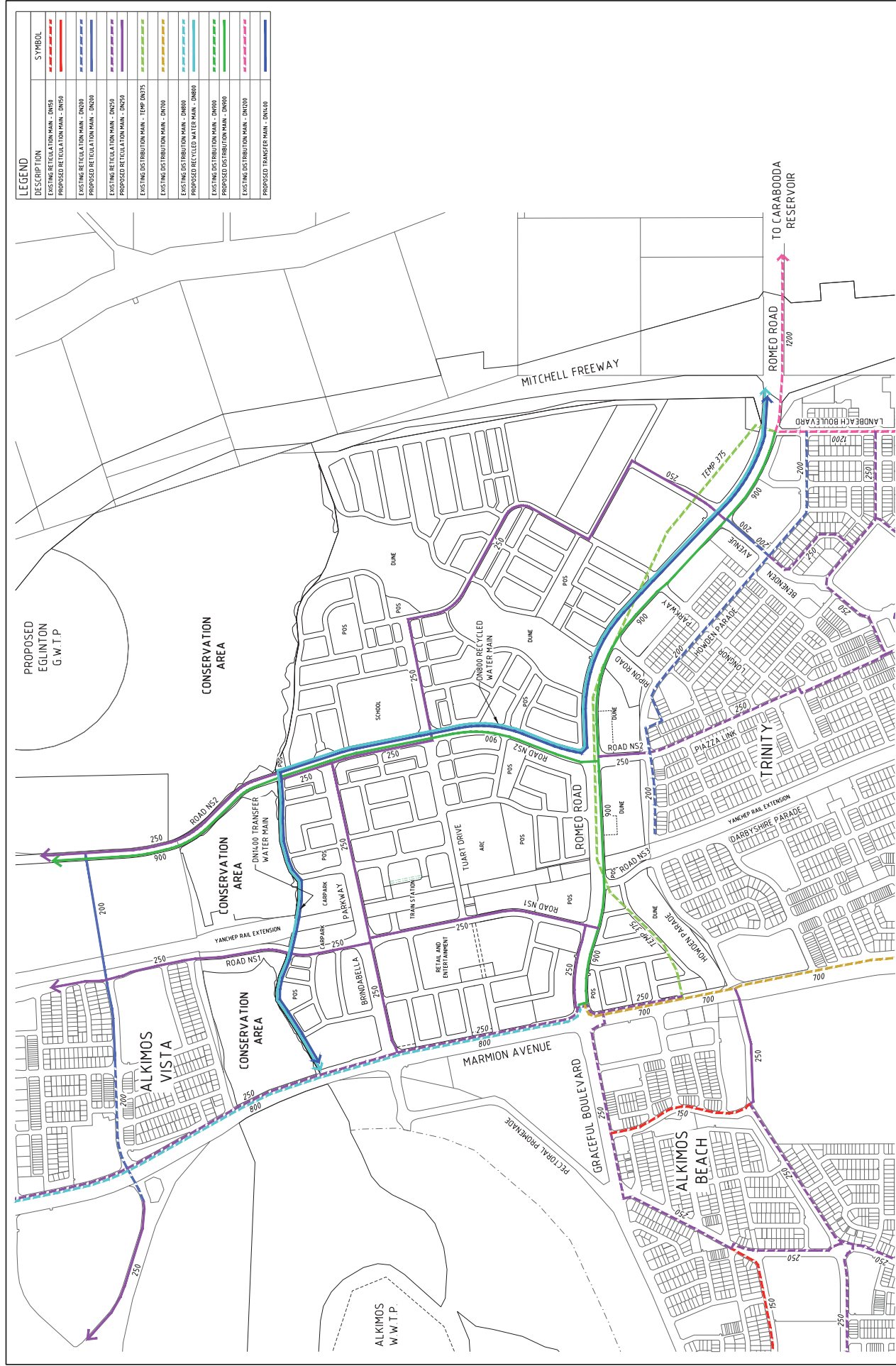
## Sewer Strategy





# Figure 7

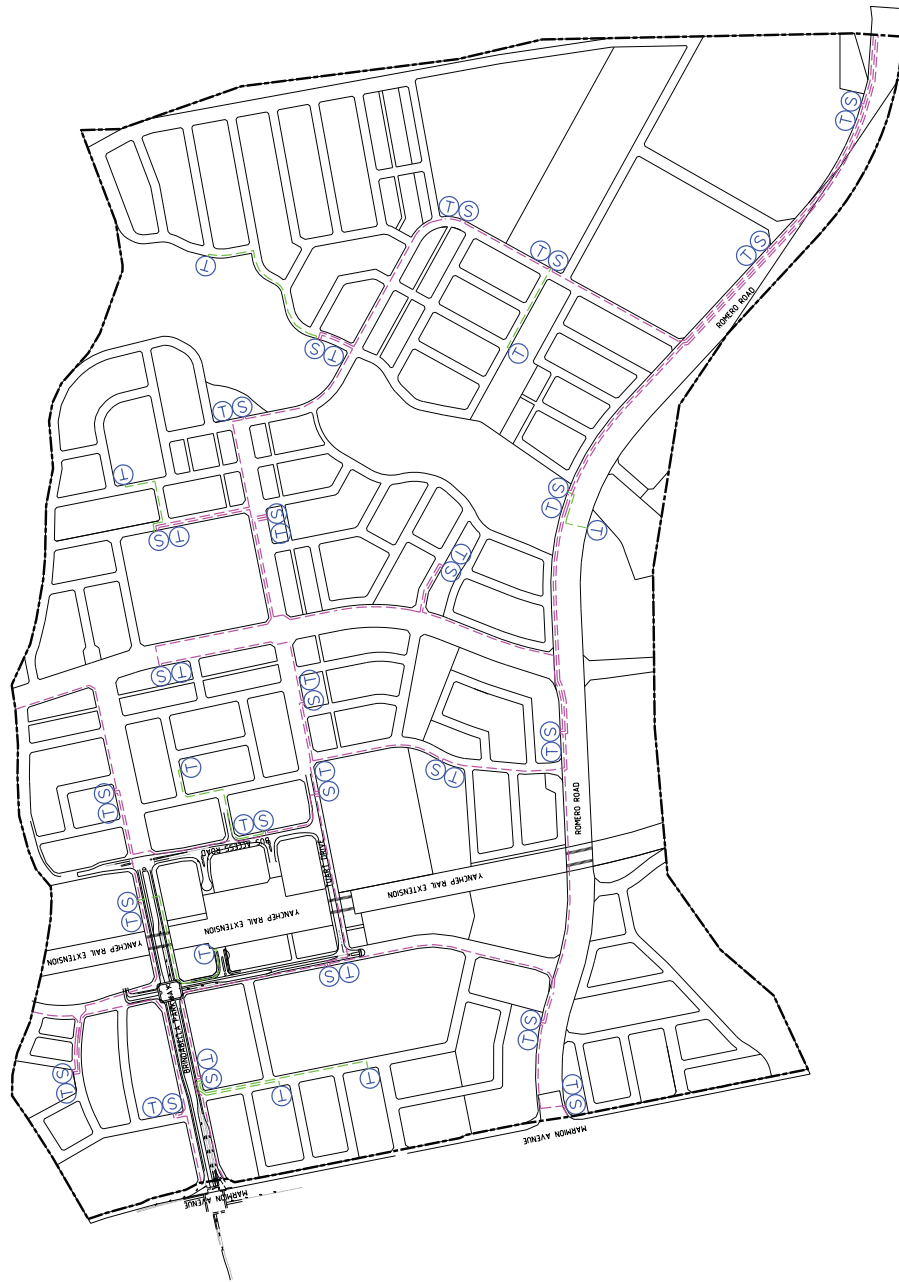
## Water Strategy

[illegible]



# Figure 8

## Power Strategy

[illegible]

**WARNING**

NO OTHER UTILITY SERVICES SHALL BE LOCATED WITHIN THE SERVICE PILLAR EXCLUSION ZONE (500mm SEPARATION FROM WATER, GAS & SANITARY DRAINAGE AND 600mm FOR STORM WATER DRAINAGE) SEE UDS MANUAL CLAUSE 5.3.5.2 FOR DETAILS

ALL WORKS IN THE VICINITY (WV) OF EXISTING WESTERN POWER ASSETS ARE TO BE UNDERTAKEN IN ACCORDANCE WITH OCCUPATIONAL SAFETY AND HEALTH (OSH), WORKSAFE AND WESTERN POWER ELECTRICAL SYSTEM SAFETY RULES (ESSR) REQUIREMENTS AS PER WORKING NEAR ELECTRICITY SECTION OF THE WESTERN POWER WEBSITE

[illegible]

**ETC**  
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AEN 005 16 479  
Email: etcc@earthlink.net

LOT DETAILS		GEO REF	
Residential Lots:		Lat:	° - ' - S
Group Housing:		Long:	° - ' - W
Commercial:			
Pumps:			
POS:			

PROJECT NAME	ALKIMOS CENTRAL
DRAWING TITLE	MASTER PLAN - H
CLIENT / DEVELOPER	DEVELOPMENT WA
DESIGNER CONTACT DETAILS	Name: B.HOWARD

W.A.P.C. REFERENCE No.	TBC		A1
WESTERN POWER REFERENCE No.	TBC		
SCALE 12500	DATE: JUNE 2021		SHT 3 OF 3
DRAWING No.	8904 D-102		REV B

