A501

Infrastructure Assessment Report

Golden GatewayPrecinct

Prepared for
City of Belmont

5 May 2017

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Executive Summary

The Golden Gateway Structure Plan provides a framework for the redevelopment of the Golden Gateway Precinct area into a “major growth area by 2031”.

Through close liaison with the relevant service providers, Cardno has researched and reported on the current capacity of the infrastructure and services within the Golden Gateway area. Cardno has also provided detailed findings and recommendations regarding the future infrastructure and servicing requirements that are needed to accommodate the redevelopment of the area as proposed by the Structure Plan.

In summary, Cardno’s assessment of the Golden Gateway Precinct in terms of required infrastructure for the Golden Gateway Structure Plan area is as follows:

- The Golden Gateway Precinct area faces a shortage in wastewater infrastructure to service the proposed increase in residential and commercial activity.
- There is currently capacity in the existing HV feeders to supply the proposed development with power. However, Western Power advise power capacity cannot be reserved, and that subject to other developments in the area, a new HV feeder may be required to fully support the development.
- Upgrades other than the required major infrastructure upgrades as outlined in this report infrastructure will be rolled out in response to new development within the subject area.
- It is recommended that a working group between the City of Belmont and Water Corporation is set up in order to help plan and coordinate precinct development and staging with any Water Corporation trunk infrastructure capital works.
- National Broadband Network (NBN) Co. has not yet rolled their infrastructure across the Golden Gateway Precinct. It is recommended that the City of Belmont liaise with NBN Co. as per the *Best practice guide for Councils when initially dealing with NBN Co* document.

In conclusion, based on advice received by Cardno from the relevant service authorities, there should be no reason from a servicing point of view that the Golden Gateway Precinct Structure Plan could not be implemented with the proposed infrastructure upgrades outlined in this report.

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1 Background

1.1 Introduction

Cardno was engaged to assist the City of Belmont, in conjunction with the Department of Planning to undertake an infrastructure and services strategy for the Golden Gateway precinct, Ascot. The strategy will help guide the preparation of a Local Structure Plan over the area.

The scope of works includes:

- Review of planned growth area;
- Provide analysis of existing services infrastructure, including;
  - Water;
  - Sewer;
  - Power;
  - Gas; and
  - Telecommunications
- Identification of future service demands;
- Liaison and engagement of services providers; and
- Development of reports.

Cardno assessed the infrastructure to inform the City on decisions around the long-term provision of electrical energy, natural gas, potable water, wastewater disposal, along with high speed data /telecommunications for the growth areas.

The findings and advice presented in this report is based on Cardno's observations, experience from similar projects and responses from various service providers and stakeholders.

The investigations and preparation of this report have largely been based on preliminary advice from the various Service Authorities. The information is current as of April 2017 and is subject to change as development proceeds.

1.2 Location

The subject area is located in Ascot, and is generally bounded by Great Eastern Highway, Stoneham Street, Grandstand Road and Resolution Drive. It includes the Belmont Trust Land, a portion of the Ascot Racecourse site as well as the Western Australian Turf Club headquarters and Ascot Kilns. The extent of the subject area is shown in **Figure 1-1**.

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Figure 1-1 Golden Gateway Subject Area

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2 Water

Water Corporation Western Australia is the state authority regulating the distribution infrastructure for water reticulation in the area.

2.1 Existing Infrastructure

The Serpentine Trunk Main runs along Grandstand Road and Daly Street. There is also a 915 steel distribution main running along Grandstand Road through the subject area. The existing lots are well serviced with a mixture of 100, 150 and 200 dia reticulation pipes made of asbestos cement, cast iron, PVC and steel.

Cardno Drawing *CW942300-CI-SK2* in **Appendix A** shows the location of the existing power infrastructure within and adjacent to the subject area.

2.2 Required Infrastructure

The Golden Gateway Precinct is located in the Supply Scheme area. It is difficult to ascertain exactly what capacity the current infrastructure network has without full water network modelling carried out by Water Corporation. However, Water Corporation does not foresee any issues with servicing the proposed scheme with potable water at the time of this report.

Exact water infrastructure upgrades will be determined when Water Corporation carries out full water network modelling. Water Corporation has advised that water reticulation planning and modelling will be done after Structure Plan and rezoning is confirmed, effectively at development application phase. The Water Corporation provided initial advice to Cardno and in their advice; they offered the following key points.

- Water Corporation will upgrade the headwork's, pipe equal to or greater than 300mm diameter and pump stations, as and when required. However, headwork's charges will be charged to the developer. Minor reticulation works, typically pipework less than 300mm diameter, are to be funded directly by the developer.
- All temporary works associated with any development within the Golden Gateway Precinct is to be funded directly by the developer.
- Redevelopment areas within the Golden Gateway Precinct need to integrate water efficiency technology and design approaches into the area and buildings in line with Water Corporation's 'Water Forever 2009" document. This will require a local water management strategy that includes local scale water balancing and identifying water efficiency measures such as; rainwater reuse, appropriate fittings, irrigation smart systems, planting and soil types and drainage collection and reuse.
- Water Corporation advises that a Development Area Plan be commissioned to support development in the Golden Gateway Precinct and submitted to Water Corporation once the Structure Plan has been finalised. This should include a plan identifying the proposed development, densities and likely staging and timeframe. Accompanying this should be a water management strategy outlining how water efficiencies are to be met along with engineering plans detailing proposed works and estimates. The water efficiency targets are to be determined by the City of Belmont in consultation with Water Corporation. Water Corporation runs a Waterwise Development Program that enables developments that have applied water efficient principles to be recognised and endorsed by Water Corporation.
- Water Corp recommends a consolidated approach to the requesting and programming of works to minimise disruptions and maximise cost efficiencies. Water Corporation recommends any reticulation reinforcement or new work should be managed by the City of Belmont due to the fractured land ownership within the area. It is recommended that a working group between the City of Belmont and Water Corporation is set up in order to help plan and coordinate precinct development and staging with any Water Corporation trunk infrastructure capital works.

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Additionally, Water Corporation have advised that some existing cast iron water mains will need to be replaced as they are ageing and to increase capacity necessitated by increased demand arising from the proposed higher density development. These may need to be replaced by the developer or alternatively a request can be put to the Water Corporation cast iron replacement program.

Identification of required infrastructure upgrades requires detailed water modelling and more specific demand inputs. Water reticulation planning will be done after Structure Plan and rezoning is confirmed.

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3 Wastewater

The Water Corporation (WC) of Western Australia is the main service provider regulating the distribution, storage and disposal infrastructure for wastewater in the Ascot area.

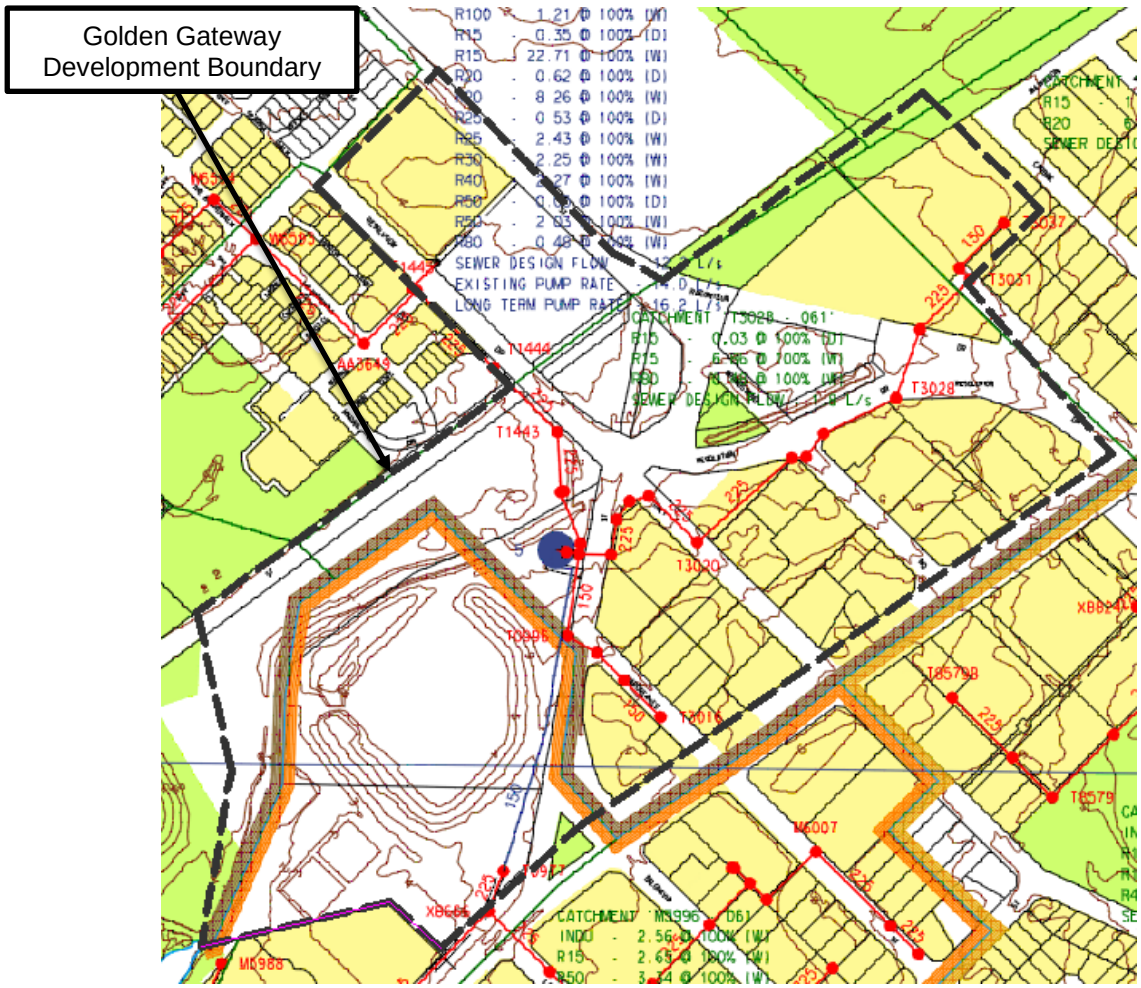
Wastewater infrastructure general to Ascot area is serviced by gravity style wastewater drainage infrastructure. A mixture of concrete and plastic arterial pipes on grade service all areas to local pump stations throughout the City of Belmont.

3.1 Existing Infrastructure

Lots within and surrounding the proposed Golden Gateway Structure plan are serviced by two main arterial sewer routes; a 225mm collector flowing north to south and a 225mm collector flowing east to west. Both collectors flow to the Redcliffe Pump Station 5 located on Stoneham Street. The Redcliffe P.S 5 collects all sewerage west of the Ascot raceway within the Ascot Suburb and discharges it to the Redcliffe Pump Station 2 located on Abernethy Road.

Refer to Cardno Drawing *CW942300-CI-SK1* in **Appendix A** for further details and drawings for the wastewater infrastructure in this area.

Figure 3-1 Existing Sewer Infrastructure



3.2 Future Demand

Table 3-1 identifies the additional sewer demand estimated for the proposed Golden Gateway re-zoning structure plan.

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Table 3-1 Local Scheme Zone Sewer Demand

Local Scheme Zones	Area (ha)	Additional Dwellings (No.)*	Additional Sewer Demand (L/s)**
Mixed-Use (R-AC0)	10.3	1648	9.15
Residential (R20)	0.88	18	0.19
Residential (R40)	1.73	70	0.61
Residential (R100)	1.57	157	1.34
Total		**1893**	**11.29**

* Refer Table 4.4 of DS 50 for Design & Construction Requirements for Gravity Sewers DN150 to DN600

**Capacity based on Water Corporation DS50 Table 4.1.

3.2.2 Service Capacity

Service Capacity has been analysed for Redcliffe P.S 5 and Redcliffe P.S 2 to determine if the stations have adequate capacity to service the proposed Golden Gateway development

Table 3-2 Pump Station Service Capacity

Pumping Station	Additional Flow (L/s)	P.S Existing Sewer Flow (L/s)	Long Term P.S. Capacity (L/s)	Future Capacity / [Shortfall] (L/s)
Redcliffe PS 5	11.29	14.0	16.2	[9.09 L/s]
Redcliffe PS 2	11.29	20.1	37.0	5.61 L/s

As per **Table 3-2** the proposed development will have significant impacts to the current wastewater infrastructure. It is not envisaged the existing Redcliffe PS5 will have sufficient capacity with a shortfall of 9.09 L/s to service the proposed development and will require a significant upgrade. Redcliffe PS 2 will likely have capacity however further planning should be co-ordinated with the Water Corporation to ascertain other timing of other developments in the area.

3.3 Required Infrastructure

Due to wastewater flows increasing due to the high density development, a number of upgrades will be required to headworks infrastructure in the area. These include increasing the capacity of the Stoneham Street Wastewater Pump Station as well as a number of sewer mains. These will be scheduled in the Water Corporation Capital Investment Program at the appropriate time.

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4 Power Supply

4.1 Existing Infrastructure

Power distribution and production is managed by Western Power. Data obtained from the Western Power *Network Mapping Tool* indicates that the area is serviced by the Belmont Substation and the forecast network capacity for 2015 is >30MVA, as shown in **Figure 4-1**. There are High and Low Voltage power lines in the vicinity of the site.

Figure 4-1 Existing Power Network Capacity
(Source: http://ncmt.westernpower.com.au/index.cfm)

Cardno Drawing *CW942300-CI-SK6* in **Appendix A** shows the location of the existing power infrastructure within and adjacent to the subject area.

4.2 Required Infrastructure

Maximum power requirement for the development has been calculated using Western Power's online Design Maximum Demand calculator. The estimated demand for the development is shown in **Table 4-1** below.

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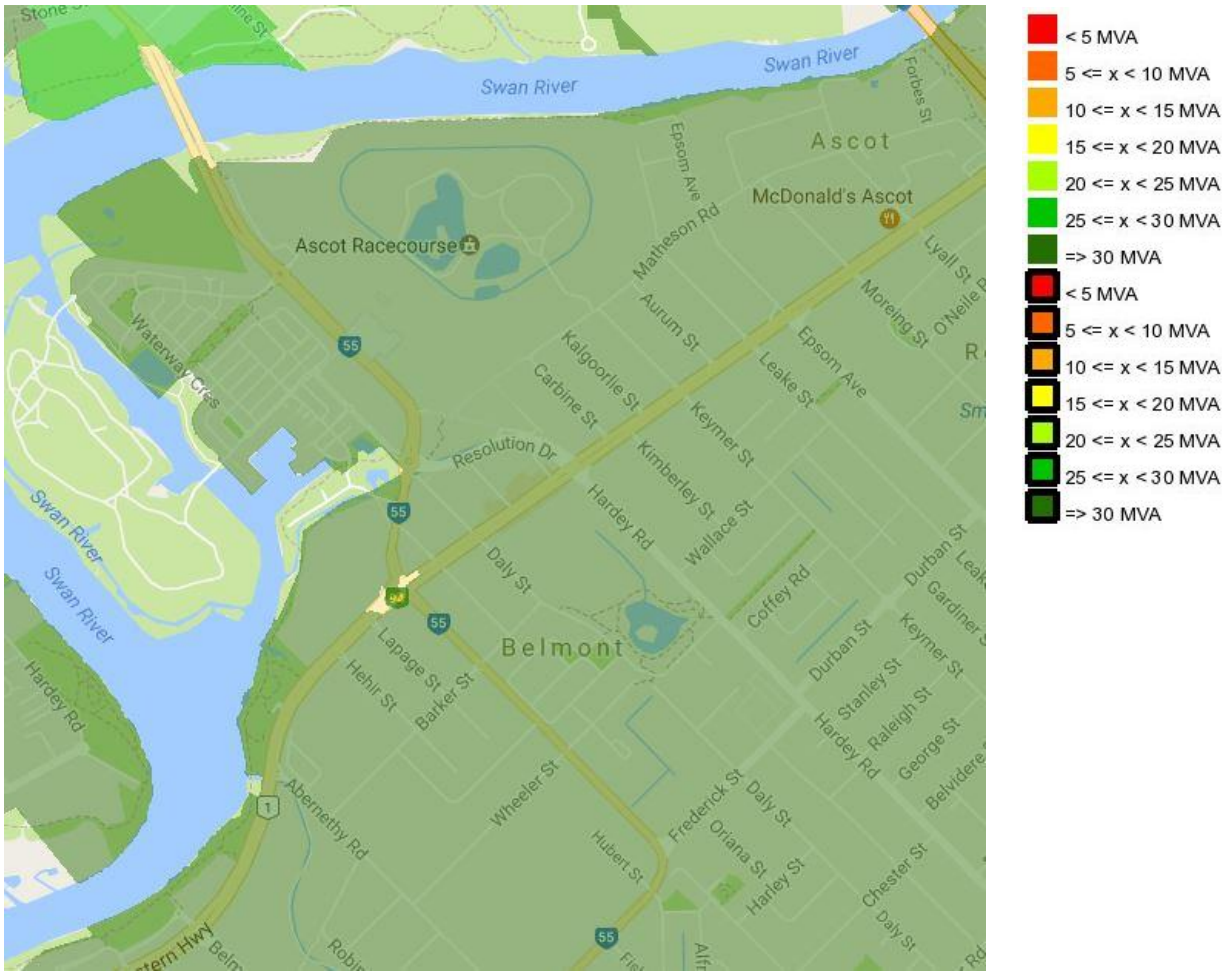
Table 4-1 Estimated Maximum Power Demand

Proposed Lot Use	Number of Units/Dwellings	Max. Demand/Unit (kVA)	Approx. Estimated Demand (kVA)
Single Dwelling Units	18	4.7	84.6
Grouped Residential (5-10 Units)	70	3.5	245
Grouped Residential (Over 10 Units)	1805	3.1	5,596
Mixed Use Commercial	1	2,400kVA	2,400
Total Development			**8,325.6**

Belmont substation falls under the Cannington load area. Western Power's *Annual Planning Report 2015/16* states "no substation capacity shortfall is forecast in the Cannington load area over the next five years." This takes into account committed and most likely to occur network expansion plans for the area. The Western Power *Network Mapping Tool* indicates that there is >30MVA spare capacity in the network until at least 2036 based on current and forecast demand (see **Figure 4-2**).

Figure 4-2 Forecast Power Network Capacity 2036
(Source: http://ncmt.westernpower.com.au/index.cfm)



Western Power has completed a feasibility report for the proposed development, which is attached in Appendix B. Western Power has advised the following:

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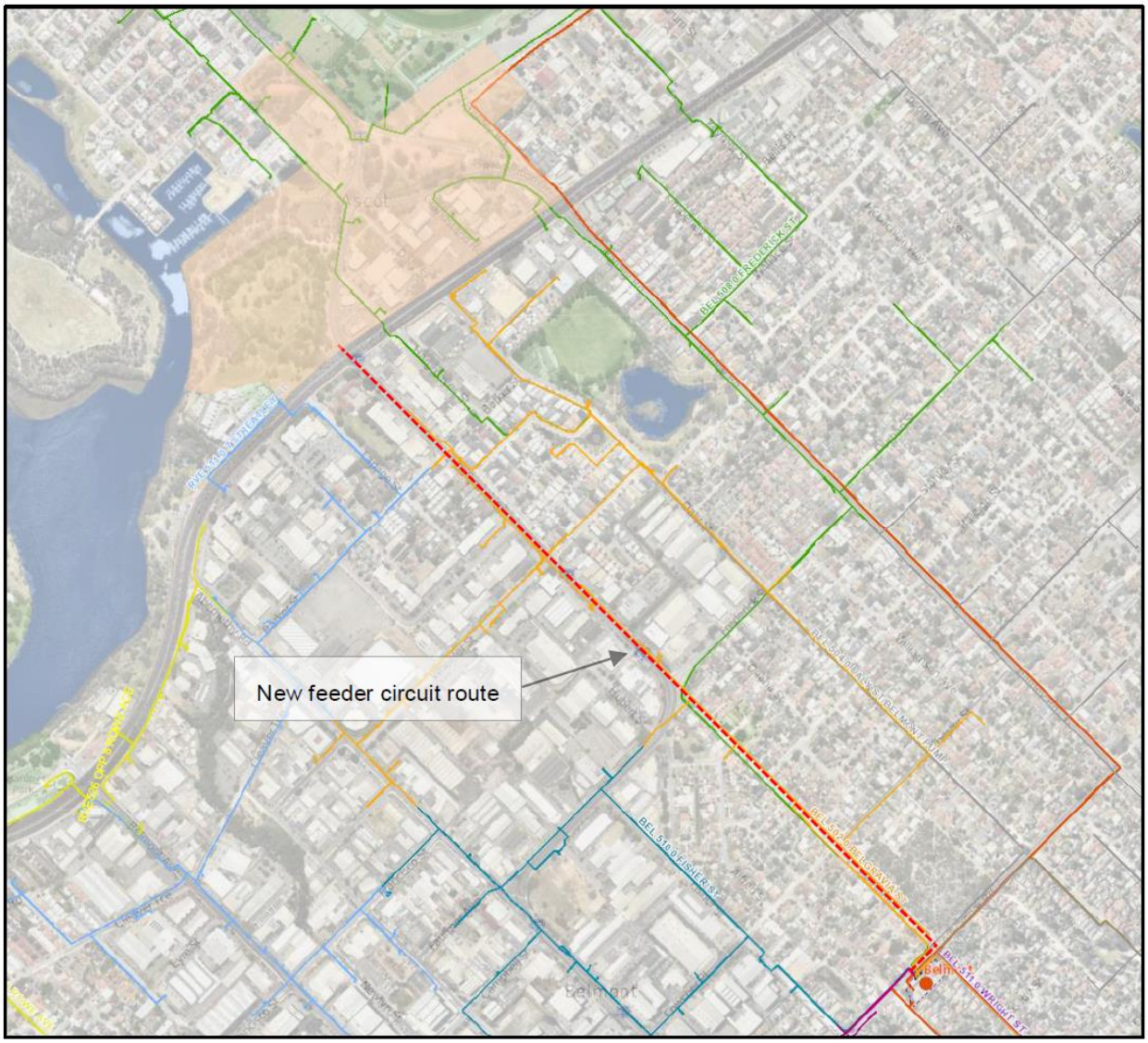
"Network analysis has identified that there sufficient capacity on the present configured network, and new feeder circuit would not be required as there are adequate spare capacity available on the BEL508 and surrounding feeders (BEL502 & RVE526) to fully accommodate the 8.325MVA total load. However, as the load growth to the redevelopment area is not expected till 2031, it is deemed reasonable that the provision to install a new 2km long feeder from BEL to entirely supply the 8.325MVA load may be required."

The proposed route of a new feeder from the Belmont Substation is shown in **Figure 4-3**.

Figure 4-3 Proposed Western Power Feeder Route
(Source: Western Power Feasibility Report – MF010862 – Golden Gateway Precinct, May 2017)



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5 Gas

5.1 Existing Infrastructure

Gas infrastructure and distribution in Western Australia is managed by ATCO Gas Australia.

Correspondence from ATCO Gas identifies Medium Pressure gas mains (pressure indicated at 70kPa) along most roads within the subject site.

Cardno Drawing *CW942300-CI- SK4* in **Appendix A** contains information on gas infrastructure in the vicinity of the area.

5.2 Required Infrastructure

Correspondence received from Atco Gas advised that the existing infrastructure can support the proposed development as outlined in the Structure Plan.

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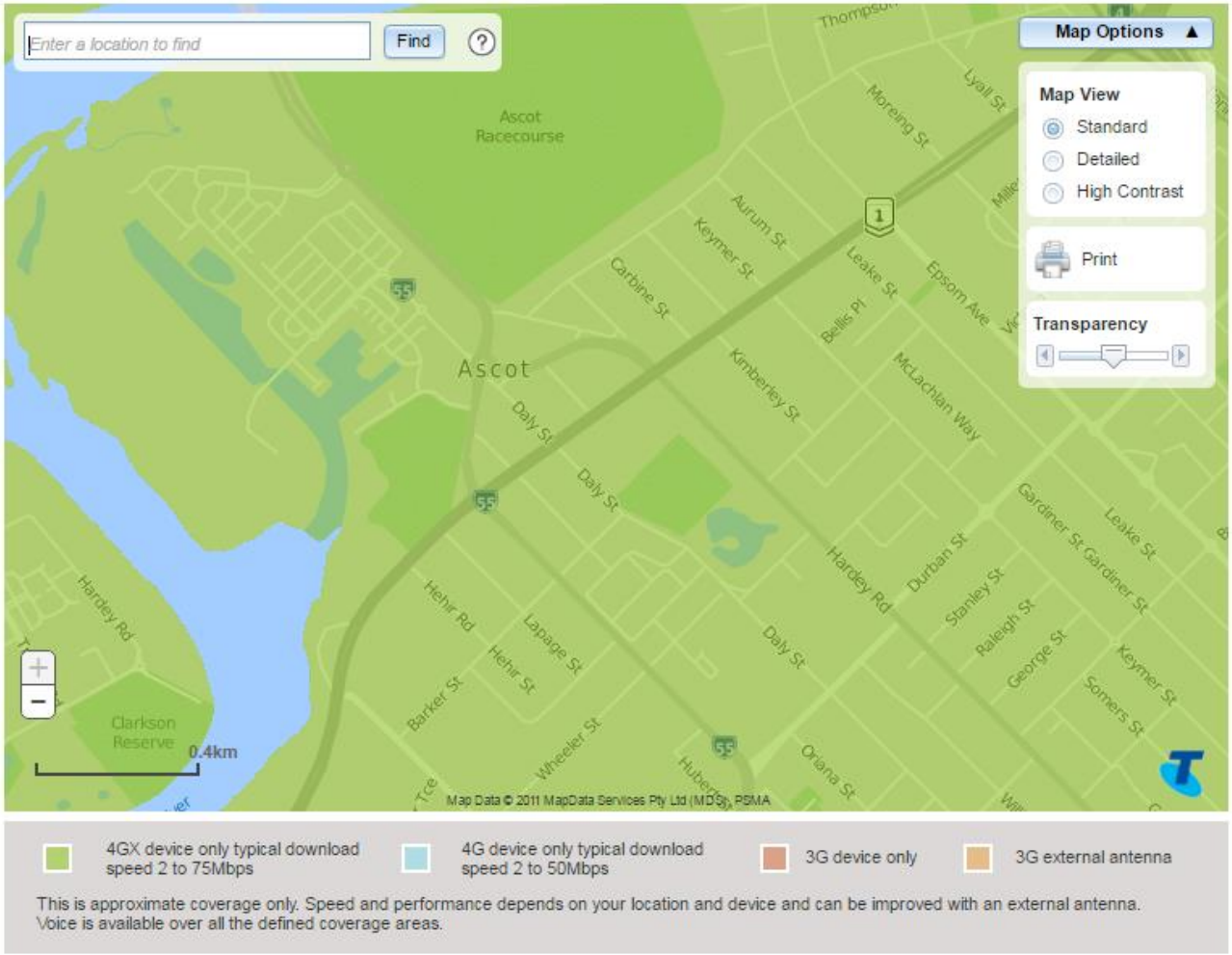
6 Communications

6.1 Existing Infrastructure

The subject area is well serviced by telecommunications infrastructure with optical fibre running in or adjacent to all precincts. This infrastructure is owned by various telecommunications providers including Telstra, Optus and others.

Refer to Cardno Drawing *CW942300-CI-SK5* in **Appendix A** for a detailed plan of the fibre optic cable locations.

Figure 6-1 Telstra Mobile Network Coverage
(Source: www.telstra.com.au/coverage-networks/our-coverage)



Mobile network coverage in the area is well serviced with 4G covering the entire subject area under the Telstra network (as shown in **Figure 6-1**); other network providers may vary.

The National Broadband Network (NBN) has yet to be rolled out in the subject area. However, NBN Co have advised that fibre to the node (FTTN) technology rollout has been planned for October-December 2017.

6.2 Required Infrastructure

6.2.1 Telstra

Should a developer wish to register a development with Telstra smart communities; this must be done twelve weeks prior to construction.

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The infrastructure within a development will be installed by the developer. Alternatively, Telstra can be engaged to install infrastructure within a development at the developer's expense.

Telstra's commercial pit and pipe service will generally not be offered in developments where NBN Co has confirmed agreement to install NBN Co fibre within a development stage.

6.2.2 NBN

As NBN is still in the planning phase, it is recommended that the City of Belmont liaise with NBN Co as per the *Best practice guide for Councils when initially dealing with NBN Co* document published by the Australian Local Government Association and NBN Co.

In line with the new *Telecommunications Infrastructure in New Developments* policy, NBN is required to recover part of the cost of deploying network infrastructure by applying a deployment contribution charge. These deployment charges only apply to developers and builders.

- A charge of $400 per premises in multi dwelling units (MDUs).
- A charge of $600 per premises within a single dwelling unit (SDU).

A backhaul contribution charge may also apply to the development, NBN will clarify this requirement when the developer submits his application.

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APPENDIX

A

EXISTING INFRASTRUCTURE

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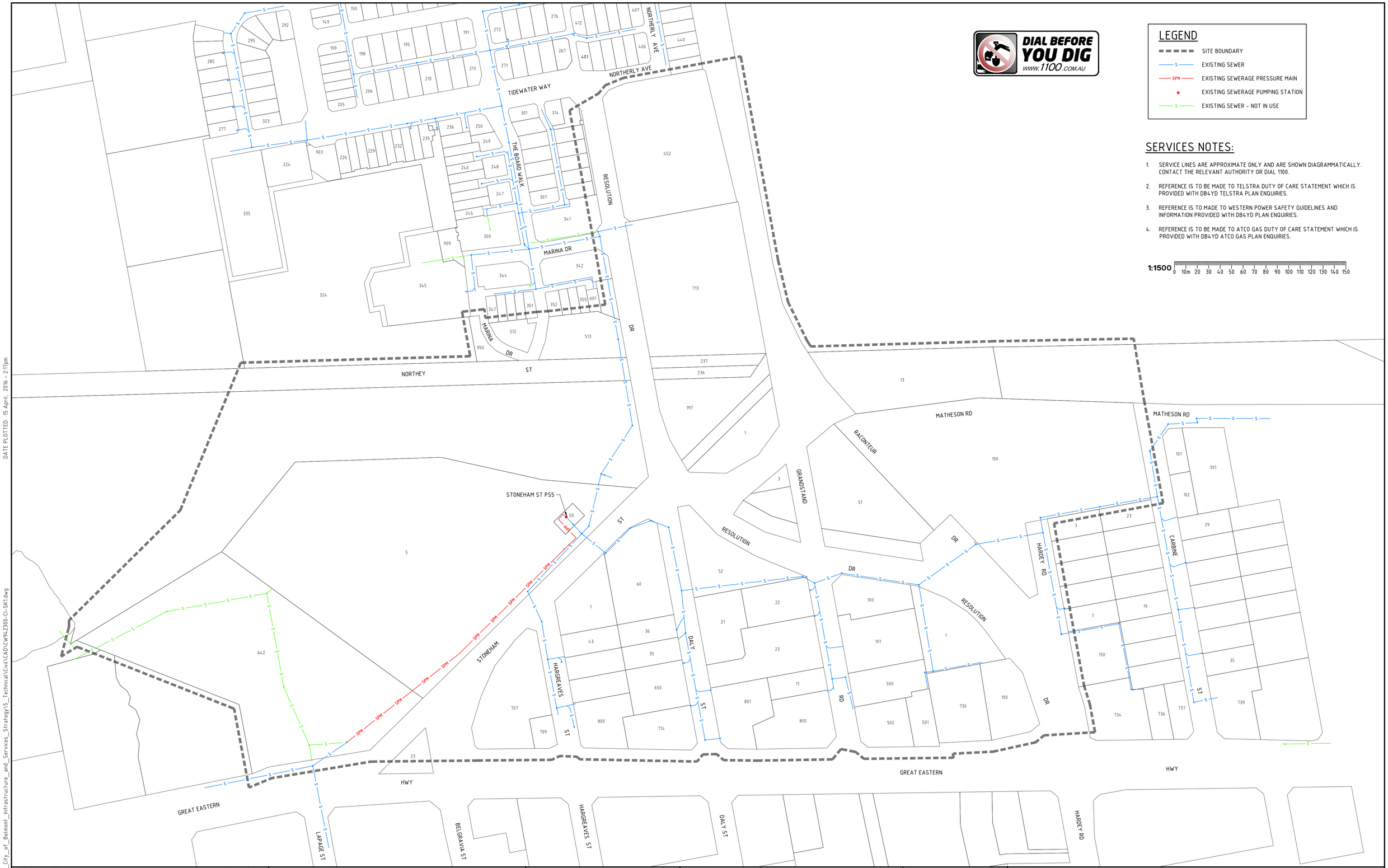

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Project: GOLDEN GATEWAY PRECINCT
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Status: NOT FOR CONSTRUCTION

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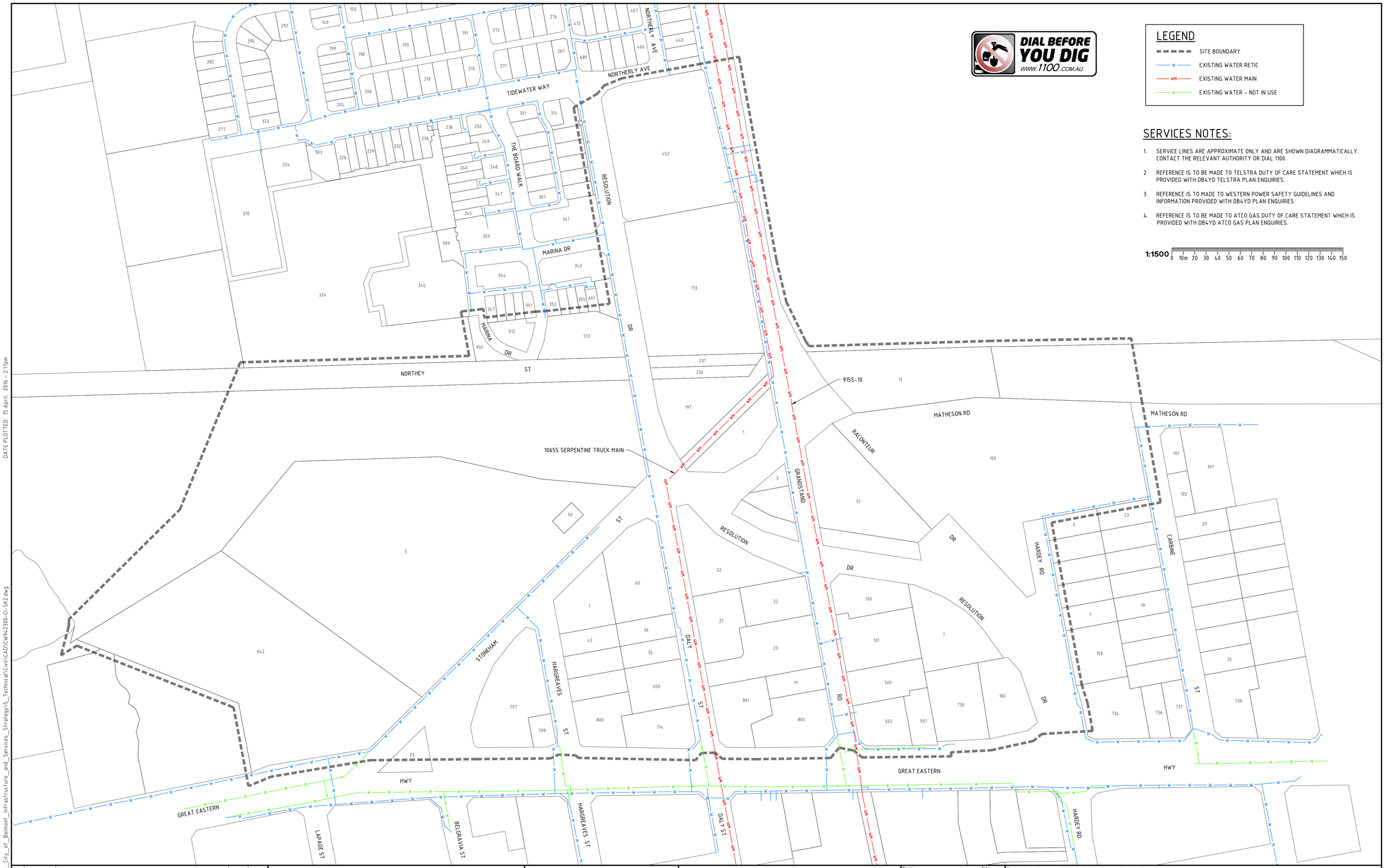

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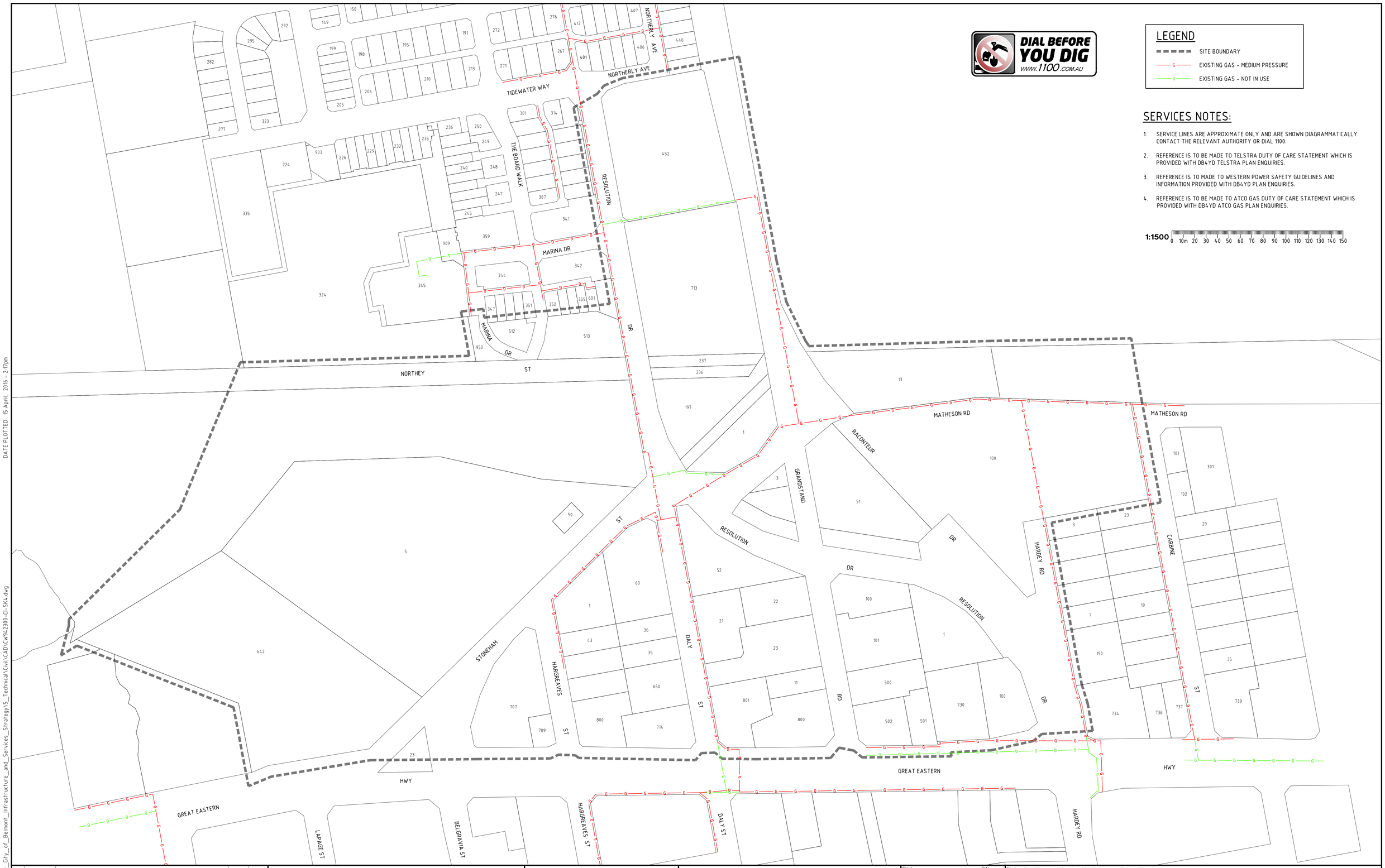

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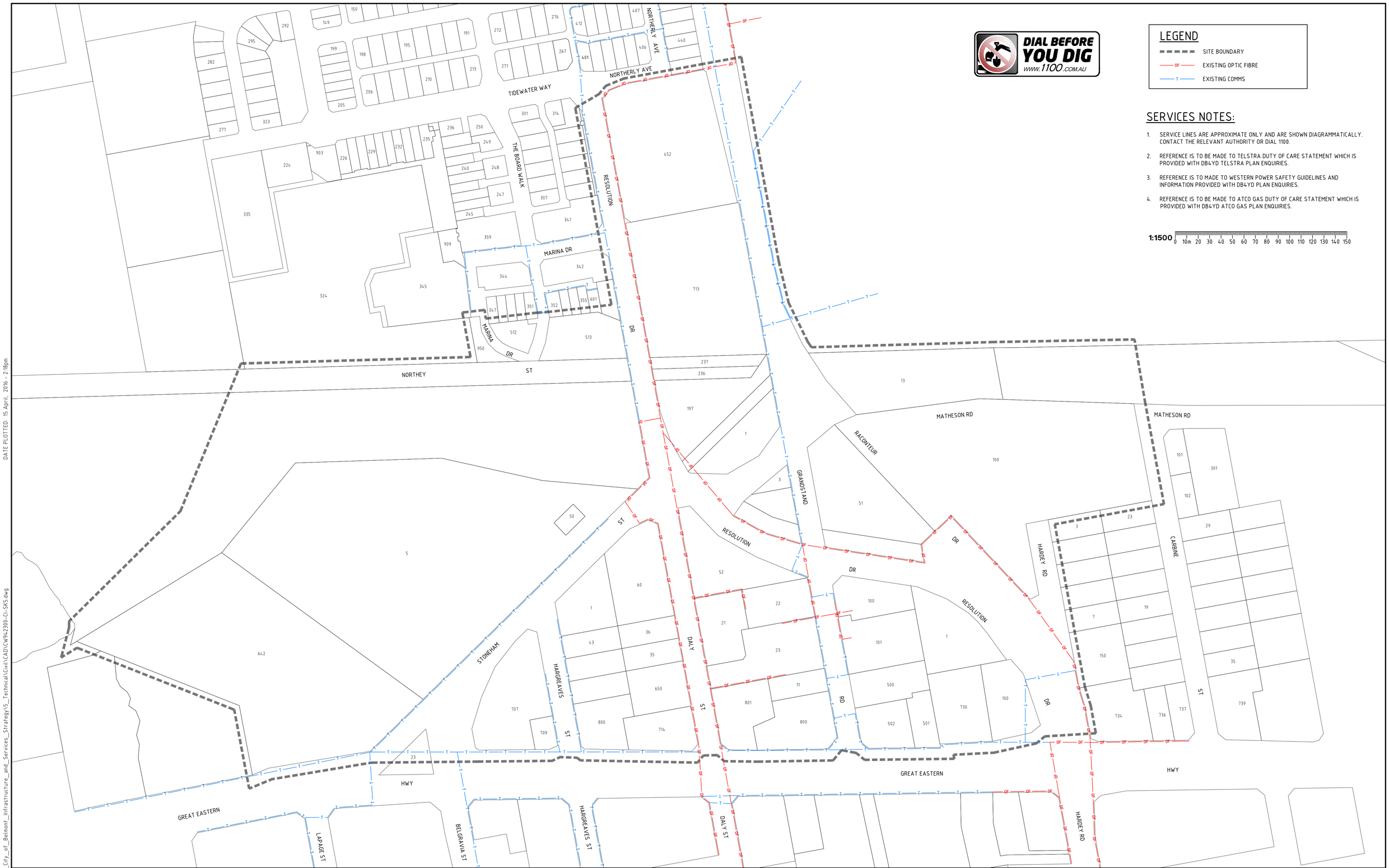

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		Date
Drawn	JYY	15.04.2016
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Approved	PR	15.04.2016

Client: CITY OF BELMONT

Project: GOLDEN GATEWAY PRECINCT

Title: EXISTING COMMS SERVICE PLAN

Status: NOT FOR CONSTRUCTION

Date	Datum	Scale	Size
15.04.2016	A.H.D	1:1500	A1

Drawing Number: CW942300-CI-SK5

Revision: A

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LEGEND

- SITE BOUNDARY
- TD — EXISTING POWER OVERHEAD - TRANSMISSION
- O/H — EXISTING POWER OVERHEAD - HIGH VOL
- O/H — EXISTING POWER OVERHEAD - LOW VOL
- HV — EXISTING POWER UNDERGROUND - HIGH VOL
- LV — EXISTING POWER UNDERGROUND - LOW VOL

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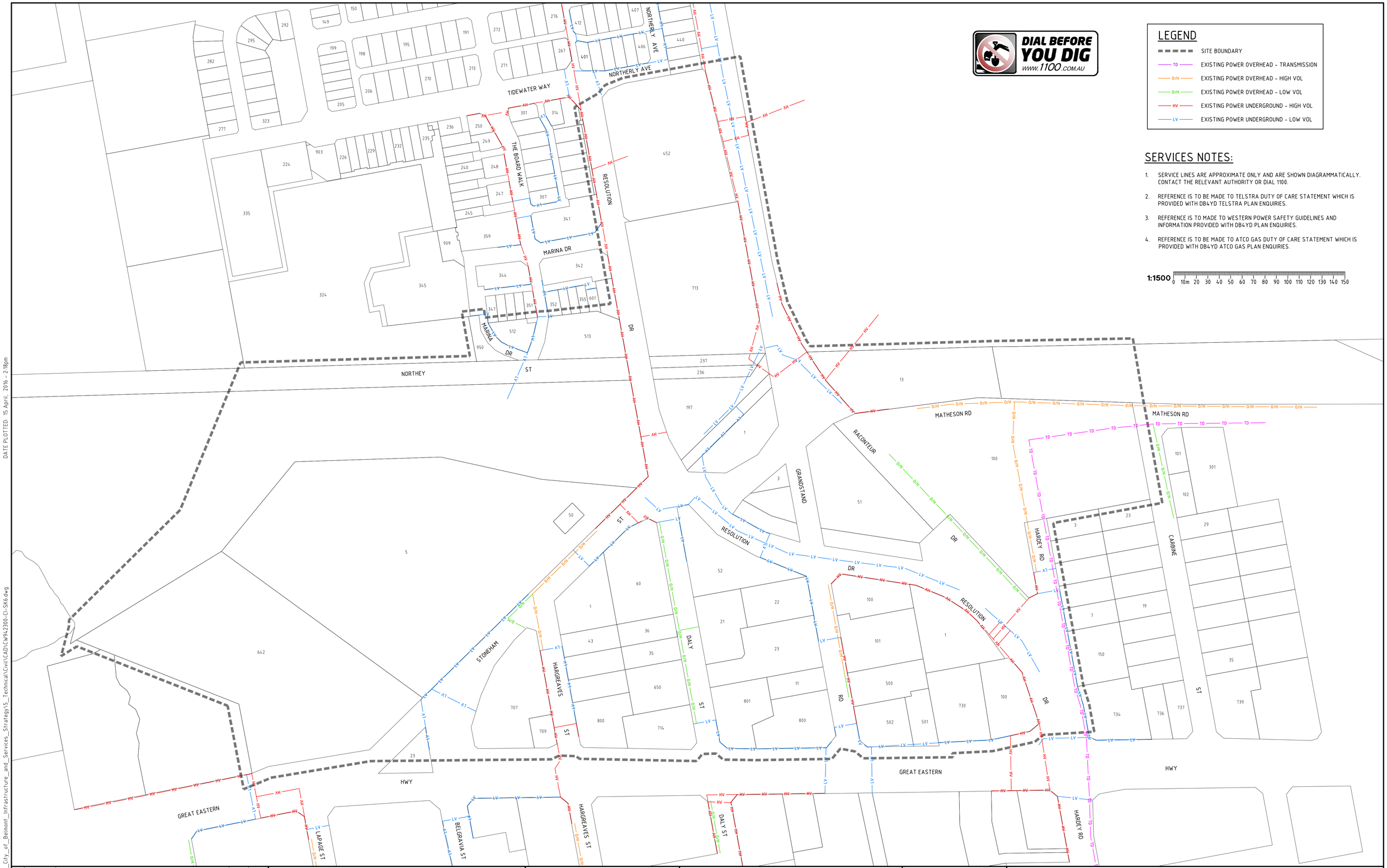

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A	15.04.2016	INITIAL ISSUE	JYY	PR

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Approved	PR	Date 15.04.2016

Client: CITY OF BELMONT

Project: GOLDEN GATEWAY PRECINCT

Title: EXISTING POWER SERVICE PLAN

Status: NOT FOR CONSTRUCTION

Date	Datum	Scale	Size
15.04.2016	A.H.D	1:1500	A1

Drawing Number: CW942300-CI-SK6

Revision: A

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DATE PLOTTED: 15 April, 2016 - 2:18pm

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Document Set ID: 5881971
Version: 1, Version Date: 11/09/2024

APPENDIX B

WESTERN POWER FEASIBILITY STUDY

Cardno
Shaping the Future

Document Set ID: 5881971
Version: 1, Version Date: 11/09/2024

Feasibility Report

MF010862 – Golden Gateway Precinct

Large Mixed-Use Development – 8.325MVA Supply Options

5/05/2017

Document Set ID: 5881971
Version: 1, Version Date: 11/09/2024

Document release information

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Document prepared by:

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Distribution Network Design Officer

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1 Introduction

1.1 Background

Cardno has submitted a feasibility study on behalf of the City of Belmont, in conjunction with the Department of Planning to undertake an infrastructure and services strategy for the Golden Gateway Precinct in Ascot. The strategy will help guide the preparation for the Local Structure Plan over the area. Cardno is seeking information on the available network capacity to supply the Golden Gateway Precinct.

1.2 Purpose

The proposed outcomes from the feasibility study are;

- Desktop network assessment on the nearby distribution HV networks to determine the available capacity from these networks.
- Network planning capacity assessment (Distribution & Transmission) to determine available capacity from zone substations within proximity to the development.
- High level scope of works for the transmission and distribution works required to provide up to 8.325MVA of capacity (if reinforcement or extension is required).

1.3 Scope of Study

The activities that will be undertaken to achieve the specified outcomes are;

1. Network Configuration Assessment
2. Network Impact Assessment
3. Western Power Scope of Works

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2 Study Activities

2.1 Activity 1 – Network Configuration Assessment

The proposed development are is set amongst the BEL508 22kV feeder network emanating from the Belmont zone substation (BEL) located approximately 2.0km south. The BEL508 22kV feeder along with three other HV feeder networks (BEL502, RVE511 & RVE526) are the only networks within close proximity to the redevelopment (figure 1).

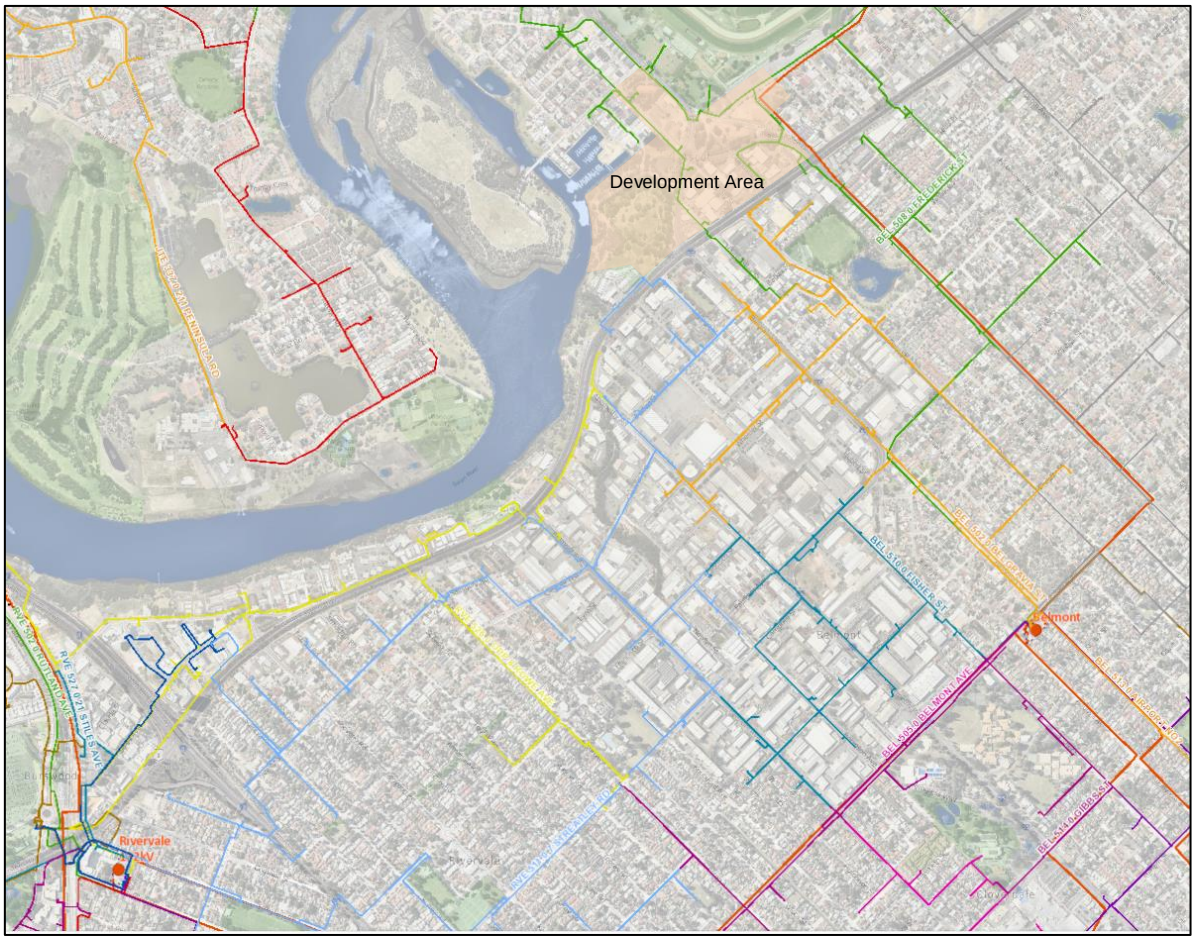

Figure 1 - Existing Distribution HV Network

2.2 Activity 2 – Network Impact Assessment

2.2.1 Transmission

Network analysis was carried out on the closet zone substation to the redevelopment area. It has been identified that there is sufficient spare NCR capacity available from BEL to cater for this 8.325MVA undiversified load. The load forecast chart for BEL is provided in figure 2.

Currently, BEL is supplied from the Cannington Terminal via BEL-KDL 81 line and BEL-RVE/WE 81 line (with the pre-contingency being BEL-NT/EP 81 line open). In connecting this load, it is not expected for the affected 132 kV transmission lines to experience the issue relating to the thermal over-loading or under-voltage, during the N-1 contingency. As well, connection of this customer load is not expected to trigger any voltage instability issues in the load area, hence this load is cleared to connect to the Western Power BEL network.

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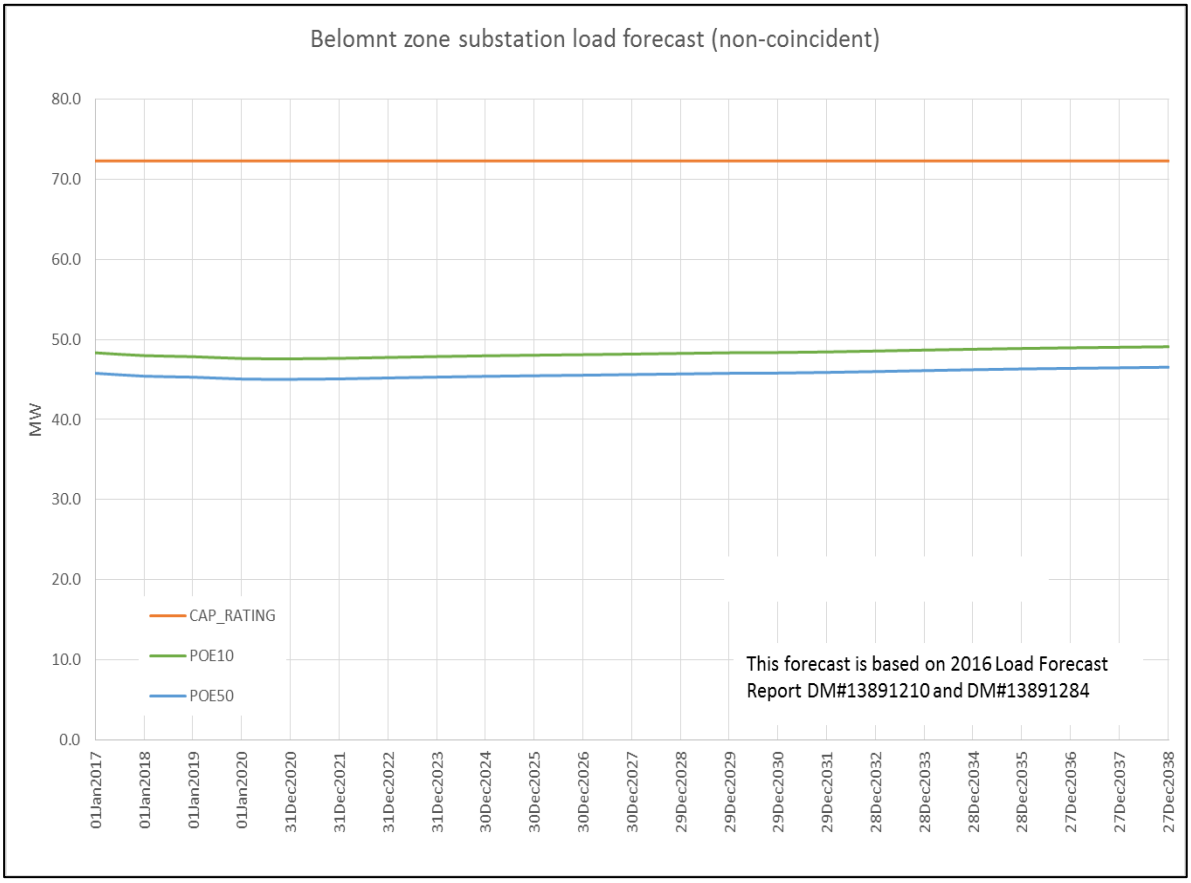

Figure 2 - BEL Zone Substation Forecast

2.2.2 Distribution

The entire redevelopment area is currently supplied by the BEL508 Frederick St feeder, including three other feeder networks (BEL502, RVE511 and RVE526) within close proximity. Based on the BEL508 feeder load readings (figure 3), there is approx. 3MVA of spare capacity available at this point of time that can be directly connected into. Additional network capacity can also be made available by network reconfiguration or extension, provided that there are significant spare capacity available on the nearby feeders at the time of connection. Hence, it is likely that the first few stages of development area can via supplied without any major network extension or reconfiguration.

Due to the expected timing of the power uptake, there is no certainty what spare capacity will still be available on the BEL508 feeder and other feeders around the proposed redevelopment area. Hence, it is not feasible to estimate what network extension will be required to create sufficient network capacity to supply the 8.325MVA load. An alternative option is to install of a new feeder from BEL to the proposed development boundary, near the intersection between Great Eastern Hwy and Stoneham St, to supply the entire 8.325MVA load. The new feeder circuit is likely to be installed along Belgravia St which will require approximately 2km of 400mm2 Al XLPE 22kV cable. Although there is no spare feeder circuits available at BEL, arrangement can be made (such as double feeders termination) to allow new feeder connections to the BEL.

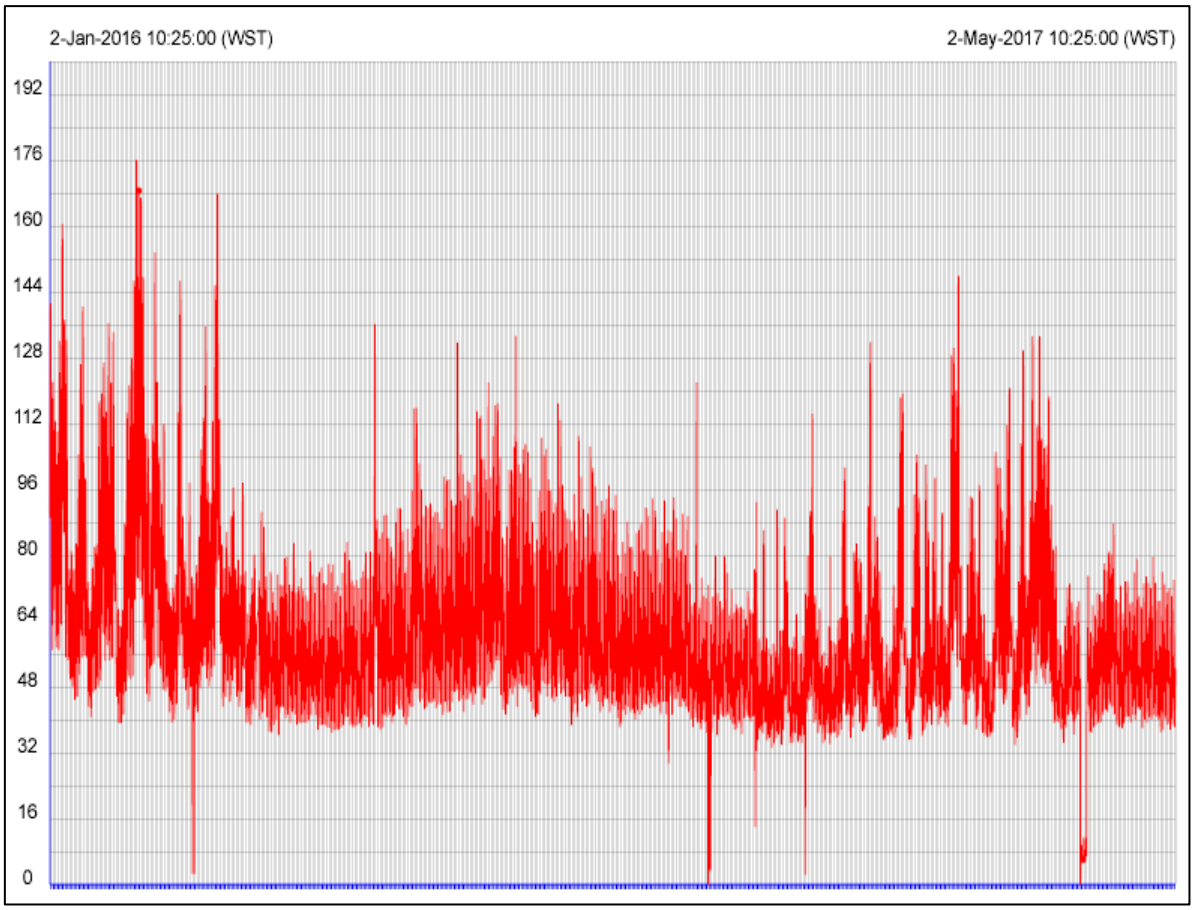

Figure 3 - BEL508 Feeder Utilisation

3 Technical Evaluation

3.1 Supply Options

3.1.1 Overview

As stated in section 2.2.2 of this report, there is approximately 3MVA of spare capacity available on the BEL508 Frederick St feeder with the opportunity to utilise the surrounding feeders (BEL502 & RVE526) to fully accommodate the total 8.325MVA load until either exhausted by the customer's development or other competing applications. A new feeder circuit can be provided for further capacity beyond the existing HV networks capacity limitations.

Considering the above information, there are two design options which have been identified to meet the customers' requirements;

1. Utilise the remaining capacity available on the BEL508 feeder and other nearby HV networks until exhausted. The scope of works for this option cannot be defined due to the unknown load uptake and location of connections to the redevelopment area.

2. Once depleted, install approximately 2.0km of new underground cable from the BEL to the redevelopment area expected along Belgravia St.

3.1.2 Site Map

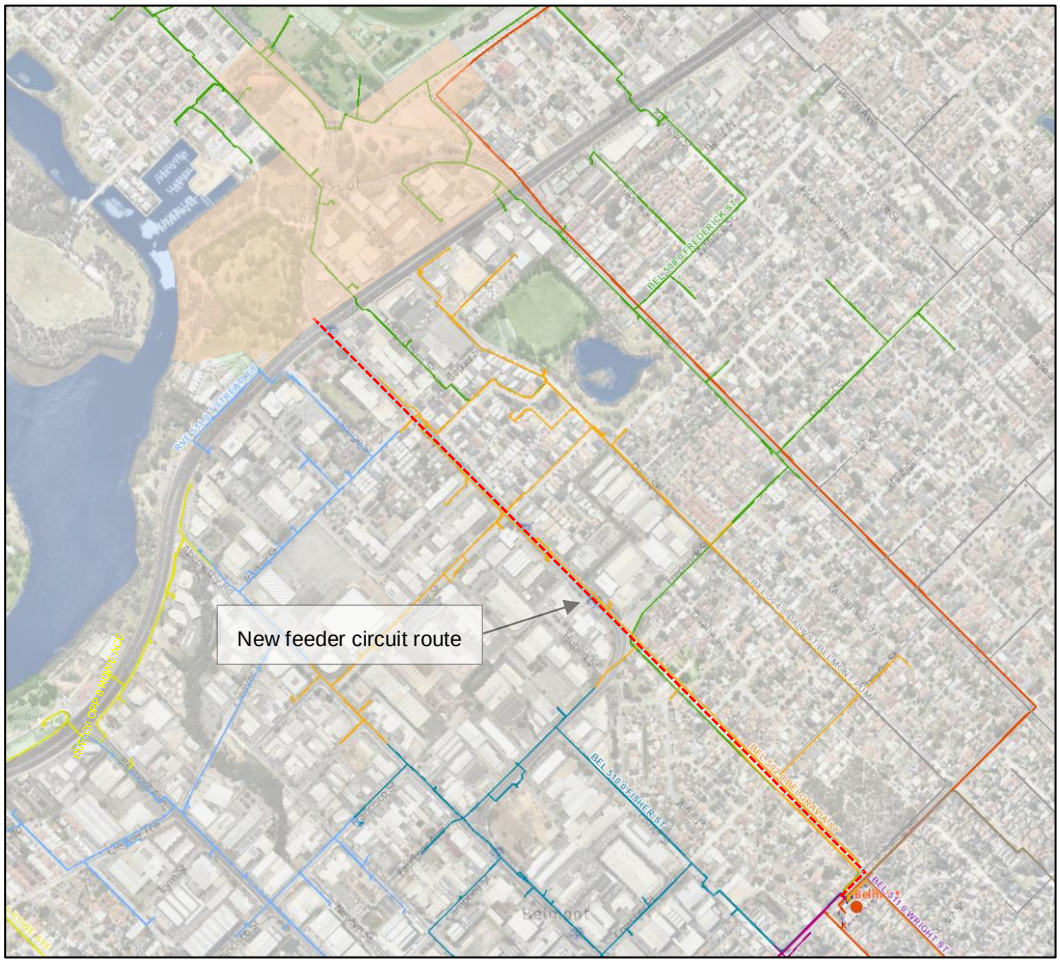

Figure 4 - Proposed Western Power Scope of Works

3.1.3 Western Power Scope of Works

With reference to the site map in section 3.1.2 of the document, the Western Power scope of works for the new feeder extension is as follows;

- The connection of the new circuit into the BEL zone substation.
- Cable installation by a combination of open trenching and directional drilling from the BEL to the corner of Great Eastern Hwy and Stoneham St.
- Cable jointing, including testing and commissioning.

3.1.4 Third Party Approvals

If any of the surrounding HV feeders are to be extended or a new feeder circuit is installed from BEL then it is likely that the proposed cable route will need to cross under the Great Eastern Fwy. This instalment of new cable will require the approval from Main Roads. The underground cable route will be determined when a formal application has been received and detailed planning studies have been conducted.

3.1.5 Assumptions

The customer contribution and scope of works are dependent on the following assumptions;

- No other connection requests and changes to network conditions prior to the formal application for this connection.
- The proposed design solution, estimated cost (non-binding) is based on the desktop information only & is subject to detailed design investigation.
- All new underground cables are assumed to be installed in at the Western Power standard depth (i.e. 850mm deep from finished level) and in the Western Power standard alignment (0-500m from property boundaries) apart from road crossings.
- Drilling depth of electrical cables under roadways must be between 1000 and 1500mm of ground level.
- Allowance of polypipe included for the proposed cable route where cable is crossing under roadway or deemed rock ground conditions.
- Main Roads approval is granted for works associated on Great Eastern Hwy
- The proposed works receive no objection from all involved parties (which may include local authorities, private land owners and/or other utilities).
- The interconnection works required within the development site boundary are not considered in the study.
- The load assessment on the submission of the formal application will support the customers load request.
- Environmental studies have not been undertaken for the purpose of this report.
- Detailed Load Flow and Power Quality studies have not been undertaken for this study.

4 Conclusions and Recommendations

Network analysis has identified that there sufficient capacity on the present configured network, and new feeder circuit would not be required as there are adequate spare capacity available on the BEL508 and surrounding feeders (BEL502 & RVE526) to fully accommodate the 8.325MVA total load. However, as the load growth to the redevelopment area is not expected till 2031, it is deemed reasonable that the provision to install a new 2km long feeder from BEL to entirely supply the 8.325MVA load may be required.

Applicants need to be aware that the information herein is provided in good faith and is accurate at the time of issue. Power systems are dynamic in nature, due to the connection of new users and changes in consumer behaviour. As such, Western Power's distribution electricity networks will change over time - this may have a bearing on the amount of reinforcement required to accommodate new developments.

As capacity cannot be reserved, it is possible that requirements will also be altered resulting in a variation in power infrastructure requirements. There may be other competing applications for new loads or upgrades which may use the available spare capacity.

Please be aware that Western Power's response may become out-of-date, resulting in a significant variation in power infrastructure requirements. To provide a firm connection proposal and cost, a formal application to Western Power will need to be made, in accordance with current connection policies.

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About Cardno

Cardno is a professional infrastructure and environmental services company, with expertise in the development and improvement of physical and social infrastructure for communities around the world. Cardno's team includes leading professionals who plan, design, manage and deliver sustainable projects and community programs. Cardno is an international company listed on the Australian Securities Exchange [ASX:CDD].

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