



Infrastructure Servicing Report Robbs Jetty Local Structure Plan Area Cockburn Coast Development

for

LandCorp
Attention: Sergio Famiano

23 October 2012

Revision No. 1

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1 Introduction

Wood & Grieve Engineers (WGE) were commissioned by LandCorp to provide an Infrastructure Servicing Report to support the Robbs Jetty Local Structure Plan Area. Hassell are leading the Local Structure Plan development and we have liaised with them on the planning specifics for the area.

This report has been prepared to provide information on the service infrastructure for the area. It discusses existing infrastructure in the area, upgrades, relocations, changes required and likely timing of infrastructure upgrades and requirements.

The structure of the report is such that each particular element of infrastructure is discussed separately to give a full account of each service.

2 Wastewater and Effluent Disposal

In this section of the report we discuss the existing wastewater and effluent disposal services in the area. Development in accordance with the Local Structure Plan will require modifications and upgrading of the existing system. We will also address the issue of likely timing and funding of the major upgrades.

2.1 Existing Sewerage System

The development area currently has a number of lots which are served by a reticulated gravity sewer system. The current Water Corporation Sewer Strategy for the area is shown in Appendix 1.

The existing system consists of the following:

- Gravity sewer lines serving all existing lots in the area. Typically pipe sizes are 225mm Ø.
- Sewer pumping station – pipework gravitates to this pump station which exists near the corner of Rollinson Road and Bennett Avenue.

The pumping station is a major installation and accepts flows from other pumping stations in the Fremantle area. It pumps flows ultimately to the Woodman Point Wastewater Treatment Plant.

- Sewer pressure main – the pump station pumps flows in a 500mm Ø steel pressure main to the wastewater treatment plant. The route is shown on the Water Corporation base plans, but follows major roads as much as possible and Cockburn Road to the south of the development area.
- Emergency Ocean Outfall – the pumping station would be designed to retain sewer flows on site for a certain time (typically 3 hours) in case of station failure. Further to this, in an emergency it is required to discharge flows safely. As such a gravity ocean outfall main of 610mm Ø RC pipe exists as shown on the drawings. This discharge line would only operate in an emergency situation.

All sewerage infrastructure is owned and operated by the Water Corporation. All serviced lots in the area would be rated and pay an annual charge. Industrial uses may have specific agreements in place with the Water Corporation.

2.2 Wastewater Service Upgrades and Modifications

Although a well developed sewerage system exists in the area, on development a number of changes will be required over time to cater for different cadastral boundaries, subdivision and increased effluent load.

2.2.1 Pump Station

The Water Corporation has recently reviewed their detailed strategy for sewer planning over the area. The major sewer infrastructure in the area is the Bennett Avenue wastewater pumping station and rising main. It is proposed to do an initial upgrade to the Bennett Avenue WWPS to increase the pumping rate to 260l/s. This is provisionally planned to occur in the 2012/13 financial year. Further pump rate upgrades are not expected to be needed until after 2030.

The Bennett Avenue WWPS is a permanent Water Corporation asset. It fully owns and operates this facility. At the subdivision stage the developer will liaise with the Water Corporation to advise them of likely development timings and take-up rates. Having this information, Water Corporation in accordance with their policies will upgrade their pumping station at the time of their choosing to match demand. Costs for upgrading of the pumping station are met by the Water Corporation as long as development timing matches previously advised development rates.

The Water Corporation levies Headwork charges as part of the subdivision process and at building stage to fund these elements of providing and upgrading infrastructure headworks elements.

2.2.2 Rising Main

The existing pressure main from the Bennett Avenue pumping station heads to the south and east to discharge into the Spearwood main sewer. The existing DN500 pressure main is provisionally indicated for replacement with a DN700 (or possibly duplication) around 2040 which would coincide with the Bennett Avenue pumping station being upgraded.

The rising main route would need to be within road reserves and a majority of the route would need to be accommodated within Cockburn Road.

Currently the existing rising main traverses approximately diagonally through the Local Structure Plan area. The attached plans (Appendix 2) show the current route of both the rising main, existing gravity main and emergency outfall. It also shows the likely diversions required to effect the subdivision.

It will be required as part of the development of the areas affected by the location of the rising main to relocate the rising main into new road reserves to ensure they are protected and can be maintained by the Water Corporation.

Physically these works would require the construction of the relocated main for the full length, provision of a bypass or temporary pumping system and then cutting over from the old rising main to the new rising main.

2.2.3 Emergency Pump Station Ocean Outfall

As a fail-safe measure, the Bennett Avenue WWPS has an existing emergency DN600mm RC pipe which connects from the pump station to the ocean. This is only used after other emergency measures have failed. These initial emergency measures include the following:

- Storage within the wet well.
- High level alarms with Telemetry to Water Corporation maintenance depots.
- Underground emergency on-site storage tanks.
- Provision for emergency generator hook-up.
- Provision for pumping bypass.

Currently the Local Structure Plan indicates that the emergency pipeline cuts through development areas.

The alignment of structure plan boundaries have been chosen to minimise the effect on development areas by truncating development sites to accommodate the pipeline and include parts of it in the POS. Where development cannot or does not want to accommodate the pipeline by way of easement (for example) then the pipeline would need to be relocated to within a road reserve area. The Sketch Plan 5 (Appendix 2) shows how this may be accommodated within LandCorp's land holding.

The timing of these works would be required upon subdivisional development of the affected areas.

2.2.4 Gravity Sewer Reticulation

The attached plans in Appendix 2 show the extent of existing gravity sewer reticulation over and beyond the Local Structure Plan area.

As per the rising main, a part of the gravity network goes diagonally through the Local Structure Plan development area. Development of these sites would require the gravity main to be rebuilt and reconnected within the future road reserves.

The attached figure indicates the likely route of this relocation. This main currently picks up flow from the Embankment Crescent area. As such, this would be required to remain in place until the new mains can be cut in to take its place.

An existing network of gravity sewer mains exist on site running from the pumping station heading southward. The initial part of the main exists within the current road reserve. This initial part of the road reserve will remain as is and the sewer main can remain in this reserve as is. Further south the cadastral boundaries are proposed to change as part of the Local Structure Plan. As this part of the gravity system does not currently have any active flows connected, it will be possible to abandon these existing mains and reconstruct the gravity sewer system within the new road reserve system in accordance with normal subdivisional development. This area is shown on the Sketch Plan 3 in Appendix 2.

These works will be timed to match into construction of the particular subdivisional area.

3 Water Supply

3.1 Existing Water Supply Infrastructure

As in the case of sewer infrastructure, all lots within the development area are served with reticulated potable water supply delivered by a piped system which exists within existing road reserves.

All existing lots are served in accordance with minimum Water Corporation criteria regarding quality and pressure.

Water supply is served from the Hamilton Hill high level tank and supply area. All water supply assets are owned and operated by the Water Corporation of WA. Lots within the area would be rated by the Water Corporation.

3.2 Water Supply Planning

The Water Corporation has completed a comprehensive review of water infrastructure planning for the Hamilton Hill Gravity Supply Scheme. This planning review has incorporated the anticipated dwelling/service yields from the full development of the Cockburn Coast land. The main recommendations and projects relevant to future servicing of the Cockburn Coast development include: (The attached plans in Appendix 3 show these upgrades).

- i) Approximately 800m of DN375 water main from Bellion Drive intersection heading southwards along Cockburn Road (this could be done in stages depending on demand, spatial staging of land development, and having regard to any Council plans to reconstruct/upgrade this section of Cockburn Road).

At planning level, it is estimated that this DN375 main will be required around 2014 (dependent on the pattern and rate of development of the Cockburn Coast land). The final pipe route and sizing will be refined based on the spatial pattern of the development in Cockburn Coast. It may be possible for equivalent pipe volumes to be constructed as two separate feeds in other roads through the development area parallel to Cockburn Road.

- ii) Approximately 1,430m of DN500 distribution main from the end of the existing Forrest Road DN610 (coming out of the Hamilton Hill Reservoir) heading westwards as indicated on the attached plan to join up with the Cockburn Road DN300-375 at Bellion Drive (see point (i) above).

At planning level, it is estimated that this DN500 main will be required around 2016 depending on the pattern and rate of development of the Cockburn Coast land. The operational trigger for the DN500 is when the peak day demands in the Cockburn Coast development area exceed 1.6ML/day (the equivalent of approximately 1,000 services) and/or the HGL at the intersection of the proposed DN500 with the DN300-375 main at Bellion Drive approaches RL53m AHD. See Water Corporation plan in Appendix 3.

These mains are all Water Corporation Headworks assets. As such, developers will need to liaise with the Water Corporation for the timing and funding of the works. Some pre-funding may be required in order to facilitate these works.

3.3 Water Supply Reticulation

The attached plan (Sketch Plan 7 at Appendix 4) shows the location of existing water supply reticulation pipework overlaid onto the Local Structure plan area.

Where possible, that is where water mains exist in future road reserves, these mains will be maintained. Where existing mains do not match future road reserves, then new mains will be reconstructed within the new reserve areas.

4 Roadworks

4.1 Existing Roadworks

Existing lots within this development area are fronted by a sealed and kerbed roads system. The main through road is Cockburn Road which carries traffic into and out of the area. Cockburn Road is the main freight route for existing commercial business in the area.

All major services at one point or another exist within the Cockburn Road road reserve.

The integrated Transport Network report and further traffic studies being undertaken by others informs the project more fully on roads and transportation issues and plans.

4.2 Roadwork Upgrading

Major roadworks infrastructure consists of two main elements for the Cockburn Coast area, namely:

- Cockburn Coast Drive; This main road may be constructed outside of the 10 year horizon and would likely be decided by State Government and/or Main Roads WA as to the need and timing. It is shown to the immediate east of the Cockburn Coast development area.
- Cockburn Road; This road is the current north-south artery through the development area. It will remain as an important transportation link. It is likely that Cockburn Road will be upgraded as part of the development process. The exact form of the upgrading works will depend on the final configuration of the integrated transportation plan, existing road user requirements and City of Cockburn requirements. Upgrading of Cockburn Road may also include the relocation of existing services within the existing and/or future reserve boundaries. Currently many services exist within the Cockburn Road verges.

We envisage that the transportation studies will inform what roadworks and road widths are required. From a services point-of-view the main issue will be in the design of Cockburn Road. In addition to providing transportation solutions such as bus lanes or light rail, the road reserve will be required to accommodate servicing infrastructure. The aim of Cockburn Road's design should be to ensure a minimum of existing services are disturbed or require relocation. Due to the nature of services along Cockburn Road, any servicing relocations would be relatively costly to implement.

5 Drainage

Currently all rain that falls within the Cockburn Coast development area is infiltrated on site. Upon development we would require the same situation to occur. As such, all new lots would be required to infiltrate their rainfall runoff on site up to a return period stipulated by the Local Authority. We understand that the City of Cockburn standard for drainage retention on site is for a 1 in 20 year, 5 minute duration storm event.

Flows greater than this and all roadworks would be pipe and pit drained. These flows would be directed to infiltration areas. Our expectation is that the existing drainage sumps would be phased out and aesthetically pleasing infiltration areas incorporated within POS areas and highly landscaped areas would take their place.

Landscaping and engineering design of the new infiltration areas will be critical in that it can turn existing ugly infiltration areas into POS assets.

As part of the Urban Water Management Plan, GHD have analysed flows within the development area and calculated the volume of storage/infiltration areas required in the various locations.

These volumes may be accommodated by a variety of means and will be incorporated as part of the engineering and POS landscaping detailed designs.

6 Power Supply

6.1 Power Supply Upgrading

Western Power have carried out a feasibility study looking at how the development may be served with a power supply from now until ultimate development from a distribution point of view. The Western Power feasibility study is included at Appendix 5.

Geographically SF505 is an ideal feeder to supply the initial stages of development. However, this feeder has high fault ratings and is not recommended due to its poor reliability. It is noted that the South Fremantle sub-station may be relocated in future and it is planned not to have any distribution feeders from this sub-station. As a result, SF505 may not exist in the future.

AMT507 L346 Orsino Boulevard runs through Cockburn Coast south along Cockburn Road and is currently lightly loaded. It may be utilised to supply the initial stages. However, AMT507 was initially installed to primarily supply Port Coogee. When Port Coogee requirements increase over time, this feeder may not have enough capacity to cater for any significant Cockburn Coast load.

AMT512 Lefroy Road feeder is considered one of the critical feeders due to its limited capacity and various reliability issues. Western Power currently has a project planned to install a new feeder in order to transfer some load from the AMT512 feeder. The project is likely to be implemented in the near future.

In summary:

- Planning study indicates that the existing feeders within the vicinity are likely to not be able to supply the total load.
- AMT507 may be able to supply the initial stages of development, but this is dependent on the load take up timing of the Port Coogee development.

Ultimately a new feeder is likely to be required to be installed from the Amherst sub-station to the development area. It is also likely that major reinforcement will be required for both transmission and distribution assets to increase capacity.

The order of magnitude cost of installing a new feeder is approximately \$1.4 million.

Further discussion with Western Power following their feasibility study indicates a sub-station may be required within the Cockburn Coast area. A sub-station typically requires a land area of 1 hectare and hence has land planning implications. Western Power is addressing this possible requirement in conjunction with the Terminal Substation relocation.

Installation of a new feeder is proposed to occur by direct horizontal drilling within existing road reserves. Hence, future road reserves need to take into account the installation of HV infrastructure.

Existing power supply infrastructure in Cockburn road indicates that underground power cables adjacent to Cockburn Road are within private property. As such, the planning of the revised Cockburn Road reserve needs to accommodate these cables so that expensive relocations do not occur.

6.2 Power Supply Planning Issues

Further discussion with Western Power following their feasibility study indicates a sub-station may be required within the Cockburn Coast area. A sub-station typically requires a land area of 1 hectare and hence has land planning implications. Western Power is addressing this possible requirement in conjunction with the Terminal Substation relocation. This area is outside the Robb's Jetty Structure Plan Area, but affects future development localities.

6.3 Transmission Lines

Within the Robb's Jetty Structure Plan Area exists a section of aerial power transmission lines running from the Terminal Sub-Station area to the South Beach area and heading northward.

Part of these lines run within the Bennett Avenue road reserve. Whilst it is likely not to be a condition of subdivision, it would be aesthetically pleasing and aid the subdivision to underground at least a portion of these transmission lines.

As such, it is the Developer's intention to commence negotiations with Western Power to underground these lines.

The plan shown in Appendix 6 shows the location of these transmission lines.

7 Telecommunications

Telstra landline telecoms system exists in this area to a reasonable level.

The newly announced National Broadband Network (NBN) would be involved in the provision of telecommunications for the development area. Current policy is that for developments greater than 100 dwellings the NBN will provide optic fibre to each dwelling. The developer will be required to provide pipe and pit for each stage of development in accordance with NBN specifications.

This infrastructure would ensure a very high level of connectivity for the development.

A plan attached in Appendix 7 shows the current extent of Telstra cabling. Where cadastral boundaries change, some of this infrastructure will be redundant and possibly require relocation. This would require early liaison with Telstra to minimise cost and timing of these service relocations.

8 Gas Supply

The area is currently supplied with a reticulated gas system. A main high pressure gas main exists within Cockburn Road. Other mains also exist within existing road reserves as shown on the sketch plans in Appendix 8.

Subdivision of the southern end of the Robbs Jetty precinct would require the cutting and capping of redundant portions of main. New mains connected to the existing supply mains would be constructed as part of the subdivision process.

9 Conclusions

Overall the Robbs Jetty Local Structure Plan area is well serviced by servicing infrastructure as shown in the various plans.

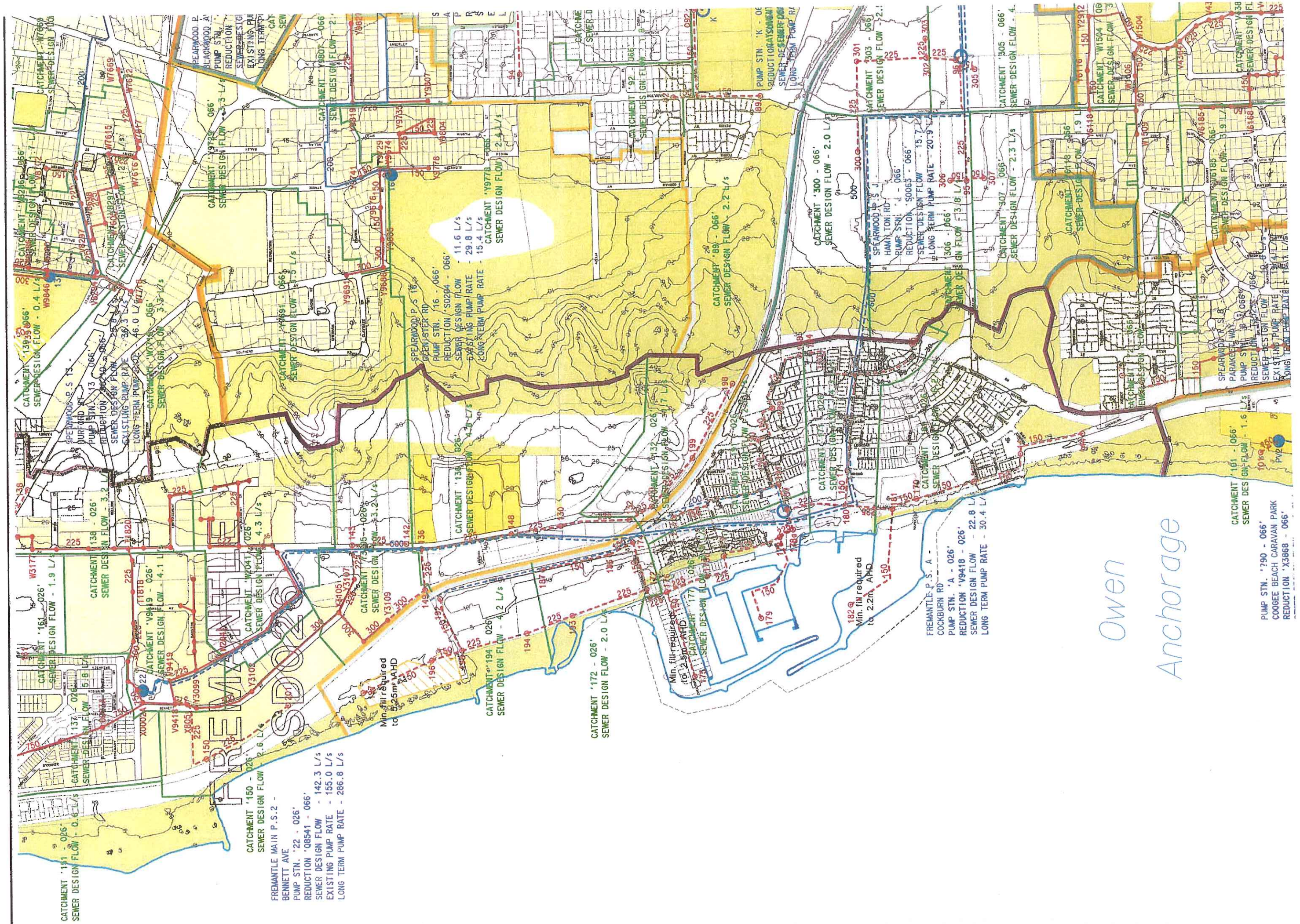
On development, some of the existing infrastructure will require upgrading and relocating to fit in with new cadastral boundaries due to the proposed structure plan subdivision.

Liaison with the Authorities is recommended to effect timely upgrading and changes to the Authorities' networks.



Appendix 1

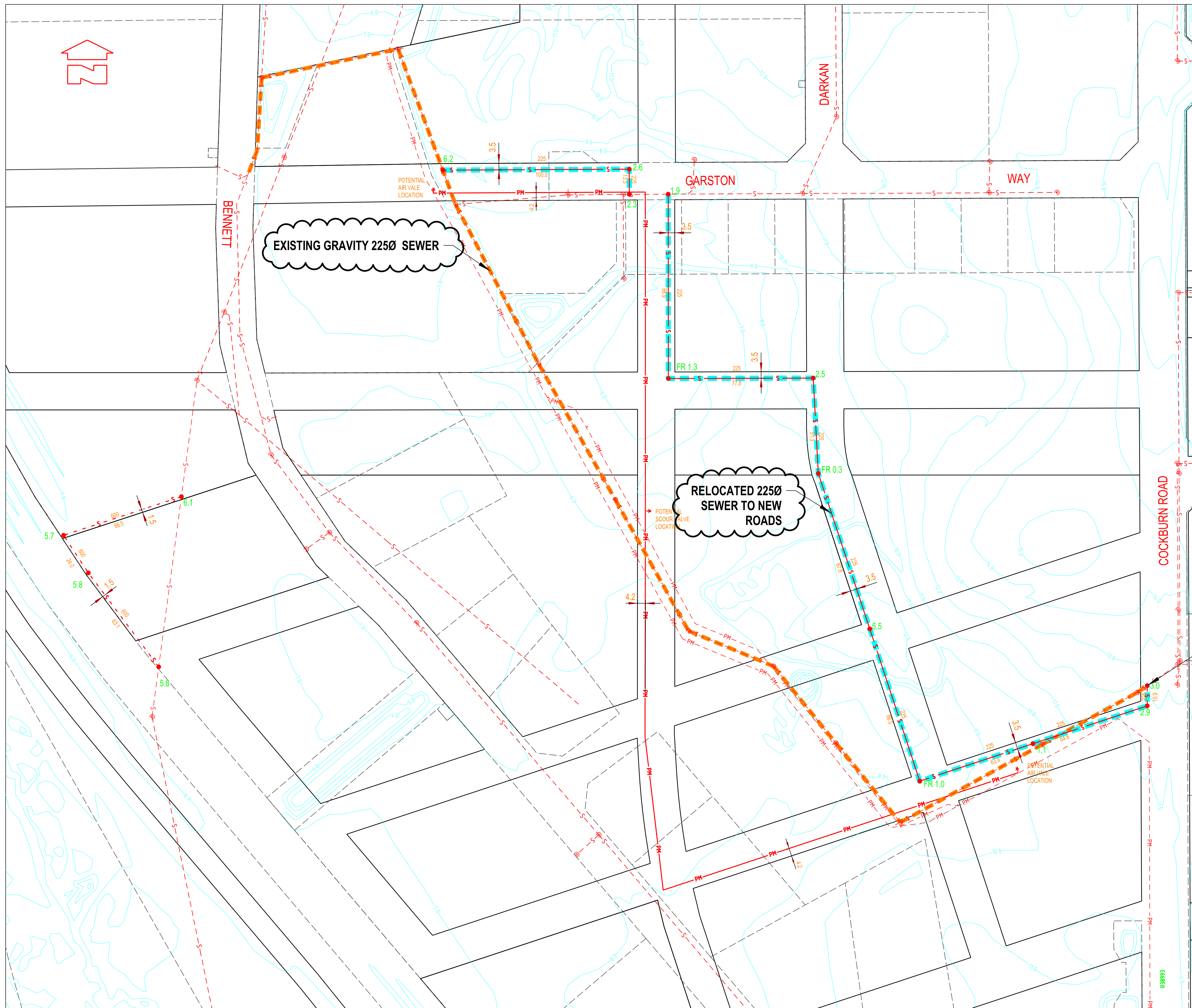
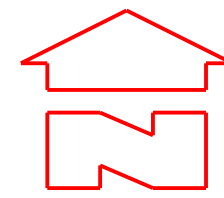
Water Corporation Sewer Strategy





Appendix 2

Sewer Sketch Plans Showing Existing Services and Proposed Relocations



- LEGEND**
- S - - PROPOSED SEWER OVERFLOW DIVERSION
 - S - - PROPOSED GRAVITY SEWER DIVERSION
 - PH - - PROPOSED PRESSURE MAIN DIVERSION
 - - - EXISTING CONTOURS
 - S - - EXISTING GRAVITY SEWER
 - PH - - EXISTING PRESSURE MAIN
 - - - EXISTING CADSTRAL
 - - - PROPOSED CADSTRAL

- NOTATION**
- FR 0.3 (0.3m FILL REQUIRED)
 - AC - PROPOSED ACCESS CHAMBER
 - AC - EXISTING ACCESS CHAMBER

EXISTING GRAVITY 225Ø SEWER

RELOCATED 225Ø SEWER TO NEW ROADS

PICKS UP FLOW FROM EMPLACEMENT CRES AREA

PLAN
SCALE 1:1000

REV.	DESCRIPTION	DRAWN	VER	APPROVED
A	ORIGINAL ISSUE			

CELEBRATING 50 YEARS

WOOD & GRIEVE ENGINEERS

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PERTH
MELBOURNE
SYDNEY
BRISBANE
ALBANY
BUSSELTON
SHENZHEN

CLIENT:
LANDCORP

PROJECT:
COCKBURN COAST

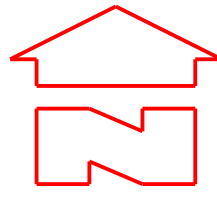
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GRAVITY SEWER

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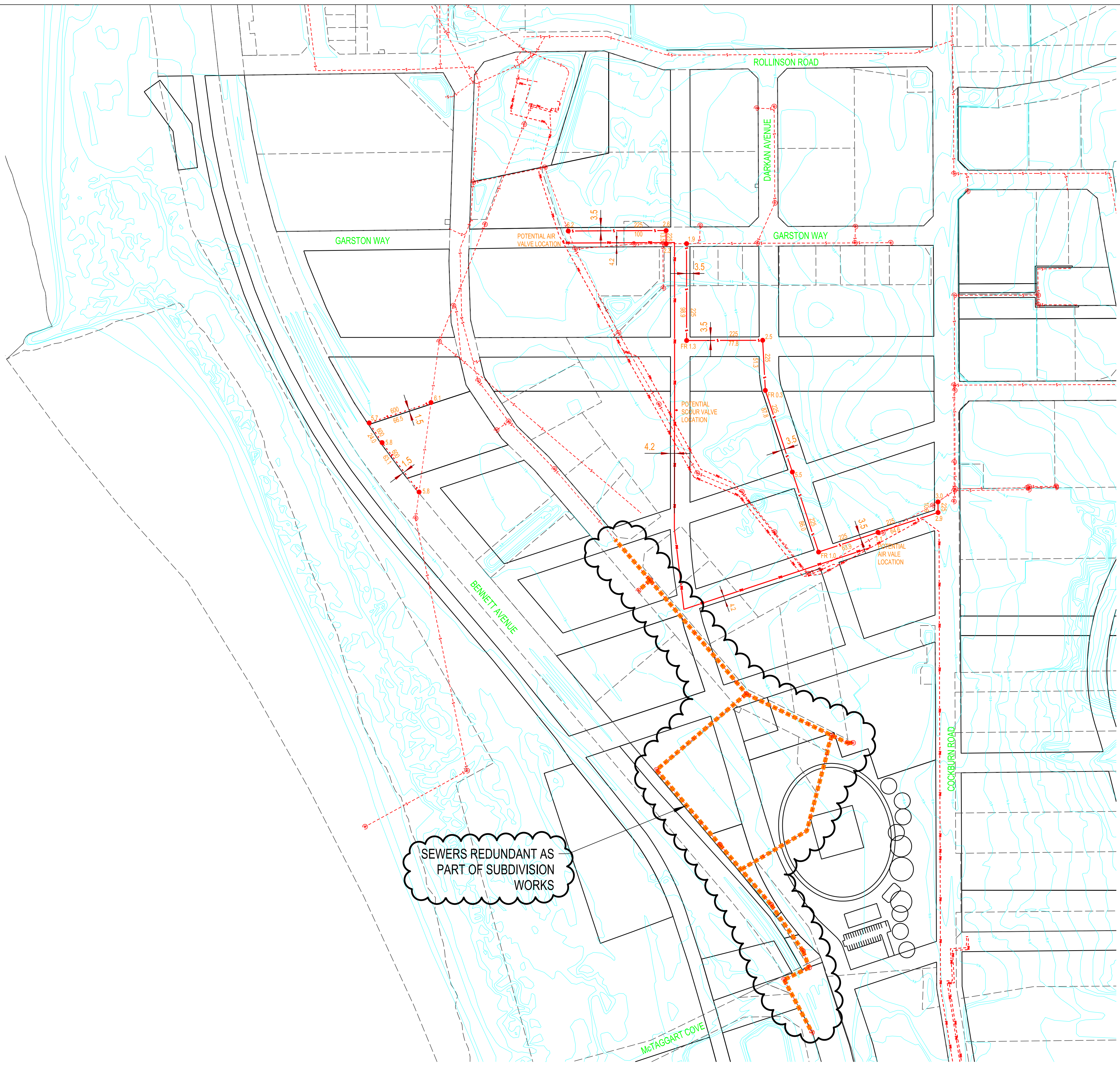
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 - - - PROPOSED PRESSURE MAIN DIVERSION
 - - - EXISTING CONTOURS
 - - - EXISTING GRAVITY SEWER
 - - - EXISTING PRESSURE MAIN
 - - - EXISTING CADSTRAL
 - - - PROPOSED CADSTRAL

- NOTATION**
- FR 0.3 (0.3m FILL REQUIRED)
 - PROPOSED ACCESS CHAMBER
 - EXISTING ACCESS CHAMBER



SEWERS REDUNDANT AS PART OF SUBDIVISION WORKS

PLAN
SCALE 1:2000

REV.	DESCRIPTION	DRAWN	VER	APPROVED
A	ORIGINAL ISSUE			

CELEBRATING 50 YEARS

WOOD & GRIEVE ENGINEERS

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PERTH
MELBOURNE
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BRISBANE
ALBANY
BUSSELTON
SHENZHEN

CLIENT:
LANDCORP

PROJECT:
COCKBURN COAST

TITLE:
OTHER GRAVITY SEWERS

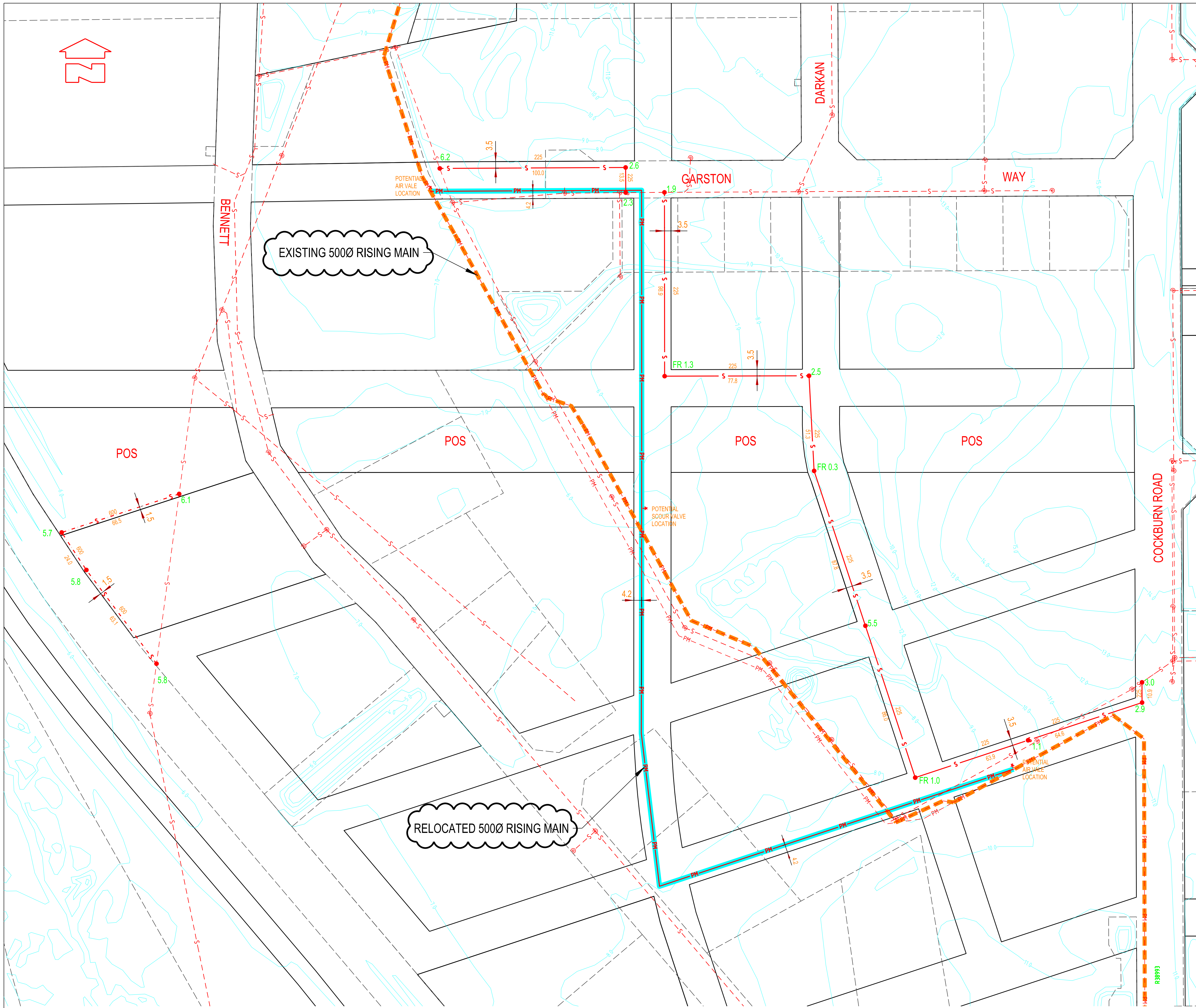
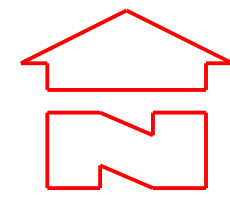
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- LEGEND**
- S - PROPOSED SEWER OVERFLOW DIVERSION
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PLAN
SCALE 1:1000

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PERTH
MELBOURNE
SYDNEY
BRISBANE
ALBANY
BUSSELTON
SHENZHEN

CLIENT: LANDCORP
PROJECT: COCKBURN COAST
TITLE: SEWER RISING MAIN

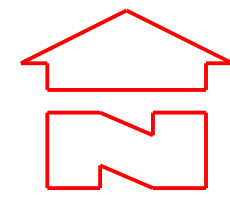
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AS 1500



POSSIBLY RELOCATE TO BENNETT

600Ø EMERGENCY FLOW FROM PS

TRUNCATIONS

TRUNCATIONS

POS

RELOCATE

POS

POS

POS

GARSTON

WAY

DARKAN

COCKBURN ROAD

- LEGEND**
- S - - PROPOSED SEWER OVERFLOW DIVERSION
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PERTH
MELBOURNE
SYDNEY
BRISSANE
ALBANY
BUSSELTON
SHENZHEN

CLIENT:
LANDCORP

PROJECT:
COCKBURN COAST

TITLE:
PS GRAVITY EMERGENCY OUTFALL

PRELIMINARY

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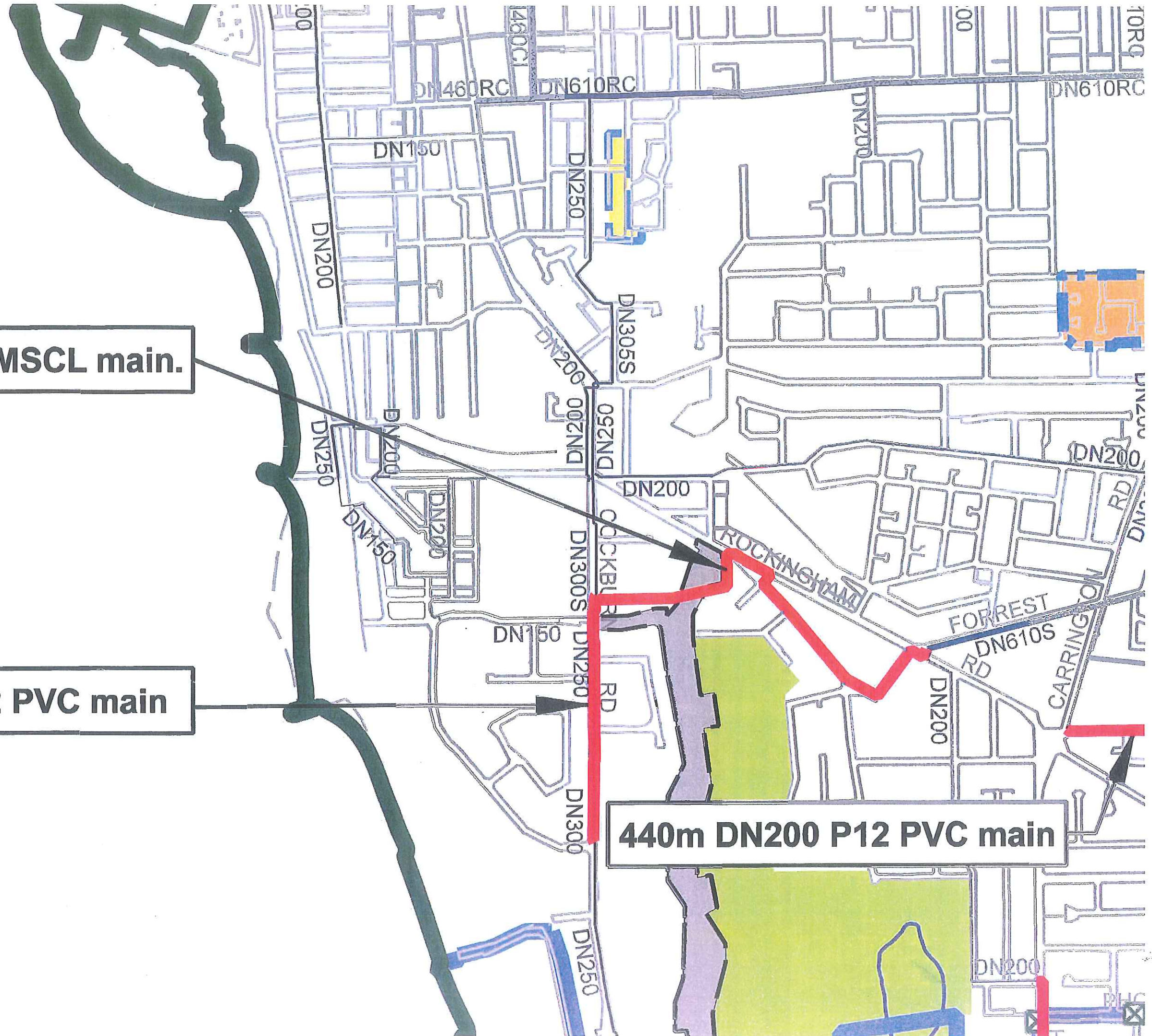
Appendix 3

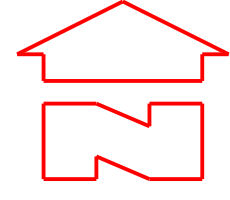
Water Corporation Proposed Water Supply Upgrade Works

1,430 m DN500 MSCL main.

760 m DN375 P12 PVC main

440m DN200 P12 PVC main





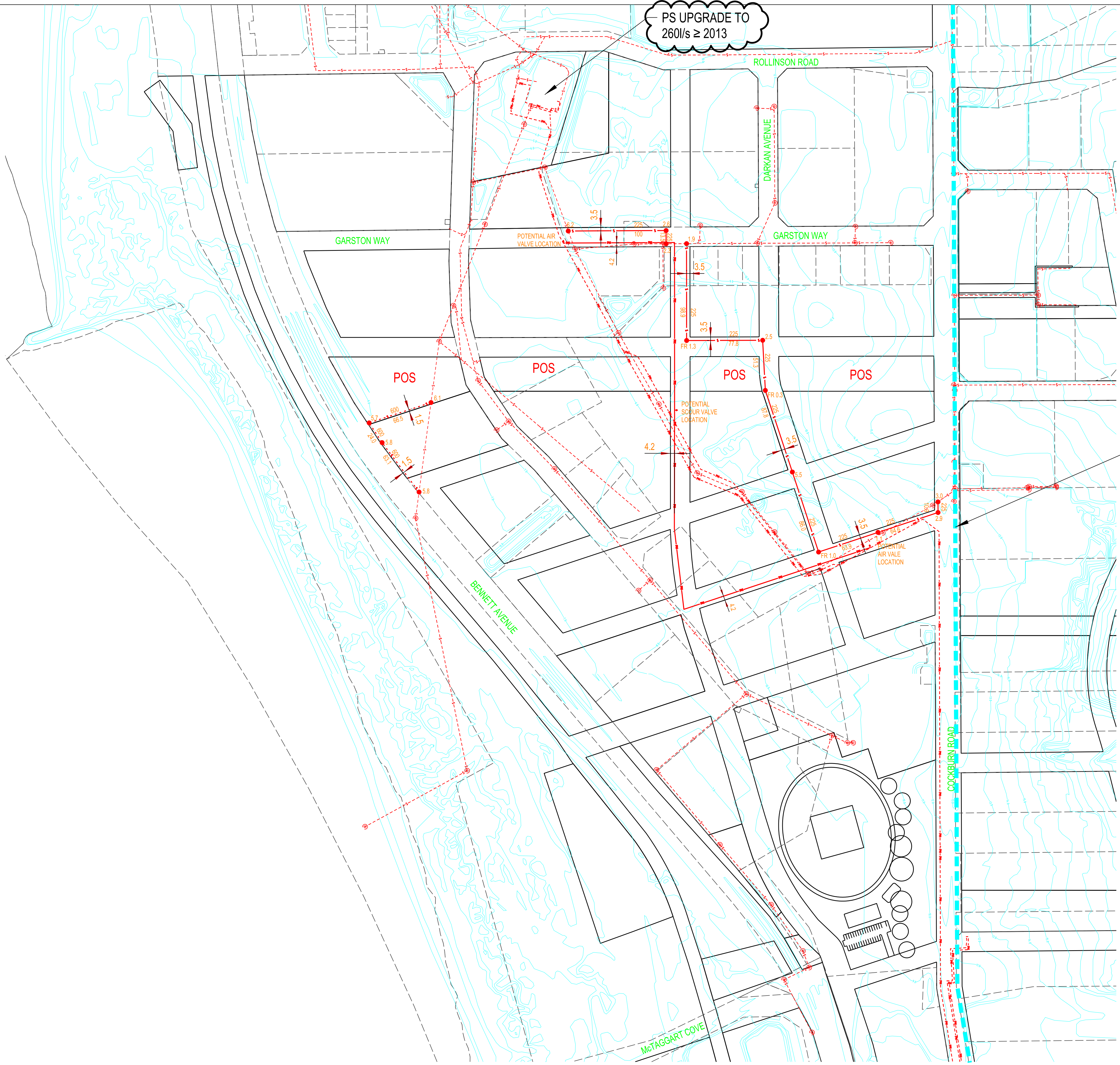
PS UPGRADE TO 260l/s ≥ 2013

FORREST ROAD 1430m OF 500Ø WATER MAIN AFTER 2016 ~ 1000 SERVICES

- LEGEND
- - - PROPOSED SEWER OVERFLOW DIVERSION
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- NOTATION
- FR 0.3 (0.3m FILL REQUIRED)
 - PROPOSED ACCESS CHAMBER
 - EXISTING ACCESS CHAMBER

375Ø WATER MAIN UPGRADE. AFTER 2014 (PROB 15/16) STAGED, COULD BE DONE WITH COCKBURN RD UPGRADE



PLAN
SCALE 1:2000

REV.	DESCRIPTION	DRAWN	VER	APPROVED
A	ORIGINAL ISSUE			

CELEBRATING 50 YEARS

WOOD & GRIEVE ENGINEERS

Wood & Grieve Engineers Ltd
A.C.N. 137 999 939
Ground Floor
220 Adelaide Tce, Perth
Western Australia 6000
Phone: +61 8 9222 7000
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Email: wge@wge.com.au
Web: www.wge.com.au

PERTH
MELBOURNE
SYDNEY
BRISBANE
ALBANY
BUSSELTON
SHENZHEN

CLIENT:
LANDCORP

PROJECT:
COCKBURN COAST

TITLE:
OFFSITE SEWER & WATER UPGRADES

PRELIMINARY

SECTION: CIVIL SERVICES	VERIFIED:	SCALE: A1 @ 1:2000
DESIGNED: JJ	APPROVED FOR TENDER:	DATUM: A.H.D.
DRAWN: JZHE	APPROVED FOR CONSTRUCTION:	WAPC: -

PROJECT No.	DRAWING No.	REVISION
20146-PER-LSP-C	SK6	A

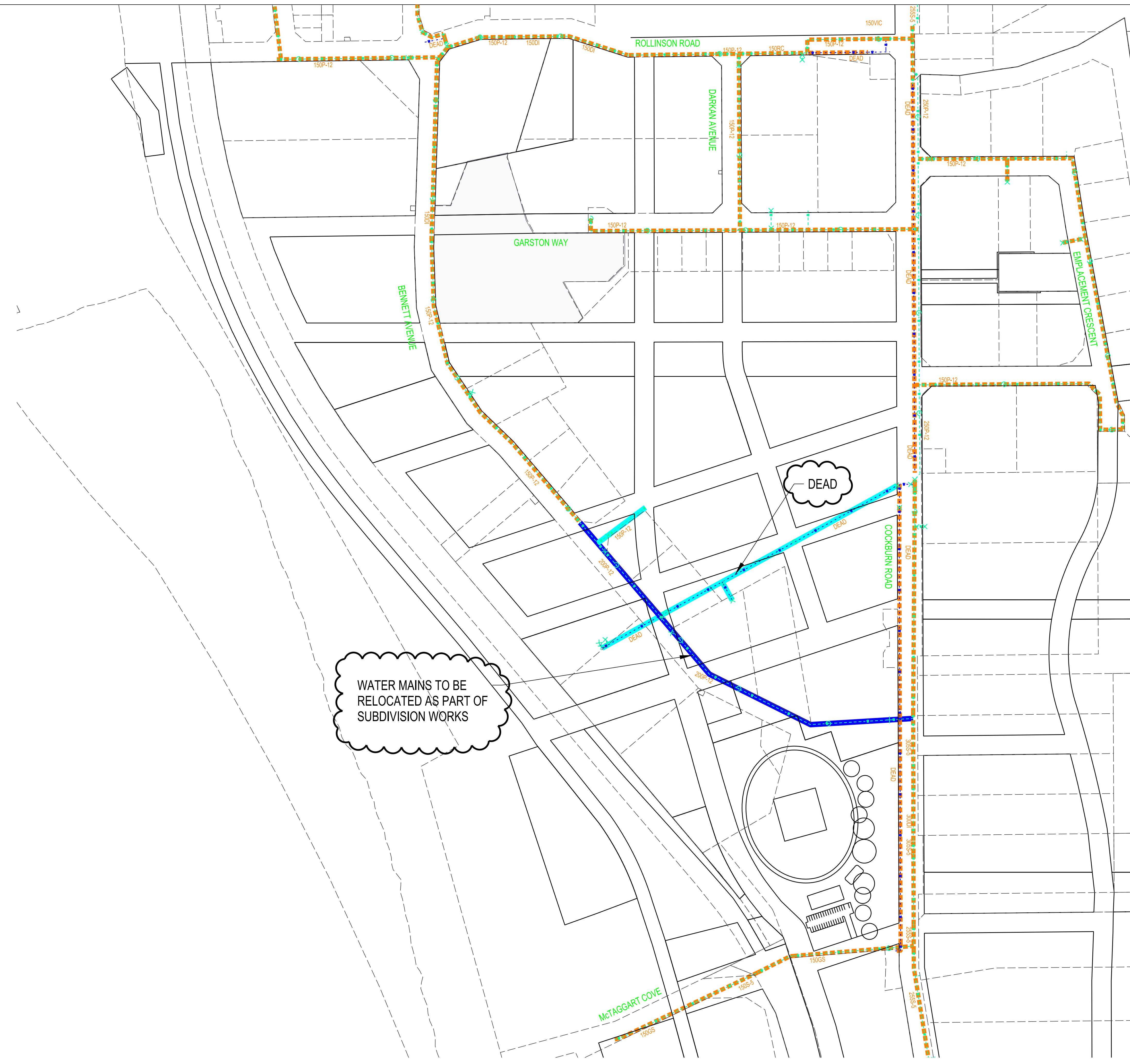
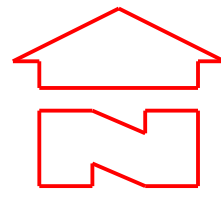
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Appendix 4

Water Supply Existing Services and Proposed Relocations



- LEGEND
- EXISTING WATER MAIN
 - EXISTING DEAD WATER MAIN
 - EXISTING VALE
 - EXISTING WATER HYDRANT
 - EXISTING CADASTRAL
 - PROPOSED CADASTRAL

WATER MAINS TO BE
RELOCATED AS PART OF
SUBDIVISION WORKS

DEAD

PLAN
SCALE 1:2000

REV.	DESCRIPTION	DRAWN	VER	APPROVED
A	ORIGINAL ISSUE			

CELEBRATING 50 YEARS

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PERTH
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BUSSELTON
SHENZHEN

CLIENT:
LANDCORP

PROJECT:
COCKBURN COAST

TITLE:
WATER MAINS

PRELIMINARY

SECTION: CIVIL SERVICES	VERIFIED:	SCALE: A1 @ 1:2000
DESIGNED:	APPROVED FOR TENDER:	DATUM: A.H.D.
DRAWN: LZ	APPROVED FOR CONSTRUCTION:	WAPC: -

PROJECT No.	DRAWING No.	REVISION
20146-PER-LSP-C	SK7	A

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Appendix 5

Western Power Feasibility Study

20146-Per-C





Feasibility Study

Project Name: Cockburn Coast
Customer Ref: 20146 - PER - U
Number of lots: 4850 Lots
Project Number: MF010044

1. INTRODUCTION

Landcorp has requested a Feasibility Study in South Fremantle. The project name is Cockburn Coast. The following information was provided for us to conduct this study:

Number of lots	4860
Number of stages	20
Number of lots per stage	243
Construction to begin	July 2011
Rate of development	one stage per year

Based on the customer request of 9kVA per lot, the total load required therefore is approximately 43.74 MVA. Please refer to **Appendix 1** for details.

2. EXISTING INFRASTRUCTURE

The location of Cockburn Coast and existing infrastructure of HV distribution network supplying the surrounding area are as shown in Figure 1 and Figure 2. There are three 22 kV feeders within the vicinity of the development, *AMT512 Lefroy Rd (yellow)*, *AMT507 346 Orsino Bvd 1 (pink)* which are from Amherst zone Substation, and *SF505 Cockburn Rd North (blue)* which is from South Fremantle substation.

The majority of this development is within the Amherst zone substation's catchment area.

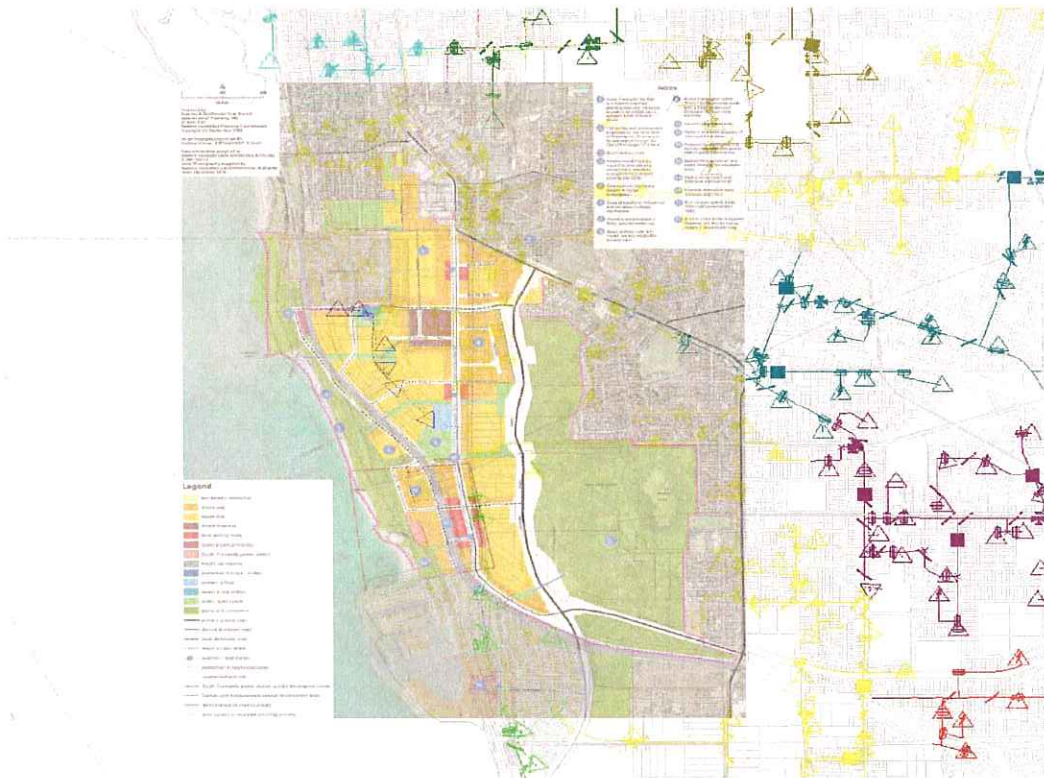


Figure 1: Location of Cockburn Coast

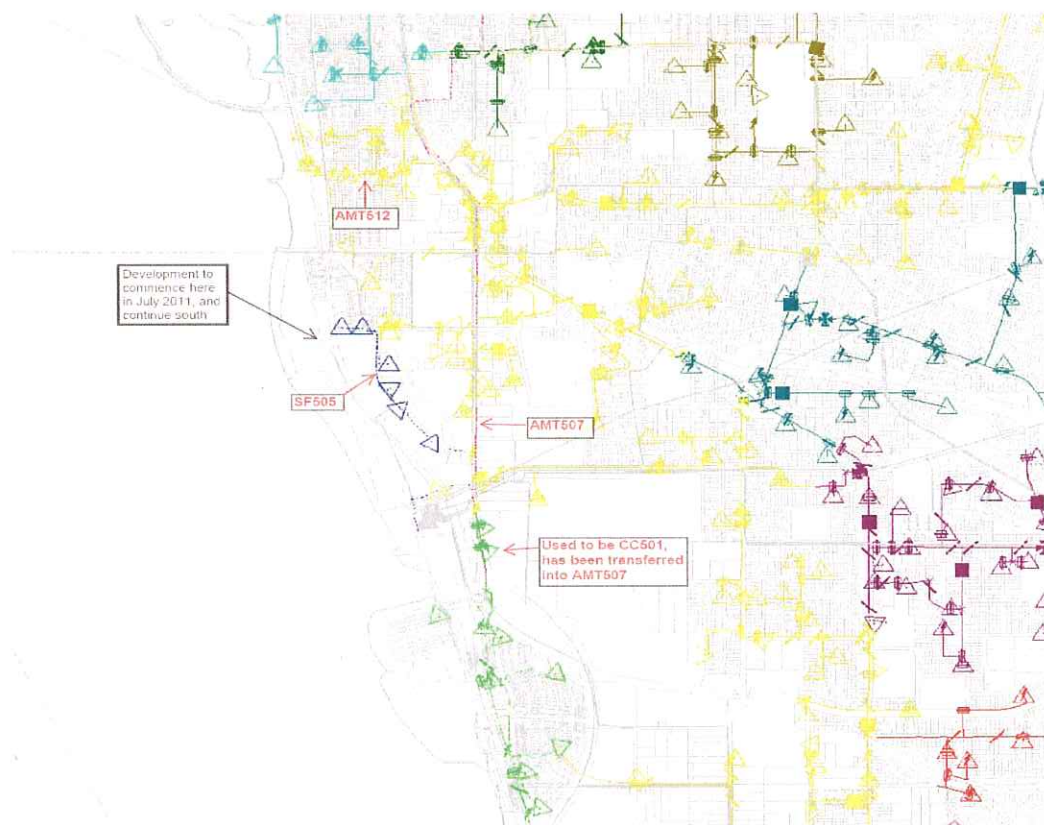


Figure 2: Existing Infrastructure - Distribution

3. STUDY DETAILS

The initial analysis revealed that the existing network infrastructure does not have capacity to supply the new load requested as a whole (43.65MVA) due to the large size of the development.

As shown on **Appendix 1**, the initial stages are to commence around 'area 3' of the structure plan and will continue south. Please see **Appendix 2** for structure plan. Geographically, SF505 is an ideal feeder to supply the initial stages. However, this feeder has high fault ratings and not recommended due to its poor reliability. South Fremantle substation maybe relocated in the future and it is planned not to have any distribution feeders from this substation. As a result, SF 505 may not exist in the future.

AMT507 L346 Orsino Bvd 1 runs through Cockburn Coast south along Cockburn Rd, and it is currently lightly loaded. It may be utilised to supply the initial stages. However, AMT507 was installed to primarily supply Port Coogee and if the load on Port Coogee increases in the near future, this feeder may not have enough capacity to cater for this load take up at Cockburn Coast, particularly at 'area 3'.

AMT512 Lefroy Rd feeder is considered as one of the critical feeders due to limited capacity and the various reliability issues with it. There is a project planned to install a new feeder to transfer some of the loads from AMT 512 feeder but it may be implemented beyond July 2011.

In summary, planning study reveals that the existing feeders within the vicinity of this development are not able to supply the total load request. AMT 507 maybe possible to supply the initial stages but it is highly dependent on the load take up timing at Port Coogee development.

4. REINFORCEMENT REQUIREMENTS

Based on the study details above, the estimated scope of works required is listed below:

- New feeders from Amherst substation
- Major reinforcement required for both Transmission and distribution assets to increase the capacity

The timing of the above reinforcements is highly dependent on the rate of this development and future load growth in the area surrounding.

5. CONCLUSION/ GENERAL ASSESSMENT

Based on the study, the existing HV distribution network infrastructure surrounding the areas of the development may not be able to support this new load. A new feeder is highly recommended to connect the initial loads for this development. The timing of this is best to be evaluated when the formal application for load connection has been received. It may be possible to connect the initial load of approximately 2 MVA on to AMT 507 while it is lightly load at the moment. However, this is not a guaranteed approval as the large amount of load is expected on AMT 507. Due to the large load take up area, major reinforcements for both Transmission and Distribution assets are necessary to cater for this development.

The details in this feasibility enquiry report are only indicative. Further in-depth study and analysis will be required to determine the exact requirement of the reinforcement works once a formal application to Western Power has been lodged. It would be appreciated that at the time of the initial application, a staging plan with expected takeoff dates be provided to Western Power.

Western Power can neither reserve capacity nor guarantee supply to this development without a formal request being lodged. In order to provide a firm connection proposal and cost, a formal application to Western Power will have to be made, in accordance with our connection policies.

6. LAND DEVELOPMENT COMMENTS

Unless the Port Coogee development utilises the spare capacity on the AMT 507 feeder, the current network should be able to supply the first stage of this development.

The following stages will need to be supplied from a new HV feeder from Amherst Zone substation. The approximate cost of direct drilling a 400mm HV cable over 3 kilometres is **\$1.4 million (unbinding)**.

This new feeder should be able to supply the development for the next 4 to 5 stages, depending on uptake from other projects in the area.

The above estimation is based on but not limited to the aforementioned assumptions and design variables. Normal Subdivision Policy applies.

Appendix 1



Electricity Networks Corporation ABN 18 540 492 861

Part A - Application type

Feasibility Enquiry
 Feasibility Study

Applicant details - for tax invoice

Title (e.g. Mr, Mrs)	Mr	Surname	Hazelden
Given name(s)	Glenn		
Company or business name	Landcorp C/o Wood and Grivoe Engineers		
Postal address	Level 3, 3 Plain street		
Suburb or town	East Perth	Post code	6004
Email (optional)			
Mobile (optional)		Telephone	08 6222 7000
Fax (optional)			
Western Power reference number (if applicable)			

Part B - Land use

Residential	<input type="checkbox"/>	Commercial/Industrial	<input type="checkbox"/>	Special Rural	<input type="checkbox"/>
Other (please describe)					
Number of lots	4850	Number of stages		Number of lots per stage	
Approximate commencement date for each stage	Stage 1 to commence in July 2011, subsequent stages (243 lots per annum) each year after that. Staging to commence around 'area 3' of the structure plan and will continue south, the last area of development to be 'area 1' (south Fremantle tip site).				
Comments	This project is on the WAPC planning website and includes the relocation of the Western Power South Fremantle switchyard.				

Part C - Project details

Please attached Stage Plan with this document.

Project name	Cockburn Coast
Your project reference number	20146-PER-U



Part D - Site address/location plan

Please attach a location plan or concept plan with this document.

Site address	Cockburn Coast		
Suburb or town	Cockburn	Post code	
Nearest cross street	Cockburn Coast Drive		
Map number			
Grid reference		From street directory	

Part E - Proposed loading

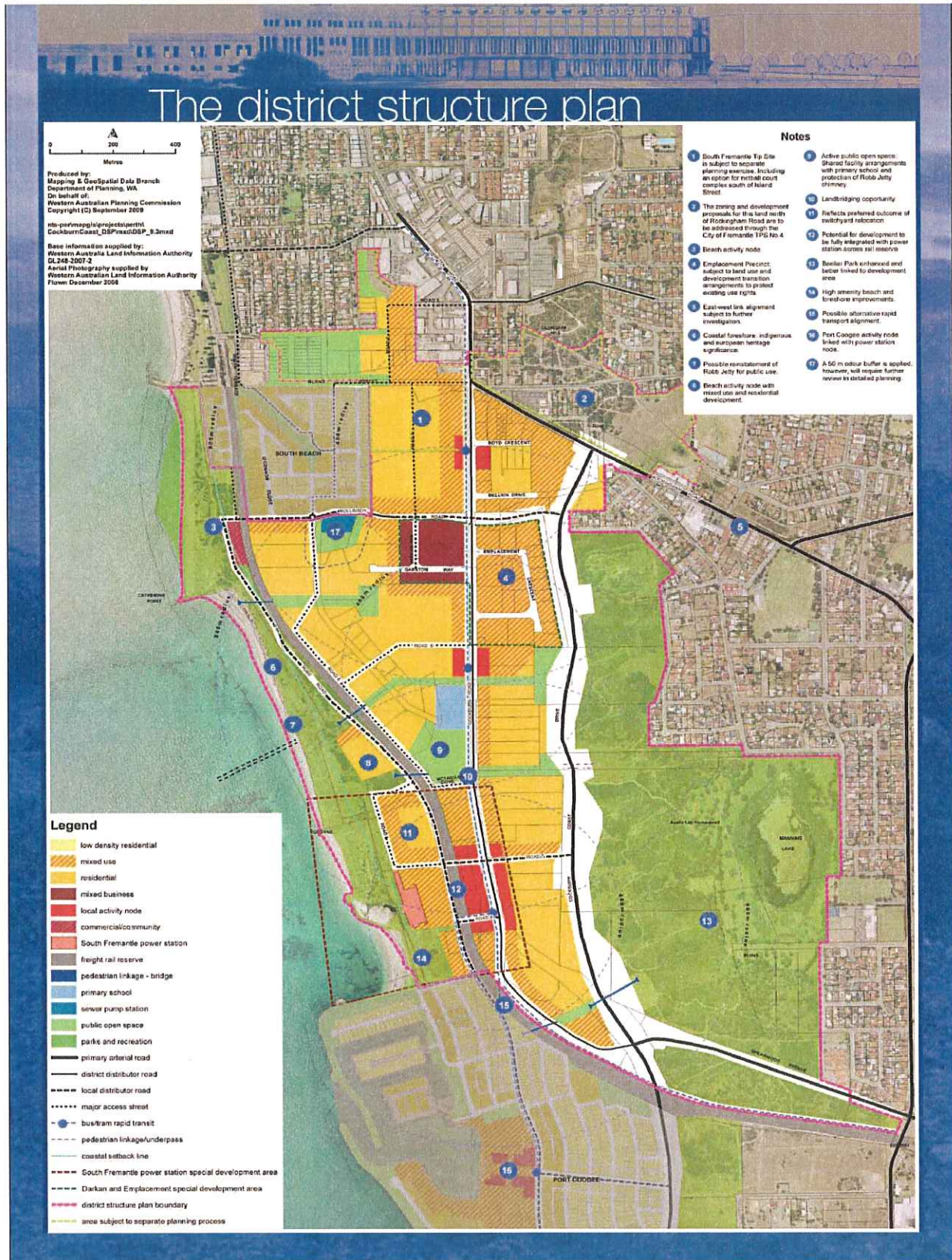
ADMD per lot	9kVA
Comments	

Part F - Approval

On signing this form as the duly authorised representative, the signatory accepts liability for payment of \$315.00 (inc GST) for a Feasibility Enquiry or \$775.00 (inc GST) for a Feasibility Study. Please refer to 'Terms & Conditions'.

Name	Clenn Hazelden		
Mobile (optional)		Telephone (08)	6 222 200
Signature	C. Hazelden	Date	20 / 4 / 2010

Appendix 2





Your Ref: 20146-PER-U
Our Ref: MF010044
Enquiries: Customer Contact Centre
Telephone 13 10 87
Fax: 9225 2073

Western Power
Connections Manager
Locked Bag 2520
PERTH, WA 6001
Electricity Networks Corporation
ABN 18 540 492 861

25 June 2010

Wood & Grieve Engineers
Unit 3, 3 Plain Street
EAST PERTH WA 6004

Attention: Mr Glenn Hazelden

Dear Sir/Madam,

COCKBURN COAST
WESTERN POWER REF: MF010044, WAPC No: N/A

In response to your request for a Feasibility Study, 21 April 2010, I am pleased to provide you with the attached report.

Our Tax Invoice will be sent to you in due course. The amount due includes the standard fee of \$775.00.

The following is an estimated cost of the high voltage distribution works to provide electricity distribution capacity to your proposed development. This estimate is based on a desktop review of your requirements and the existing electrical network.

FEASIBILITY ESTIMATE

The estimated cost of the reinforcement works to your proposed development is \$1,394,627.00, including GST.

Please note the following important information about this estimated cost:

- o It is an indicative figure only, to assist you to plan and make decisions about your project.
- o The final quoted cost may be higher or lower than this estimate. In some cases, final quotes are significantly higher than estimates, because of ground conditions and other impediments identified during the site visit and / or fluctuations in the cost of materials and labour etc.
- o This estimated cost is non-binding.

DISCLAIMER

- o This information is based on information available today.
- o Western Power cannot reserve any capacity to accommodate the proposed development unless a quotation is offered and accepted.

- Western Power accepts no responsibility for any consequences resulting from decisions made on the basis of information provided in this response.

ANY QUESTIONS?

If you have any questions, please telephone our Customer Contact Centre on 13 10 87 during business hours.

Yours faithfully,

Customer Services Officer
for
Connections Manager
Customer Assist

enc: Terms and Conditions



Electricity Networks Corporation
ABN 18 540 492 861

FEASIBILITY STUDY TERMS AND CONDITIONS

1. Terms and Conditions

These terms and conditions shall form part of the contract unless specifically excluded in writing by an authorised representative of Western Power.

2. Consequential Loss

Damages shall be limited to damages for direct and foreseeable loss attributable to breach or default under this Agreement. The rights of either party to damages for indirect or consequential loss are hereby excluded. Neither party shall be liable to the other for any loss of profit suffered by a party to this Agreement or any other person.

3. Modification

A purported modification, variation or amendment of this Agreement including the scope of works or any waiver of any rights of any party or any approval or consent shall have no effect unless in writing and signed by the party to be charged, and may attract a subsequent fee.

4. Application of Acts and By-Law

Nothing contained in these Terms and Conditions shall in any way limit the operation or effect of the Electricity Corporation Act 1994, Energy Corporations (Powers) Act 1994, Energy Corporations (Transitional and Consequential Provisions) Act 1994, or any Regulations, By-Laws or Orders made pursuant thereto.

5. Ownership of Works

The whole of the electricity extension that forms the works carried out in accordance with the proposal is the property of Western Power and Western Power has the right to connect additional customers to any part of the extension.

6. Indicative Estimate

This indicative estimate of the cost of electrical distribution [and transmission] works is ONLY AN INDICATIVE ESTIMATE.

7. Assumptions

Western Power has calculated the indicative estimate on the basis of a "desktop study" only which includes information readily available at the time and certain assumptions regarding the project and costs. The information and assumptions may turn out to be incorrect or incomplete.

8. Fluctuations

Construction costs, including materials and labour, are subject to fluctuation and may change significantly over time. The final quoted cost may be higher or lower. In some cases final quoted costs are SIGNIFICANTLY HIGHER than indicative estimates.

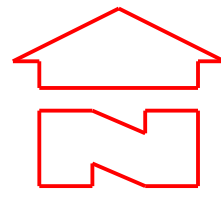
9. Liability

Western Power has calculated the indicative estimate in good faith however Western Power, to the extent permitted by law, accepts no liability for any errors or omissions or for any discrepancy between the indicative estimate and the final quoted cost, if any.



Appendix 6

Western Power Transmission Lines



- LEGEND
- - - EXISTING WATER MAIN
 - - - EXISTING DEAD WATER MAIN
 - - - EXISTING VALE
 - - - EXISTING WATER HYDRANT
 - - - EXISTING CADASTRAL
 - - - PROPOSED CADASTRAL

TRANSMISSION LINE

TRANSMISSION LINE

PLAN
SCALE 1:2000

REV.	DESCRIPTION	DRAWN	VER	APPROVED
A	ORIGINAL ISSUE			

CELEBRATING 50 YEARS

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 Web: www.wge.com.au

PERTH
 MELBOURNE
 SYDNEY
 BRISBANE
 ALBANY
 BUSSELTON
 SHENZHEN

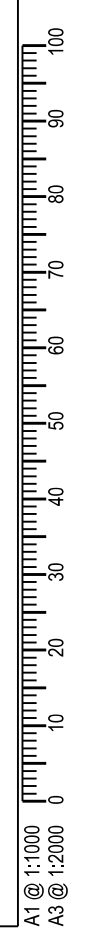
CLIENT:
LANDCORP
 PROJECT:
COCKBURN COAST
 TITLE:
WESTERN POWER TRANSMISSION LINES

PRELIMINARY

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DESIGNED:	APPROVED FOR TENDER:	DATUM: A.H.D.
DRAWN: LZ	APPROVED FOR CONSTRUCTION:	WAPC: -

PROJECT No.	DRAWING No.	REVISION
20146-PER-LSP-C	SK8	A

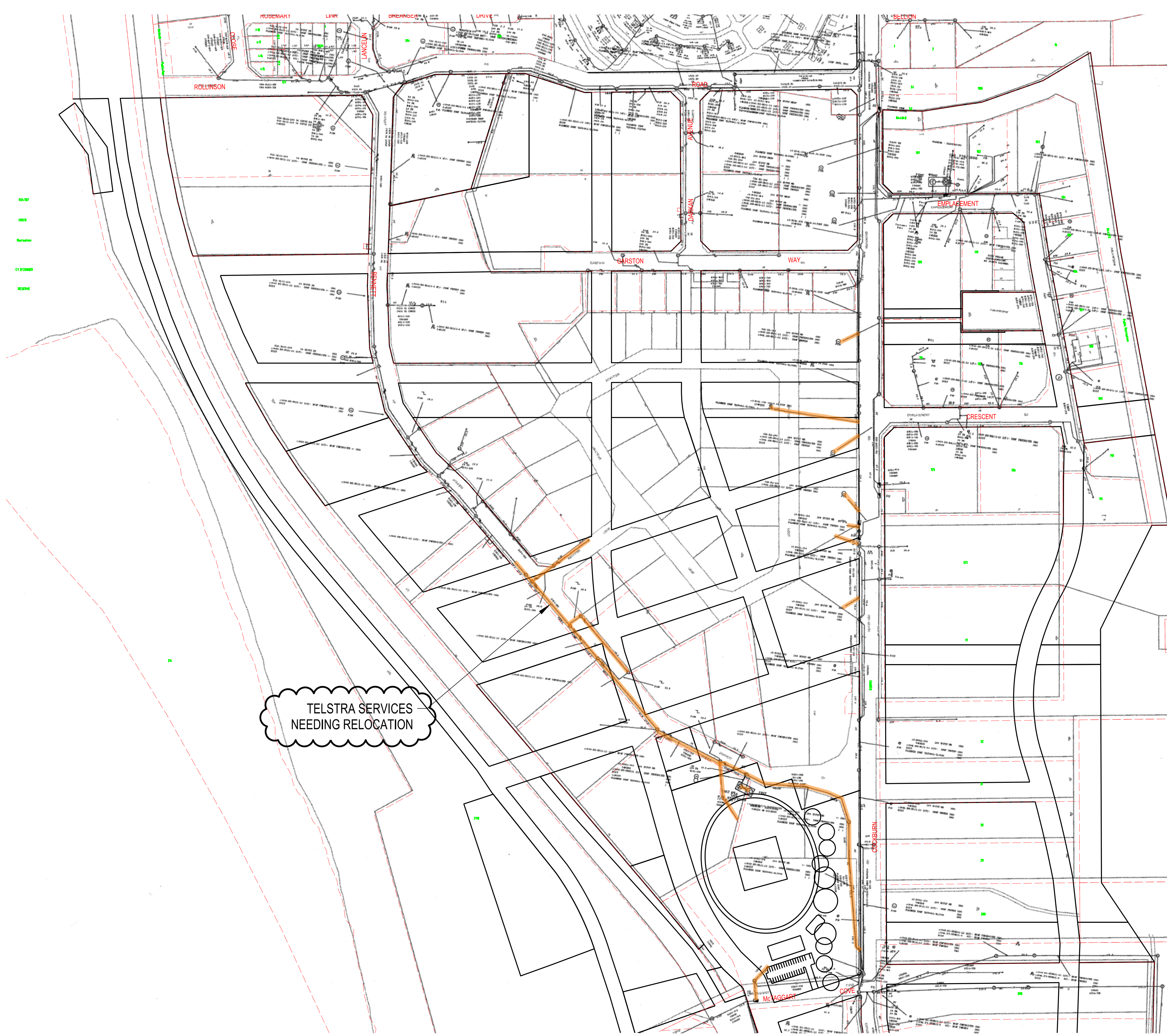
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Appendix 7

Existing Telstra Cabling and Required Relocations



TELSTRA
SERVICES
NEEDING
RELOCATION

TELSTRA SERVICES
NEEDING RELOCATION

PLAN
SCALE 1:2000

REV.	DESCRIPTION	DRAWN	VER	APPROVED
A	ORIGINAL ISSUE			

CELEBRATING 50 YEARS

WOOD & GRIEVE ENGINEERS

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SHENZHEN

CLIENT:
LANDCORP

PROJECT:
COCKBURN COAST

TITLE:
TELSTRA SERVICING

PRELIMINARY

SECTION: CIVIL SERVICES	VERIFIED:	SCALE: A1 @ 1:2000
DESIGNED:	APPROVED FOR TENDER:	DATUM: A.H.D.
DRAWN: YZS	APPROVED FOR CONSTRUCTION:	WAPC: -

PROJECT No.	DRAWING No.	REVISION
20146-PER-LSP-C	SK10	A

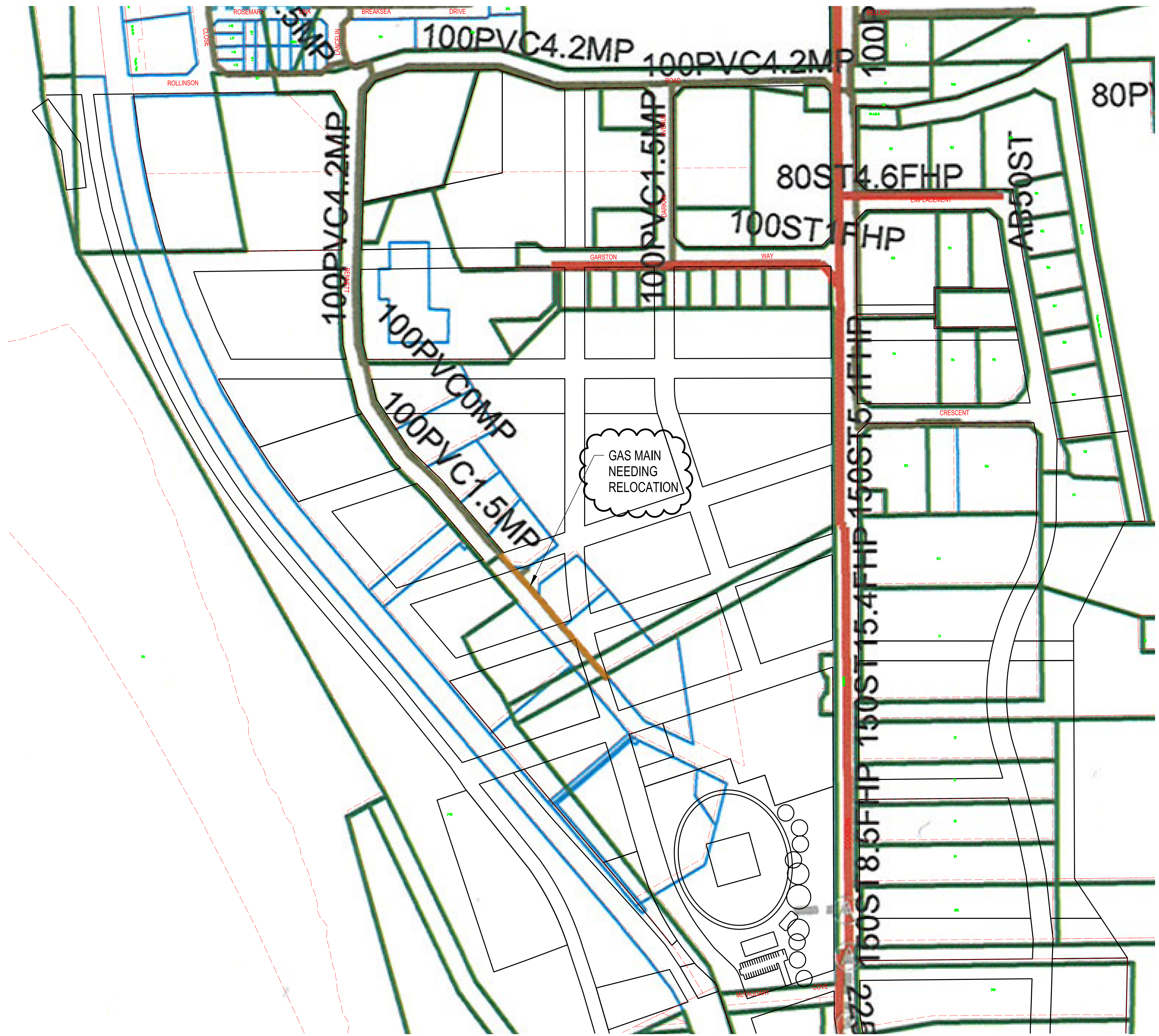
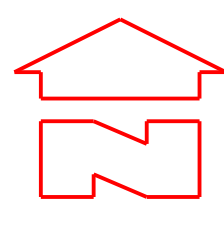
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Appendix 8

Existing Gas Mains



PLAN
SCALE 1:2000

REV.	DESCRIPTION	DRAWN	VER	APPROVED
A	ORIGINAL ISSUE			


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CLIENT:
LANDCORP
 PROJECT:
COCKBURN COAST
 TITLE:
GAS SERVICES

PRELIMINARY

SECTION: CIVIL SERVICES	VERIFIED:	SCALE: A1 @ 1:2000
DESIGNED:	APPROVED FOR TENDER:	DATUM: A.H.D.
DRAWN: LZ	APPROVED FOR CONSTRUCTION:	WAPC: -

PROJECT No.	DRAWING No.	REVISION
20146-PER-LSP-C	SK9	A

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