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BG Australia

Curtis Island LNG Project

Gladstone Intersection Upgrades - Concept Design Report

June 2009

INFRASTRUCTURE | MINING & INDUSTRY | DEFENCE | PROPERTY & BUILDINGS | ENVIRONMENT

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1. Introduction

1.1 Background

GHD has been engaged by QGC – A BG Group Business to provide Infrastructure Engineering services for the Queensland Curtis LNG Project. The role generally involves providing technical support, undertaking studies and reviewing reports done by others regarding infrastructure requirements for the project.

As part of the QCLNG EIS currently being undertaken, QGC has to analyse the logistical effects of the construction and operational phases of the plant on the existing road network in and around Gladstone. Traffic analysis has been undertaken on behalf of QGC by Halcrow to test the current intersection capacity at various study locations around Gladstone. The traffic analysis was based on a preliminary case that involved:

- a peak workforce of 2,000 persons, for which it is assumed that 1,100 reside in Gladstone and 900 reside outside of Gladstone.
- daily movement of the 1,100 Gladstone workers to and from Auckland Point by private motor vehicle, with the 900 non-local workers moving to and from Auckland Point at the beginning and end of fortnightly work rotations; and
- peak truck movements of around 230 trucks per day.

This preliminary case is expected to be superseded by a revised case involving different pipeline transport methods, different peak workforce numbers plus a different local / non-local split. The revised case will result in a lower impact than the preliminary case. Accordingly the preliminary case deliberately represents a maximum impact scenario.

Based on the preliminary case the traffic study identified four intersections that will require upgrading to accommodate the future growth caused by the QCLNG Project in conjunction with background “ambient” demand growth. Further micro-simulation analysis, also by Halcrow, shows another two intersections also require upgrading. Thus a total of 6 intersections were identified as requiring an upgrade primarily as a result of a maximum impact scenario QCLNG project.

GHD has been engaged to undertake the concept design of the intersection upgrades, assess the feasibility of their construction within the constraints of each site, assess the effect on services in the area and provide cost estimates for each intersection. The cost estimates are reported separately in Appendix C.

This report describes the concept design that has been undertaken for the intersection upgrade works.

2. Purpose and Scope of Works

2.1 Purpose

The purpose of the concept design is to ascertain the pre - feasibility of constructing the intersections as shown in the Traffic Reports considering the requirements of Gladstone City Council, Austroads and The Department of Main Roads standards and the constraints upon each site. Additionally the cost of each intersection upgrade is to be estimated.

2.2 Scope of Works

The scope of works for the concept design includes:

- Layout design based on aerial photo base provided by QGC;
- Design of intersections based on dimensions and layouts proposed by the traffic study by Halcrow. No review of the report for accuracy or completeness has been undertaken;
- Cost estimation + / - 35%;
- Desktop/assumed geotechnical assessment for pavement thickness;
- Concept design to Gladstone Regional Council, Austroads and The Department of Main Roads standards for urban roads;
- Indicative AutoCAD layout drawings for each intersection;
- Consideration of existing services and assessment of service relocation required including:
  - Retrieval of Dial-Before-You-Dig (DBYD) information;
  - Identification of potential services for relocation;
  - Assessment of costs for relocation.
- Identification of affected properties and possible resumptions; and
- Complication of concept design report.

3. Design Assumptions

To enable the concept design to be carried out the following assumptions have been made:

- No topographical survey is available, so design has been based on aerial photography provided by QGC;
- Design is based on plan layouts. No vertical geometrical design has been undertaken. This would be undertaken under full feasibility assessment if required.
- Pavement design is based on desktop and assumed geotechnical information, supported by local knowledge.
- All roads are owned by Gladstone Regional Council, the Gladstone Ports Corporation or The Department of Main Roads. The standards of each relevant authority have been adopted;
- Service relocations will be required and have been estimated based solely on information provided by Dial-Before-You-Dig (DBYD). The accuracy of this information is limited and hence service information shall not be relied upon and is only used to present a concept cost estimate appropriate for pre-feasibility study;
- The cost estimate is based upon rates for similar work and is valid at the present day base of April 2009;
- A contingency allowance of 20% has been included in the cost estimate to make provision for rate and quantity fluctuations of known items;
- Other unknown items such as poor ground conditions, extent and full impact of works including bridge widening (can not be defined until detailed design is undertaken), escalation for timing of works, actual service relocation costs, full three-dimensional modelling to show impact on earthworks and other items that can not be defined at this pre-feasibility level of design are likely to be subject to a greater variance hence the cost estimates are only expected to be within a range of accuracy of +/-35%;
- Cost for any land resumption has been estimated only; and
- No specific requirement for ASS treatment, other than lime dosing, is required.

4. Intersection Requirements

The traffic study by Halcrow identifies six intersections that require upgrade as a result of additional traffic generated from the QCLNG Project.

Those intersections and their upgrade requirements are:

- Hanson Road / Alf O'Rourke Drive / Blain Drive – upgrade of roundabout to provide left slip lane from Hanson Road to Alf O'Rourke Drive and short exit lane plus two entry and exit lanes off each leg and two circulating lanes;
- Glenlyon Street / Port Access Road – provision of a dual left turn slip lane from Port Access Road in to Glenlyon Street;
- Glenlyon Street / Bramston Road / Dawson Road – lengthening of the short right turn lane on Glenlyon Street (north) to 70m, from 40m, reconfiguration of the median-side through movement on Glenlyon Street (north) to a shared right/through lane and reconfiguration of signal phasing and modification of actuated timing to fixed timing;
- Port Access Road / Mark Fenton Drive / Hopper Road / Tug Berth Access Road – upgrade of roundabout for the addition of a 50m shared left/through lane on the Port Access and Tug Berth Access Roads and of complementary short downstream lanes on Port Access and Tug Berth Access Road to cater for the additional through lane on the opposing approach;
- Dawson Highway / Blain Drive / Herbertson Street – Provision of left slip lane from Dawson Highway into Herbertson Street.
- Philip Street / Dawson Highway – provision of a left turn slip lane from Philip Street to Dawson Highway;

Table 1 Halcrow Intersection Recommendations

Intersection	Halcrow recommendation	Year required
Hanson Road / Alf O'Rourke Drive / Blain Drive	Provide left slip lane from Hanson Road to Alf O'Rourke Drive plus short exit lane plus two entry and opposing exit lanes and two circulating lanes	2013
Glenlyon Street / Port Access Road	Provide dual left signalised slip lane along with an extension of signal cycle time to 150 seconds	2010
Glenlyon Street / Bramston Road / Dawson Road	Incorporate minor lane reconfigurations on the northern and eastern approaches. Signal cycle time also to be extended to 150 seconds	2010
Port Access Road / Mark	The addition of a 50m shared	2010

Intersection	Halcrow recommendation	Year required
Fenton Drive / Hopper Road / Tug Berth Access Road	left/through lane on the Port Access and Tug Berth Access Roads; and• the provision of complementary short downstream lanes on Port Access and Tug Berth Access Road to cater for the additional through lane on the opposing approach	
Dawson Highway / Blain Drive / Herbertson Street	Addition of a short left turn slip lane from the Dawson Highway (north) into Herbertson Street (east)	2013
Philip Street / Dawson Highway	Incorporate a left turn slip lane from the Phillip Street approach into the Dawson Highway (south)	2010

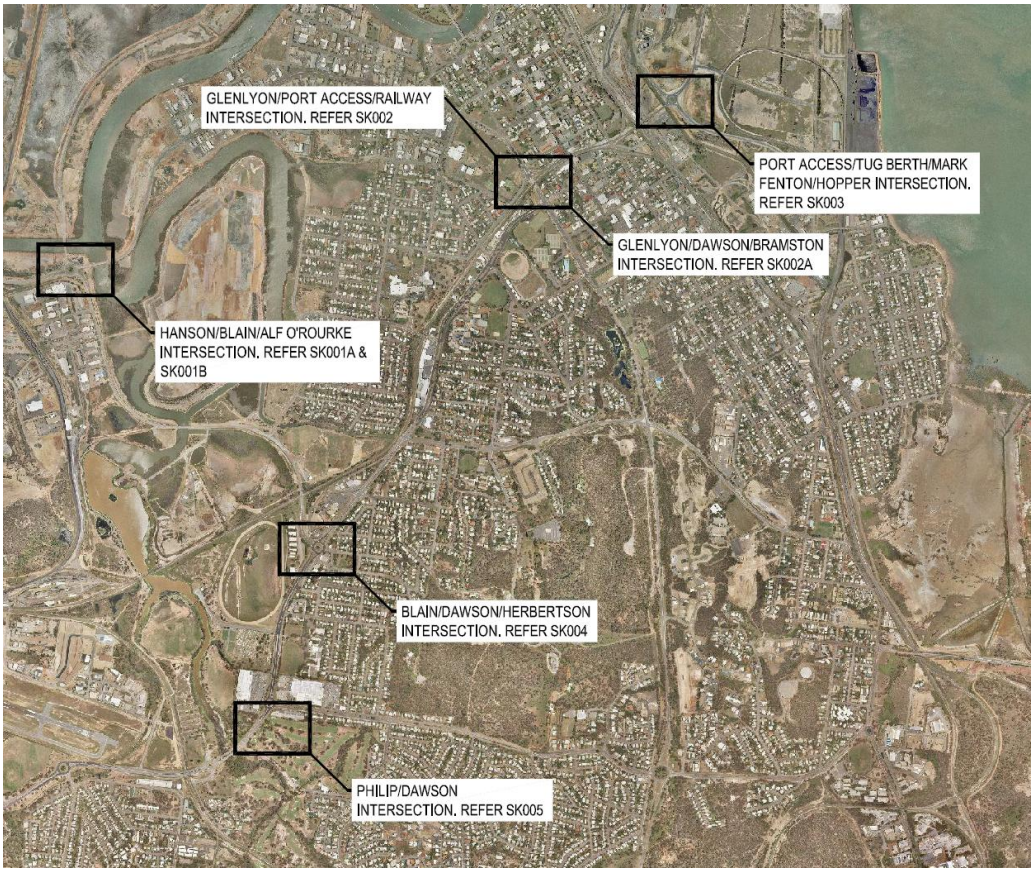

Figure 1 Plan of Gladstone showing intersection locations

5. Intersection Upgrade Concept Design

Concept design has been undertaken in accordance with the required standards of Gladstone Regional Council, Austroads and Department Main Roads (DMR) as applicable to each intersection. Standards used in the pre-feasibility design of the intersection upgrade works are:

- Roundabouts
    - Austroads Standards, Part 6 – Roundabouts
    - DMR Road Planning & Design Manual - Chapter 14 - Roundabouts
- Diverge and merge tapers
    - Austroads Standard; Part 5 – Intersections at Grade
    - DMR Road Planning & Design Manual Chapter 13 - Intersections at Grade
- Slip lanes (width)
    - Austroads Standard; Part 5 – Intersections at Grade
    - DMR Road Planning & Design Manual Chapter 14 - Roundabouts
- Median islands
    - Austroads Standards, Part 6 – Roundabouts
- Road widths
    - DMR Road Planning & Design Manual Chapter 7 – Cross Section

It has been found that in some instances the required lane lengths, merge and diverge tapers and sight distances can not be achieved in accordance with all of the required standards due to physical constraints such as bridges. Instances of non – conformance with the standards are described below. In such instances two designs have been undertaken, one showing an intersection conforming to design standards incorporating the constraint and the second an intersection conforming to design standards but avoiding the constraint while representing, as closely as possible, the requirement of the traffic study.

In the first case there are considerable cost implications, as incorporation of the constraint into the design will require significant extension and widening of existing bridgeworks. It is advised that in the second case the traffic study should be re-addressed to analyse if the designed alternative option will satisfy traffic requirements or if another suitable alternative can be found.

5.1 Concept Design Layout Plans

Concept design layout plans for each intersection are included in Appendix A.

5.2 Hanson Road / Alf O'Rourke Drive / Blain Drive

Drawing No. 41-20490-07-SK001A shows the pre-feasibility layout that conforms to the design standards and fulfils the traffic report requirements. However, the design standards for the length of left turn and merge lanes causes the works to extend beyond the end of the existing bridge in both north and eastbound directions. The cost implications of extending and widening the bridge are significant particularly when the upgrade is driven by a short term and finite construction program. Additionally significant earthworks in the order of 2850 m^3 can be expected to form the slip lane from Hanson Road to Alf O'Rourke Drive. This is to be over an area of likely poor ground conditions anticipated to require costly treatment to form a suitable earthworks foundation.

Drawing No. 41-20490-07-SK001B shows an alternative layout that provides for the traffic report requirements but does not fully conform to the design standards. Merge tapers have been shortened to fit the road within the existing constraints of the bridges This alternative is significantly less costly but would require discussion and agreement with Gladstone Regional Council. The earthworks required to form the slip lane from Hanson Road to Alf O'Rourke Drive will be more extensive, in the order of 3850 m^3, as the road is further away from the existing roundabout due to the approach angle required.

5.3 Glenlyon Street / Port Access Road

Drawing No. 41-20490-07-SK002 shows the pre-feasibility layout for the left slip lane from Port Access Road to Glenlyon Street that conforms to design standards and fulfils the Halcrow traffic report requirements.

5.4 Glenlyon Street / Bramston Road / Dawson Road

Drawing No. 41-20490-07-SK002A shows the pre-feasibility layout for the extension of the right turn lane that conforms to design standards and fulfils the traffic report requirements.

Level differences at this location may require some minor some retaining structures.

5.5 Port Access Road / Mark Fenton Drive / Hopper Road / Tug Berth Access Road

Drawing No. 41-20490-07-SK003 shows the pre-feasibility layout that conforms to the design standards and fulfils the traffic report requirements. However, the design standards for the length of left turn and merge lanes cause the works to extend beyond the end of the existing bridge. The cost implications of extending and widening the bridge are significant, plus access over the bridge may be restricted during the works, the full affect of which can only be assessed once a more detailed design of the bridge widening requirements is undertaken. The expense and disruption would be difficult to justify particularly as the upgrade is driven by a short term and finite construction program.

It is not possible to provide a feasible alternative slip lane design at this location.

Other alternatives beyond the scope of this design that may deliver the performance needed and conform to the design standards that could be considered are:

- The relocation of the roundabout further away from the watercourse and bridge, however the distance required would require full re-alignment of approach roads and the roundabout.
- Signalisation of the roundabout to provide opportunity for north bound traffic to access the roundabout and Port Access Road.
- Provide opportunity for northbound vehicles from Hopper Road to enter the roundabout by re-routing the through traffic from Tug Berth Access Road to the south along Hopper Road.

5.6 Dawson Highway / Blain Drive / Herbertson Street

Drawing No. 41-20490-07-SK004 shows the pre-feasibility layout that conforms to the design standards and fulfils the traffic report requirements. However, despite the proposed slip lane exit being positioned as close as possible to the existing roundabout, the slip lane and required relocation of an existing footpath locate the new works closer to a residential property than the existing road. Land resumption to accommodate the works may be required. A more detailed design, using topographical survey and accurate cadastral boundaries would be required to determine the actual effect on the property.

5.7 Philip Street / Dawson Highway

Drawing No. 41-20490-07-SK005 shows the pre-feasibility layout that conforms to the design standards and fulfils the traffic report requirements. An existing left slip lane into Gold Course Road south of the intersection will require shortening but it is currently excessively long and can be shortened while still conforming to required design standards.

6. Service Conflict and Relocation

6.1 Existing Service Information

Dial-Before-You-Dig (DBYD) information has been gained for each location. A copy of the DBYD information is included in Appendix B.

A visual assessment of this information shows that all intersection upgrade locations have some existing services that may be affected to a certain degree. No vertical level information is available so whether services are deep or shallow cannot be assessed. An allowance has been made in each concept cost estimate for relocation of potentially affected services.

The major services anticipated to require relocation are shown on the drawings contained in Appendix B and a summary of information received from the service providers for each intersection is provided below:

6.2 Hanson Road / Alf O'Rourke Drive / Blain Drive

Table 2 Service Information – Hanson Road / Alf O'Rourke Drive / Blain Drive

Service	Location	Affect
Queensland Gas Pipeline	SE corner of intersection	Outside works
Gas Pipeline (APA)	Diagonally across Blain to Hanson	Passes under ex. road – anticipate no effect.
Telstra	Generally throughout site	Anticipate relocation.
Electrical	HV and LV o/h line throughout site	Requires some relocation
Stormwater (GRC)	Generally throughout site	Anticipate will require some relocation/extension
Water (GRC)	Generally throughout site	Anticipate no effect
Sewer	None	N/A

6.3 Glenlyon Street / Port Access Road

Table 3 Service Information – Glenlyon Street / Port Access Road

Service	Location	Affect
Gas Pipeline (APA)	None	N/A
Comms Network (Reef)	In rail corridor	N/A
Telstra	None	N/A

Service	Location	Affect
Electrical	HV o/h line across intersection. Pole in kerb.	Requires relocation
Traffic Signals	n/a	Relocate signal control box Reconfigure traffic signal phasing
Stormwater (GRC)	Under rail bridge	None
Water (GRC)	Across road intersection	Anticipate no effect

6.4 Glenlyon Street / Bramston Road / Dawson Road

Table 4 Service Information – Glenylon Street / Bramston Road / Dawson Road

Service	Location	Affect
Gas Pipeline (APA) 110 MDPE	3.5m inside ex. kerb line	None
Comms Network (Reef)	In rail corridor	N/A
Telstra	None	N/A
Electrical	Along existing kerb line Opposite side of street	Relocate 2 power poles None
Stormwater (GRC)	Further south at intersection	None
Water (GRC)	Opposite side of street	None
Sewer	Opposite side of street	None

6.5 Port Access Road / Mark Fenton Drive / Hopper Road / Tug Berth Access Road

Table 5 Service Information – Port Access Road / Mark Fenton Drive / Hopper Road / Tug Berth Access Raod

Service	Location	Affect
Gas Pipeline (APA)	No info supplied for area	N/A
Comms Network (Reef)	In rail corridor and Auckland St.	N/A
Telstra	No info supplied for area	N/A

Service	Location	Affect
Electrical	No info supplied for area	N/A
Stormwater (GRC)	No info supplied for area	N/A
Water (GRC)	No info supplied for area	N/A
Sewer	No info supplied for area	N/A

6.6 Dawson Highway / Blain Drive / Herbertson Street

Table 6 Service Information – Dawson Highway / Blain Drive / Herbertson Street

Service	Location	Affect
Gas Pipeline (APA) 90 MDPE	Across intersection of proposed road	May require relocation depending upon depth
Comms Network (Reef)	In rail corridor	N/A
Telstra	Adjacent to eastern property boundary	May be affected and require relocation for short length
Electrical	HV o/h line along route of works	Requires relocation
Stormwater (GRC)	Pit & pipe at intersection	Requires relocation
Water (GRC)	Valve and main at intersection	Requires relocation
Sewer	Further up Herbertson Street	None

6.7 Philip Street / Dawson Highway

DBYD information has not been received for this site as it was additional to original scope. From aerial photographs it can be seen that power poles, streetlights and stormwater pits and outlets will be affected by the works. It should be possible to relocate these adjacent to the new works. A monetary allowance has been made for their relocation. It may however be necessary to replace the existing streetlight poles. Further detailed design will be required to ascertain if lighting standards of the main highway can still be achieved by extending the outreach of the existing poles.

7. Stormwater Drainage

7.1 Surface Drainage

It is assumed that all stormwater drainage from the road surface is still able to be directed to existing stormwater drainage and that downstream drainage has the capacity to cope with any additional flows generated from the works.

Allowance has been made for additional table drains, pipes and pits where applicable.

Allowance has been made to extend cross drainage and relocate existing headwalls where applicable.

8. Land Resumption

It may be possible to carry out all the works for all the intersections without any land resumption. However, two sites have potential for land resumption. A final decision on the need for land resumption would only become clear if the study progresses to full feasibility.

1. The lane widening required for the extension to the right turn lane on Glenlyon Street as shown on Drawing No. 41-20490-07-SK002A. The widening is adjacent to Council park and some minor resumption may be required.
2. The left slip lane from Dawson Highway to Blain Drive, as shown on Drawing No. 41-20490-07-SK004. The edge of works comes very close to a residential property and relocation of an existing footpath may require land resumption to accommodate it. Until final design with a detailed survey is carried out it is difficult to assess this requirement. As such it has been assumed that a minimal amount of resumption is required and an allowance has been made in the cost estimate. This will need to be re-addressed once a more detailed design is undertaken.

9. Cost Estimates

Concept design cost estimates have been undertaken for each intersection as a separate report included in Appendix C.

Appendix A

Concept Design Drawings

Drawing No. 41-20490-07-SK001A

Drawing No. 41-20490-07-SK001B

Drawing No. 41-20490-07-SK002

Drawing No. 41-20490-07-SK002A

Drawing No. 41-20490-07-SK003

Drawing No. 41-20490-07-SK004

Drawing No. 41-20490-07-SK005

FOR INFORMATION

rev	description	app'd	date
B	SERVICES RELOCATION		29.05.09
A	INITIAL ISSUE		11.03.09

BG AUSTRALIA: QLD CURTIS LNG PROJECT
INTERSECTION UPGRADES

HANSON RD/BLAIN DR
ALF O'ROURKE DR_OPT-A

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scale | 1:500 for A1 job no. | 41-20490
date | MAY 2009 rev no. | B

approved SK001A

Plot Date: 18 June 2009 - 3:50 PM Plotted by: Benjamin J. Taylor , Brisbane Cad File No: G:\41\20490\CADD\Drawings\Intersection Upgrade\41-20490-SK001_OptA.dwg

GENERAL NOTES

1. NEW ROAD PAVEMENT MARKING REQUIRED.
2. RELOCATE VARIOUS UNDERGROUND SERVICES .

FOR INFORMATION

rev	description	app'd	date
B	SERVICES RELOCATION		29.05.09
A	INITIAL ISSUE		11.03.09

BG AUSTRALIA: QLD CURTIS LNG PROJECT
INTERSECTION UPGRADES

HANSON RD/BLAIN DR
ALF O'ROURKE DR_OPT-B

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date	MAY 2009	rev no.	B

approved .....

SK001B

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GENERAL NOTES

1. NEW ROAD PAVEMENT MARKING REQUIRED.
2. RELOCATE VARIOUS UNDERGROUND SERVICES .

FOR INFORMATION

rev	description	app'd	date
B	DUAL SLIP LANE		29.05.09
A	INITIAL ISSUE		11.03.09

BG AUSTRALIA: QLD CURTIS LNG PROJECT
INTERSECTION UPGRADES

GLENLYON ST/PORT ACCESS/ RAILWAY ST

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scale | 1:500 for A1 | job no. | 41-20490
date | MAY 2009 | rev no. | B

approved SK002

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GENERAL NOTES

1. NEW ROAD PAVEMENT MARKING REQUIRED.
2. RELOCATE VARIOUS UNDERGROUND SERVICES .

FOR INFORMATION

rev	description	app'd	date
B	SERVICES RELOCATION		29.05.09
A	INITIAL ISSUE		11.03.09

BG AUSTRALIA: QLD CURTIS LNG PROJECT
INTERSECTION UPGRADES

GLENLYON ST/DAWSON RD/ BRAMSTON RD

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scale	1:500 for A1	job no.	41-20490
date	MAY 2009	rev no.	B

approved SK002A

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FOR INFORMATION

rev	description	app'd	date
B	SERVICES RELOCATION		29.05.09
A	INITIAL ISSUE		11.03.09

BG AUSTRALIA: QLD CURTIS LNG PROJECT
INTERSECTION UPGRADES

PORT ACCESS/TUG BERTH/ MARK FENTON/HOPPER RD

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scale	1:500 for A1	job no.	41-20490
date	MAY 2009	rev no.	B

approved SK003

Plot Date: 18 June 2009 - 3:52 PM Plotted by: Benjamin J. Taylor , Brisbane Cad File No: G:\41\20490\CADD\Drawings\Intersection Upgrade\41-20490-SK003.dwg

GENERAL NOTES

1. NEW ROAD PAVEMENT MARKING REQUIRED.
2. RELOCATE VARIOUS UNDERGROUND SERVICES

FOR INFORMATION

rev	description	app'd	date
B	SERVICES RELOCATION		29.05.09
A	INITIAL ISSUE		11.03.09

BG AUSTRALIA: QLD CURTIS LNG PROJECT
INTERSECTION UPGRADES

BLAIN DR/DAWSON HWY/ HERBERTSON ST

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scale | 1:500 for A1 job no. | 41-20490
date | MAY 2009 rev no. | B

approved SK004

Plot Date: 18 June 2009 - 3:52 PM Plotted by: Benjamin J. Taylor , Brisbane Cad File No: G:\41\20490\CADD\Drawings\Intersection Upgrade\41-20490-SK004.dwg

GENERAL NOTES

1. NEW ROAD PAVEMENT MARKING REQUIRED.
2. RELOCATE VARIOUS UNDERGROUND SERVICES

FOR INFORMATION

rev	description	app'd	date
B	SERVICES RELOCATION		29.05.09
A	INITIAL ISSUE		11.03.09

BG AUSTRALIA: QLD CURTIS LNG PROJECT
INTERSECTION UPGRADES

PHILIP ST/DAWSON HWY

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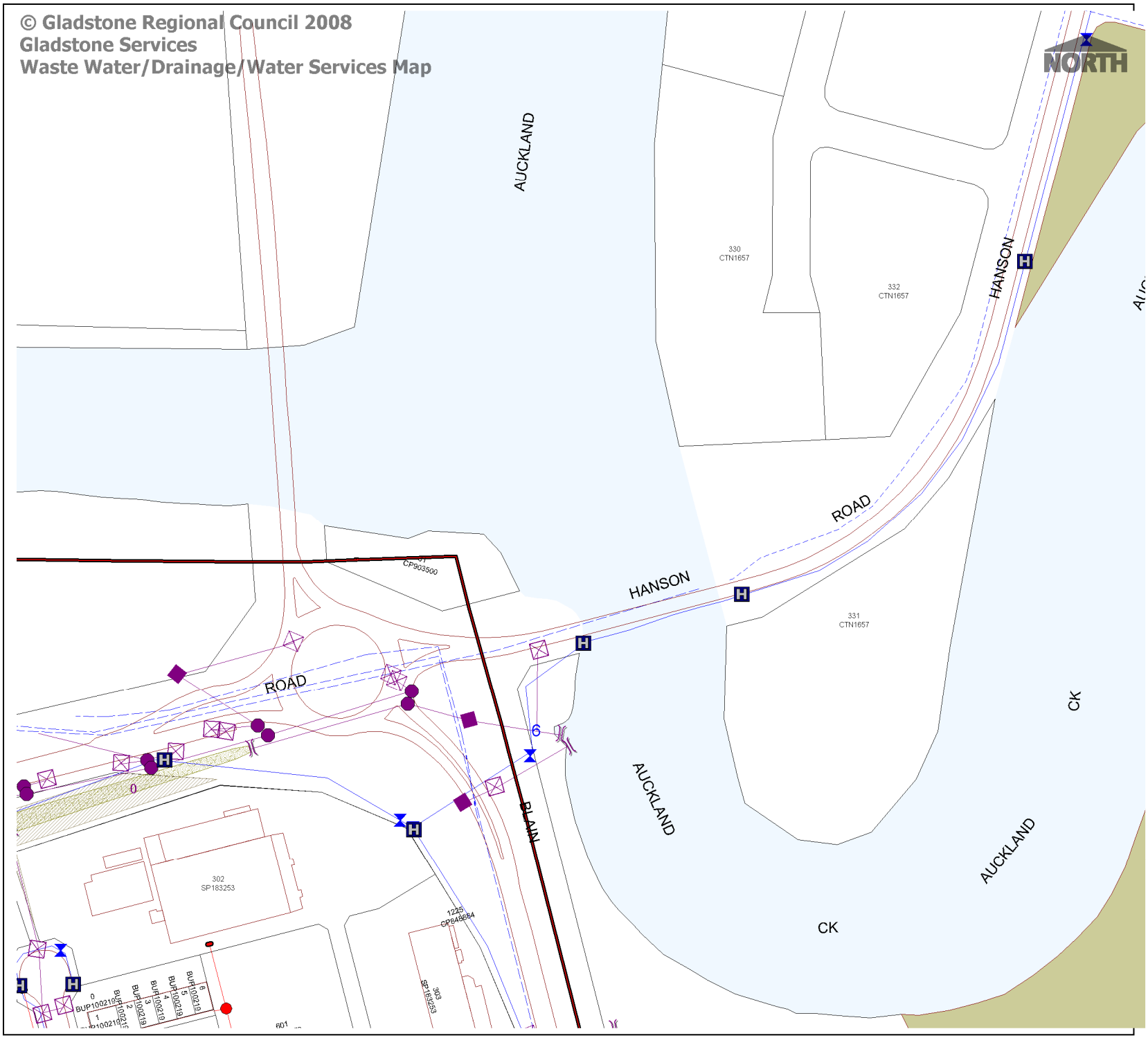
scale	1:500 for A1	job no.	41-20490
date	MAY 2009	rev no.	B

approved SK005

Plot Date: 18 June 2009 - 3:53 PM Plotted by: Benjamin J. Taylor , Brisbane Cad File No: G:\41\20490\CADD\Drawings\Intersection Upgrade\41-20490-SK005.dwg

Appendix B

Dial-Before-You-Dig information



15496748 - Hanson Rd Map 2

Map Created on :
13 March 2009

Map Created by :
kelleneh

GDA

Map Width is
600 **in** m

Map Scale: 1:2,779

LEGEND

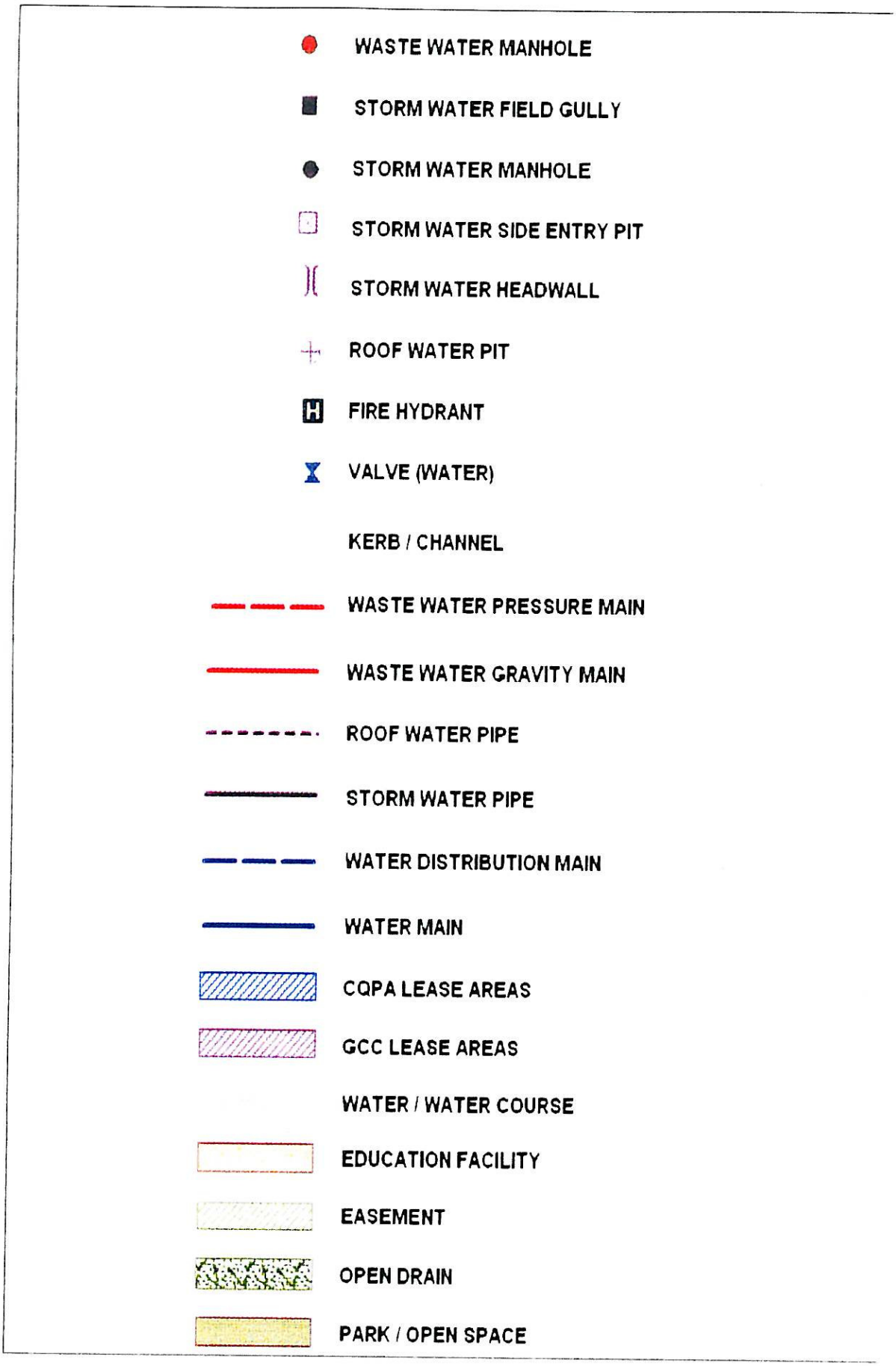
- NewDrainageFi dGully
- NewDrainageM holes
- NewDrainageSi EntryPits
- NewSewerMair nanceHole
- StreetNamesTe
- RealPropDescri onText
- Sewerage Requ Location
- Roofwater Pit
- Fire Hydrants

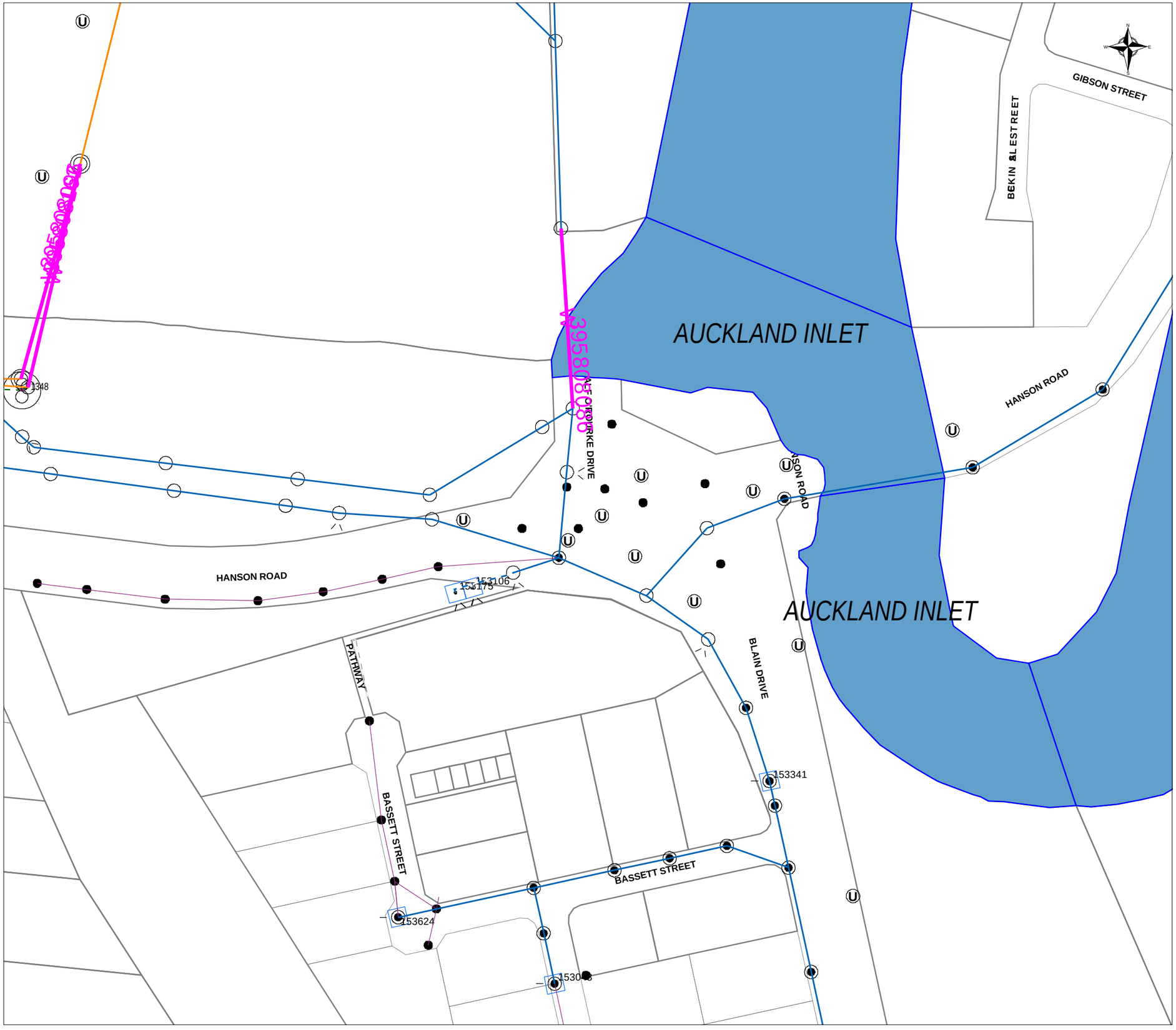
GLADSTONE REGIONAL COUNCIL

Gladstone Office
PO Box 29
Gladstone Q 4680

Phone: 07 4970 0700
Fax: 07 4972 3381

Originally A4 Size


WASTE WATER MANHOLE
STORM WATER FIELD GULLY
STORM WATER MANHOLE
STORM WATER SIDE ENTRY PIT
STORM WATER HEADWALL
ROOF WATER PIT
FIRE HYDRANT
VALVE (WATER)
KERB / CHANNEL
WASTE WATER PRESSURE MAIN
WASTE WATER GRAVITY MAIN
ROOF WATER PIPE
STORM WATER PIPE
WATER DISTRIBUTION MAIN
WATER MAIN
CQPA LEASE AREAS
GCC LEASE AREAS
WATER / WATER COURSE
EDUCATION FACILITY
EASEMENT
OPEN DRAIN
PARK / OPEN SPACE



ERGON ENERGY

Hanson Road

Gladstone Central

Created by: Kelly DAVIS

Created date: 13/03/2009 12:30:11

Scale: 1:2450

LEGENDS

DCDB

- Easements
- Land Parcel - STATE LAND
- Land Parcel - LANDS LEASE
- Land Parcel - FREEHOLD
- Land Parcel - RESERVE
- Watercourse

Electricity

- Communications Cable - as constructed
- Communications Joint - as constructed
- Communications Line - as constructed
- Communications Pit - as constructed
- Pole - HV
- Pole - TR/HV
- Pole - HV/LV
- Pole - LV
- Pole - Unknown
- Substation - Pole
- Substation - Ground
- WaterWay Crossing

Low Voltage

- LV Line - as constructed (415v)
- LV Isolating Device - as constructed (415v)

High Voltage

- HV Cable - as constructed (11kv)
- HV Line - as constructed (11kv)
- Hv Isolating Device - as constructed (11Kv)

Transmission

- TR Line - as constructed (66kv)

Envestra

Investing in energy infrastructure

APA Group

LEGEND

TN	Transmisson Pressure Natural Gas
HN	High Pressure Natural Gas
MN	Medium Pressure Natural Gas
MNins	Inserted Medium Pressure Natural Gas
LN	Low Pressure Natural Gas
LNins	Inserted Low Pressure Natural Gas
LPG	LPG Reticulation
IDLE	Dormant Main
PROPOSED	Proposed Main

	Sleeve	S	Sewer Manhole
	Valve	PP	Power Pole
	Syphon	T	Telecom Pit
	Endcap	B	Baghole
R	Regulator		Reducer
	Pipe Connector		Purge Point
	Insulated Connection	W	Warning Sign (Marker)
CP	Cathodic Test Point		

APA Group Queensland Networks
A.B.N. 13 112 358 595

Location Map | Issued Date: 16-03-2009

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DBYD Ref:
15496753

SCALE 1:5000

-25 0 25 50 75 100

METRES

N W E S

Queensland Gas Pipeline

Pipeline Location Plan

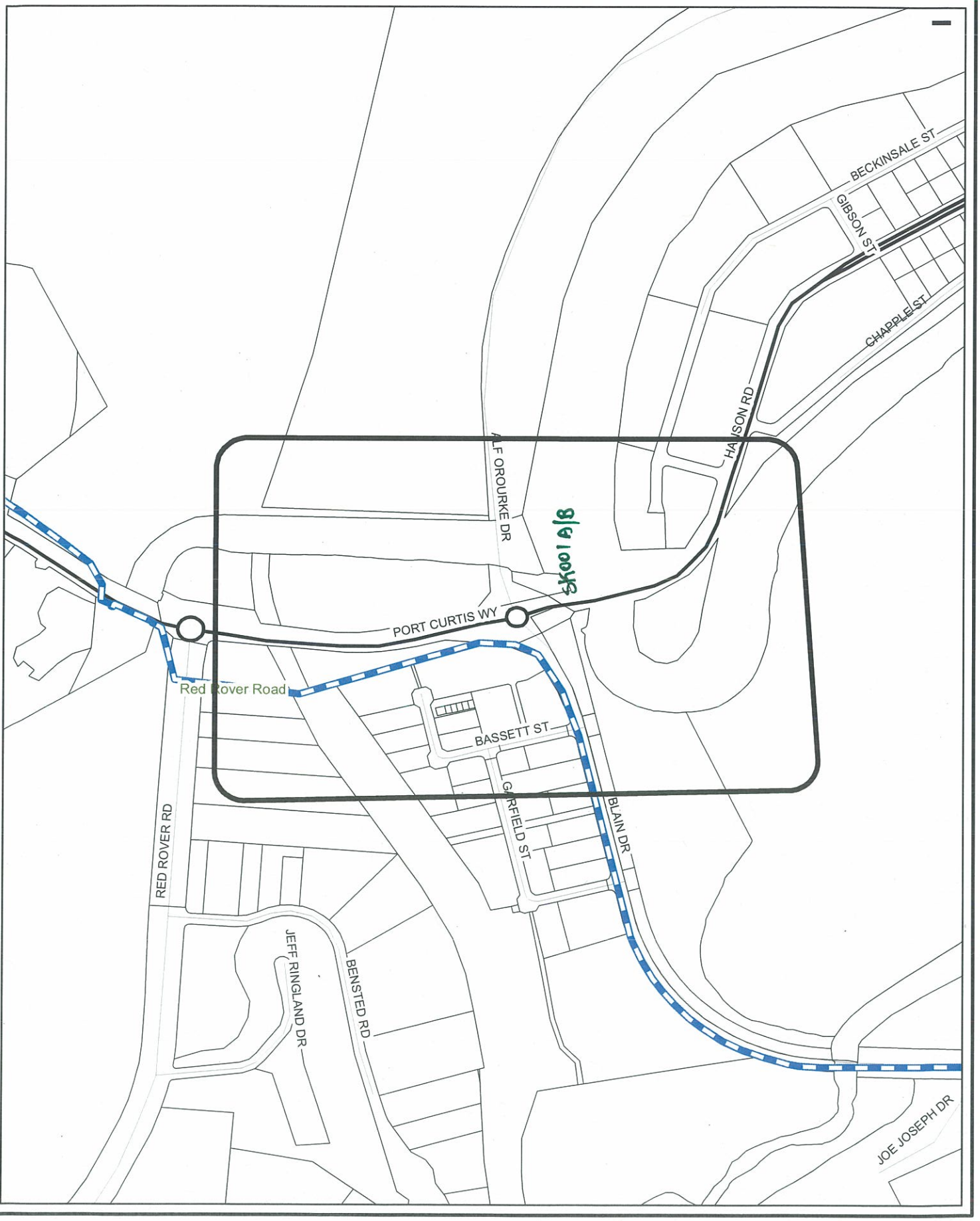
DIAL 1100
BEFORE YOU DIG

Jemena

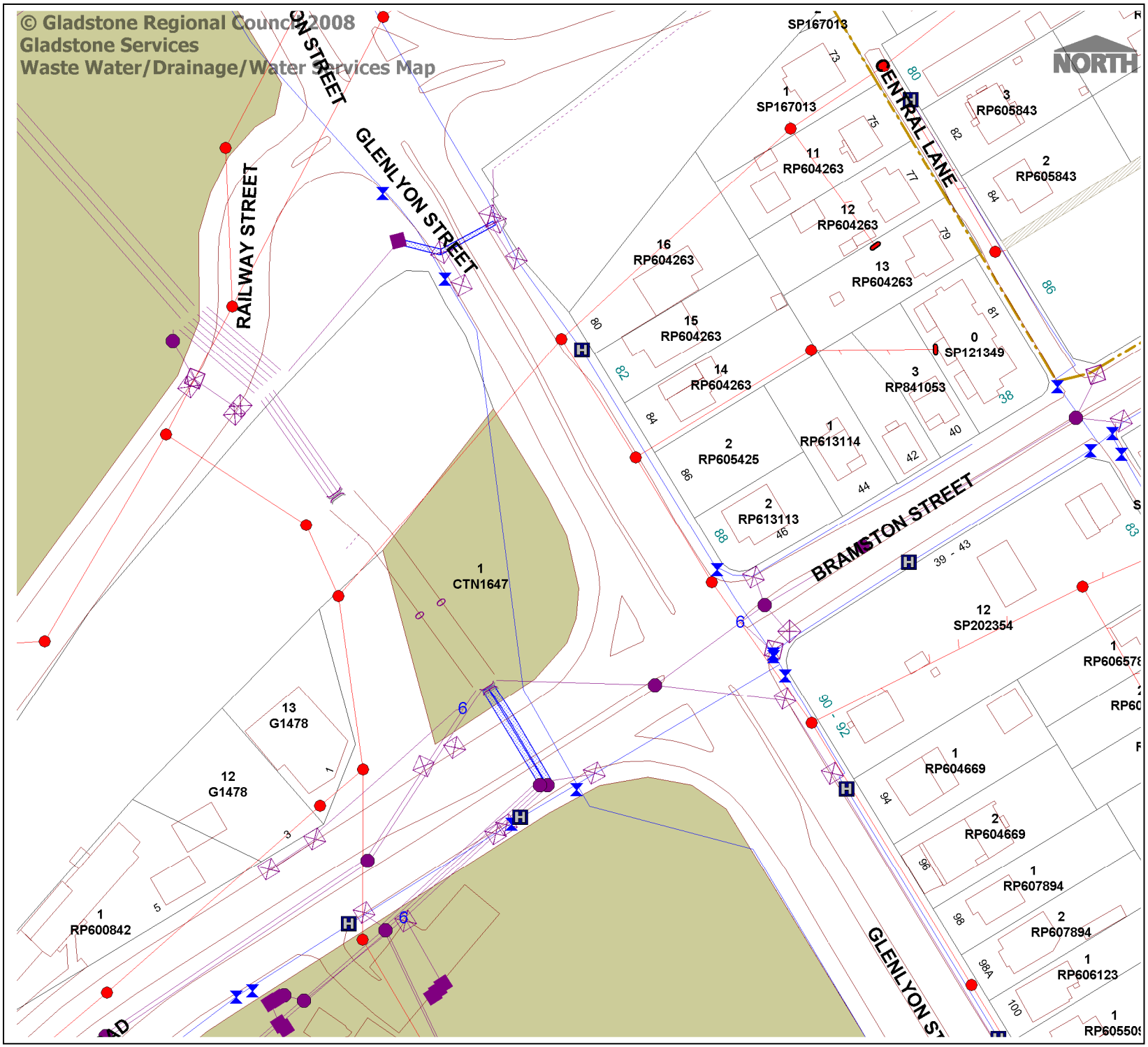
0 50 100 200 300 400
Meters

Date: Mar 13, 2009
Sequence No: 15496750

Queensland Gas Pipeline
DBYD Work Area




L153
CTN1910
DIST(AA)
P100
312.3
AUCKLAND INLET
c3507:HD-HE/1-36 36F/- SMOF FNPEHJ/STD (A
c4:M401-700 400 CPEIUT (BA)
100DEAD
3xP35 SUBDUCTS (CA)
c3002:YY-HG/1-22 22F/- SMOF FNPEHJ-D (CA
P100
ALF O'ROURKE DR
L31
VCL43040
94.7
MC
DIST(AA)
P100
REPAIR IN CONDUITS.(MH MOVED BACK 32.5m)
RD
HE
2591m
100DEAD 94.7
100 PEHJ
P35
32.5
P36 204/900
P36
2952m
1.0
3022.9
82.0
76.0
3.5
BENDS
c4:M401-550
c4:M603
c4:M605
c4:M622-623
c4:M651-700
2952m
DA36
MC
M
GM3
O1-100
O201-300
2x100 MBHJ
P100CE P35
3xP35 SUBDUCTS (AA)
c3002:YY-HG/1-22 22F/- SMOF FNPEHJ-D (AA1)
c4:M401-700 400 CPEIUT (AB)
100DEAD
c3507:HD-HE/1-36 36F/- SMOF FNPEHJ/STD (BB)
14
100DEAD 400 CPEIUT (AB)
c4:M501-650
150DEAD
3xP35 SUBDUCTS (BA)
c3002:YY-HG/1-22 22F/- SMOF FNPEHJ-D (BA1)
c3507:HE-HF/1-24 24F/- SMOF FNPEHJ/STD (BB)
QK800018
QK800018
3xP35 SUBDUCTS (AA)
c3002:YY-HG/1-22 22F/- SMOF FNPEHJ-D (AA1)
100DEAD 400 CPEIUT (AB)
c4:M501-650
150DEAD
c3507:HE-HF/1-24 24F/- SMOF FNPEHJ/STD (BB)
P100CE P35
T739
O61-70
P50
20.0
10
30 PEHJ
20.0
P50
10
20.0
T738
O71-80
2
6
12
193.3
193.3
2xDIST(AA)
P100
P20 21.0
10 PR PEHJ
O241-250
T853
AUCKLAND INLET



Infrastructure Services
Planning & Design - Road Reserve
15496839
Glenlyon Street, Gladstone Qld 4680

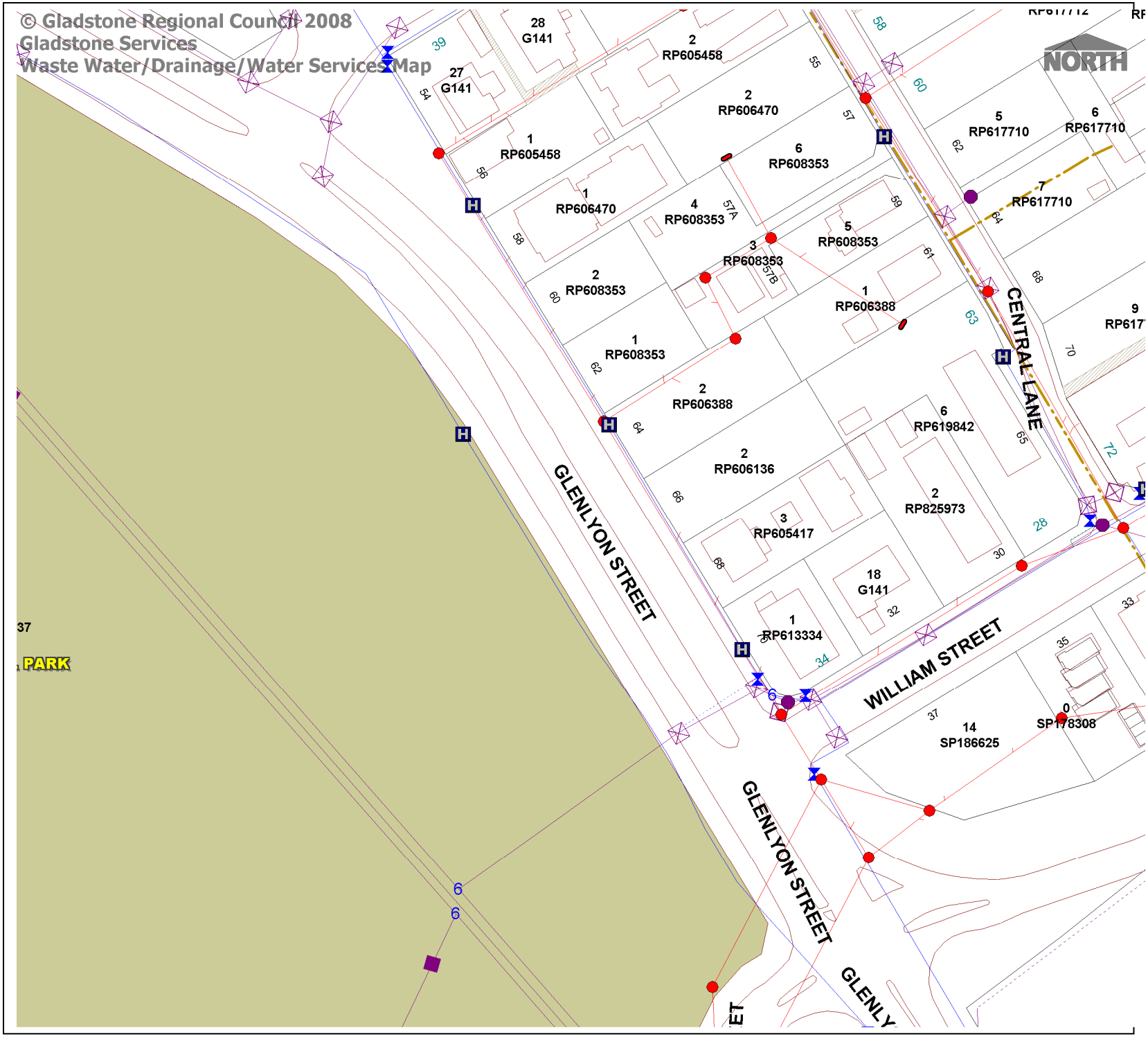
Map Created on : 13 March 2009
Map Created by : kelleneh
GDA

Map Width is 300 **in** m
Map Scale: 1:1,390

LEGEND

- NewDrainageFieldGully
- NewDrainageManholes
- NewDrainageSideEntryPits
- NewSewerMaintenanceHole
- HouseStreetNumberText
- AlternateStreetNumberText
- Sewerage Request Location
- Roofwater Pits
- Fire Hydrants
- Sewer Maintenance Hole
- GAWB Mains
- Water Valves
- Drainage Gross Pollutant Traps
- DrainageJ unctions

GLADSTONE REGIONAL COUNCIL
Gladstone Office
PO Box 29
Gladstone Q 4680
Phone: 07 4970 0700
Fax: 07 4972 3381
Originally A4 Size



15496839 - Glenlyon St Map 2

Map Created on :
13 March 2009
Map Created by :
kelleneh
GDA

Map Width is
300 in m
Map Scale: 1:1,390

LEGEND

NewDrainageFi dGully
NewDrainageM holes
NewDrainageSi EntryPits
NewSewerMair nanceHole
HouseStreetNur erText
AlternateStreetN mberText
Sewerage Requ Location
Roofwater Pit

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Gladstone Office
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Fax: 07 4972 3381
Originally A4 Size

Glenlyon Road

West Gladstone

Created by: Kelly DAVIS

Created date: 13/03/2009 13:03:41

Scale: 1:1980

LEGENDS

DCDB

- Building Unit Parcel - FREEHOLD
- Easements
- Land Parcel - STATE LAND
- Land Parcel - FREEHOLD
- Land Parcel - RESERVE
- Land Parcel - RAILWAY
- Strata Parcel - LANDS LEASE

Electricity

- Pillar - Commercial/Industrial
- Pillar - Unknown
- Pillar - Normal Pillar
- Pit - as constructed
- Substation - Pole
- Substation -
- Substation - Ground

Low Voltage

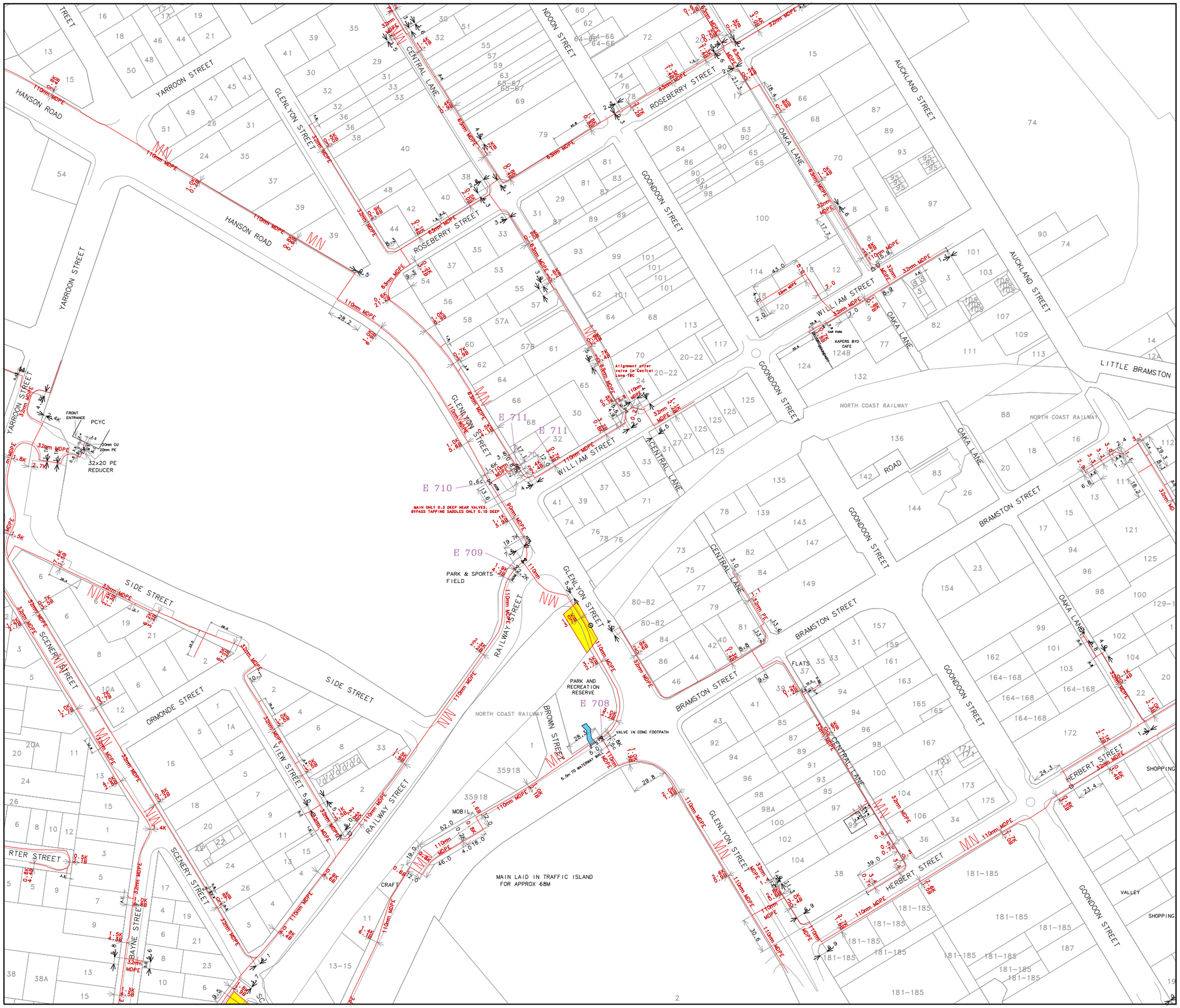
- LV Cable - as constructed (240v)
- LV Cable - as constructed (415v)
- LV Line - as constructed (240v)
- LV Line - as constructed (415v)
- LV Line - as constructed (Streetlight)
- LV Isolating Device - as constructed (240v)
- LV Isolating Device - OpenBridge_as constructed (240v)
- LV Isolating Device - as constructed (415v)
- LV Isolating Device - OpenBridge_as constructed (415v)

High Voltage

- HV Cable - as constructed (11kv)
- HV Line - as constructed (11kv)
- Hv Isolating Device - as constructed (11Kv)

Drafting

- Redline Line (Path)



Envestra

Investing in energy infrastructure

APA Group

LEGEND

TN	Transmisson Pressure Natural Gas
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MNins	Inserted Medium Pressure Natural Gas
LN	Low Pressure Natural Gas
LNins	Inserted Low Pressure Natural Gas
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	Endcap	B	Baghole
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	Pipe Connector		Purge Point
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APA Group Queensland Networks

A.B.N. 13 112 358 595

Location Map — Issued Date: 16-03-2009

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DBYD Ref:
15496843

SCALE 1:3000

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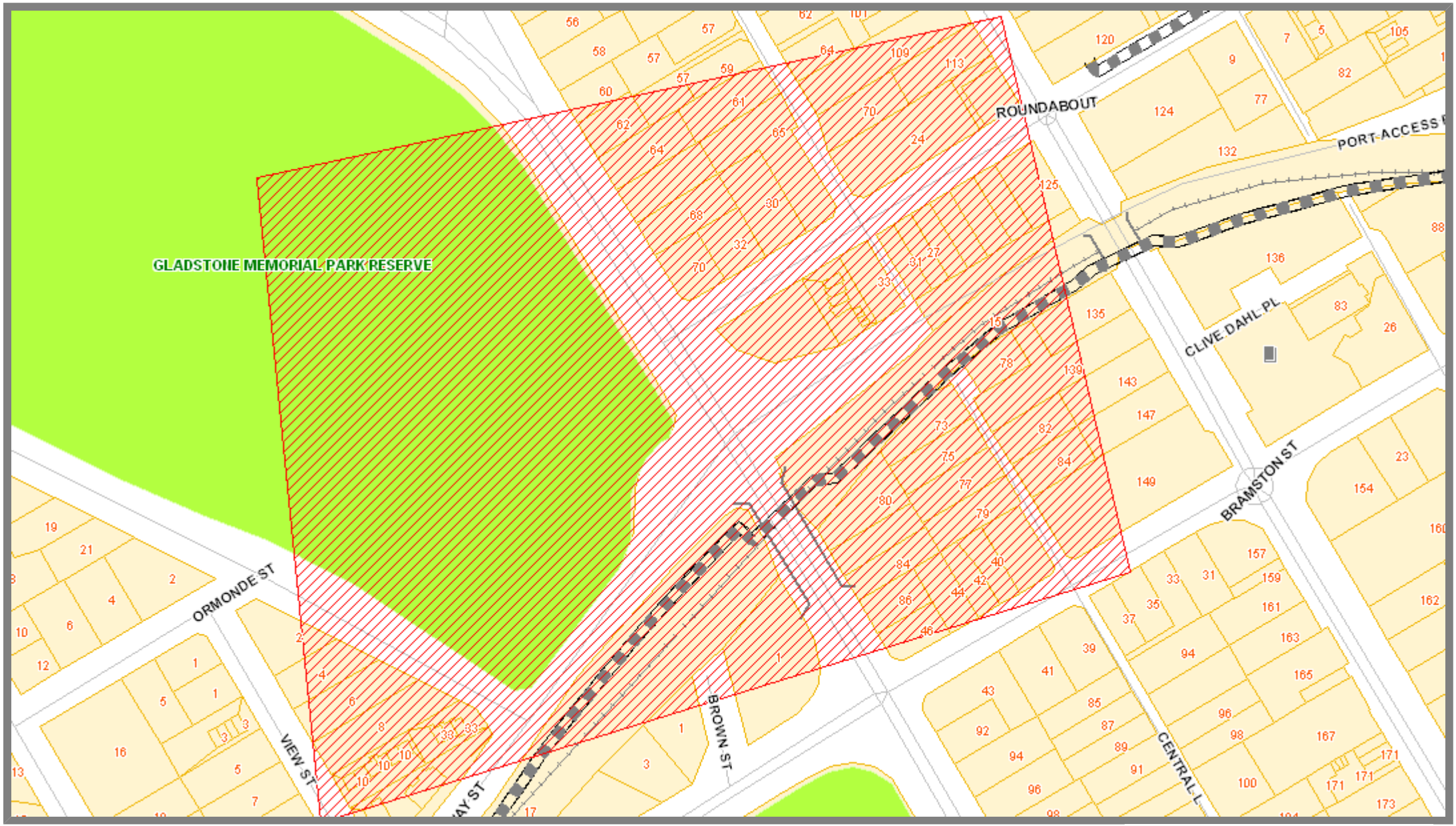
METRES

N W E S



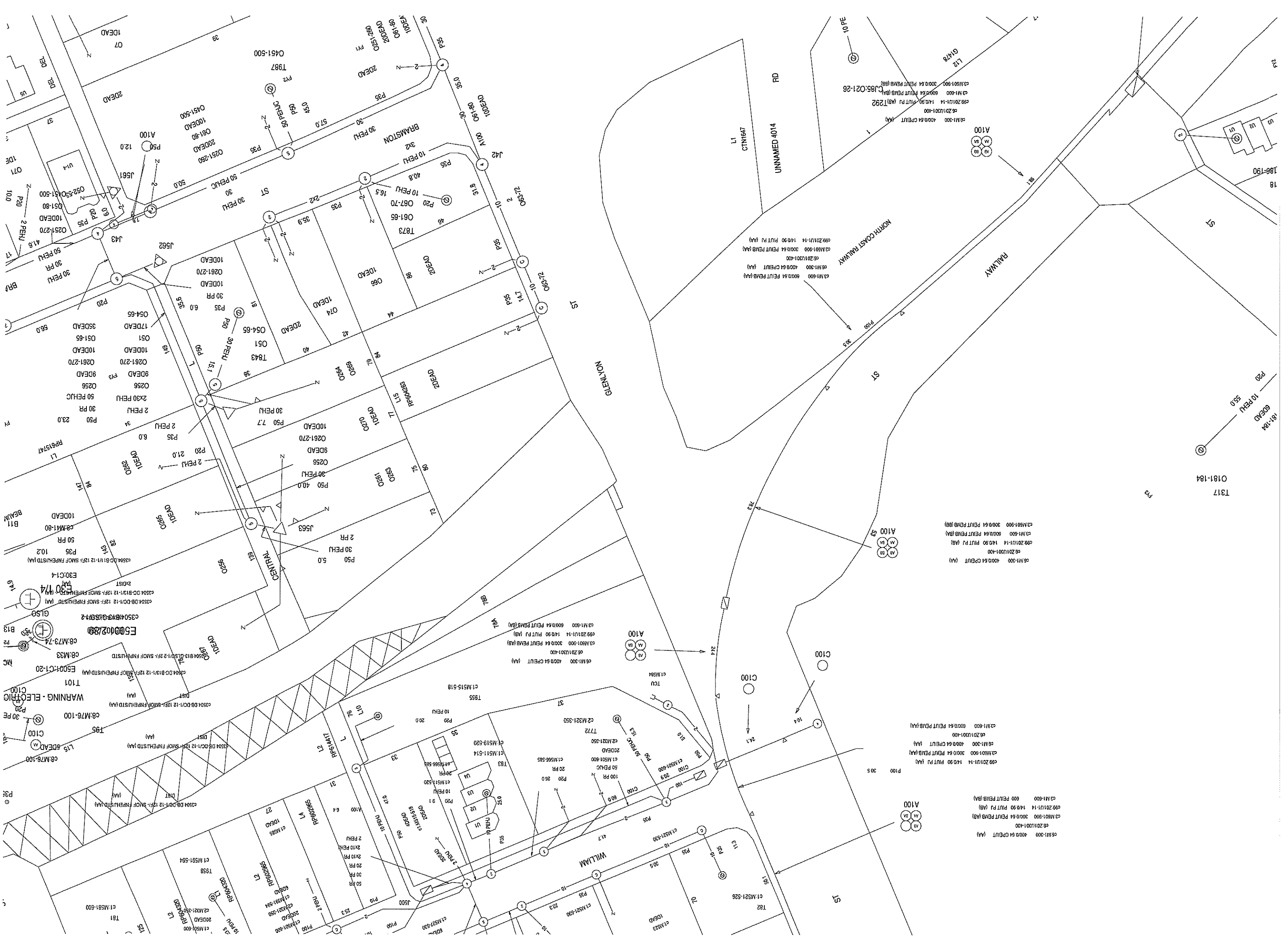
Sequence Number: 15496841

Date: 13/03/2009

Reef Networks

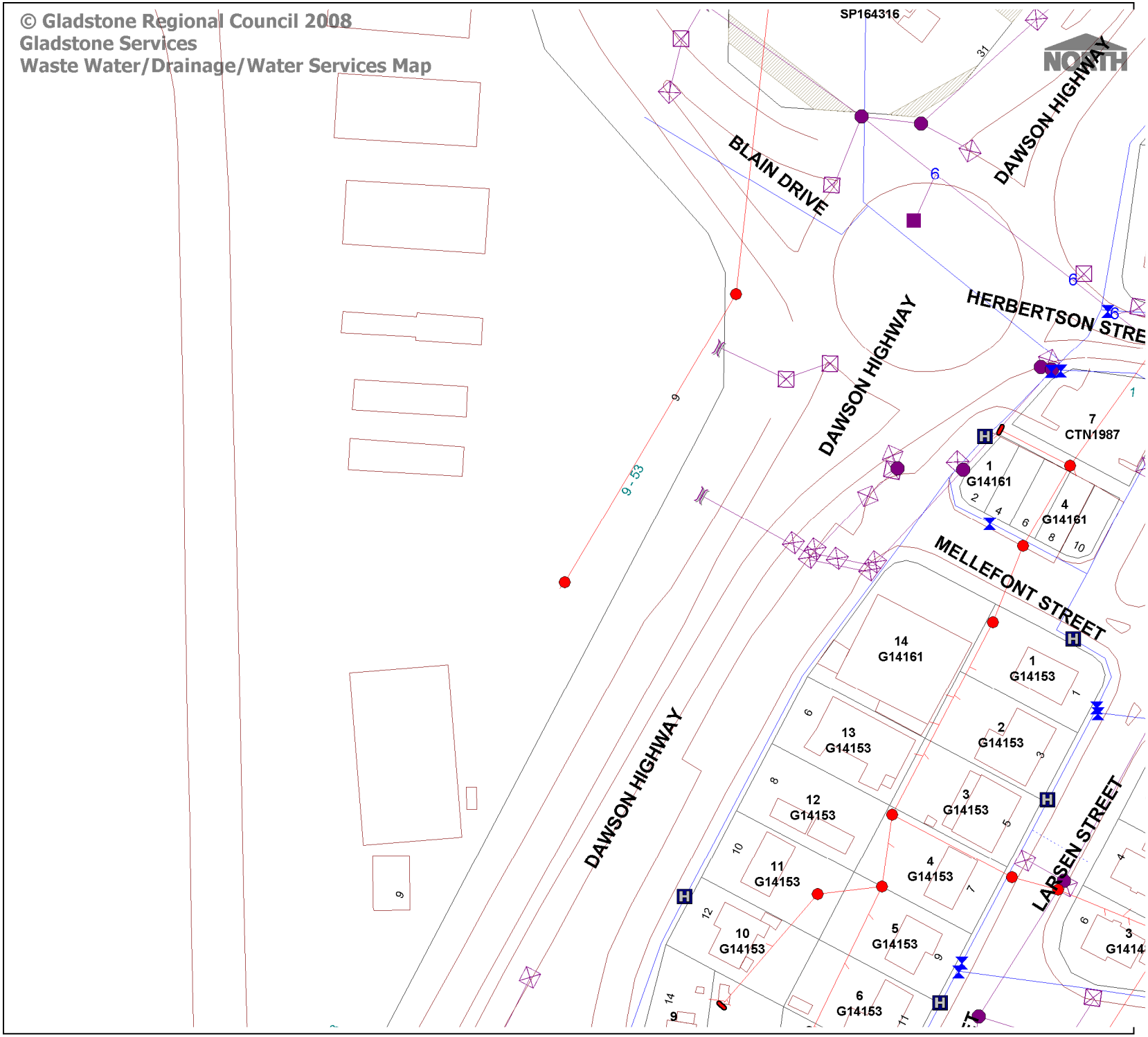
LEGEND

Digsite	Assets
Point	Cable
Line	
Area	



CENTRAL
GLENLYON
ST
WILLIAM
BRAMSTON
ST
UNNAMED 4014
RD
NORTH COAST RAILWAY
RAILWAY
ST
WARNING - ELECTRIC
C100
T101
E5001:C1-20
J563
J562
J561
J43
J42
J500
L1
CTN1647
L2
RP604320
RP602965
L4
RP614417
L15
RP604263
T987
T873
T843
T955
T772
T82
T317
O181-184
T292
A100
C100
P100
P35
P50

Gladstone Services
Waste Water/Drainage/Water Services Map



15497218 - Dawson Hwy Map 2

Map Created on :
13 March 2009
Map Created by :
kelleneh
GDA

Map Width is
300 **in** m
Map Scale: 1:1,390

LEGEND

NewDrainageFi
dGully
NewDrainageM
holes
NewDrainageSi
EntryPits
NewSewerMair
nanceHole
HouseStreetNur
erText
AlternateStreetN
mberText
Sewerage Requ
Location
Roofwater Pit

GLADSTONE
REGIONAL COUNCIL

Gladstone Office
PO Box 29
Gladstone Q 4680

Phone: 07 4970 0700
Fax: 07 4972 3381
Originally A4 Size

ERGON ENERGY

Dawson Highway

West Gladstone

Created by: Kelly DAVIS

Created date: 13/03/2009 14:46:43

Scale: 1:1380

LEGENDS

DCDB
- Easements
- Land Parcel - FREEHOLD
- Land Parcel - RESERVE

Unregistered Property
- URP Features

Electricity
- CI Pillar - Commercial/Industrial
- Substation - Pole
- Substation - Ground

Low Voltage
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- LV Cable - as constructed (Streetlight)
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High Voltage
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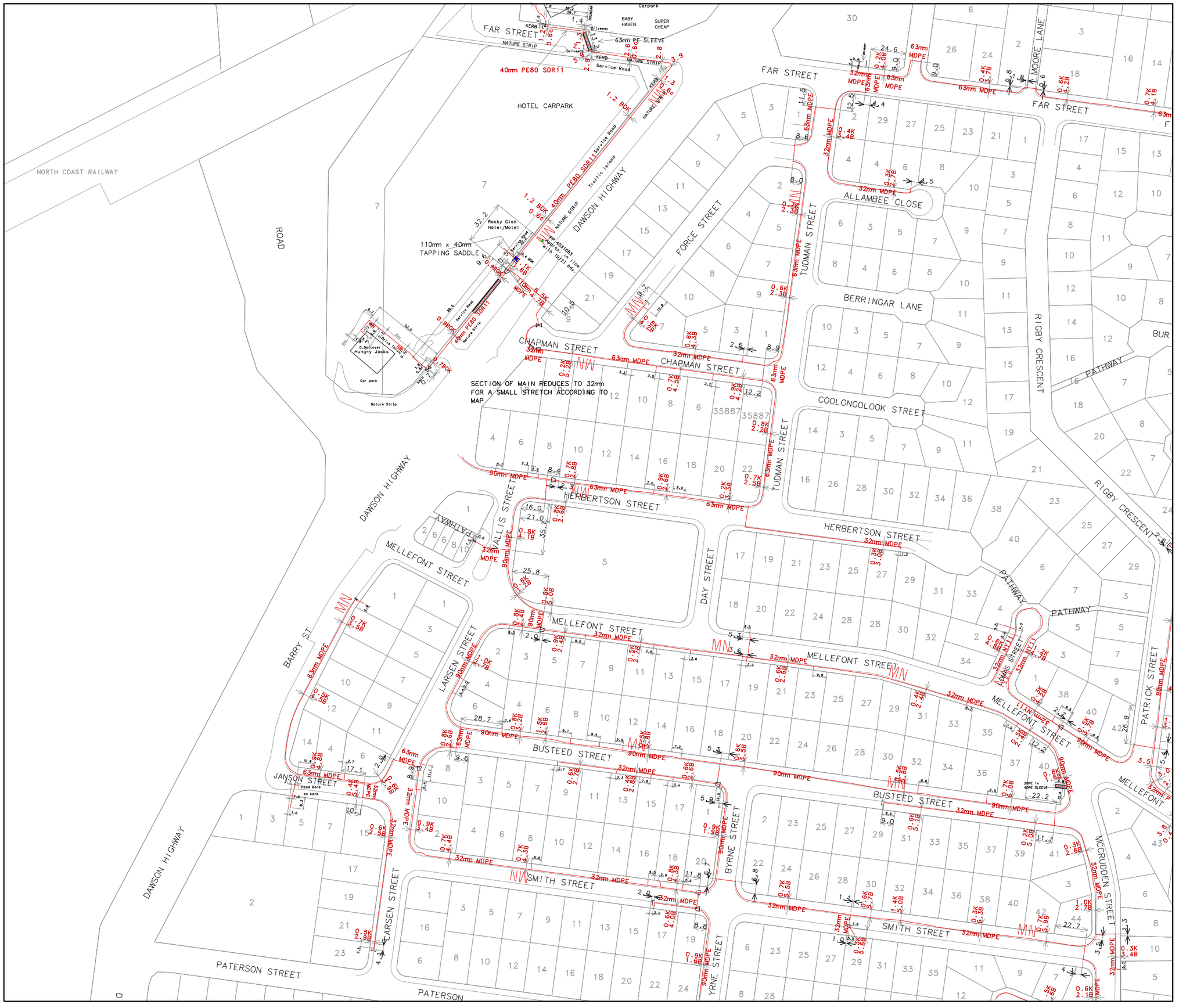
- HV Line - as constructed (11kv)
- Hv Isolating Device - as constructed (11Kv)



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LNins	Inserted Low Pressure Natural Gas
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	Valve	PP	Power Pole
	Syphon	T	Telecom Pit
	Endcap	B	Baghole
R	Regulator		Reducer
	Pipe Connector		Purge Point
( )	Insulated Connection	W	Warning Sign (Marker)
CP	Cathodic Test Point		

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Location Map | Issued Date: 16-03-2009

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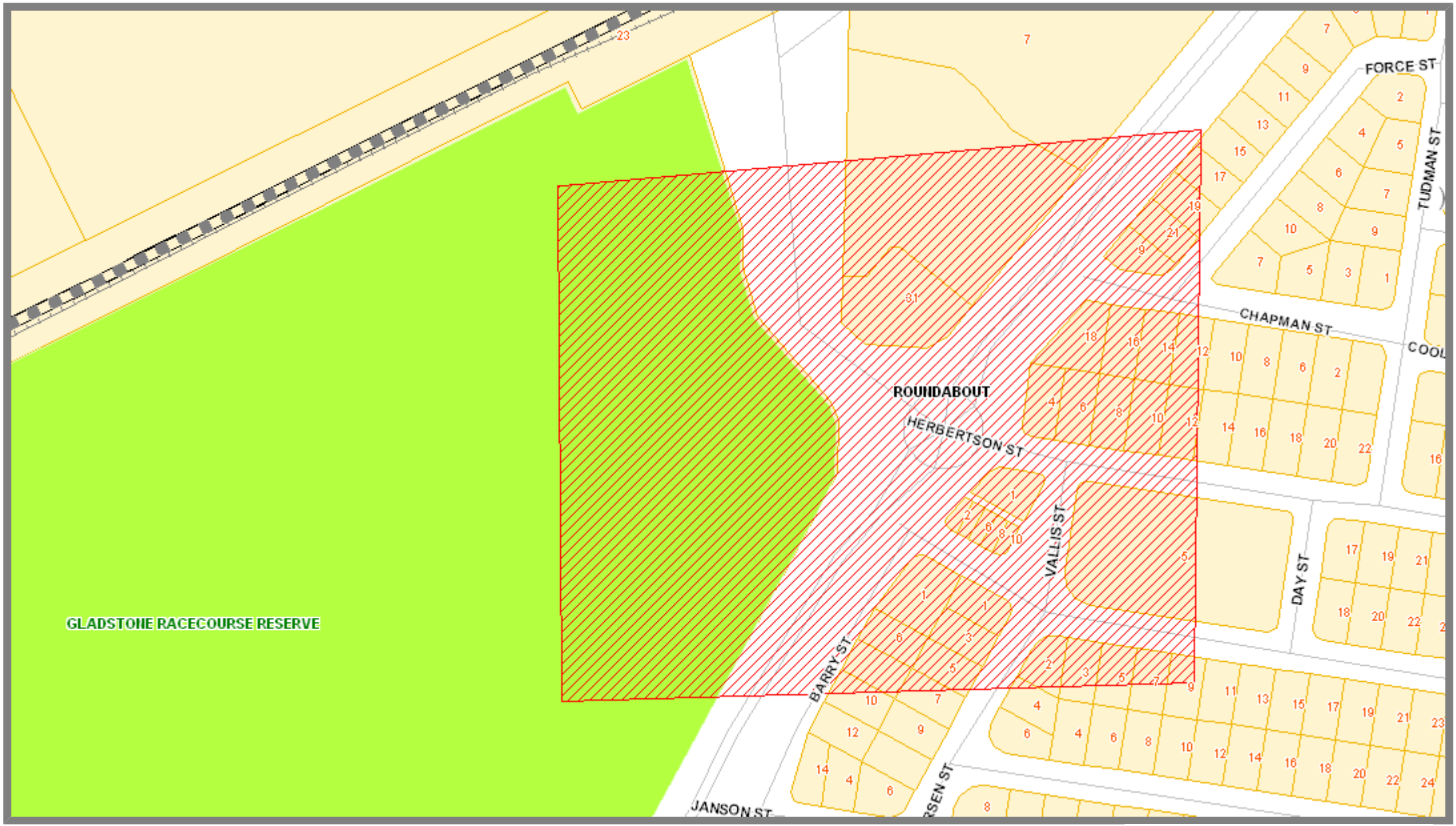
DBYD Ref.
15497222

SCALE 1:2500
-10 0 10 20 30 40
METRES

N W E S



Sequence Number: 15497220

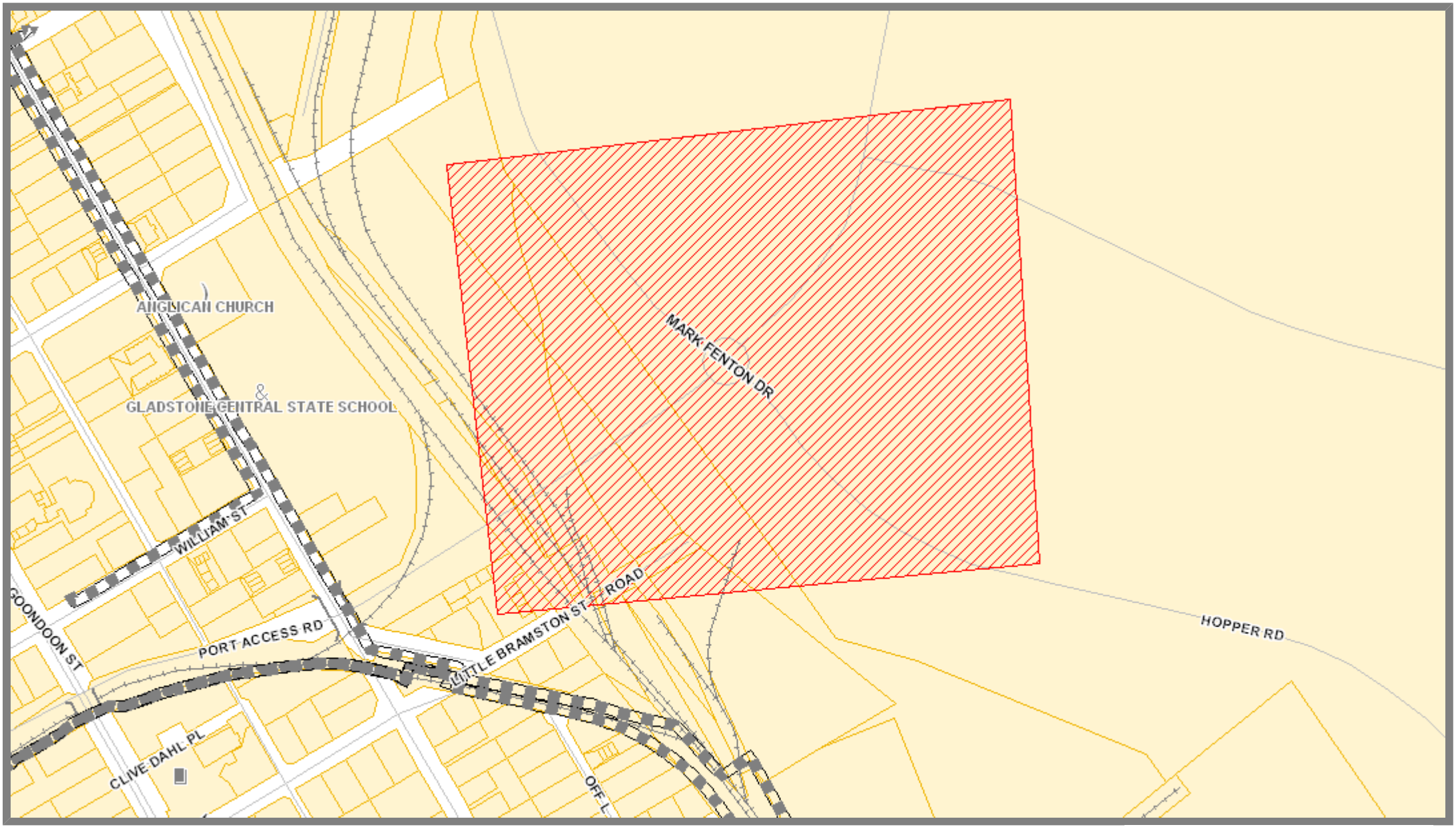
Date: 13/03/2009

Reef Networks

LEGEND

Digsite	Assets
Point	Cable
Line	
Area	

QK800384
JOINS CNON CC 12
A100
QK800384
JOINS GLST CC 118
P20 308/900
WARNING - ELECTRICITY
CE
A41
0 ohms
HUNGRY JACKS
VALLIS
ST
HERBERTSON
MC
2x30 PEHJ
126.7
53.0
QK800384(BA1)
DIST(AA)
J224
J223
J456
T326
T320
T327
T969
G14161



Sequence Number: 15496896

Date: 13/03/2009

Reef Networks

LEGEND

Digsite	Assets
Point	Cable
Line	
Area	

Appendix C

Cost Estimates

CLIENTS | PEOPLE | PERFORMANCE

QGC - A BG Group Business

Curtis Island LNG Project

Gladstone Intersection Upgrades - Concept Design Cost Estimate Report

June 2009

INFRASTRUCTURE | MINING & INDUSTRY | DEFENCE | PROPERTY & BUILDINGS | ENVIRONMENT

Contents

Table Index

Appendices

1. Introduction

1.1 Background

GHD has been engaged by QGC – A BG Group Business to provide Infrastructure Engineering services for the Queensland Curtis LNG Project. The role generally involves providing technical support, undertaking studies and reviewing reports done by others regarding infrastructure requirements for the project.

As part of the QCLNG EIS currently being undertaken, QGC has to analyse the effect of the logistics of the construction and operational phases of the plant on the existing road network in and around Gladstone.

GHD has been engaged to undertake the concept design of the intersection upgrades and pre-feasibility cost estimates of the proposed work.

This report contains pre-feasibility cost estimates of the works required to upgrade the intersections. For all information regarding the concept design, design standards, upgrade requirements, service conflicts, stormwater drainage and land resumption reference should be made to the Curtis Island LNG Project - Gladstone Intersection Upgrades Concept Design Report,

2. Purpose and Scope of Works

2.1 Purpose

The purpose of the concept design is to ascertain the pre-feasibility of constructing the intersections as shown in the Traffic Reports considering the requirements of Gladstone City Council, Austroads and The Department of Main Roads standards and the constraints upon each site. The purpose of this report is to provide pre-feasibility cost estimates of the proposed intersection upgrade works.

2.2 Scope of Works

Scope of works is:

- The provision of pre-feasibility cost estimate to + / - 35%; and
- Compile concept design cost estimate report.

3. Cost Estimates

Pre-feasibility cost estimates based on the concept design have been undertaken for each intersection. A summary of the estimates is shown below with the full estimate included in Appendix A.

3.1 Base Case

Table 1 Estimated Cost Summary (Base Case)

Intersection	Estimated Cost
Hanson Road / Alf O'Rourke Drive / Blain Drive – Option A	$1,990,000
Glenlyon Street / Port Access Road	$130,000
Glenlyon Street / Bramston Road / Dawson Road	$73,000
Port Access Road / Mark Fenton Drive / Hopper Road / Tug Berth Access Road	$1,753,000
Dawson Highway / Blain Drive / Herbertson Street	$189,000
Philip Street / Dawson Highway	$356,000
TOTAL	$4,491,000

3.2 Possible Alternatives

3.2.1 Hanson Road / Alf O'Rourke Drive / Blain Drive – Option B

To avoid costly and impractical bridge widening works an alternative option has been considered and included below:

Table 2 Estimated Cost Summary – Hanson Road Alternative

Intersection	Estimated Cost
Hanson Road / Alf O'Rourke Drive / Blain Drive – Option B	$508,000

3.2.2 Port Access Road / Mark Fenton Drive / Hopper Road / Tug Berth Access Road

A visual assessment of the Port Access Road / Mark Fenton Drive / Hopper Road / Tug Berth Access Road has been undertaken and rough order costs, without any degree of accuracy, of three possible alternative options for this intersection are included below:

Table 3 Rough Order Costs – Port Access / Mark Fenton Alternative

Port Access Road / Mark Fenton Drive / Hopper Road / Tug Berth Access Road - Alternatives	Rough Order Cost
Provision of signalisation to existing roundabout and minor works to accommodate signals	$400,000
Reconfiguration of intersection to a four-way signalised intersection (including signals)	$750,000
Reconstruct roads and relocate roundabout away from watercourse	$1,000,000

3.3 Basis for Estimation

The cost estimates have been based on the following:

- The estimates have a base date of 27 April 2009;
- Current contract rates obtained from recent similar jobs were utilised in developing the estimates;
- The estimates are based on an incomplete design and are not warranted by GHD;
- The accuracy of the estimates is not expected to be better than ± 35% for the items described in the schedules;
- As no geotechnical or topographical survey information is available the pavement type, depth and earthworks treatment have all been assumed and are subject to change;
- No streetlight or traffic signal design has been undertaken. An allowance for streetlights where it is assumed applicable has been made and is subject to change;
- The estimates are based on Drawing Nos. 41-20490-07-SK001 to 41-20490-07-SK005 refer Curtis Island LNG Project - Gladstone Intersection Upgrades Concept Design Report;
- No allowance has been made for excavation in rock;
- The rates provided for cut to spoil assume that transportation and disposal will occur within a 10 km radius from the site; and
- No allowance has been made for landscaping of the works beyond topsoiling and grassing.

Appendix A

Cost Estimates

- Hanson Road / Blain Drive (Opt-A)
- Hanson Road / Blain Drive (Opt-B)
- Glenlyon Street / Port Access / Railway Street
- Glenlyon Street / Dawson Road / Bramston Road
- Port Access Road / Mark Fenton Drive / Hopper Road
- Blain Drive / Dawson Highway / Herbertson Street
- Philip Street / Dawson Highway

HANSON RD/BLAIN DRIVE (OPT-A)
Pre-Feasibility Costing Summary

Item	Description	Unit	Rate	Qty	Amount
1.00	**PRELIMINARIES**				
1.01	Establishment (% of construction cost)	Item	10%	1	142,120
1.02	Provision for Traffic (% of establishment cost)	Item	40%	1	56,848
1.03	Environmental Management (% of est. cost)	Item	10%	1	14,212
1.04	Erosion and Sediment Control including measures for stockpile site (% of est. cost)	Item	10%	1	14,212
1.05	Locate and protect existing underground services (% of est. cost)	Item	2%	1	2,842
2.00	**EARTHWORKS**				
2.01	Clearing and Grubbing	LS	2,000.00	1	2,000
2.02	Topsoil				
	(a) Strip to stockpile and Respread (150mm nom. Depth)	m^3	10.00	475	4,750
2.03	Earthworks				
	(a) Cut to Fill	m^3	12.50	850	10,625
	(b) Import Fill	m^3	25.00	2,000	50,000
	(c) Preparation of stockpile area	Item	1,000.00	1	1,000
	(d) Excavate & dispose of unsuitable material below road subgrade - blanket layer **(Provisional Quantity – If Ordered)**	m^3	15.00	100	1,500
2.04	Replacement of unsuitable material:				
	(a) CBR 15 material to replace excavation below subgrade **(Provisional Quantity – If Ordered)**	m^3	50.00	150	7,500
	(b) Type 2.4 Cement Stabilised (Working Platform) **(Provisional Quantity – If Ordered)**	m^3	75.00	80	6,000
	(c) Geofabric wrapped 150mm spalls to replace excavation below subgrade **(Provisional Quantity - If Ordered)**	m^3	4.00	640	2,560
2.05	Subgrade Treatment	m^2	5.00	2,000	10,000
3.00	**ROADWORKS**				
3.01	Supply and Place Pavement Material				
	(a) Granular pavement layers	m^3	90.00	1,000	90,000
	(b) 50mm AC surfacing	m^2	30.00	2,000	60,000
3.02	Kerb and Channel / Kerb				
	(a) Kerb	m	45.00	170	7,650
	(b) Kerb and Channel	m	55.00	720	39,600
3.03	Grassing				
	(a) Hydromulch verges and batters	m^2	1.00	2,160	2,160
3.04	Relocate Existing Guide Signs	No.	350.00	6	2,100
3.05	Warning, Regulatory, Speed and Street Signs	No.	350.00	3	1,050
3.06	Linemarking	m	2.00	2,700	5,400
3.07	Patterned Concrete Median	m^2	180.00	0	0
3.08	Concrete Footpath	m^2	100.00		0
3.08	Concrete slab to bus shelter	m^2			0
4.00	**DRAINAGE WORKS**				
4.01	Major culvert crossings	No.		0	0
4.02	Network Drainage				
	(a) pipe length - 600 mm diameter	m	300.00	30	9,000
	(b) Gully pits/Field inlets	No.	2,500.00	2	5,000
	(c) Outlet structures	No.	3,000.00	2	6,000
4.03	Dumped Rock Protection	m^2	150.00	10	1,500
4.04	Turf lined open drain	m	55.00	0	0
5.00	**MISCELLANEOUS**				
5.01	Bridge widening works	m^2	5,000	200	1,000,000
5.02	Compliance Testing, Quality Assurance Testing, Verification Testing for all works as specified – all sorts	Item		1	7,106
5.03	Preparation and submission of As-constructed	Item	10,000	1	10,000
5.04	Traffic Signals				
	(a) Signalisation at roundabout	No.		0	0
5.05	Intersection and Route Lighting	No.	4,000	4	16,000
5.06	Noise Barriers	Item		0	0
5.07	Fauna Crossings (3.0x1.85x45m nom)	No.		0	0
5.08	Fauna Fencings	m		0	0
5.09	Fencing				
	(a) Nominal style for pricing	m		0	0
5.10	Property Accesses	No.		0	0
5.11	Traffic Barriers				
	(a) Wire Rope - along median	m		0	0
	(b) Guardrail	m		0	0
	(c) Guardrail terminals	No.		0	0
5.12	Temporary drainage works	Item		0	0
5.13	Subsoil drainage	m	22	900	19,800
5.14	Resumptions (Council Land / Road Reserve)	m^2		0	0
5.15	Resumptions (Residential)	m^2		0	0
5.16	Retaining walls	m^2		0	0
5.17	Service Relocations				
	(a) Telecommunications	LS	20,000	1	20,000
	(b) Energex (O/H mains)	LS	30,000	1	30,000
	(c) Watermains	LS		0	0
	(e) Sewer	LS		0	0

Construction Costs		HANSON RD/BLAIN DRIVE (OPT-A)
Total Estimated Cost Per Element		**$1,658,535**
Contingency	**20%**	**$331,707**

Total Estimated Cost Per Element	**$1,990,000**

HANSON RD/BLAIN DRIVE (OPT-B)
Pre-Feasibility Costing Summary

Item	Description	Unit	Rate	Qty	Amount
1.00	**PRELIMINARIES**				
1.01	Establishment (% of construction cost)	Item	10%	1	41,676
1.02	Provision for Traffic (% of establishment cost)	Item	40%	1	16,671
1.03	Environmental Management (% of est. cost)	Item	10%	1	4,168
1.04	Erosion and Sediment Control including measures for stockpile site (% of est. cost)	Item	10%	1	4,168
1.05	Locate and protect existing underground services (% of est. cost)	Item	2%	1	834
2.00	**EARTHWORKS**				
2.01	Clearing and Grubbing	LS	2,000.00	1	2,000
2.02	Topsoil				
	(a) Strip to stockpile and Respread (150mm nom. Depth)	m^3	10.00	465	4,650
2.03	Earthworks				
	(a) Cut to Fill	m^3	12.50	835	10,438
	(b) Import Fill	m^3	25.00	3,000	75,000
	(c) Preparation of stockpile area	Item	1,000.00	1	1,000
	(d) Excavate & dispose of unsuitable material below road subgrade - blanket layer **(Provisional Quantity – If Ordered)**	m^3	15.00	100	1,500
2.04	Replacement of unsuitable material:				
	(a) CBR 15 material to replace excavation below subgrade **(Provisional Quantity – If Ordered)**	m^3	50.00	100	5,000
	(b) Type 2.4 Cement Stabilised (Working Platform) **(Provisional Quantity – If Ordered)**	m^3	75.00	50	3,750
	(c) Geofabric wrapped 150mm spalls to replace excavation below subgrade **(Provisional Quantity - If Ordered)**	m^3	4.00	540	2,160
2.05	Subgrade Treatment	m^2	5.00	1,700	8,500
3.00	**ROADWORKS**				
3.01	Supply and Place Pavement Material				
	(a) Granular pavement layers	m^3	90.00	850	76,500
	(b) 50mm AC surfacing	m^2	30.00	1,700	51,000
3.02	Kerb and Channel / Kerb				
	(a) Kerb	m	45.00	202	9,090
	(b) Kerb and Channel	m	55.00	695	38,225
3.03	Grassing				
	(a) Hydromulch verges and batters	m^2	1.00	2,100	2,100
3.04	Relocate Existing Guide Signs	No.	350.00	6	2,100
3.05	Warning, Regulatory, Speed and Street Signs	No.	350.00	3	1,050
3.06	Linemarking	m	2.00	2,700	5,400
3.07	Patterned Concrete Median	m^2	180.00	0	0
3.08	Concrete Footpath	m^2	100.00		0
3.08	Concrete slab to bus shelter	m^2			0
4.00	**DRAINAGE WORKS**				
4.01	Major culvert crossings	No.		0	0
4.02	Network Drainage				
	(a) pipe length - 600 mm diameter	m	300.00	30	9,000
	(b) Gully pits/Field inlets	No.	2,500.00	2	5,000
	(c) Outlet structures	No.	3,000.00	2	6,000
4.03	Dumped Rock Protection	m^2	150.00	10	1,500
4.04	Turf lined open drain	m	55.00	0	0
5.00	**MISCELLANEOUS**				
5.01	Compliance Testing, Quality Assurance Testing, Verification Testing for all works as specified – all sorts	Item		1	2,084
5.02	Preparation and submission of As-constructed	Item	10,000	1	10,000
5.03	Traffic Signals				0
	(a) Signalisation at roundabout	No.		0	0
5.04	Intersection and Route Lighting	No.	4,000	4	16,000
5.05	Noise Barriers	Item		0	0
5.06	Fauna Crossings (3.0x1.85x45m nom)	No.		0	0
5.07	Fauna Fencings	m		0	0
5.08	Fencing				
	(a) Nominal style for pricing	m		0	0
5.09	Property Accesses	No.		0	0
5.10	Traffic Barriers				
	(a) Wire Rope - along median	m		0	0
	(b) Guardrail	m		0	0
	(c) Guardrail terminals	No.		0	0
5.11	Temporary drainage works	Item		0	0
5.12	Subsoil drainage	m	22	900	19,800
5.13	Resumptions (Council Land / Road Reserve)	m^2		0	0
5.14	Resumptions (Residential)	m^2		0	0
5.15	Retaining walls	m^2		0	0
5.16	Service Relocations				
	(a) Telecommunications	LS	20,000	1	20,000
	(b) Energex (O/H mains)	LS	30,000	1	30,000
	(c) Watermains	LS		0	0
	(e) Sewer	LS		0	0

Construction Costs		HANSON RD/BLAIN DRIVE (OPT-B)
Total Estimated Cost Per Element		**$486,362**
Contingency	**20%**	**$97,272**

Total Estimated Cost Per Element	**$584,000**

GLENLYON ST / PORT ACCESS / RAILWAY ST
Pre-Feasibility Costing Summary

Item	Description	Unit	Rate	Qty	Amount
1.00	**PRELIMINARIES**				
1.01	Establishment (% of construction cost)	Item	10%	1	9,269
1.02	Provision for Traffic (% of establishment cost)	Item	40%	1	3,707
1.03	Environmental Management (% of est. cost)	Item	10%	1	927
1.04	Erosion and Sediment Control including measures for stockpile site (% of est. cost)	Item	10%	1	927
1.05	Locate and protect existing underground services (% of est. cost)	Item	2%	1	185
2.00	**EARTHWORKS**				
2.01	Clearing and Grubbing	LS	2,000.00	1	2,000
2.02	Topsoil				
	(a) Strip to stockpile and Respread (150mm nom. Depth)	m^3	10.00	100	1,000
2.03	Earthworks				
	(a) Cut to Spoil	m^3	20.00	200	4,000
	(b) Cut to Fill	m^3	12.50	10	125
	(c) Preparation of stockpile area	Item	1,000.00	1	1,000
	(d) Excavate & dispose of unsuitable material below road subgrade - blanket layer **(Provisional Quantity – If Ordered)**	m^3	15.00	50	750
2.04	Replacement of unsuitable material:				
	(a) CBR 15 material to replace excavation below subgrade **(Provisional Quantity – If Ordered)**	m^3	50.00	50	2,500
	(b) Type 2.4 Cement Stabilised (Working Platform) **(Provisional Quantity – If Ordered)**	m^3	75.00	10	750
	(c) Geofabric wrapped 150mm spalls to replace excavation below subgrade **(Provisional Quantity - If Ordered)**	m^3	4.00	75	300
2.05	Subgrade Treatment	m^2	5.00	230	1,150
3.00	**ROADWORKS**				
3.01	Supply and Place Pavement Material				
	(a) Granular pavement layers	m^3	90.00	115	10,350
	(b) 50mm AC surfacing	m^2	30.00	230	6,900
3.02	Kerb and Channel / Kerb				
	(a) Kerb	m	45.00	30	1,350
	(b) Kerb and Channel	m	55.00	80	4,400
3.03	Grassing				
	(a) Hydromulch verges and batters	m^2	1.00	240	240
3.04	Relocate Existing Guide Signs	No.	350.00	1	350
3.05	Warning, Regulatory, Speed and Street Signs	No.	350.00	1	350
3.06	Linemarking	m	2.00	210	420
3.07	Patterned Concrete Median	m^2	180.00	0	0
3.08	Concrete Footpath	m^2	100.00		0
3.08	Concrete slab to bus shelter	m^2			0
4.00	**DRAINAGE WORKS**				
4.01	Major culvert crossings	No.		0	0
4.02	Network Drainage				
	(a) pipe length	m		0	0
	(b) Gully pits/Field inlets	No.	2,500.00	0	0
	(c) Outlet structures	No.		0	0
4.03	Dumped Rock Protection	m^2	150.00	0	0
4.04	Turf lined open drain	m	55.00	0	0
5.00	**MISCELLANEOUS**				
5.01	Compliance Testing, Quality Assurance Testing, Verification Testing for all works as specified – all sorts	Item		1	463
5.02	Preparation and submission of As-constructed	Item	2,000	1	2,000
5.03	Traffic Signals				
	(a) Relocate signals, conrol box and install new signal & reconfigure phasing	LS	30,000	1	30,000
5.04	Intersection and Route Lighting	No.	4,000	2	8,000
5.05	Noise Barriers	Item		0	0
5.06	Fauna Crossings (3.0x1.85x45m nom)	No.		0	0
5.07	Fauna Fencings	m		0	0
5.08	Fencing				
	(a) Nominal style for pricing	m		0	0
5.09	Property Accesses	No.		0	0
5.10	Traffic Barriers				
	(a) Wire Rope - along median	m		0	0
	(b) Guardrail	m		0	0
	(c) Guardrail terminals	No.		0	0
5.11	Temporary drainage works	Item		0	0
5.12	Subsoil drainage	m	25	110	2,750
5.13	Resumptions (Council Land / Road Reserve) - Possible	m^2		0	0
5.14	Resumptions (Residential)	m^2		0	0
5.15	Retaining walls - average 0.5 m high	m^2	200	10	2,000
5.16	Service Relocations				
	(a) Telecommunications	LS		0	0
	(b) Energex (O/H mains)	LS	10,000	1	10,000
	(c) Watermains	LS		0	0
	(e) Sewer	LS		0	0

Construction Costs		**GLENLYON ST / PORT ACCESS / RAILWAY ST**
Total Estimated Cost Per Element		**$108,163**
Contingency	**20%**	**$21,633**

Total Estimated Cost Per Element	**$130,000**

GLENLYON ST / DAWSON RD / BRAMSTON ST
Pre-Feasibility Costing Summary

Item	Description	Unit	Rate	Qty	Amount
1.00	**PRELIMINARIES**				
1.01	Establishment (% of construction cost)	Item	10%	1	5,208
1.02	Provision for Traffic (% of establishment cost)	Item	40%	1	2,083
1.03	Environmental Management (% of est. cost)	Item	10%	1	521
1.04	Erosion and Sediment Control including measures for stockpile site (% of est. cost)	Item	10%	1	521
1.05	Locate and protect existing underground services (% of est. cost)	Item	2%	1	104
2.00	**EARTHWORKS**				
2.01	Clearing and Grubbing	LS	2,000.00	1	2,000
2.02	Topsoil				
	(a) Strip to stockpile and Respread (150mm nom. Depth)	m^3	10.00	55	550
2.03	Earthworks				
	(a) Cut to Spoil	m^3	20.00	100	2,000
	(b) Cut to Fill	m^3	12.50	5	63
	(c) Preparation of stockpile area	Item	1,000.00	1	1,000
	(d) Excavate & dispose of unsuitable material below road subgrade - blanket layer **(Provisional Quantity – If Ordered)**	m^3	15.00	20	300
2.04	Replacement of unsuitable material:				
	(a) CBR 15 material to replace excavation below subgrade **(Provisional Quantity – If Ordered)**	m^3	50.00	20	1,000
	(b) Type 2.4 Cement Stabilised (Working Platform) **(Provisional Quantity – If Ordered)**	m^3	75.00	10	750
	(c) Geofabric wrapped 150mm spalls to replace excavation below subgrade **(Provisional Quantity - If Ordered)**	m^3	4.00	30	120
2.05	Subgrade Treatment	m^2	5.00	100	500
3.00	**ROADWORKS**				
3.01	Supply and Place Pavement Material				
	(a) Granular pavement layers	m^3	90.00	50	4,500
	(b) 50mm AC surfacing	m^2	30.00	100	3,000
3.02	Kerb and Channel / Kerb				
	(a) Kerb	m	45.00	80	3,600
	(b) Kerb and Channel	m	55.00	60	3,300
3.03	Grassing				
	(a) Hydromulch verges and batters	m^2	1.00	180	180
3.04	Relocate Existing Guide Signs	No.	350.00	1	350
3.05	Warning, Regulatory, Speed and Street Signs	No.	350.00	1	350
3.06	Linemarking	m	2.00	220	440
3.07	Patterned Concrete Median	m^2	180.00	0	0
3.08	Concrete Footpath	m^2	100.00		0
3.08	Concrete slab to bus shelter	m^2			0
4.00	**DRAINAGE WORKS**				
4.01	Major culvert crossings	No.		0	0
4.02	Network Drainage				
	(a) pipe length	m		0	0
	(b) Gully pits/Field inlets	No.	2,500.00	0	0
	(c) Outlet structures	No.		0	0
4.03	Dumped Rock Protection	m^2	150.00	0	0
4.04	Turf lined open drain	m	55.00	0	0
5.00	**MISCELLANEOUS**				
5.01	Compliance Testing, Quality Assurance Testing, Verification Testing for all works as specified – all sorts	Item		1	260
5.02	Preparation and submission of As-constructed	Item	2,000	1	2,000
5.03	Traffic Signals				
	(a) Signalisation	No.		0	0
5.04	Intersection and Route Lighting	No.	4,000	2	8,000
5.05	Noise Barriers	Item		0	0
5.06	Fauna Crossings (3.0x1.85x45m nom)	No.		0	0
5.07	Fauna Fencings	m		0	0
5.08	Fencing				
	(a) Nominal style for pricing	m		0	0
5.09	Property Accesses	No.		0	0
5.10	Traffic Barriers				
	(a) Wire Rope - along median	m		0	0
	(b) Guardrail	m		0	0
	(c) Guardrail terminals	No.		0	0
5.11	Temporary drainage works	Item		0	0
5.12	Subsoil drainage	m	22	140	3,080
5.13	Resumptions (Council Land / Road Reserve) - Possible	m^2	5,000	1	5,000
5.14	Resumptions (Residential)	m^2		0	0
5.15	Retaining walls - average 0.5 m high	m^2	200	50	10,000
5.16	Service Relocations				
	(a) Telecommunications	LS		0	0
	(b) Energex (O/H mains)	LS		0	0
	(c) Watermains	LS		0	0
	(e) Sewer	LS		0	0

Construction Costs		**GLENLYON ST / DAWSON RD / BRAMSTON ST**
Total Estimated Cost Per Element		**$60,780**
Contingency	**20%**	**$12,156**

Total Estimated Cost Per Element	**$73,000**

PORT ACCESS / TUG BERTH / MARK FENTON / HOPPER RD
Pre-Feasibility Costing Summary

Item	Description	Unit	Rate	Qty	Amount
1.00	**PRELIMINARIES**				
1.01	Establishment (% of construction cost)	Item	10%	1	125,203
1.02	Provision for Traffic (% of establishment cost)	Item	40%	1	50,081
1.03	Environmental Management (% of est. cost)	Item	10%	1	12,520
1.04	Erosion and Sediment Control including measures for stockpile site (% of est. cost)	Item	10%	1	12,520
1.05	Locate and protect existing underground services (% of est. cost)	Item	2%	1	2,504
2.00	**EARTHWORKS**				
2.01	Clearing and Grubbing	LS	2,000.00	1	2,000
2.02	Topsoil				
	(a) Strip to stockpile and Respread (150mm nom. Depth)	m^3	10.00	200	2,000
2.03	Earthworks				
	(a) Cut to Spoil	m^3	20.00	400	8,000
	(b) Cut to Fill	m^3	12.50	50	625
	(c) Preparation of stockpile area	Item	1,000.00	1	1,000
	(d) Excavate & dispose of unsuitable material below road subgrade - blanket layer **(Provisional Quantity – If Ordered)**	m^3	15.00	100	1,500
2.04	Replacement of unsuitable material:				
	(a) CBR 15 material to replace excavation below subgrade **(Provisional Quantity – If Ordered)**	m^3	50.00	100	5,000
	(b) Type 2.4 Cement Stabilised (Working Platform) **(Provisional Quantity – If Ordered)**	m^3	75.00	20	1,500
	(c) Geofabric wrapped 150mm spalls to replace excavation below subgrade **(Provisional Quantity - If Ordered)**	m^3	4.00	140	560
2.05	Subgrade Treatment	m^2	5.00	420	2,100
3.00	**ROADWORKS**				
3.01	Supply and Place Pavement Material				
	(a) Granular pavement layers	m^3	90.00	210	18,900
	(b) 50mm AC surfacing	m^2	30.00	420	12,600
3.02	Kerb and Channel / Kerb				
	(a) Kerb	m	45.00	45	2,025
	(b) Kerb and Channel	m	55.00	165	9,075
3.03	Grassing				
	(a) Hydromulch verges and batters	m^2	1.00	495	495
3.04	Relocate Existing Guide Signs	No.	350.00	0	0
3.05	Warning, Regulatory, Speed and Street Signs	No.	350.00	2	700
3.06	Linemarking	m	2.00	1,015	2,030
3.07	Patterned Concrete Median / Island	m^2	180.00	10	1,800
3.08	Concrete Footpath	m^2	100.00		0
3.08	Concrete slab to bus shelter	m^2			0
4.00	**DRAINAGE WORKS**				
4.01	Major culvert crossings	No.		0	0
4.02	Network Drainage				
	(a) pipe length - 600 mm diameter	m	300.00	10	3,000
	(b) Gully pits/Field inlets	No.	2,500.00	0	0
	(c) Outlet structures	No.	3,000.00	2	6,000
4.03	Dumped Rock Protection	m^2	150.00	10	1,500
4.04	Turf lined open drain	m	55.00	0	0
5.00	**MISCELLANEOUS**				
5.01	Bridge widening works	m^2	5,000	230	1,150,000
5.02	Compliance Testing, Quality Assurance Testing, Verification Testing for all works as specified – all sorts	Item		1	6,260
5.03	Preparation and submission of As-constructed	Item	5,000	1	5,000
5.04	Traffic Signals				
	(a) Signalisation at roundabout	No.		0	0
5.05	Intersection and Route Lighting	No.	4,000	0	0
5.06	Noise Barriers	Item		0	0
5.07	Fauna Crossings (3.0x1.85x45m nom)	No.		0	0
5.08	Fauna Fencings	m		0	0
5.09	Fencing				
	(a) Nominal style for pricing	m		0	0
5.10	Property Accesses	No.		0	0
5.11	Traffic Barriers				
	(a) Wire Rope - along median	m		0	0
	(b) Guardrail	m		0	0
	(c) Guardrail terminals	No.		0	0
5.12	Temporary drainage works	Item		0	0
5.13	Subsoil drainage	m	22	210	4,620
5.14	Resumptions (Council Land / Road Reserve)	m^2		0	0
5.15	Resumptions (Residential)	m^2		0	0
5.16	Retaining walls	m^2		0	0
5.17	Service Relocations				
	(a) Telecommunications	LS		0	0
	(b) Energex (O/H mains)	LS		0	0
	(c) Watermains	LS		0	0
	(e) Sewer	LS		0	0
	(f) Unknown	LS	10,000	1	10,000
	Construction Costs				**PORT ACCESS / TUG BERTH / MARK FENTON / HOPPER RD**
	Total Estimated Cost Per Element				**$1,461,119**
	Contingency	**20%**			**$292,224**

Total Estimated Cost Per Element	**$1,753,000**

BLAIN DRIVE / DAWSON HWY / HEBERTSON ST
Pre-Feasibility Costing Summary

Item	Description	Unit	Rate	Qty	Amount
1.00	**PRELIMINARIES**				
1.01	Establishment (% of construction cost)	Item	10%	1	13,497
1.02	Provision for Traffic (% of establishment cost)	Item	40%	1	5,399
1.03	Environmental Management (% of est. cost)	Item	10%	1	1,350
1.04	Erosion and Sediment Control including measures for stockpile site (% of est. cost)	Item	10%	1	1,350
1.05	Locate and protect existing underground services (% of est. cost)	Item	2%	1	270
2.00	**EARTHWORKS**				
2.01	Clearing and Grubbing	LS	2,000.00	1	2,000
2.02	Topsoil				
	(a) Strip to stockpile and Respread (150mm nom. Depth)	m^3	10.00	150	1,500
2.03	Earthworks				
	(a) Cut to Fill	m^3	12.50	30	375
	(b) Preparation of stockpile area	Item	1,000.00	1	1,000
	(c) Excavate & dispose of unsuitable material below road subgrade - blanket layer **(Provisional Quantity – If Ordered)**	m^3	15.00	50	750
2.04	Replacement of unsuitable material:				
	(a) CBR 15 material to replace excavation below subgrade **(Provisional Quantity – If Ordered)**	m^3	50.00	50	2,500
	(b) Type 2.4 Cement Stabilised (Working Platform) **(Provisional Quantity – If Ordered)**	m^3	75.00	10	750
	(c) Geofabric wrapped 150mm spalls to replace excavation below subgrade **(Provisional Quantity - If Ordered)**	m^3	4.00	110	440
2.05	Subgrade Treatment	m^2	5.00	320	1,600
3.00	**ROADWORKS**				
3.01	Supply and Place Pavement Material				
	(a) Granular pavement layers	m^3	90.00	160	14,400
	(b) 50mm AC surfacing	m^2	30.00	320	9,600
3.02	Kerb and Channel / Kerb				
	(a) Kerb	m	45.00	80	3,600
	(b) Kerb and Channel	m	55.00	120	6,600
3.03	Grassing				
	(a) Hydromulch verges and batters	m^2	1.00	360	360
3.04	Relocate Existing Guide Signs	No.	350.00	2	700
3.05	Warning, Regulatory, Speed and Street Signs	No.	350.00	1	350
3.06	Linemarking	m	2.00	270	540
3.07	Patterned Concrete Median	m^2	180.00	0	0
3.08	Concrete Footpath	m^2	100.00		0
3.08	Concrete slab to bus shelter	m^2			0
4.00	**DRAINAGE WORKS**				
4.01	Major culvert crossings	No.		0	0
4.02	Network Drainage				
	(a) pipe length - 600 mm diameter	m	300.00	20	6,000
	(b) Gully pits/Field inlets	No.	2,500.00	3	7,500
	(c) Outlet structures	No.		0	0
4.03	Dumped Rock Protection	m^2	150.00	0	0
4.04	Turf lined open drain	m	55.00	0	0
5.00	**MISCELLANEOUS**				
5.01	Compliance Testing, Quality Assurance Testing, Verification Testing for all works as specified – all sorts	Item		1	675
5.02	Preparation and submission of As-constructed	Item	3,000	1	3,000
5.03	Traffic Signals				
	(a) Signalisation at roundabout	No.		0	0
5.04	Intersection and Route Lighting	No.	4,000	3	12,000
5.05	Noise Barriers	Item		0	0
5.06	Fauna Crossings (3.0x1.85x45m nom)	No.		0	0
5.07	Fauna Fencings	m		0	0
5.08	Fencing				
	(a) Nominal style for pricing	m		0	0
5.09	Property Accesses	No.		0	0
5.10	Traffic Barriers				
	(a) Wire Rope - along median	m		0	0
	(b) Guardrail	m		0	0
	(c) Guardrail terminals	No.		0	0
5.11	Temporary drainage works	Item		0	0
5.12	Subsoil drainage	m	22	200	4,400
5.13	Resumptions (Council Land / Road Reserve) - Possible	LS	10,000	1	10,000
5.14	Resumptions (Residential)	m^2		0	0
5.15	Retaining walls	m^2		0	0
5.16	Service Relocations				
	(a) Telecommunications	LS	5,000	1	5,000
	(b) Energex (O/H mains)	LS	20,000	1	20,000
	(c) Watermains	LS	10,000	1	10,000
	(e) Sewer	LS		0	0
	(f) Gas - 90 MDPE	LS	10,000	1	10,000
	Construction Costs				**BLAIN DRIVE / DAWSON HWY / HEBERTSON ST**
	Total Estimated Cost Per Element				**$157,504**
	Contingency	**20%**			**$31,501**

Total Estimated Cost Per Element	**$189,000**

PHILIP ST / DAWSON HWY
Pre-Feasibility Costing Summary

Item	Description	Unit	Rate	Qty	Amount
1.00	**PRELIMINARIES**				
1.01	Establishment (% of construction cost)	Item	10%	1	25,442
1.02	Provision for Traffic (% of establishment cost)	Item	40%	1	10,177
1.03	Environmental Management (% of est. cost)	Item	10%	1	2,544
1.04	Erosion and Sediment Control including measures for stockpile site (% of est. cost)	Item	10%	1	2,544
1.05	Locate and protect existing underground services (% of est. cost)	Item	2%	1	509
2.00	**EARTHWORKS**				
2.01	Clearing and Grubbing	LS	2,000.00	1	2,000
2.02	Topsoil				
	(a) Strip to stockpile and Respread (150mm nom. Depth)	m^3	10.00	310	3,100
2.03	Earthworks				
	(a) Cut to Spoil	m^3	20.00	300	6,000
	(b) Cut to Fill	m^3	12.50	300	3,750
	(c) Preparation of stockpile area	Item	1,000.00	1	1,000
	(d) Excavate & dispose of unsuitable material below road subgrade - blanket layer **(Provisional Quantity – If Ordered)**	m^3	15.00	100	1,500
2.04	Replacement of unsuitable material:				
	(a) CBR 15 material to replace excavation below subgrade **(Provisional Quantity – If Ordered)**	m^3	50.00	100	5,000
	(b) Type 2.4 Cement Stabilised (Working Platform) **(Provisional Quantity – If Ordered)**	m^3	75.00	20	1,500
	(c) Geofabric wrapped 150mm spalls to replace excavation below subgrade **(Provisional Quantity - If Ordered)**	m^3	4.00	230	920
2.05	Subgrade Treatment	m^2	5.00	1,000	5,000
3.00	**ROADWORKS**				
3.01	Supply and Place Pavement Material				
	(a) Granular pavement layers	m^3	90.00	500	45,000
	(b) 50mm AC surfacing	m^2	30.00	1,000	30,000
3.02	Kerb and Channel / Kerb				
	(a) Kerb	m	45.00	65	2,925
	(b) Kerb and Channel	m	55.00	245	13,475
3.03	Grassing				
	(a) Hydromulch verges and batters	m^2	1.00	735	735
3.04	Relocate Existing Guide Signs	No.	350.00	2	700
3.05	Warning, Regulatory, Speed and Street Signs	No.	350.00	0	0
3.06	Linemarking	m	2.00	620	1,240
3.07	Patterned Concrete Median	m^2	180.00	0	0
3.08	Concrete Footpath	m^2	100.00	0	0
3.08	Concrete slab to bus shelter	m^2		0	0
4.00	**DRAINAGE WORKS**				
4.01	Major culvert crossings	No.		0	0
4.02	Network Drainage				
	(a) pipe length - 600 mm diameter	m	300.00	20	6,000
	(b) Gully pits/Field inlets	No.	2,500.00	3	7,500
	(c) Outlet structures	No.	3,000.00	3	9,000
4.03	Dumped Rock Protection	m^2	150.00	15	2,250
4.04	Turf lined open drain	m	55.00	0	0
5.00	**MISCELLANEOUS**				
5.01	Compliance Testing, Quality Assurance Testing, Verification Testing for all works as specified – all sorts	Item		1	1,272
5.02	Preparation and submission of As-constructed	Item	4,000	1	4,000
5.03	Traffic Signals				
	(a) Signalisation	No.		0	0
5.04	Intersection and Route Lighting	No.	5,000	6	30,000
5.05	Noise Barriers	Item		0	0
5.06	Fauna Crossings (3.0x1.85x45m nom)	No.		0	0
5.07	Fauna Fencings	m		0	0
5.08	Fencing				
	(a) Nominal style for pricing	m		0	0
5.09	Property Accesses	No.		0	0
5.10	Traffic Barriers				
	(a) Wire Rope - along median	m		0	0
	(b) Guardrail	m		0	0
	(c) Guardrail terminals	No.		0	0
5.11	Temporary drainage works	Item		0	0
5.12	Subsoil drainage	m	22	310	6,820
5.13	Resumptions (Council Land / Road Reserve)	m^2		0	0
5.14	Resumptions (Residential)	m^2		0	0
5.15	Retaining walls	m^2		0	0
5.16	Service Relocations				
	(a) Telecommunications	LS		0	0
	(b) Energex (O/H mains)	LS	25,000	1	25,000
	(c) Watermains	LS		0	0
	(e) Sewer	LS		0	0
	(f) Unknown	LS	40,000	1	40,000

Construction Costs		**PHILIP ST / DAWSON HWY**
Total Estimated Cost Per Element		**$296,902**
Contingency	**20%**	**$59,380**

Total Estimated Cost Per Element	**$356,000**

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A	A. Oliver	M. Grim	*M. Grim	A. Oliver	*A. Oliver	28/04/09
0	A. Oliver	M. Grim		A. Oliver		19/6/09