

**PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL**

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AMENDED IN RED

By: Brandon Bouda

Date: 15 June 2017



**PREPARED FOR CELESTINO PTY LTD
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ISSUE C
WATER & ENVIRONMENT**

**Jimboomba Celestino Master Planning
Water and Wastewater Infrastructure Master Plan**

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DOCUMENT CONTROL

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Issue	Date	Issue Details	Author	Checked	Approved
A	21.10.16	Original Issue	MAH	ABM (RPEQ 13639)	MM (RPEQ 13357)
B	31.10.16	Revised Context Plan	MAH	ABM (RPEQ 13639)	MM (RPEQ 13357)
C	16.03.17	Response to RFI	MAH	ABM (RPEQ 13639)	NJ (RPEQ 10075)

EXECUTIVE SUMMARY

Calibre Consulting (Qld) Pty Ltd has been engaged by Celestino Pty Ltd to prepare this *Water and Wastewater Infrastructure Master Plan* report for the proposed Jimboomba Celestino development at Teviot Road, Jimboomba. The assessment has given provision for the future surrounding development areas.

The purpose of this report is to demonstrate that the development can be serviced generally in accordance with the Economic Development Queensland (EDQ) Flagstone Priority Development Area (PDA) Water Supply and Wastewater Servicing Strategies. Investigations undertaken demonstrate that water and wastewater infrastructure servicing options are available to service the ultimate study area yield of approximately 29,200 EP. Consideration of trunk water and wastewater infrastructure staging in line with projected development growth was included as part of the master plan investigation.

Water network investigations demonstrate that the initial stages (Precincts 1 & 3) of the Jimboomba Celestino development may be serviced via approximately 1,100 m of DN300 water main and 700 m of DN450 water main from the existing DN375 at the intersection of Homestead Drive and Teviot Road to within the site. From here the site will be serviced via either a booster pump station or a Pressure Reducing Valve (PRV). Once the capacity triggers within the existing network are exceeded, the development will be serviced generally in accordance with the EDQ Flagstone PDA Water Supply Servicing Strategy. It is anticipated that approximately 2,000 m of DN675 water main, 5,700 m of DN600 water main and 700 m of DN525 water main will be constructed from Round Mountain reservoir to the study area boundary.

Two potential ultimate servicing strategies have been identified for servicing the development. Option 1 proposes to utilise a booster pump station at the development boundary. Option 2 involves construction of a new connection to the future Flinders/Flagstone reservoir. It is considered that Option 1 is the preferred ultimate service strategy due to the anticipated capital costs associated with the new connection to Flinders/Flagstone Reservoir.

Wastewater network investigations demonstrate that the initial stages (0 – 5 years) of the Jimboomba Celestino development may be serviced via a temporary Wastewater Treatment Plant (WWTP) to be located within the site. Liaison with EDQ has indicated that the Cedar Grove WWTP will be in operation by 2021. Once commissioned, it is proposed that the on-site WWTP will be decommissioned and replaced with a Sewage Pump Station (SPS). Flows will be pumped south to a new trunk gravity main at the southern boundary of the site which conveys wastewater to the planned RB2 SPS. The RB2 SPS will inject flows into the regional Flagstone PDA rising main which will discharge to the Cedar Grove WWTP.

Should the construction of the aforementioned trunk gravity main, RB2 SPS or regional rising main be delayed, it is proposed that the site will be serviced via extending the RB1 rising main to discharge directly to the Cedar Grove WWTP.

Investigation of the water and wastewater service strategies demonstrate that the proposed Jimboomba Celestino development can be serviced generally in accordance with the EDQ Flagstone PDA Water and Wastewater Servicing Strategies. It is recommended that this *Water and Wastewater Infrastructure Master Plan* report be approved and the interim service strategies presented within this report be incorporated into future design.

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GLOSSARY

AD	Average Day
ADWF	Average Dry Weather Flow
AHD.....	Australian Height Datum
C ₂	Coefficient for Dry Weather Flow
DN.....	Diameter Nominal
du.....	Dwelling Units
DSS	Desired Standards of Service
EDQ.....	Economic Development Queensland
EP	Equivalent Persons
FF.....	Fire Flow
LCC.....	Logan City Council
LWIA.....	Logan Water Infrastructure Alliance
MDMM.....	Mean Day Max Month
NRW	Non-Revenue Water
PD	Peak Day
PDA.....	Priority Development Area
PDWF	Peak Dry Weather Flow
PH	Peak Hour
PRV	Pressure Reducing Valve
PWWF.....	Peak Wet Weather Flow
RIGS.....	Reduced Inflow Gravity Sewer
RL.....	Relative Level
SEQ Code	South East Queensland Water Supply and Sewerage Design & Construction Code
SPS	Sewage Pump Station
SRWP	Southern Regional Water Pipeline
ULDA.....	Urban Land Development Authority
WWTP.....	Wastewater Treatment Plant

1 INTRODUCTION

Calibre Consulting (Qld) Pty Ltd has been engaged by Celestino Pty Ltd to prepare this *Water and Wastewater Infrastructure Master Plan* report to obtain Preliminary Approval for the proposed Jimboomba Celestino development at Teviot Road, Jimboomba. The proposed development is located within the Greater Flagstone Priority Development Area (PDA) of the Logan City Council (LCC) local government area.

The proposed Jimboomba Celestino development master plan layout, as part of the Context Plan, is outlined in Appendix A. For clarity and consistency, the aforementioned development area (Precincts 1 – 10) will herein be referred to as the 'site' or 'Jimboomba Celestino'.

Provision has been made for future surrounding development areas as outlined in Appendix A. For clarity and consistency, the aforementioned study area (Precincts 11 – 15) will herein be referred to as the 'balance of the Context Plan'.

Water and wastewater servicing strategies for the Flagstone PDA have been developed by Economic Development Queensland (EDQ), previously known as the Urban Land Development Authority (ULDA). The purpose of this report is to demonstrate that the proposed Jimboomba Celestino development can be serviced generally in accordance with the servicing strategies developed by EDQ.

This document has been developed following consultation with Council, EDQ, Logan Water Infrastructure Alliance (LWIA) and other key stakeholders. An iterative process of infrastructure planning was undertaken with stakeholder input between March 2016 and October 2016. This report provides a summary of the outcomes and provides an overview of the supporting technical analyses.

This report (Issue C) has been revised in response to the Seqwater information request (dated 16 January 2017) and the EDQ information request (dated 19 January 2017). The overall servicing strategies of the site have remained unchanged from what was previously endorsed. The network modelling and reporting was updated to reflect the amended LWIA Desired Standards of Service, received January 2017, and to improve the configuration and performance of the internal water supply network.

2 SITE CHARACTERISTICS

2.1 LOCATION

The site is located at Teviot Road, Jimboomba within the Logan City Council (LCC) local government area. The site has a total area of approximately 520 ha and covers five existing properties with the real property descriptions of Lot 101, 102, 105, and 106 on SP254145 and Lot 800 on SP247625. The site is bounded by Teviot Road to the west, Logan River to the east, and rural properties to the north and south.

The Context Plan area has a total site area of approximately 946 ha and consists of numerous additional existing land titles.

Figure 2-1 outlines the approximate location of the site and the Context Plan.

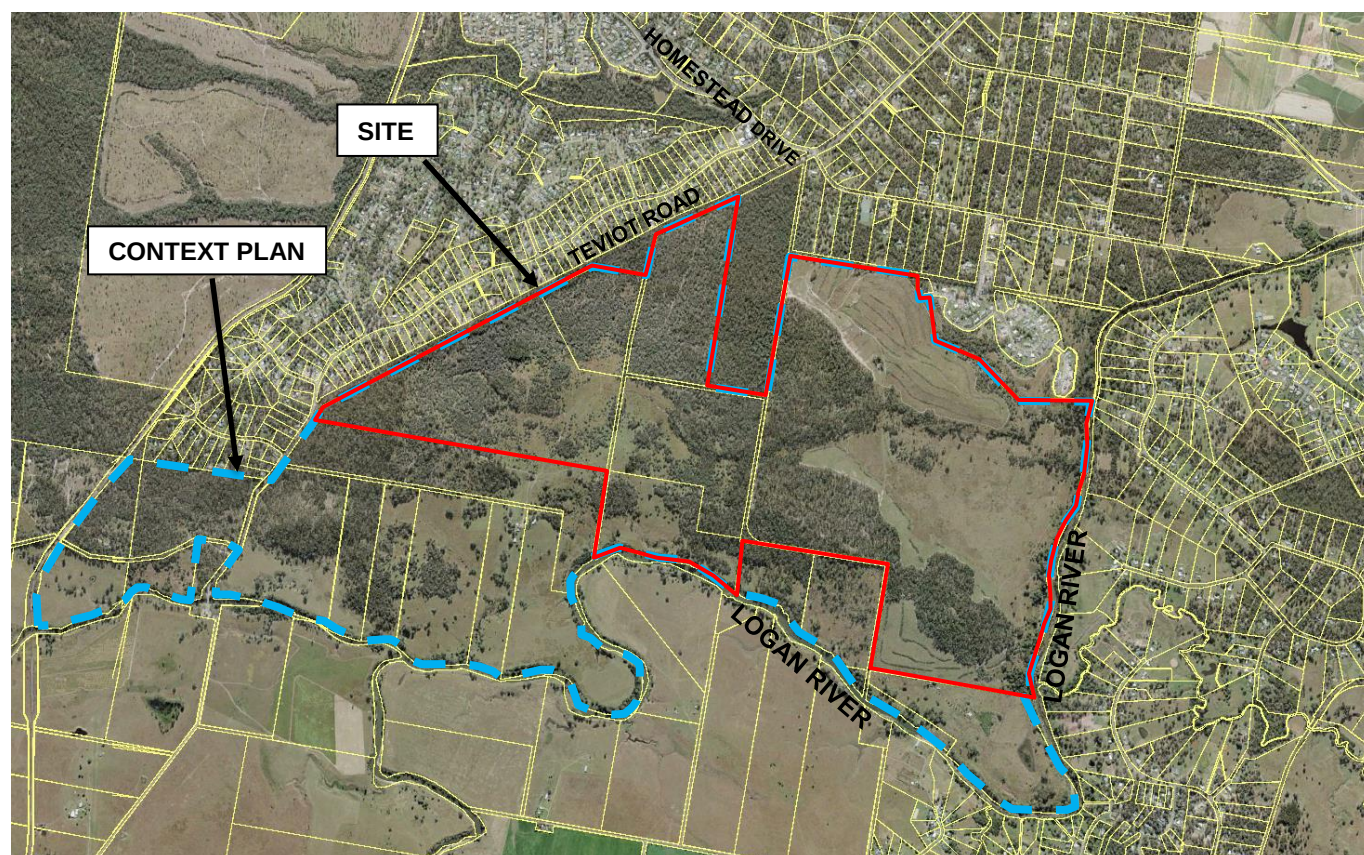


Figure 2-1: Site Location (Source: Google Earth)

The existing site is undeveloped with portions of the site already cleared. The cleared areas are currently being used as grazing land.

The natural surface elevations of the site range from approximately Relative Level (RL) 72 metres to Australian Height Datum (mAHD) at the south-western corner and RL 25 mAHD at the eastern boundary of the site adjacent Logan River. The site generally falls from west to east.

3 ASSUMPTIONS

This section provides an overview of the key assumptions made in developing the water and wastewater service strategies proposed to support the Jimboomba Celestino development.

3.1 INFORMATION SOURCES

The following information was provided by third parties in support of the water and wastewater assessment undertaken for the proposed development and is referenced within this report:

- Greater Flagstone PDA Wastewater Servicing Strategy (Cardno, 2 November 2016).
- SRWP Water Supply Zone Master Planning Figures 1, 2, 10 and 13 (LWIA, November 2014).
- H2OMap Water Supply Network Model entitled Logan_Comb11.H2O (LCC, 25 May 2016).

For the purpose of this water and wastewater network analysis it has been assumed that the information provided above is the most accurate and appropriate at the time of reporting.

3.2 DESIRED STANDARD OF SERVICE

Issues A & B of this report were undertaken in accordance with the *South East Queensland Water Supply and Sewerage Design & Construction Code* (SEQ Code) as per liaison with EDQ and LWIA (5 October 2016).

At the request of the LWIA, assessment for this issue (Issue C) was undertaken in accordance with the 2015 Logan City Council Desired Standards of Service (DSS). The DDS is included in Appendix D with key criteria of the adopted DSS as follows:

3.2.1 WATER

- Average Day Demand (AD): 165 L/EP/Day;
- Non-Revenue Water (NRW): 25 L/EP/Day
- Residential Fire Flow: 15 L/s for 2 hours;
- Commercial Fire Flow: 30 L/s for 4 hours;
- Minimum Service Pressure (Peak Hour Conditions): 22 m;
- Minimum Residual Pressure (Fire Flow Conditions): 12 m; and
- Target Maximum Service Pressure: 55 m.

3.2.2 WASTEWATER

- Average Dry Weather Flow (ADWF): 165 L/EP/Day;
- Peak Wet Weather Flow (PWWF): ~~1300 L/EP/Day~~; 1000L/EP/Day
- Pipe Roughness 'k' value: 1.5mm; and
- Maximum depth of flow in new pipes: ~~100%~~ depth at PWWF.
75%

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By: Brandon Bouda

Date: 15 June 2017



3.3 GENERAL ASSUMPTIONS

3.3.1 WATER

For the purpose of this assessment it has been assumed that the Southern Regional Water Pipeline (SRWP) and greater South-East Queensland Water Grid have sufficient capacity to service the additional demands associated with the Flagstone PDA. It is anticipated that EDQ and LWIA will undertake future liaison with Seqwater to confirm sufficient capacity while balancing the supply allocations within the South-East Queensland Water Grid.

It is anticipated that trunk infrastructure external to the site within the Flagstone PDA will be constructed following the interim service strategy.

3.3.2 WASTEWATER

Previous discussions with EDQ have indicated that the Cedar Grove Wastewater Treatment Plant (WWTP) and trunk RB2 SPS will be constructed prior to 2021. For the purpose of this assessment it has been assumed proposed land irrigation areas for the interim WWTP are in accordance with the relevant codes and standards.

3.3.3 NAMING CONVENTION

Naming and numbering of proposed trunk infrastructure has been adopted in accordance with Calibre Consulting *drawings B13343.W-WS001 to WS004 and B13343.W-WW002 to WW004* included within Appendix B. Naming is subject to future liaison with EDQ and LCC.

3.4 DEVELOPMENT PROJECTIONS

Ultimate development projections for the proposed Jimboomba Celestino development have been estimated in accordance with the Veris Context Plan, *drawing 30697-CP02(D)* and the Veris Development Summaries included within Appendix A. Equivalent Persons (EP) were estimated using the demand (by landuse) values prescribed within Table 4.2.5.7 of the Logan City Council Planning Scheme 2015. **Table 3-1** outlines the equivalent water and wastewater demands calculated for the proposed Jimboomba Celestino development.

Table 3-1: Jimboomba Celestino Development Projections

Precinct	Development Land Use	Quantity	Unit	Water Supply		Wastewater	
				EP/Unit	Total EP	EP/Unit	Total EP
1	Residential Dwellings	516	du	2.8	1444.8	2.8	1444.8
	School	141.0	100 m ² GFA	0.6076	85.7	0.6638	93.6
	District Centre	175.2	100 m ² GFA	0.7523	131.8	0.8219	144.0
2	Residential Dwellings	900	du	2.8	2520.0	2.8	2520.0
	District Centre	64.8	100 m ² GFA	0.7523	48.7	0.8219	53.3
3	Residential Dwellings	254	du	2.8	711.2	2.8	711.2
4	Residential Dwellings	1145	du	2.8	3206.0	2.8	3206.0
5	Residential Dwellings	759	du	2.8	2125.2	2.8	2125.2
	Neighbourhood Centre	68.0	100 m ² GFA	0.7523	51.2	0.8219	55.9
6	Residential Dwellings	669	du	2.8	1873.2	2.8	1873.2
7	Residential Dwellings	696	du	2.8	1948.8	2.8	1948.8
8	Residential Dwellings	713	du	2.8	1996.4	2.8	1996.4
9	Residential Dwellings	287	du	2.8	803.6	2.8	803.6
10	Residential Dwellings	593	du	2.8	1660.4	2.8	1660.4
Total				18,607 EP		18,636 EP	
Total inc. 10% Contingency				20,468 EP		20,500 EP	

As outlined in **Table 3-1**, it is anticipated that the proposed Jimboomba Celestino development will have water supply and wastewater equivalent populations of 18,607 EP and 18,636 EP respectively. For modelling analyses, a 10% contingency has been applied. The adopted water supply and wastewater equivalent populations for design are 20,468 EP and 20,500 EP respectively. Provision has been made for future surrounding development areas within the Context Plan. Table 3-2 outlines the water and wastewater projections for the balance of the Context Plan.

Table 3-2: Balance of Context Plan Ultimate Development Projections

Precinct	Development Land Use	Quantity	Unit	Water Supply		Wastewater	
				EP/Unit	Total EP	EP/Unit	Total EP
11	Residential Dwellings	783	du	2.8	2192.4	2.8	2192.4
	Neighbourhood Centre	28.6	100 m ² GFA	0.7523	21.5	0.8219	23.5
12	Residential Dwellings	561	du	2.8	1570.8	2.8	1570.8
	Neighbourhood Centre	12.4	100 m ² GFA	0.7523	9.3	0.8219	10.2
13	Residential Dwellings	659	du	2.8	1845.2	2.8	1845.2
	School	132.8	100 m ² GFA	0.6076	80.7	0.6638	88.2
14	Residential Dwellings	576	du	2.8	1612.8	2.8	1612.8
15	Residential Dwellings	205	du	2.8	574.0	2.8	574.0
Total				7,907 EP		7,917 EP	
Total inc. 10% Contingency				8,697 EP		8,709 EP	

As outlined in Table 3-2, for design purposes, the balance of the Context Plan will have water supply and wastewater equivalent populations of 8,697 EP and 8,709 EP respectively. **Table 3-3** provides a summary of the development projections for the Context Plan.

Table 3-3: Summary of Context Plan Development Projections

	Water Supply		Wastewater	
	Total EP	Total EP inc. 10% Cont	Total EP	Total EP inc. 10% Cont
Jimboomba Celestino	18,607	20,468	18,636	20,500
Balance of Context Plan	7,907	8,697	7,917	8,709
Context Plan Total	26,514	29,165	26,553	29,209

The adopted water supply and wastewater equivalent population demands for the Context Plan are 29,165 EP and 29,209 EP respectively. Development projections have remained unchanged with this issue (Issue C) of the report.

3.5 PROJECTED GROWTH RATES

It is assumed that the development growth rate will be 200 lots per year over the first 5 years. It is anticipated that the growth rate will ramp up beyond the 5 year development horizon, subject to many factors including market demand. Projections beyond the 5 year development horizon will be developed as planning analyses proceed. The initial projected development timeframes are outlined in **Table 3-4**.

Table 3-4: Projected Development Growth Over Initial 5 Year Horizon

Precinct	Residential Lots	Residential EP	Non-residential EP	Total EP	Total EP (including 10% contingency)
2018	200	560	158	718	790
2019	200	560	-	560	616
2020	200	560	-	560	616
2021	200	560	-	560	616
2022	200	560	-	560	616

As outlined in **Table 3-4**, it is anticipated that approximately 1,000 lots will be delivered in the first 5 years. The development may also include a small convenience shopping centre with associated facilities in the first stage. For the purpose of this assessment, a non-residential area of up to 17,500 m² GFA has been assumed for the first year. The following assumptions are noted with reference to the initial growth rates outlined in **Table 3-4**:

- Precinct 1 contains 516 lots and will be developed indicatively between 2018 and 2020.
- Precinct 3 contains 254 lots and will be developed indicatively between 2020 and 2021.
- Precinct 8 contains 713 lots and will be developed indicatively from 2021.

The final sequencing strategy will be developed based on provision of services and other engineering and planning factors. It was assumed that non-residential land development uses will be provided in the initial phase.

3.6 INTERIM AND ULTIMATE SERVICING

Water supply and wastewater servicing strategies have been developed during interim and ultimate horizons. The purpose of this report is to seek approval of the interim servicing strategies. Ultimate servicing strategies have been prepared to demonstrate that the Context Plan can be serviced generally in accordance with the EDQ Flagstone PDA Water and Wastewater Servicing Strategies. It is anticipated that ultimate servicing strategies will be further refined as the EDQ servicing strategies are finalised.

4 WATER SUPPLY SERVICE STRATEGY

A water supply network assessment was undertaken to assess the infrastructure required to service the Jimboomba Celestino development and the balance of the Context Plan. Trunk network infrastructure was adopted generally in accordance with the EDQ Flagstone PDA Water Supply Servicing Strategy. Assessment was undertaken for the ultimate population projection of 29,165 EP. All proposed water service strategies are conceptual only and remain subject to detailed engineering design.

4.1 METHODOLOGY

Water supply network modelling was undertaken with InfoWater Suite 12.3. The Logan H2OMap water network model (Logan_Comb11.H2O) provided by Logan City Council on 25 May 2016 was imported to InfoWater. Network infrastructure was assessed against the LCC DSS outlined within Section 3.2.1. The network investigation was undertaken generally in accordance with the EDQ Flagstone PDA Water Supply Servicing Strategy. Assessment was undertaken for three planning horizons:

1. Interim Horizon (0 – 3 years): Connection to existing water supply infrastructure. Preliminary network modelling and liaison with EDQ has indicated that up to 1,750 EP can be serviced via existing infrastructure. For the purpose of this assessment, the interim horizon will be for 0 to 1,750 EP. Previous revisions (Revisions A and B) of this report indicated that the interim horizon yield would be 1,000 EP. Due to the revised LCC DSS, the interim horizon development yield was increased from 1,000 EP to 1,750 EP.
2. Context Plan Horizon: Trunk infrastructure to service the Context Plan. External infrastructure will be required once development within the Context Plan exceeds the available existing capacity. Internal infrastructure to be staged subject to timing of individual development applications. For the purpose of this assessment, the Context Plan Horizon will be for 1,751 EP to 29,165 EP.
3. Flagstone PDA Horizon: Trunk infrastructure to service balance of Flagstone PDA. The Logan H2OMap water model has indicated that the balance of the Flagstone PDA is anticipated to have an ultimate demand of 89,200 EP. For the purpose of this assessment, the Flagstone PDA horizon will be for 29,166 EP to 118,365 EP.

4.2 WATER SUPPLY FLOW PROJECTION

The design water demands were calculated based on the population projections outlined in **Table 3-1** and **Table 3-2**. Water demands were estimated in accordance with the three planning horizons as outlined in Section 4.1. The design water demands are outlined in **Table 4-1**.

Table 4-1: Jimboomba Celestino and Context Plan Projected Water Demands

Planning Horizon	Land Use	Demand (EP)	AD (L/s)	NRW (L/s)	AD+NRW (L/s)	MDMM (L/s)	PD (L/s)	PH (L/s)	FF (L/s)
Interim	Residential	1,592	3.04	0.46	3.50	4.41	5.63	9.89	15
	Commercial	158	0.30	0.05	0.35	0.41	0.44	0.65	30
	Total	1,750	3.34	0.51	3.85	4.82	4.82	10.53	30
Context Plan	Residential	28,693	54.80	8.30	63.10	79.54	101.46	178.17	15
	Commercial	472	0.90	0.14	1.04	1.22	1.31	1.94	30
	Total	29,165	55.70	8.44	64.14	80.76	102.76	180.11	30
Flagstone PDA	Residential	110,404	210.84	31.95	242.79	306.04	390.38	685.55	15
	Commercial	7,961	15.20	2.30	17.51	20.55	22.07	32.71	30
	Total	118,365	226.04	34.25	260.29	326.59	412.44	718.26	30

The design water demands were estimated using an Average Day demand of 165 L/EP/day and a non-revenue water allowance of 25 L/EP/day. Peaking factors were not applied to the non-revenue water allowance. The Context Plan demand of 29,165 EP has an estimated Peak Hour (PH) flow of 180 L/s and will require a minimum Fire Flow (FF) capacity of 30 L/s.

4.3 EXISTING WATER SUPPLY NETWORK INFRASTRUCTURE

Drawing B13343.W-WS001 within Appendix B outlines the existing water supply infrastructure within the vicinity of the site. There is an existing DN375 trunk water main to the north of the site at the intersection of Homestead Drive and Teviot Road. This DN375 water main is supplied via Round Mountain Reservoir, approximately 6.9 km north-west. There is also an existing DN225 water main located immediately north-east of the site in Riverbend Boulevard.

Site inspections have identified an existing ground level water reservoir adjacent the north-east boundary of the site at Riverbend Boulevard. Liaison with EDQ has confirmed that the reservoir was temporary infrastructure and is currently in the decommissioning process. For the purpose of this assessment, operation of the reservoir has not been accounted for in the investigation.

4.4 PROPOSED WATER SUPPLY SERVICE STRATEGY

Drawings No.B13343.W-WS001 to WS005 within Appendix B outline the proposed water supply servicing strategies for the three proposed planning horizons. The proposed servicing strategies are generally in accordance with the EDQ Flagstone PDA Water Supply Servicing Strategy.

As outlined on *drawing No.B13343.W-WS001*, it is proposed that the initial stages of the Jimboomba Celestino development (Precincts 1 & 3) will be serviced via approximately 1,100 m of DN300 water main and 700 m of DN450 water main from the existing DN375 at the intersection of Homestead Drive and Teviot Road to within the site. From here the site will be serviced via either a booster pump station or a Pressure Reducing Valve (PRV). The high elevation areas (HLZ1), typically Precinct 1, will be supplied via a variable speed booster pump station. The low elevation areas (LLZ), typically Precinct 3, will be pressure managed by a PRV.

Once development within the Context Plan exceeds the available existing capacity which, based on modelling is up to 1,750 EP, external trunk infrastructure will be triggered. As outlined on *drawing No.B13343.W-WS002*, it is proposed that approximately 2,000 m of DN675 water main, 5,700 m of DN600 water main and 700 m of DN525 water main will be constructed from Round Mountain reservoir to the Context Plan boundary. From here approximately 1,500 m of DN525 water main and 2,350 m of DN450 water main will be constructed up to trunk infrastructure constructed during the interim horizon.

The context plan is proposed to be serviced via four catchment district metered zones (DMA's). *Drawing No.B13343.W-WS005* outlines the proposed DMA configurations. The four proposed DMA's are as follows:

- Low Level Zone (LLZ): An extension of the LLZ downstream of the PRV proposed during the initial stages of the Jimboomba Celestino development. The LLZ is typically east of Bushland Road.
- High Level Zone 1 (HLZ1): An extension of the HLZ downstream of the booster pump station proposed during the initial stages of the Jimboomba Celestino development. The HLZ is typically west of Bushland Road.
- High Level Zone 2 (HLZ2): Construction of a new booster pump station at the northern corner of the development adjacent Bushland Road. This booster pump station will service the high elevation areas at the north-eastern portion of the site.
- Round Mountain Head: Internal reticulation mains to be supplied via the proposed trunk water main from Round Mountain Reservoir. A large portion of the 'balance area' is proposed to be serviced within this DMA.

The initial service connection via the DN300 connecting to the existing infrastructure near Homestead Drive will be normally closed following the ultimate connection to the west. A secondary connection, also normally closed, will be provided through to the existing infrastructure in Riverbend Boulevard.

The approximate lengths of internal trunk water supply mains proposed to service the Context Plan are as follows:

- 1,500 m of DN525 water main.
- 3,050 m of DN450 water main.
- 3,900 m of DN375 water main.
- 3,700 m of DN300 water main.
- 12,800 m of DN225 water main.
- 8,500 m of DN150 water main.

Infrastructure sizing has been developed to meet minimum pressure requirements under peak hour and fire flow demands. Provision has been made to align interim supply mains with the proposed road construction sequencing in order to minimise costs. Staging of the trunk water mains and booster pump stations, PRV configurations and alignments of reticulation water mains will be developed during future reconfiguration of lot applications.

Two options have been identified to service the Context Plan during the ultimate scenario as follows:

- Option 1: Maintain proposed booster pump station.
- Option 2: Flinders/Flagstone reservoir connection and Pressure Reducing Valve (PRV).

The two options are outlined below.

Option 1: Booster Pump Station

As outlined on *drawing No.B13343.W-WS003*, it is proposed that the Context Plan will be serviced via utilising the booster pump station proposed to be constructed during the previous planning horizon. No additional infrastructure works will be required for the Context Plan. The balance of the Flagstone PDA may be serviced via additional external infrastructure. Alternative configurations were considered, including smaller booster pump stations to service localised high level areas. The configurations will be reviewed to determine an optimal layout in conjunction with earthworks for individual lot reconfigurations.

Option 2: Flinders/Flagstone reservoir connection and PRV

As outlined on *drawing No.B13343.W-WS004*, it is proposed that the Context Plan will be serviced via decommissioning the booster pump station and constructing a new DN600 trunk water main connection from the future Flinders Reservoir or Flagstone Reservoir. EDQ and LWIA are currently in the process of developing the Flagstone PDA water supply service strategy. Therefore, the reservoir locations and water main alignments will be determined by others at a future date. It is anticipated that a PRV may be required at the Context Plan boundary to reduce internal pressures.

It is considered that both options would provide satisfactory levels of service to the Flinders/Flagstone PDA. Option 1 is considered to be the preferred strategy due to the substantial costs that will be associated with duplicating DN600 water main from the future Flinders/Flagstone Reservoir.

4.5 WATER SUPPLY NETWORK ASSESSMENT

4.5.1 EXTERNAL WATER SUPPLY NETWORK ASSESSMENT

An external water supply network assessment has been undertaken to assess the available capacity within the existing network. Assessment was undertaken for the Flagstone metered area during Peak Hour and Fire Flow conditions.

Table 4-2 identifies the minimum network pressures and number of nodes failing during the 2016 planning horizon with additional development demands. **Table 4-2** provides an overview of external infrastructure performance during the interim development horizon. Additional information is provided on *drawing B13343.W-WS006* within Appendix B to outline the external Peak Hour pressures during the interim development horizon.

Table 4-2: External Network Performance – Interim Development Horizon

Additional Demand	Peak Hour		Fire Flow	
	Minimum PH Pressure	Number of Nodes Failing DSS	Minimum FF Pressure @ LS_J7467	Number of Nodes Failing DSS
0 EP	19.96	4	14.88	82
500 EP	19.76	4	14.61	82
1000 EP	19.50	4	14.45	82
1500 EP	19.21	4	14.22	82
1,750 EP	19.06	4	14.14	82
2,000 EP	18.90	5	13.99	82

Note: 1) Fire Flow demands of 7.5 L/s for 2 hours, 15 L/s for 2 hours and 30L/s for 4 hours applied for rural residential, residential and commercial land uses respectively in accordance with LCC DSS outlined in Section 3.2.1.

As outlined in **Table 4-2**, network failures are prevalent within the network under existing conditions. Water network modelling has indicated that approximately 1,750 EP may be serviced via existing infrastructure without significant adverse impact on existing network customers. The available spare capacity is to be confirmed by LWIA following final development of the network model. Based on preliminary modelling and discussions with LWIA and EDQ we understand that the spare capacity in the network will up to 1,750 EP for the interim case. This figure is greater than the previously reported 1,000 EP due to the reduced levels of service as outlined in the Logan DSS, provided January 2017. Once development within the Context Plan exceeds the available existing capacity which, based on modelling is up to 1,750 EP, external trunk infrastructure will be triggered.

4.5.2 INTERNAL WATER SUPPLY NETWORK ASSESSMENT

As outlined in Section 4.4, it is proposed that the ultimate development will be serviced via maintaining the proposed booster pump station or making a new connection to the future Flinders/Flagstone reservoir. A network assessment was undertaken for both options. It is intended that the proposed booster pump station and/or PRV configuration and operation will be designed during detailed design following refinement of the Flagstone PDA demands. For the purpose of this assessment, pump stations and PRV's have been optimised to reduce maximum pressures while still maintaining required DSS.

Table 4-3 identifies the minimum network pressures modelled within the Context Plan under PH and FF conditions during the ultimate Flagstone PDA planning horizon.

Table 4-3: Internal Network Performance

Planning Horizon	Option 1: Booster Pumps			Option 2: Reservoir Connection & PRV		
	Minimum PH Pressure, m	Minimum FF Pressure, m	Maximum Pressure, m	Minimum PH Pressure, m	Minimum FF Pressure, m	Maximum Pressure, m
Context Plan	23.9	19.4	64.6	N/A	N/A	N/A
Flagstone PDA	23.4	17.0	64.6	24.8	19.9	60.5

As outlined in **Table 4-3**, water network modelling indicates that the proposed water supply networks have sufficient capacity to service the proposed demands associated with the Context Plan area.

High service pressures up to 65m were modelled at localised sections within the context plan. *Drawing No.B13343.W-WS005* outline the approximate areas within the site that may have maximum pressures ranging between 55m and 65m. Liaison with EDQ has indicated that pressures up to 65m are acceptable if it allows for an overall better network. As such, development nodes exceeding the 55m target maximum pressure have not been classified as a failure.

The internal network has been conceptually designed to increase interconnectivity and minimise water age issues. Based on preliminary water age modelling, it is not considered that excessive water ages will be experienced on site. Further investigation will be undertaken during future detailed design phase and submitted to Council for assessment in conjunction with future Operational Works applications.

Based on the network modelling analyses, it is considered that the internal and external water supply networks can service the proposed Jimboomba Celestino development and the balance of the Context Plan generally in accordance with the EDQ Flagstone PDA Water Supply Servicing Strategy.

5 WASTEWATER SERVICE STRATEGY

A wastewater network assessment was undertaken to assess the infrastructure required to service the Jimboomba Celestino development and the balance of the Context Plan. Trunk network infrastructure was adopted generally in accordance with the EDQ Flagstone PDA Wastewater Servicing Strategy. Assessment was undertaken for the ultimate population projection of 29,209 EP. All proposed wastewater service strategies are conceptual only and remain subject to detailed engineering design.

5.1 METHODOLOGY

Wastewater network modelling was undertaken with the use of InfoSWMM Suite 14.5. The proposed wastewater network was developed by Calibre Consulting. Network infrastructure was assessed against the LCC DSS outlined within Section 3.2.2. The network investigation was undertaken generally in accordance with the EDQ Flagstone PDA Wastewater Servicing Strategy. Assessment was undertaken for three planning horizons:

1. Interim Horizon (0 – 5 years): Temporary on-site WWTP. For the purpose of this assessment, the interim horizon will be for 0 – 3,300 EP.
2. Intermediate Horizon: Conveyance of wastewater to the Cedar Grove WWTP. Liaison with EDQ has indicated that the Cedar Grove WWTP is planned to be completed in 2018/19. However, due to 'likely delay in environmental approval' it may be delayed until 2021. The proposed RB2 pump station and rising main timing is very likely to coincide with the Cedar Grove WWTP. This horizon is considered to be an advisory horizon only and may also provide an interim servicing strategy through to approximately 2023.
3. Context Plan Horizon: Trunk infrastructure to service the Context Plan. For the purpose of this assessment, the Context Plan will be for 3,301 EP to 29,209 EP.

5.2 WASTEWATER LOAD PROJECTIONS

The design wastewater loads were calculated based on the population projections outlined in **Table 3-1** and **Table 3-2**. Wastewater loads were estimated in accordance with the interim and ultimate planning horizons as outlined in Section 5.1. The design wastewater loads are outlined in **Table 5-1**.

Table 5-1: Wastewater Daily Flow Projection

Planning Horizon	Demand (EP)	ADWF (L/s)	PWWF (L/s)
Interim	3,300	6.31	49.65 38.19
Context Plan	29,209	55.78	439.49 338.07

1000L/EP/Day

The design wastewater loads were estimated using the ADWF load of 165 L/EP/d and a PWWF load of ~~1300 L/EP/d~~. An ultimate Peak Wet Weather Flow (PWWF) rate of ~~439 L/s~~ is estimated to discharge from the Context Plan.

338.07 L/s

5.3 EXISTING NETWORK

There is an existing gravity main located approximately 1.6 km north-west of the site in Homestead Drive whereby wastewater gravitates to the existing SPS adjacent Blueberry Ash Court. From here flows are conveyed north to the existing Jimboomba WWTP. Liaison with LWIA and LCC has indicated that the existing wastewater infrastructure and Jimboomba WWTP does not have residual capacity to service future development loads.

As outlined in the Flagstone PDA Wastewater Servicing Strategy, it is proposed that a new Cedar Grove WWTP will be constructed to the south of the site. Liaison with EDQ has indicated that the Cedar Grove WWTP will be constructed by 2021.

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Date: 15 June 2017



5.4 PROPOSED WASTEWATER SERVICE STRATEGY

Drawings No.B13343.W-WW002 to WW004 within Appendix B outline the proposed wastewater service strategies for the three proposed planning horizons. The proposed servicing strategies are generally in accordance with the EDQ Flagstone PDA Wastewater Servicing Strategy.

As outlined on *Drawing No.B13343.W-WW002*, it is proposed that the initial stages of the Jimboomba Celestino development will be serviced via a temporary WWTP to be located within the site, adjacent the green space network. Indicative irrigation areas outlined in the sketch are subject to detailed design in accordance with relevant codes and guidelines. The irrigation areas will be fully contained within the central drainage catchment and therefore any potential spill will bypass the Cedar Grove Weir.

It is proposed that a new permanent pump station (RB3 SPS) will be constructed adjacent Teviot Road to service the northern catchment. Wastewater will be pumped south to the trunk gravity network which conveys wastewater to the proposed temporary WWTP. Subject to timing of the Cedar Grove WWTP and associated RB2 SPS, rising main and trunk gravity main, provision has been made for a temporary SPS to be located at the southern boundary of the site to service the southern catchment of Precinct 8. It is proposed that wastewater will be pumped north to the temporary WWTP.

By 2021 it is anticipated that the Cedar Grove WWTP will be in operation. As outlined on *Drawing No.B13343.W-WW004*, it is proposed that the on-site WWTP will be decommissioned and replaced with a SPS. Flows will be pumped south to a new trunk gravity main at the southern boundary of the site which will convey wastewater to the planned RB2 SPS. The RB2 SPS will inject flows into the regional Flagstone PDA rising main which will discharge to the Cedar Grove WWTP. Liaison with EDQ has indicated that the RB2 SPS and regional rising main will be constructed in unison with the Cedar Grove WWTP. It is considered that the trunk gravity main alignment, RB2 SPS location and rising main alignment will be determined by others at a future date.

Should the construction of the aforementioned trunk gravity main, RB2 SPS or regional rising main delayed, it is proposed that the site will be serviced via extending the RB1 rising main to discharge directly to the Cedar Grove WWTP.

Drawing No.B13343.W-WW003 outlines the proposed ultimate service strategy for the Context Plan. It is proposed that a new SPS will be required along the eastern boundary of the site adjacent the Logan River. Flows will be pumped north to the trunk gravity main upstream of RB1 SPS. The approximate lengths of internal trunk wastewater mains proposed to service the Context Plan area are as follows:

- 1,000 m of DN675 gravity main.
- 750 m of DN600 gravity main.
- 575 m of DN525 gravity main.
- 650 m of DN450 gravity main.
- 750 m of DN375 gravity main.
- 2,000 m of DN300 gravity main.
- 2,600 m of DN225 gravity main.
- 7,000 m of DN150 gravity main.
- 200 m of OD800 rising main.
- 950 m of OD630 rising main.
- 1200 m of OD250 rising main.

pipe sizes to be reviewed based on
PWWF of 1,000L/EP/Day at maximum
depth of flow of 75%

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Infrastructure sizing has been developed with sufficient capacity to convey ADWF and PWWF in accordance with the SEQ Code and the Logan City Council DSS. Provision has been made to align interim wastewater mains with the proposed road construction sequencing in order to minimise costs. Staging of the trunk gravity mains, pump stations and rising mains will be refined during future applications.

5.5 WASTEWATER NETWORK ASSESSMENT

Assessment of the internal wastewater network was undertaken with the use of InfoSWMM software to ensure sufficient capacity is provided to service the Context Plan. Onsite wastewater infrastructure has been conceptually designed in accordance with the SEQ Code and Logan DSS and remains subject to detailed engineering design during individual development applications. The following outlines the concept design and assessment undertaken for the internal wastewater network infrastructure proposed for the Context Plan.

5.5.1 GRAVITY SEWER CONCEPTUAL DESIGN

As outlined in Section 5.4, it is proposed that the Context Plan will be serviced via a gravity catchment consisting of DN675, DN600, DN525, DN450, DN375, DN300, DN225 and DN150 gravity mains. Gravity mains have been sized to service the ultimate structure plan area. **Table 5-2** details the design specifications for the proposed internal gravity network.

Table 5-2: Internal Gravity Network Capacity Summary

Pipe Diameter (mm)	Minimum Grade (m)	Pipe Capacity @ 75% (L/s)	Pipe Full Capacity (L/s)
DN150	1:180	10.5	11.5
DN225	1:300	24.0	26.3
DN300	1:400	44.8	49.1
DN375	1:550	69.2	75.9
DN450	1:700	99.8	109
DN525	1:750	178	195
DN600	1:900	189	207
DN675	1:1050	240	263

The internal sewer network has been planned with sufficient capacity to convey PWWF without exceeding 100% of pipe capacity. The internal reticulation network proposed to service the Context Plan is outlined on *drawing No.B13343.W-WW003* within Appendix B.

Conceptual longitudinal sections for proposed Jimboomba Celestino trunk gravity mains are outlined in *drawings B13343.W-SK200 to SK203* within Appendix C.

During the initial phases of development the trunk gravity network may not achieve self-cleansing. It is anticipated that during these initial development phases the trunk network will need to be monitored and a maintenance program implemented to reduce the accumulation of sediment within the pipes. Self-cleansing requirements and potential maintenance programs are to be considered further during detailed design of the trunk gravity network.

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Date: 15 June 2017



5.5.2 PUMP STATION PLANNING

Pumps station to be designed based on
PWWF of 1,000L/EP/Day

Drawings No.B13343.W-WW002 to WW004 within Appendix B outline the proposed locations of the sewage pump stations proposed to service the Context Plan. **Table 5-3** outlines the concept design components of the pump stations.

Table 5-3: Concept Sewage Pump Station Operational Requirements

Pump Station	Catchment (EP)	ADWF (L/s)	PWWF (L/s)	Operational Storage (m ³)	¹ Emergency Storage (kL)
RB1	19,547	37.33	294.11	23.07	537.55
RB2	29,209	55.78	439.49	31.41	803.232
RB3	2,644	5.05	39.78	2.96	72.72
RB4	2,748	5.25	41.35	3.06	75.6
RB5	1,098	2.10	16.52	1.41	30.24

Note: 1) Minimum emergency storage calculated for 4 hours ADWF.

The proposed pump stations have been sized to cater for the ultimate catchment demands. It is proposed that RB1 SPS and RB2 SPS are to be staged to reduce upfront costs while also improving network performance during initial stages of development. It is recommended that pump station staging is further investigated once the Context Plan layout and development demands and staging are further refined.

5.5.3 RISING MAIN ASSESSMENT

pipe sizes to be reviewed based on
PWWF of 1,000L/EP/Day

Drawings No.B13343.W-WW002 to WW004 within Appendix B outline the proposed alignments of the rising mains proposed to service the Context Plan. **Table 5-4** outlines the proposed rising main performance during the ultimate Context Plan horizon.

Table 5-4: Proposed Rising Main Operation

Rising Main	PWWF (L/s)	Diameter (mm)	Length (m)	Velocity (m/s)	Retention Time (hrs)
RB1	294.11	OD630 (ID 512.3)	950	1.43	0.20
RB2	439.49	OD800 (ID 651.0)	200	1.32	0.21
RB3	39.78	OD250 (ID 203.2)	600	1.23	0.23
RB4	41.35	OD250 (ID 203.2)	600	1.28	0.22
RB5	16.52	OD160 (ID 129.9)	400	1.25	0.23

The proposed rising main infrastructure has been planned to meet the preferred maximum velocity requirement of 1.5 m/s as outlined in the SEQ Code. It is anticipated that construction of the RB1 rising main may be staged in order to minimise retention times during the initial stages of development. It is recommended that rising main staging is further investigated once the Context Plan layout and development demands and staging are further refined.

Through wastewater network analysis it has been demonstrated that the proposed trunk wastewater network as outlined on drawings No.B13343.W-WW002 to WW004 within Appendix B is capable of servicing the Context Plan.

6 CONCLUSIONS

Calibre Consulting (Qld) Pty Ltd has been engaged by Celestino Pty Ltd to prepare this *Water and Wastewater Infrastructure Master Plan* report for the proposed Jimboomba Celestino development at Teviot Road, Jimboomba. The assessment has given provision for the future surrounding development area within the Context Plan. Water supply and wastewater servicing strategies were developed generally in accordance with the EDQ Flagstone PDA Water Supply and Wastewater Servicing Strategies.

Water network modelling was undertaken for three planning horizons. As outlined on *drawing No.B13343.W-WS001*, it is proposed that the initial stages of the Jimboomba Celestino development (Precincts 1 & 3) will be serviced via approximately 1,100 m of DN300 water main and 700 m of DN450 water main from the existing DN375 at the intersection of Homestead Drive and Teviot Road to within the site. From here the site will be serviced via either a booster pump station or a Pressure Reducing Valve (PRV).

Once the capacity triggers within the existing network (that is, the interim yield of 1,750 EP is reached) are exceeded, it is proposed, as outlined on *drawing No.B13343.W-WS002*, that the Context Plan will be serviced via a new trunk infrastructure network which is supplied via a new DN675 connection to Round Mountain Reservoir. An internal trunk infrastructure network consisting of DN525, DN450, DN375, DN300 and DN225 water mains is proposed to service the Context Plan. The context plan is proposed to be serviced via four catchment district metered zones (DMA's). *Drawing No.B13343.W-WS005* outlines the proposed DMA configurations.

As outlined on *drawings No.B13343.W-WS003 and WS004*, two options have been identified to service the Context Plan during the ultimate Flagstone PDA horizon. Option 1 involves utilising the existing booster pump station proposed for the previous horizon. Option 2 involves decommissioning the booster pump station and constructing a new DN600 trunk water main connection from the future Flinders/Flagstone Reservoir. It is considered that Option 1 is the preferred ultimate service strategy due to the anticipated capital costs associated with the new connection to Flinders/Flagstone Reservoir.

Wastewater network modelling was undertaken for three planning horizons. As outlined on *Drawing No.B13343.W-WW002*, it is proposed that the initial stages (0 – 5 years) of the Jimboomba Celestino development will be serviced via a temporary WWTP to be located within the site. Due to topographical constraints, it is proposed that a new permanent pump station will be constructed adjacent Teviot Road to service the northern catchment. Flows will be conveyed east to the temporary WWTP.

Liaison with EDQ and LWIA has indicated that the Cedar Grove WWTP will be in operation by 2021. As outlined on *Drawing No.B13343.W-WW004*, it is proposed that the on-site WWTP will be decommissioned and replaced with a SPS. Flows will be pumped south to a new trunk gravity main at the southern boundary of the site which will convey wastewater to the planned RB2 SPS. The RB2 SPS will inject flows into the regional Flagstone PDA rising main which will discharge to the Cedar Grove WWTP. Liaison with EDQ has indicated that the RB2 SPS and the regional rising main will be constructed in unison with the Cedar Grove WWTP.

Should the construction of the aforementioned trunk gravity main, RB2 SPS or regional rising main be delayed, it is proposed that the site will be serviced via extending the RB1 rising main to discharge directly to the Cedar Grove WWTP.

Drawing No.B13343.W-WW003 outlines the proposed ultimate service strategy for the Context Plan. It is proposed that a new SPS will be required along the eastern boundary of the site adjacent the Logan River.

Internal water supply and wastewater infrastructure was conceptually designed in accordance with the SEQ Code requirements. Through water and wastewater network analyses it was determined that the proposed Jimboomba Celestino development and balance of the Context Plan can be serviced generally in accordance with the EDQ Flagstone PDA Water Supply and Wastewater Servicing Strategies.

7 RECOMMENDATIONS

Calibre Consulting recommends that this *Water and Wastewater Infrastructure Master Plan* report for the Jimboomba Celestino development be approved on the basis that the site provides suitable water and wastewater network infrastructure.

Calibre Consulting recommends the following be undertaken in support of the proposed development:

- Adopt the water supply service strategies as outlined on drawings *B13343.W-WS001 to WS004* within Appendix B.
- Adopt the wastewater service strategy as outlined on drawings *B13343.W-WW002 to WW004* within Appendix B.
- Undertake detailed design in accordance with the proposed initial water and wastewater strategies.

8 REFERENCES

- Cardno (2 November 2015), Greater Flagstone PDA Wastewater Servicing Strategy.
- Logan City Council (2016), H2Omap Water Model entitled Logan_Comb11.H2O.
- Logan City Council (2015), Logan Planning Scheme SC6.2.5 Planning Scheme Policy.
- Logan City Council (2015), LWIA Water Network DSS entitled 90-13-08.
- Logan City Council (2014), LWIA Wastewater Network DSS entitled 90-12-43.
- SEQ Water (2013), SEQ Code – South East Queensland Water Supply and Wastewater Design & Construction Code.

APPENDICES

APPENDIX A	CONTEXT PLAN LAYOUT AND YIELD SUMMARIES
APPENDIX B	CALIBRE CONSULTING DRAWINGS
APPENDIX C	CONCEPTUAL LONGITUDINAL SECTIONS
APPENDIX D	LOGAN CITY COUNCIL DSS

APPENDIX A CONTEXT PLAN LAYOUT AND YIELD SUMMARIES

LEGEND

Site boundary	
Residential Density 25dw/ha(min.)	
Residential Density 15dw/ha (min.)	
District Centre	
Neighbourhood Centre	
Park	
School	
Special Use - Infrastructure	
District recreational park (Min. 4.5ha)	
District sport park (Min. 7.5ha)	
Regional recreational park (Min. 10ha)	
Local Park	
Neighbourhood Park	
Centre Connector / Urban Arterial	
Neighbourhood Connector / Urban Collector (Dual) 4 lane	
Neighbourhood Connector / Urban Collector (Dual) 2 lane	
Neighbourhood Connector / Urban Collector (Single)	
Interface Areas	
Bicycle Path	
Activity Centre Nodes	
400m walking radius	
1 in 100 years flood line	



AMENDED IN RED

By: Brandon Bouda

Date: 15 June 2017



Teviot Road, Jimboomba

For

Jimboomba | CELESTINE

IMPORTANT NOTES:
This plan was prepared for Preliminary evaluation of the land situated at Jimboomba. This plan is intended for discussion purposes only and should not be used for any other purposes. No investigations have been undertaken by Queensland Surveying Pty Ltd over this area of land other than to sight the registered plan and topographical map. The Contours, boundaries, creek line, flood lines, building locations have all been scaled and should not have any reliance based on them as they are only intended as a general guide. Any comments contained on this plan should be confirmed by the relevant authorities. The dimensions, areas and total number of lots shown hereon are subject to field survey and also to the requirements of Council and any other authority which may have requirements under any relevant legislation. In particular, no relevance should be placed on the information on this plan for any financial dealings involving the land.

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Data Sources	
Cadastral Boundaries	30697-CP01-C
Contours / Topographic	LIDAR - DNR&M
Flood Level	Logan City Council shp file
Engineering Design	Calibre Consulting

E	Original	13.03.2017	KS/PS
Issue	Revisions	Date	Drawn

Locality: Jimboomba
Local Authority: Logan City Council
Horizontal Meridian: MGA
Vertical Level Datum: AHD
Scale: 1: 20,000 @ A3
Designed: PS/KS
Drawn: PS
Checked: PS
Plot Date: 13 Mar, 2017
Computer File Ref: 30697-CP01-E.dwg

Context Plan

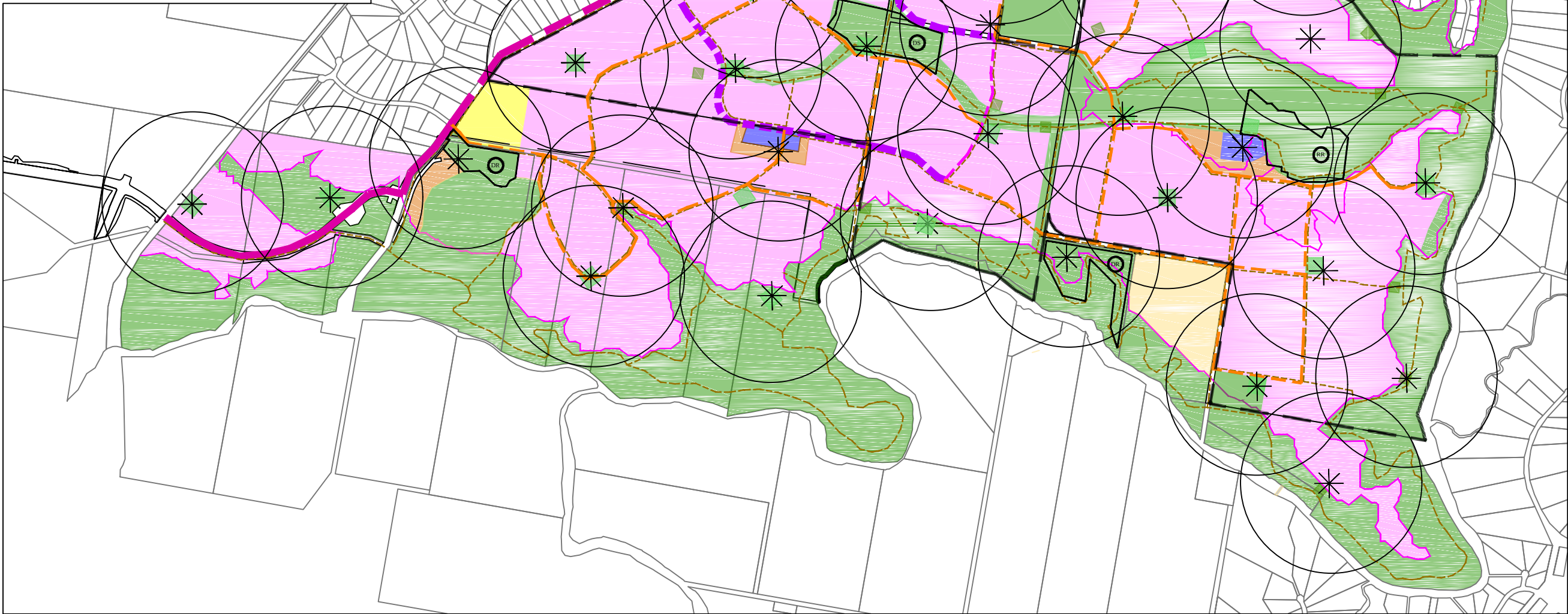


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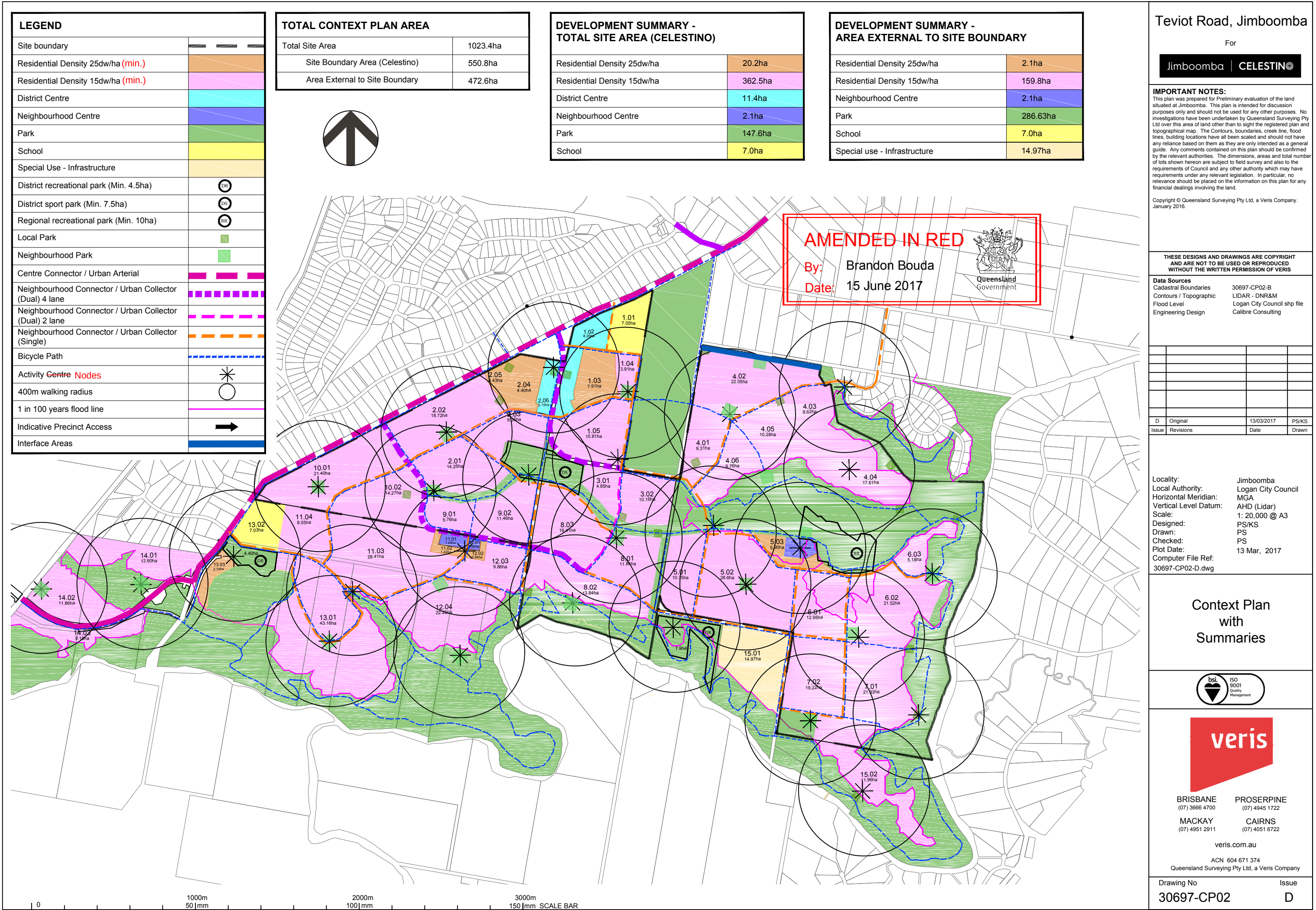
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Drawing No 30697-CP01 Issue E



0 1000m 50 |mm 2000m 100 |mm 3000m 150 |mm SCALE BAR



Celestino Jimboomba Yield Assessment

Table 1 – Development Summary

Context Plan Version I Date 19/08/2016

Site Area	Area
Lot 800 on SP247625	310.4 ha
Lot 106 on SP254145	43.3 ha
Lot 105 on SP254145	23.5 ha
Lot 104 on SP254145	31.2 ha
Lot 102 on SP254145	50.9 ha
Lot 101 on SP254145	91.5 ha
Total	550.8 ha

Land Use Elements						
Roads		Length (m)	Area			
Arterial Road (38m corridor)		0	0.0	ha		
Sub-Arterial Roads (32m corridor)		987	2.0	ha		
Total Roads (arterial)			2.0	ha		
Education Facilities			Area			
SSS1 - State High School			0.0	ha		
SPS1 - State Primary School			7.0	ha		
Total Education Facilities (State)			7.0	ha		
Centres and Other (refer separate sheet for details)		Total Area (all uses)				
District Centre			10.0	ha		
Neighbourhood Centre			1.4	ha		
			0.0	ha		
Total			11.3	ha		
Open Space			Area	Number	Total	
District Sports Park	DS1		9.2 ha	1.0	9.2	ha
	DS2		20.2 ha	1.0	20.2	ha
	DS3		4.4 ha	1.0	4.4	ha
	DS4		3.4 ha	1.0	3.4	ha
Regional Recreation Park	RR1		10.1 ha	x 1.0	10.1	ha
	RR2		17.4 ha	x 1.0	17.4	ha
	RR3		3.9 ha	x 1.0	3.9	ha
Neighbourhood Recreation (Civic) Park			0.5 ha	x 1.0	0.5	ha
Neighbourhood Recreation Park			0.5 ha	x 11.0	5.5	ha
Neighbourhood Recreation / Multi Use			0.2 ha	x 20.0	4.0	ha
Linear and Riparian Open Space			69.0 ha		69.0	ha
Total Open Space			ha		147.6	ha

Residential Yield Breakdown

Residential Typologies						
Residential areas adjacent to Centres			Area		Density	
District Centre Residential (refer Table 3)					Dwellings	
Residential			10.0	ha	35.0 dw/ha	348
Residential Transition			16.1	ha	25.0 dw/ha	Refer 2.05, 2.04 & 1.03 below
Neighbourhood Centre Residential						
NC1 - Neighbourhood Centre Residential (refer Table 3)			1.4	ha	20.0 dw/ha	27
Transition			5.1	ha	20.0 dw/ha	Refer 5.03 below
				ha	20.0 dw/ha	0
Total (Centres)			32.5	ha	Varies	375

ep/dwelling vpd/dwelling												25%
		2.9					10					
Urban Residential Areas	Precinct	Gross Area	Neighbourhood Park	Nett of Parks		Dwellings	Population / Dwelling	Traffic Generation	Movement s	density Dw/Ha	Area Road Ha.	Average Lot Size (sm)
Area 1.01	1	0.0	ha	0.0	0.0	ha	0	0	0		0.00	
Area 1.02	1	0.0	ha	0.0	0.0	ha	0	0	0		0.00	
Area 1.03	1	7.6	ha	0.0	7.6	ha	189	549	1893	25	1.89	300
Area 1.04	1	4.9	ha	0.0	4.9	ha	83	241	833	17	1.22	438
Area 1.05	1	15.0	ha	0.7	14.3	ha	244	708	2441	16	3.74	431
Area 2.01	2	16.5	ha	0.5	16.0	ha	274	795	2741	17	4.13	433
Area 2.02	2	12.3	ha	0.0	12.3	ha	211	613	2112	17	3.08	438
Area 2.03	2	13.6	ha	0.4	13.2	ha	226	656	2263	17	3.40	433
Area 2.04	2	4.1	ha	0.0	4.1	ha	103	297	1025	25	1.03	300
Area 2.05	2	3.6	ha	0.2	3.4	ha	86	249	858	24	0.91	294
Area 2.06	2	0.0	ha	0.0	0.0	ha	0	0	0		0.00	
Area 3.01	3	4.9	ha	0.0	4.9	ha	83	241	831	17	1.21	438
Area 3.02	3	10.2	ha	0.2	10.0	ha	171	495	1706	17	2.54	435
Area 4.01	4	9.3	ha	0.0	9.3	ha	159	463	1595	17	2.33	438
Area 4.02	4	22.1	ha	0.9	21.2	ha	254	736	2536	12	5.51	617
Area 4.03	4	8.6	ha	0.2	8.4	ha	101	293	1010	12	2.16	620
Area 4.04	4	17.6	ha	0.0	17.6	ha	211	612	2112	12	4.40	625
Area 4.05	4	10.3	ha	0.0	10.3	ha	176	511	1761	17	2.57	438
Area 4.06	4	9.8	ha	0.0	9.8	ha	244	708	2440	25	2.44	300
Area 5.01	5	10.8	ha	0.2	10.6	ha	181	524	1807	17	2.69	435
Area 5.02	5	28.5	ha	0.7	27.8	ha	476	1380	4757	17	7.12	434
Area 5.03	5	5.1	ha	0.0	5.1	ha	102	296	1020	20	1.28	375
Area 6.01	6	13.0	ha	0.0	13.0	ha	223	645	2225	17	3.25	438
Area 6.02	6	21.5	ha	0.7	20.8	ha	357	1034	3567	17	5.38	433
Area 6.03	6	5.2	ha	0.0	5.2	ha	89	257	887	17	1.30	438
Area 7.01	7	21.9	ha	0.5	21.4	ha	367	1065	3671	17	5.48	434
Area 7.02	7	19.2	ha	0.0	19.2	ha	329	955	3293	17	4.81	438
Area 8.01	8	11.8	ha	0.0	11.8	ha	203	588	2028	17	2.96	438
Area 8.02	8	13.8	ha	0.0	13.8	ha	237	688	2371	17	3.46	438
Area 8.03	8	16.4	ha	0.5	15.9	ha	273	790	2726	17	4.10	433
Area 9.01	9	5.8	ha	0.0	5.8	9.0	99	286	987	17	1.44	438
Area 9.02	9	11.5	ha	0.5	11.0	ha	188	544	1878	16	2.87	431
Area 10.01	10	16.7	ha	0.4	16.3	ha	278	807	2784	17	4.16	434
Area 10.02	10	19.1	ha	0.7	18.4	ha	315	913	3147	17	4.77	432
Sub-Total		390.4	ha	7.3	383.1	ha	6,530	18938	65304	17	97.60	437
Centres Residential	Varies	11.3					375	1089	3755		2.83	
Total		401.7					6,905.9	20027	69059		100.42	
Residential Dwelling Estimation	Mix	Area	Density	Lot Size	Av Rd Width (m)	Dwellings						
Centres Residential		11.3	ha	Varies	9.0	375						
Urban	15%	57.5	ha	20.5	dw/ha	375	1,179					
Semi-urban	20%	76.6	ha	19.2	dw/ha	400	1,473					
Suburban	30%	114.9	ha	17.1	dw/ha	450	1,965					
Urban Fringe	35%	134.1	ha	14.5	dw/ha	530	(2) 1,946					
Total	100%	383.1	ha									
Notes: - Following more refined design works across the site, it is anticipated that the 'adopted figure' for dwellings (and the resulting adopted population) will be achievable. The note (2) - please note that precincts 4.02, 4.03 and 4.04 have larger lots sizes than average mix to accomodate transition from Rural Residential.												

Balance Area Yield Assessment (Gittins plus Others)

Table 1 – Development Summary Context Plan Version I Date 19/08/2016

Site Area	Area		
Lot 103 on SP 254145	53.3	ha	
Lot 156 on SL 11068	43.3	ha	
Lot 157 on SL 11068	23.5	ha	
Lot 299 on S 311316	40.5	ha	
Lot 168 on SL 11068	18.2	ha	
Lot 169 on SL 11068	17.8	ha	
Lot 23 on SP 142997	44.4	ha	
Lot 77 on SL 5520	4.0	ha	
Lot 25 on SP 142997	8.8	ha	
Lot 7 on S 31536	18.4	ha	
Lot 1 on RP 49296	14.2	ha	
Lot 24 on SP 142997	28.3	ha	
Lot 146 on SL 11068	16.6	ha	
Lot 141 on S 312748	22.9	ha	
Lot 4 on SP 201569	47.7	ha	
Lot 3 on SP 201569	4.1	ha	
Lot 801 on SP 247625	0.2	ha	
Total	406.3	ha	

Land Use Elements					
Roads	Length (m)	Area			
Arterial Road (40m corridor)	0	0.0	ha		
Sub-Arterial Roads (32m corridor)	0	0.0	ha		
Total Roads (arterial)		0.0	ha		
Education Facilities		Area			
SSS1 - State High School		0.0	ha		
SPS1 - State Primary School		6.6	ha		
Total Education Facilities (State)		6.6	ha		
Centres and Other (refer separate sheet for details)		Total Area (all uses)			
District Centre		0.0	ha		
Neighbourhood Centre		2.1	ha		
		0.0	ha		
Total		2.1	ha		
Open Space		Area	Number	Total	
District Sports Park		0.0	ha	0.0	ha
		0.0	ha	0.0	ha
		0.0	ha	0.0	ha
		0.0	ha	0.0	ha
District Recreation Park	DR1	4.4	ha	x	1.0
	DR2	7.9	ha	x	1.0
		0.0	ha	x	0.0
Neighbourhood Recreation (Civic) Park		0.0	ha	x	0.0
Neighbourhood Recreation Park		0.5	ha	x	2.0
Neighbourhood Recreation / Multi Use		0.2	ha	x	0.0
Linear and Riparian Open Space		222.5	ha		222.5
Total Open Space			ha		235.8

Residential Yield Breakdown

Residential Typologies

Residential areas adjacent to Centres	Area		Density		Dwellings	
District Centre Residential (refer Table 3)						
Residential	0.0	ha	35.0	dw/ha	0	
Residential Transition	0.0	ha	25.0	dw/ha		
Neighbourhood Centre Residential						
NC1 - Neighbourhood Centre Residential (refer Table 3)	2.1	ha	20.0	dw/ha	41	
					Refer 11.02 &	
Transition	2.4	ha	20.0	dw/ha	12.02 below	
	1.2	ha	20.0	dw/ha	Refer 13.05	
Total (Centres)	4.4	ha	Varies		112	

ep/dwelling vpd/dwelling										
2.9 10 25%										
Urban Residential Areas	Precinct	Gross Area	Neighbourhood Park	Nett of Parks		Dwellings	Population / Dwelling	Traffic Generation	density Dw / Ha	Area Road Ha. Average Lot Size (sm)
Area 11.01	11	0.0	ha	0.0	ha	0	0	0		0.00
Area 11.02	11	1.4	ha	1.4	ha	29	83	286	20	0.36 375
Area 11.03	11	28.4	ha	28.4	ha	487	1411	4867	17	7.10 438
Area 11.04	11	15.6	ha	15.6	ha	267	774	2667	17	3.89 438
Area 12.01	12	0.0	ha	0.0	ha	0	0	0		0.00
Area 12.02	12	0.9	ha	0.9	ha	19	55	188	20	0.24 375
Area 12.03	12	9.9	ha	9.9	ha	169	490	1689	17	2.47 438
Area 12.04	12	22.3	ha	21.8	ha	373	1081	3726	17	5.56 434
Area 13.01	13	37.5	ha	37.0	ha	635	1840	6345	17	9.39 436
Area 13.02	13	0.0	ha	0.0	ha	0	0	0		0.00
Area 13.03	13	1.2	ha	1.2	ha	24	68	236	20	0.30 375
Area 14.01	14	12.6	ha	12.6	ha	216	626	2159	17	3.15 438
Area 14.02	14	11.9	ha	11.9	ha	203	589	2032	17	2.97 438
Area 14.03	14	9.2	ha	9.2	ha	157	456	1573	17	2.30 438
Area 15.01	15	0.0	ha	0.0	ha	0	0	0		0.00
Area 15.02	15	12.0	ha	12.0	ha	205	594	2049	17	2.99 438
			ha	0.0	ha	0	0	0		0.00
Sub-Total		162.8	ha	161.8	ha	2,782	8067	27817	17	40.70 435
Centres Residential	Varies	2.1				41	119	410		0.51
Total		164.8				2,822.7	8186	28227		41.21

Residential Dwelling Estimation	Mix	Area	Density	Lot Size	Av Rd Width (m)	Dwellings
Centres Residential		2.1	ha	Varies	9.0	41
Urban	15%	24.3	ha	20.5 dw/ha	375	498
Semi-urban	20%	32.4	ha	19.2 dw/ha	400	622
Suburban	30%	48.5	ha	17.1 dw/ha	450	830
Urban Fringe	35%	56.6	ha	14.5 dw/ha	530	822
Total	100%	161.8	ha			

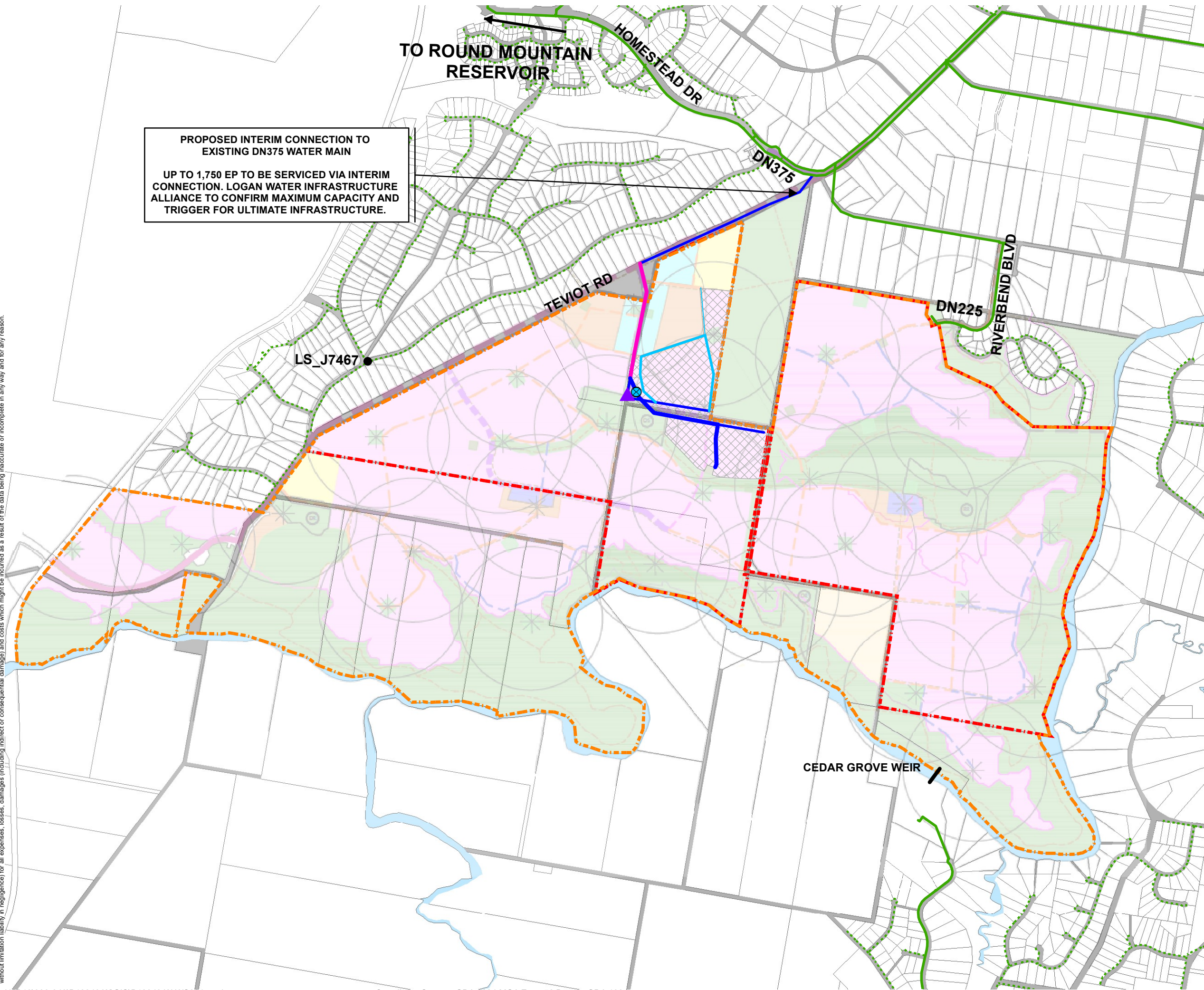
Notes:
- Following more refined design works across the site, it is anticipated that the 'adopted figure' for dwellings (and the resulting adopted population) will be achievable.

APPENDIX B CALIBRE CONSULTING DRAWINGS

While every care is taken to ensure the accuracy of data sourced through third parties, Calibre Consulting (Aust) Pty Ltd makes no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and disclaims all responsibility and all liability (including without limitation liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which might be incurred as a result of the data being inaccurate or incomplete in any way and for any reason.

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Coordinate System: GDA 1994 MGA Zone 56 Datum: GDA 1994



LEGEND

WATER SUPPLY INFRASTRUCTURE

- EXISTING RETICULATION WATER MAIN ($\leq$ DN150)
- EXISTING TRUNK WATER MAIN ($\geq$ DN225)
- PROPOSED BOOSTER PUMP STATION
- PROPOSED PRV
- PROPOSED DN150 WATER MAIN
- PROPOSED DN225 WATER MAIN
- PROPOSED DN300 WATER MAIN
- PROPOSED DN375 WATER MAIN
- PROPOSED DN450 WATER MAIN

LAND USES

- LAND PARCEL
- ROAD
- LOGAN RIVER
- INTERIM DEVELOPMENT AREA
- CONTEXT PLAN
- SITE BOUNDARY

NOTES:

- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH CALIBRE CONSULTING REPORT NO. B13343.W-03.
- THIS DRAWING IS CONCEPTUAL AND HAS BEEN PRODUCED FOR DISCUSSION PURPOSES ONLY.
- WATER NETWORK ANALYSES HAVE INDICATED THAT THE EXISTING NETWORK HAS CAPACITY TO SERVICE APPROXIMATELY AN ADDITIONAL 1,750 EP ASSOCIATED WITH THE DEVELOPMENT.
- REFER TO VERIS CONTEXT PLAN DRAWING NO. 30697-CP02(D).
- INFRASTRUCTURE HAS BEEN SIZED FOR ULTIMATE DEVELOPMENT DEMANDS.

0 125 250 500
m
1:20,000 (A3)



PROJECT:

Jimboomba | CELESTINO

CLIENT:

CELESTINO PTY LTD

DRAWING TITLE:

PROPOSED INTERIM WATER
SUPPLY SERVICE STRATEGY

DRAWING NO:

B13343.W-WS001

ISSUE:

D

ISS	BY	CHK	DATE	DETAILS
A	MAH	ABM	30.09.16	ORIGINAL
B	MAH	ABM	21.10.16	MINOR AMENDMENTS
C	MAH	ABM	31.10.16	CONTEXT PLAN UPDATED
D	MAH	ABM	15.03.17	SERVICE STRATEGY AMENDED

PROPOSED DN675 OFFTAKE FROM ROUND MOUNTAIN RESERVOIR

ROUND MOUNTAIN RESERVOIR
(SUBJECT TO UPGRADES BY OTHERS)

DN600 (EXISTING)

DN675 (PROPOSED)

DN375

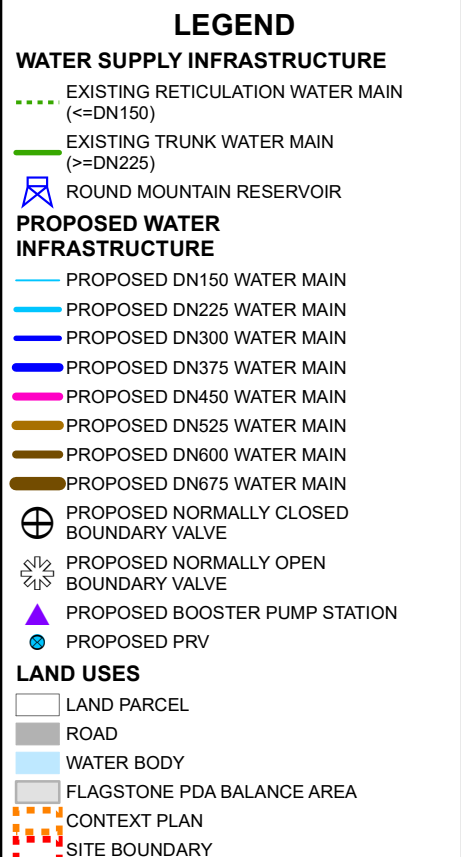
DN600

DN525

APPROXIMATE LOCATION OF PROPOSED PRV AND BOOSTER PUMP STATION.
(REFER DRAWING B13343.W-WS005 FOR DETAILS)

TRUNK DN600 WATER MAIN TO BE CONSTRUCTED
FOLLOWING INTERIM SERVICING STRATEGY.
ALIGNMENT TO BE DETERMINED BY OTHERS.

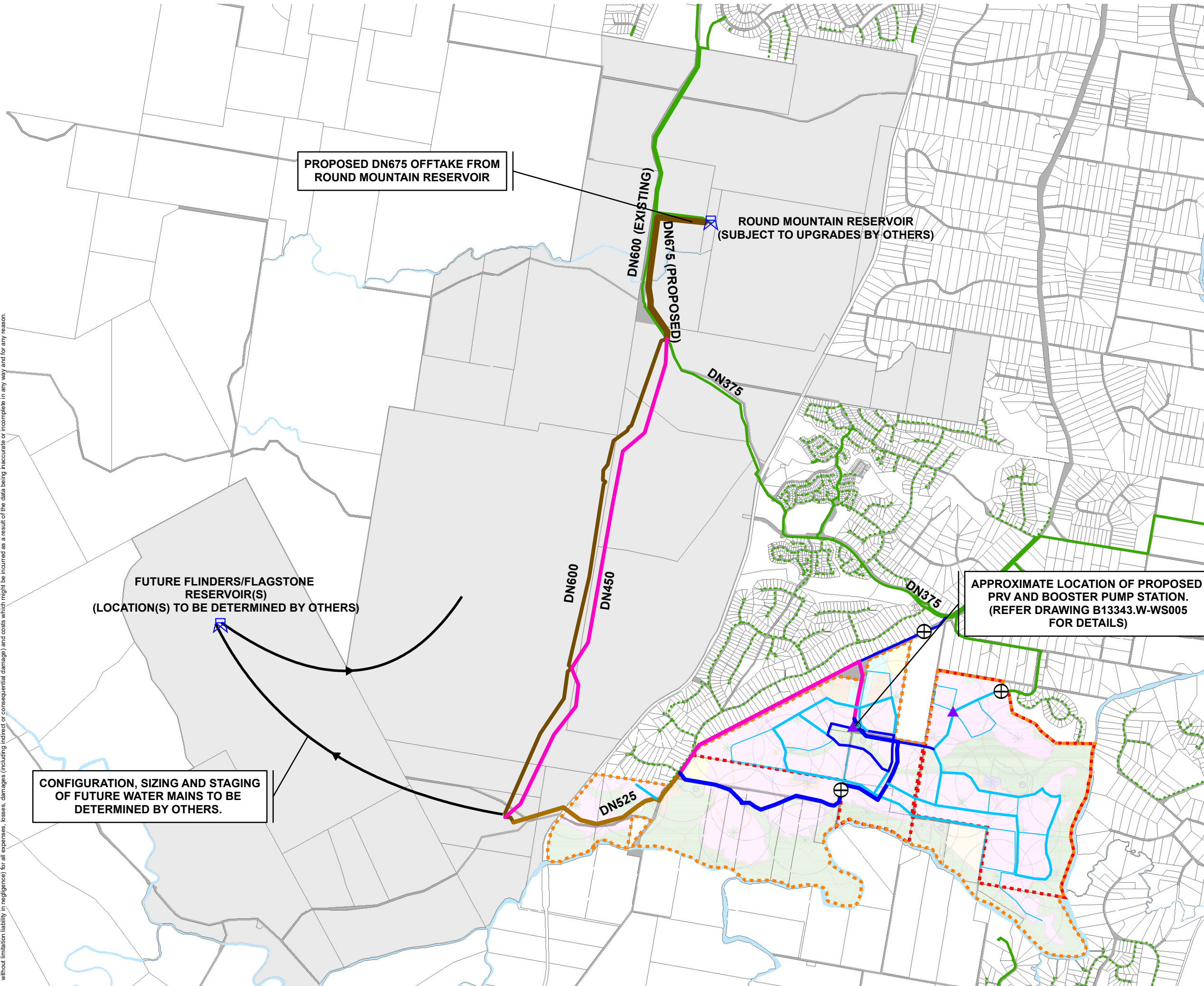
Coordinate System: GDA 1994 MGA Zone 56 Datum: GDA 1994



CLIENT:	CELESTINO PTY LTD
DRAWING TITLE:	PROPOSED JIMBOOMBA CELESTINO STAND ALONE WATER SUPPLY SERVICE STRATEGY

ISS	BY	CHK	DATE	DETAILS
A	MAH	ABM	30.09.16	ORIGINAL
B	MAH	ABM	21.10.16	MINOR AMENDMENTS
C	MAH	ABM	31.10.16	CONTEXT PLAN UPDATED
D	MAH	ABM	15.03.17	SERVICE STRATEGY AMENDED

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LEGEND

WATER SUPPLY INFRASTRUCTURE

- EXISTING RETICULATION WATER MAIN ($\leq$ DN150)
- EXISTING TRUNK WATER MAIN ($\geq$ DN225)
- RESERVOIR

PROPOSED WATER MAIN INFRASTRUCTURE

- PROPOSED DN150 WATER MAIN
- PROPOSED DN225 WATER MAIN
- PROPOSED DN300 WATER MAIN
- PROPOSED DN375 WATER MAIN
- PROPOSED DN450 WATER MAIN
- PROPOSED DN525 WATER MAIN
- PROPOSED DN600 WATER MAIN
- PROPOSED DN675 WATER MAIN

- PROPOSED CLOSED BOUNDARY VALVE
- PROPOSED BOOSTER PUMP STATION
- PROPOSED PRV
- FUTURE WATER MAIN

LAND USES

- LAND PARCEL
- ROAD
- WATER BODY
- FLAGSTONE PDA BALANCE AREA
- CONTEXT PLAN
- SITE BOUNDARY

- NOTES:**
- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH CALIBRE CONSULTING REPORT NO. B13343.W-03.
 - THIS DRAWING IS CONCEPTUAL AND HAS BEEN PRODUCED FOR DISCUSSION PURPOSES ONLY.
 - WATER NETWORK INVESTIGATIONS TO BE UNDERTAKEN BY THE LOGAN WATER INFRASTRUCTURE ALLIANCE TO DETERMINE INFRASTRUCTURE REQUIREMENTS FOR THE BALANCE OF THE FLAGSTONE PDA AREA.
 - REFER TO VERIS CONTEXT PLAN DRAWING NO. 30697-CP02(D).

0 250 500 1,000
m
1:40,000 (A3)



PROJECT:

Jimboomba | CELESTINO

CLIENT:

CELESTINO PTY LTD

DRAWING TITLE:

OPTION 1: PROPOSED ULTIMATE
FLAGSTONE PDA WATER
SUPPLY SERVICE STRATEGY

DRAWING NO:

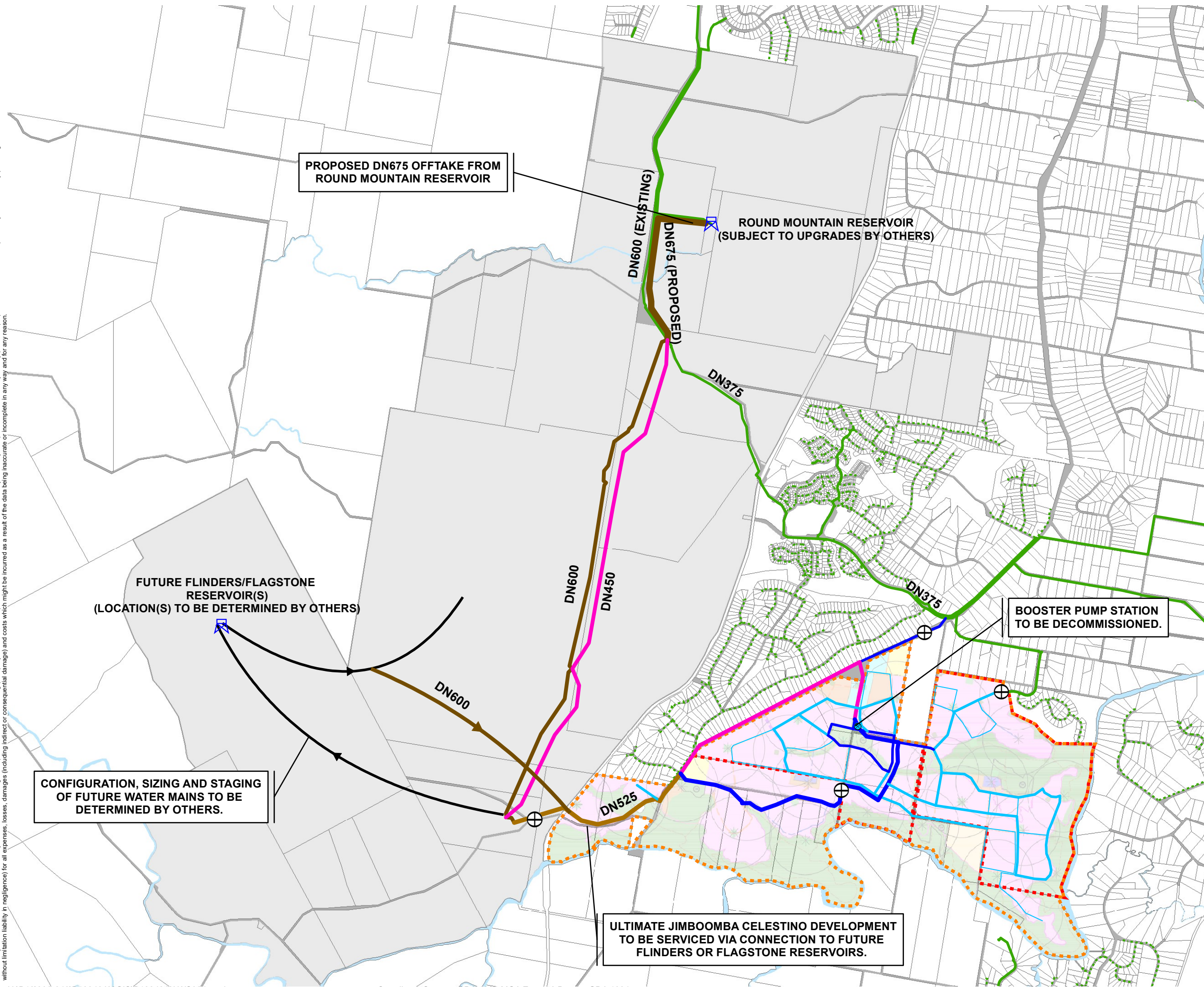
B13343.W-WS003

ISSUE:

D

ISS	BY	CHK	DATE	DETAILS
A	MAH	ABM	30.09.16	ORIGINAL
B	MAH	ABM	21.10.16	MINOR AMENDMENTS
C	MAH	ABM	31.10.16	CONTEXT PLAN UPDATED
D	MAH	ABM	15.03.17	SERVICE STRATEGY AMENDED

While every care is taken to ensure the accuracy of data sourced through third parties, Calibre Consulting (Aust) Pty Ltd makes no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and disclaims all responsibility and all liability (including without limitation liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which might be incurred as a result of the data being inaccurate or incomplete in any way and for any reason.



LEGEND

WATER SUPPLY INFRASTRUCTURE

- EXISTING RETICULATION WATER MAIN ($\leq$ DN150)
- EXISTING TRUNK WATER MAIN ($\geq$ DN225)
- RESERVOIR

PROPOSED WATER MAIN INFRASTRUCTURE

- PROPOSED DN150 WATER MAIN
- PROPOSED DN225 WATER MAIN
- PROPOSED DN300 WATER MAIN
- PROPOSED DN375 WATER MAIN
- PROPOSED DN450 WATER MAIN
- PROPOSED DN525 WATER MAIN
- PROPOSED DN600 WATER MAIN
- PROPOSED DN675 WATER MAIN
- FUTURE WATER MAIN
- PROPOSED PRV
- PROPOSED CLOSED BOUNDARY VALVE

LAND USES

- LAND PARCEL
- ROAD
- WATER BODY
- CONTEXT PLAN
- SITE BOUNDARY
- FLAGSTONE PDA BALANCE AREA

NOTES:

- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH CALIBRE CONSULTING REPORT NO. B13343.W-03.
- THIS DRAWING IS CONCEPTUAL AND HAS BEEN PRODUCED FOR DISCUSSION PURPOSES ONLY.
- WATER NETWORK INVESTIGATIONS TO BE UNDERTAKEN BY THE LOGAN WATER INFRASTRUCTURE ALLIANCE TO DETERMINE INFRASTRUCTURE REQUIREMENTS FOR THE BALANCE OF THE FLAGSTONE PDA AREA.
- REFER TO VERIS CONTEXT PLAN DRAWING NO. 30697-CP02(D).

0 250 500 1,000
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1:40,000 (A3)



PROJECT:

Jimboomba | CELESTINO

CLIENT:

CELESTINO PTY LTD

DRAWING TITLE:

OPTION 2: PROPOSED ULTIMATE
FLAGSTONE PDA WATER
SUPPLY SERVICE STRATEGY

DRAWING NO:

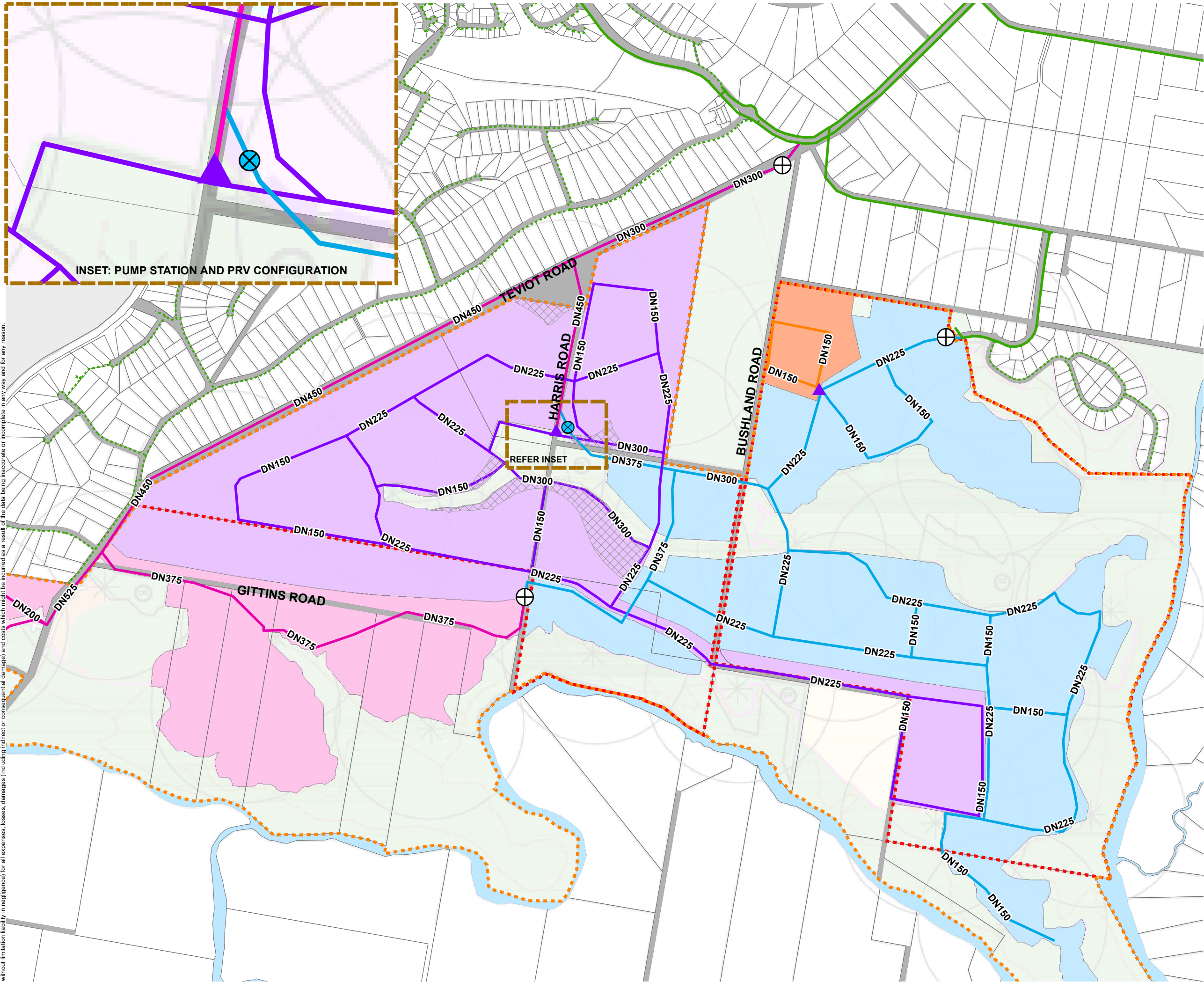
B13343.W-WS004

ISSUE:

D

ISS	BY	CHK	DATE	DETAILS
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B	MAH	ABM	21.10.16	MINOR AMENDMENTS
C	MAH	ABM	31.10.16	CONTEXT PLAN UPDATED
D	MAH	ABM	15.03.17	SERVICE STRATEGY AMENDED

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INSET: PUMP STATION AND PRV CONFIGURATION

REFER INSET



LEGEND

WATER SUPPLY INFRASTRUCTURE

- EXISTING RETICULATION WATER MAIN ($\leq$ DN150)
- EXISTING TRUNK WATER MAIN ($\geq$ DN225)
- PROPOSED LLZ
- PROPOSED HLZ1
- PROPOSED HLZ2
- ROUND MOUNTAIN HEAD
- PROPOSED PRV
- PROPOSED BOOSTER PUMP STATION
- PROPOSED CLOSED BOUNDARY VALVE
- ISOLATED AREAS WITH MAXIMUM PRESSURE UP TO 65m (SUBJECT TO DETAILED DESIGN)

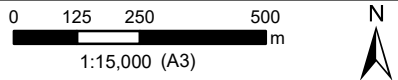
INDICATIVE DMA CONFIGURATION

- PROPOSED LLZ
- PROPOSED HLZ1
- PROPOSED HLZ2
- ROUND MOUNTAIN HEAD

LAND USES

- LAND PARCEL
- ROAD
- WATER BODY
- FLAGSTONE PDA BALANCE AREA
- CONTEXT PLAN
- SITE BOUNDARY

- NOTES:**
- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH CALIBRE CONSULTING REPORT NO. B13343.W-03.
 - THIS DRAWING IS CONCEPTUAL AND HAS BEEN PRODUCED FOR DISCUSSION PURPOSES ONLY.
 - REFER TO VERIS CONTEXT PLAN DRAWING NO. 30697-CP02(D).



PROJECT:
Jimboomba | CELESTINO

CLIENT:
CELESTINO PTY LTD

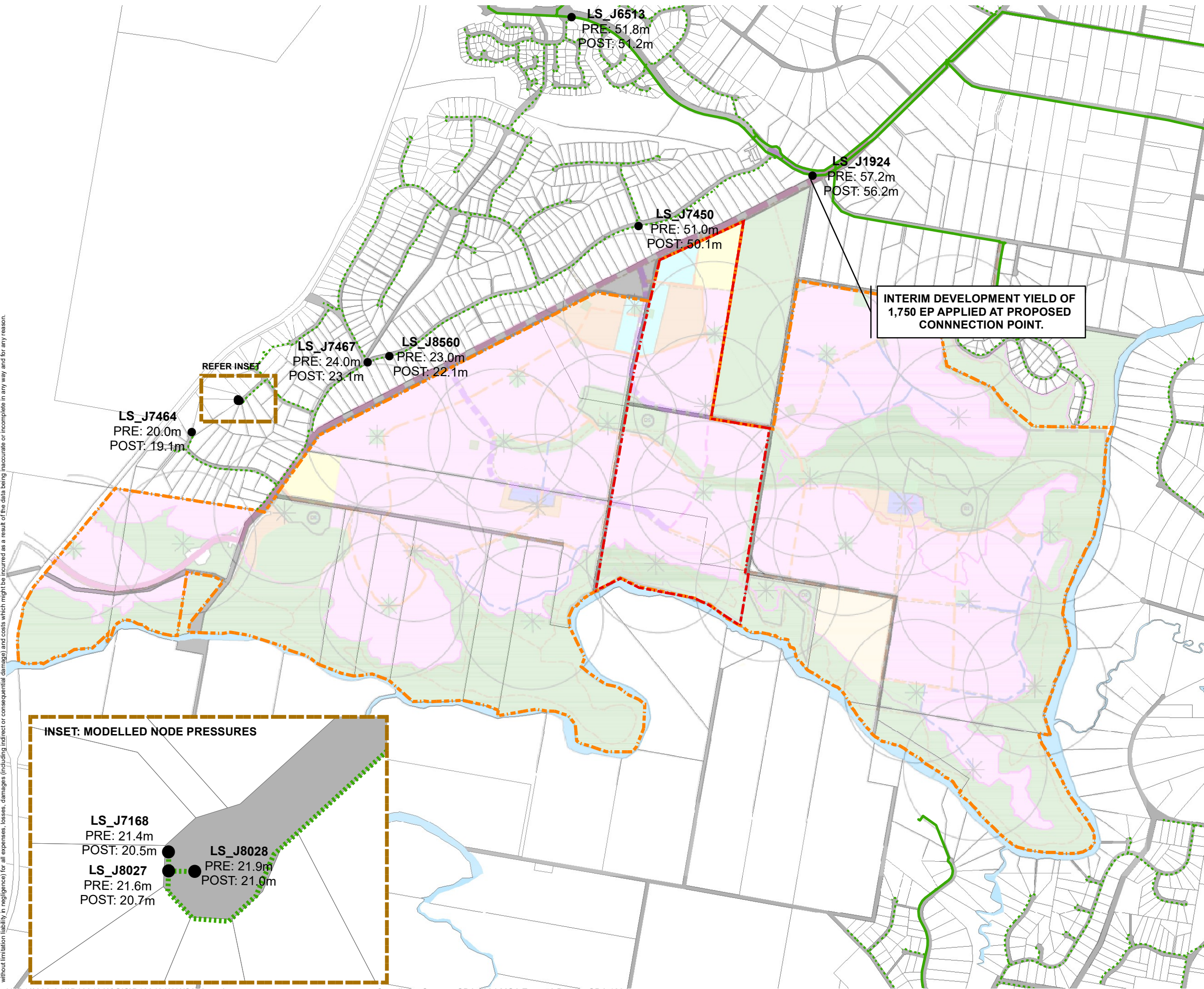
DRAWING TITLE:
PROPOSED ULTIMATE PRESSURE ZONES

DRAWING NO:
B13343.W-WS005

ISSUE:
A

ISS	BY	CHK	DATE	DETAILS
A	MAH	NJ	15.03.17	ORIGINAL

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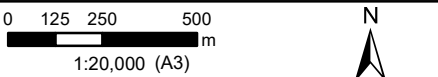
LEGEND
WATER SUPPLY INFRASTRUCTURE

- EXISTING RETICULATION WATER MAIN ($\leq$ DN150)
- EXISTING TRUNK WATER MAIN ($\geq$ DN225)

LAND USES

- LAND PARCEL
- ROAD
- LOGAN RIVER
- PRECINCTS 1, 3 & 8 BOUNDARY
- CONTEXT PLAN

- NOTES:**
- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH CALIBRE CONSULTING REPORT NO. B13343.W-03.
 - THIS DRAWING IS CONCEPTUAL AND HAS BEEN PRODUCED FOR DISCUSSION PURPOSES ONLY.
 - RECORDED PRESSURES ARE PEAK HOUR MINIMUM PRESSURES UNDER EXISTING CONDITIONS AND WITH AN ADDITIONAL 1,750 EP APPLIED FOR THE DEVELOPMENT.
 - WATER NETWORK ANALYSES HAVE INDICATED THAT THE EXISTING NETWORK HAS CAPACITY TO SERVICE APPROXIMATELY AN ADDITIONAL 1,750 EP ASSOCIATED WITH THE DEVELOPMENT.



PROJECT:
Jimboomba | CELESTINO

CLIENT:
CELESTINO PTY LTD

DRAWING TITLE:
INTERIM WATER SUPPLY MODELLING SUMMARY

DRAWING NO: **B13343.W-WS006** ISSUE: **A**

ISS	BY	CHK	DATE	DETAILS
A	MAH	ABM	15.03.17	ORIGINAL

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Coordinate System: GDA 1994 MGA Zone 56 Datum: GDA 1994

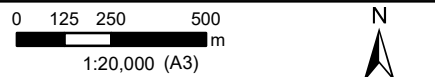


LEGEND
WASTEWATER INFRASTRUCTURE

- PROPOSED TEMPORARY ON-SITE WWTP
- PROPOSED SPS
- PROPOSED IRRIGATION AREA
- PROPOSED RISING MAIN
- PROPOSED GRAVITY MAIN

- LAND USES**
- LAND PARCEL
 - ROAD
 - LOGAN RIVER
 - PRECINCTS 1, 3 & 8 BOUNDARY
 - CONTEXT PLAN AREA

- NOTES:**
- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH CALIBRE CONSULTING REPORT NO. B13343.W-03.
 - THIS DRAWING IS CONCEPTUAL AND HAS BEEN PRODUCED FOR DISCUSSION PURPOSES ONLY.
 - WASTEWATER NETWORK ANALYSIS REQUIRED TO CONFIRM PIPE SIZES AND PUMP STATION/RISING MAIN REQUIREMENTS.
 - WASTEWATER INFRASTRUCTURE LOCATIONS AND ALIGNMENTS ARE INDICATIVE ONLY AND SUBJECT TO DESIGN.
 - REFER TO VERIS CONTEXT PLAN DRAWING NO. 30697-CP02(D).



PROJECT:
Jimboomba | CELESTINO

CLIENT:
CELESTINO PTY LTD

DRAWING TITLE:
CONCEPTUAL PRECINCTS 1, 3 AND 8 WASTEWATER SERVICE STRATEGY

DRAWING NO: **B13343.W-WW002** ISSUE: **F**

ISS	BY	CHK	DATE	DETAILS
B	MAH	ABM	16.09.16	WWTP LOCATION AMENDED
C	MAH	ABM	23.09.16	MINOR AMENDMENTS
D	MAH	ABM	19.10.16	MINOR AMENDMENTS
E	MAH	ABM	31.10.16	CONTEXT PLAN UPDATED
F	JG	ABM	15.03.17	CONTEXT PLAN UPDATED

PROPOSED RB3 SPS

PROPOSED TEMPORARY ON-SITE WWTP

PROPOSED TEMPORARY RB5 SPS

INDICATIVE IRRIGATION AREA (APPROX 70 ha)

CEDAR GROVE WEIR

AMENDED IN RED

By: Brandon Bouda
Date: 15 June 2017



pipe sizes to be reviewed based on PWWF of 1,000L/EP/Day at maximum depth of flow of 75%

While every care is taken to ensure the accuracy of data sourced through third parties, Calibre Consulting (Aust) Pty Ltd makes no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and disclaims all responsibility and all liability (including without limitation liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which might be incurred as a result of the data being inaccurate or incomplete in any way and for any reason.

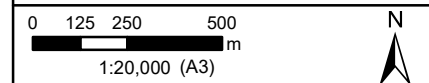
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Coordinate System: GDA 1994 MGA Zone 56 Datum: GDA 1994



- LEGEND**
- PROPOSED WASTEWATER INFRASTRUCTURE**
- FUTURE CEDAR GROVE WWTP
 - ▲ PROPOSED RB1 SPS
 - ▲ PROPOSED SPS
 - RM REGIONAL FLAGSTONE PDA RISING MAIN
 - PROPOSED RISING MAIN
 - PROPOSED ALTERNATE RISING MAIN
 - PROPOSED GRAVITY MAIN
- LAND USES**
- LAND PARCEL
 - ROAD
 - LOGAN RIVER
 - SITE BOUNDARY
 - CONTEXT PLAN AREA

- NOTES:**
1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH CALIBRE CONSULTING REPORT NO. B13343-W-03.
 2. THIS DRAWING IS CONCEPTUAL AND HAS BEEN PRODUCED FOR DISCUSSION PURPOSES ONLY.
 3. WASTEWATER NETWORK ANALYSIS REQUIRED TO CONFIRM PIPE SIZES AND PUMP STATION/RISING MAIN REQUIREMENTS.
 4. WASTEWATER INFRASTRUCTURE LOCATIONS AND ALIGNMENTS ARE INDICATIVE ONLY AND SUBJECT TO DESIGN.
 5. ULTIMATE SERVICE STRATEGY GENERALLY IN ACCORDANCE WITH THE 'LOGAN SOUTH WASTEWATER SERVICING STRATEGY' PREPARED BY CARDNO (FEB. 2016).
 6. REFER TO VERIS CONTEXT PLAN DRAWING NO. 30697-CP02(D).



PROJECT:

Jimboomba | CELESTINO

CLIENT:

CELESTINO PTY LTD

DRAWING TITLE:

CONCEPTUAL INTERMEDIATE WASTEWATER SERVICE STRATEGY

DRAWING NO: **B13343.W-WW004** ISSUE: **C**

ISS	BY	CHK	DATE	DETAILS
A	MAH	ABM	19.10.16	ORIGINAL
B	MAH	ABM	31.10.16	CONTEXT PLAN UPDATED
C	JG	ABM	15.03.17	PLAN UPDATED

PROPOSED RB3 SPS

RISING MAIN CONFIGURATION
TO BE CONFIRMED.
DUPLICATE RISING MAIN MAY
BE REQUIRED.

PROPOSED RB1 SPS
(DECOMMISSION WWTP)

PROPOSED RB2 SPS
(LOCATION TO BE
DETERMINED BY OTHERS)

FUTURE CEDAR GROVE WWTP

POTENTIAL GRAVITY MAIN CONNECTION
SUBJECT TO FEASIBILITY ASSESSMENT
OF SEWER ALIGNMENTS, DEPTHS &
PROPERTY OWNER'S CONSENT.

AMENDED IN RED

By: Brandon Bouda

Date: 15 June 2017



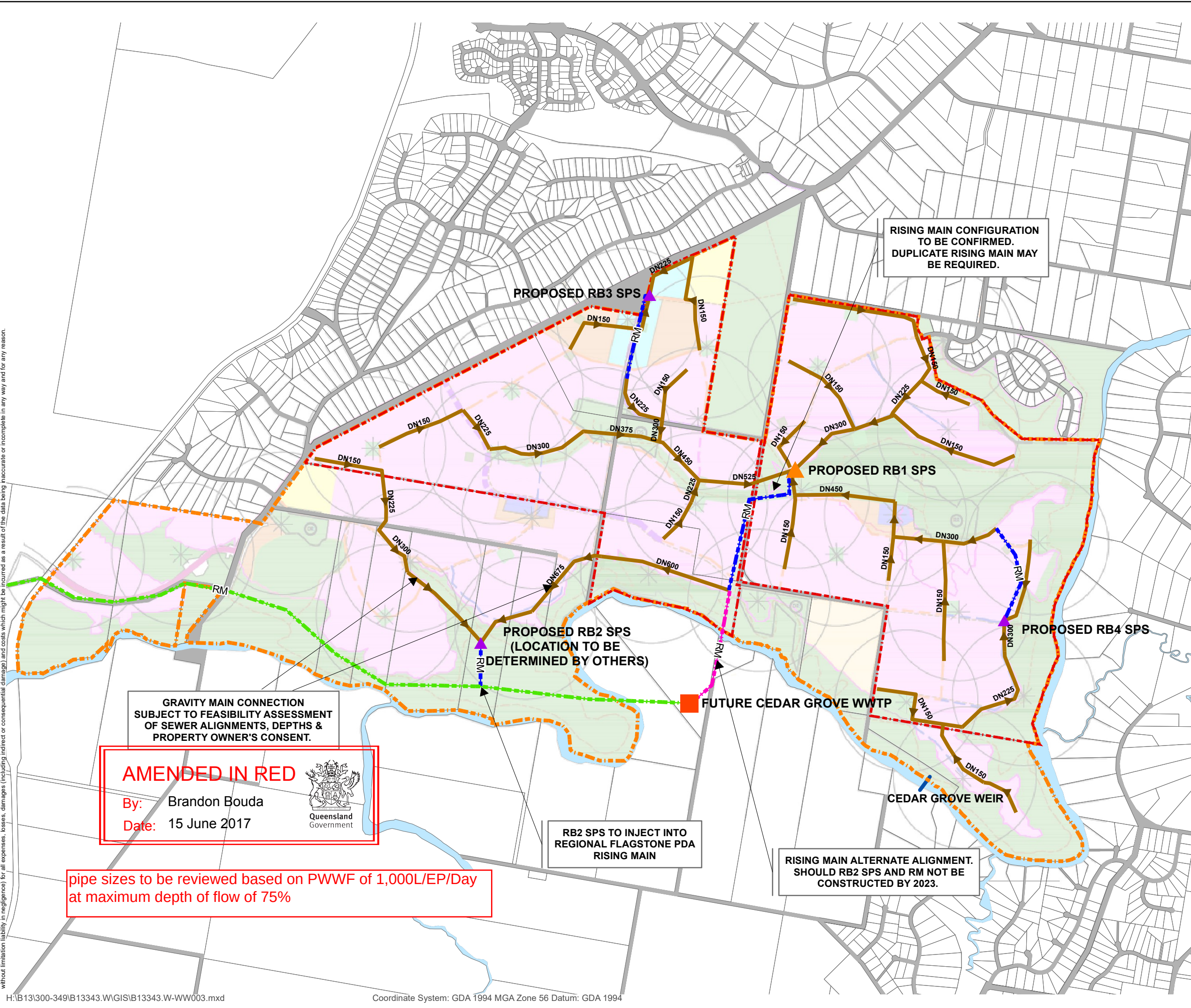
RB2 SPS TO INJECT INTO
REGIONAL FLAGSTONE PDA
RISING MAIN

RISING MAIN ALTERNATE ALIGNMENT.
SHOULD RB2 SPS AND RM NOT BE
CONSTRUCTED BY 2023.

CEDAR GROVE WEIR

pipe sizes to be reviewed based on PWWF of 1,000L/
EP/Day at maximum depth of flow of 75%

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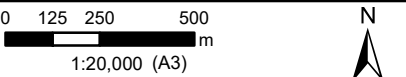


LEGEND
PROPOSED WASTEWATER INFRASTRUCTURE

- FUTURE CEDAR GROVE WWTP
- ▲ PROPOSED RB1 SPS
- ▲ PROPOSED PUMP/LIFT STATION
- RM REGIONAL FLAGSTONE PDA RISING MAIN
- RM PROPOSED RISING MAIN
- RM PROPOSED ALTERNATE RISING MAIN
- PROPOSED GRAVITY MAIN

- LAND USES**
- LAND PARCEL
 - ROAD
 - LOGAN RIVER
 - SITE BOUNDARY
 - CONTEXT PLAN AREA

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 6. REFER TO VERIS CONTEXT PLAN DRAWING NO. 30697-CP02(D).



PROJECT:
Jimboomba | CELESTINO

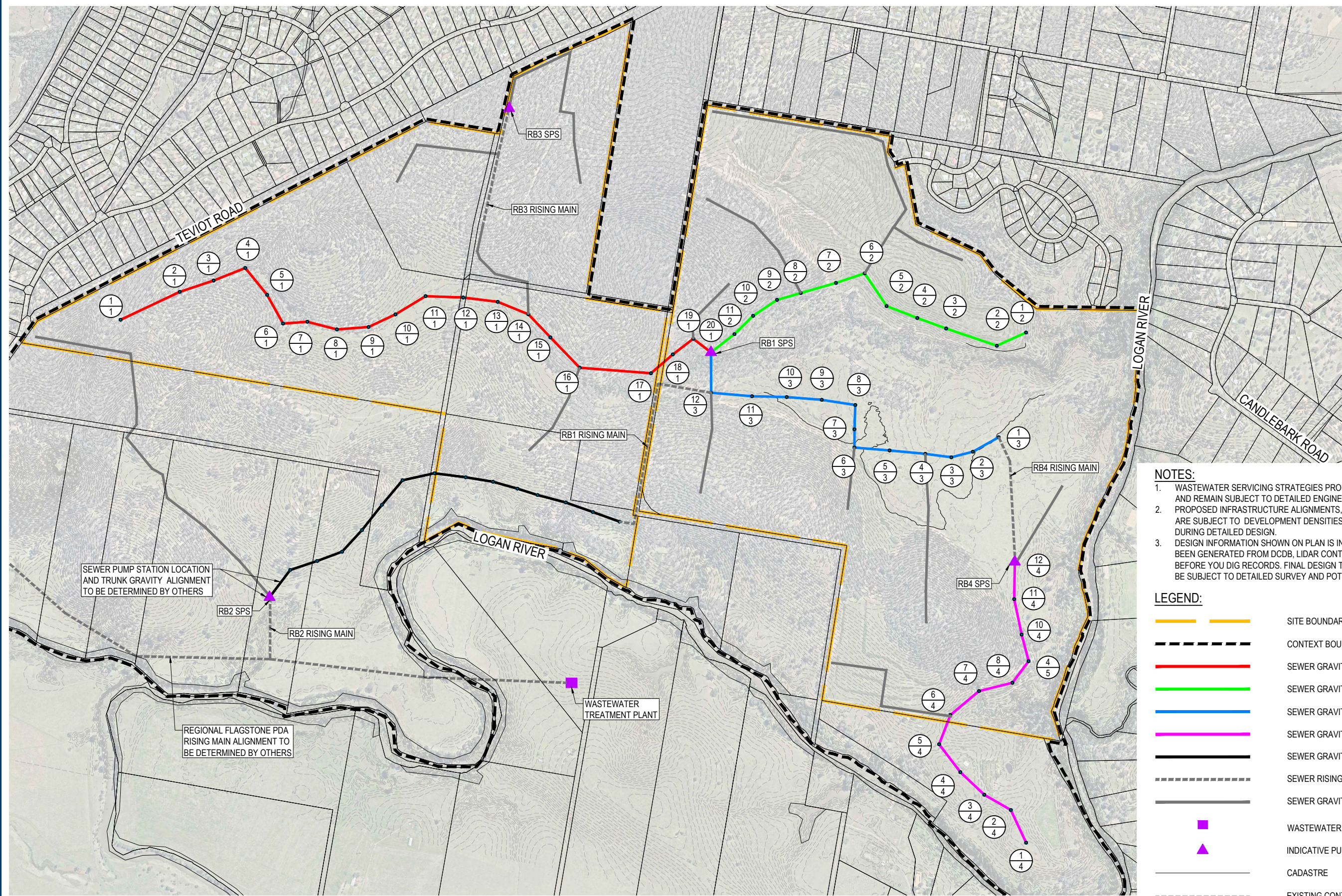
CLIENT:
CELESTINO PTY LTD

DRAWING TITLE:
CONCEPTUAL ULTIMATE WASTEWATER SERVICE STRATEGY

DRAWING NO: **B13343.W-WW003** ISSUE: **G**

ISS	BY	CHK	DATE	DETAILS
C	MAH	ABM	22.09.16	SPS LOCATION AMENED
D	MAH	ABM	23.09.16	STRATEGY AMENDED
E	MAH	ABM	19.10.16	MINOR AMENDMENTS
F	MAH	ABM	31.10.16	CONTEXT PLAN UPDATED
G	MAH	ABM	15.03.17	MAIN SIZES UPDATED

APPENDIX C CONCEPTUAL LONGITUDINAL SECTIONS



- NOTES:**
- 1. WASTEWATER SERVICING STRATEGIES PROPOSED ARE CONCEPTUAL AND REMAIN SUBJECT TO DETAILED ENGINEERING DESIGN.
 - 2. PROPOSED INFRASTRUCTURE ALIGNMENTS, DIAMETERS AND MATERIALS ARE SUBJECT TO DEVELOPMENT DENSITIES AND WILL BE CONFIRMED DURING DETAILED DESIGN.
 - 3. DESIGN INFORMATION SHOWN ON PLAN IS INDICATIVE ONLY AND HAS BEEN GENERATED FROM DCDB, LIDAR CONTOURS, COUNCIL AND DIAL BEFORE YOU DIG RECORDS. FINAL DESIGN TO BE CONFIRMED AND WILL BE SUBJECT TO DETAILED SURVEY AND POT-HOLING.

- LEGEND:**
- SITE BOUNDARY
 - CONTEXT BOUNDARY
 - SEWER GRAVITY MAIN ALIGNMENT 1
 - SEWER GRAVITY MAIN ALIGNMENT 2
 - SEWER GRAVITY MAIN ALIGNMENT 3
 - SEWER GRAVITY MAIN ALIGNMENT 4
 - SEWER GRAVITY MAIN (BY OTHERS)
 - SEWER RISING MAINS (NOT DESIGNED)
 - SEWER GRAVITY MAINS (NOT DESIGNED)
 - WASTEWATER TREATMENT PLANT
 - INDICATIVE PUMP STATION LOCATION
 - CADASTRE
 - EXISTING CONTOURS



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DRAWN BY:
S. LINDE

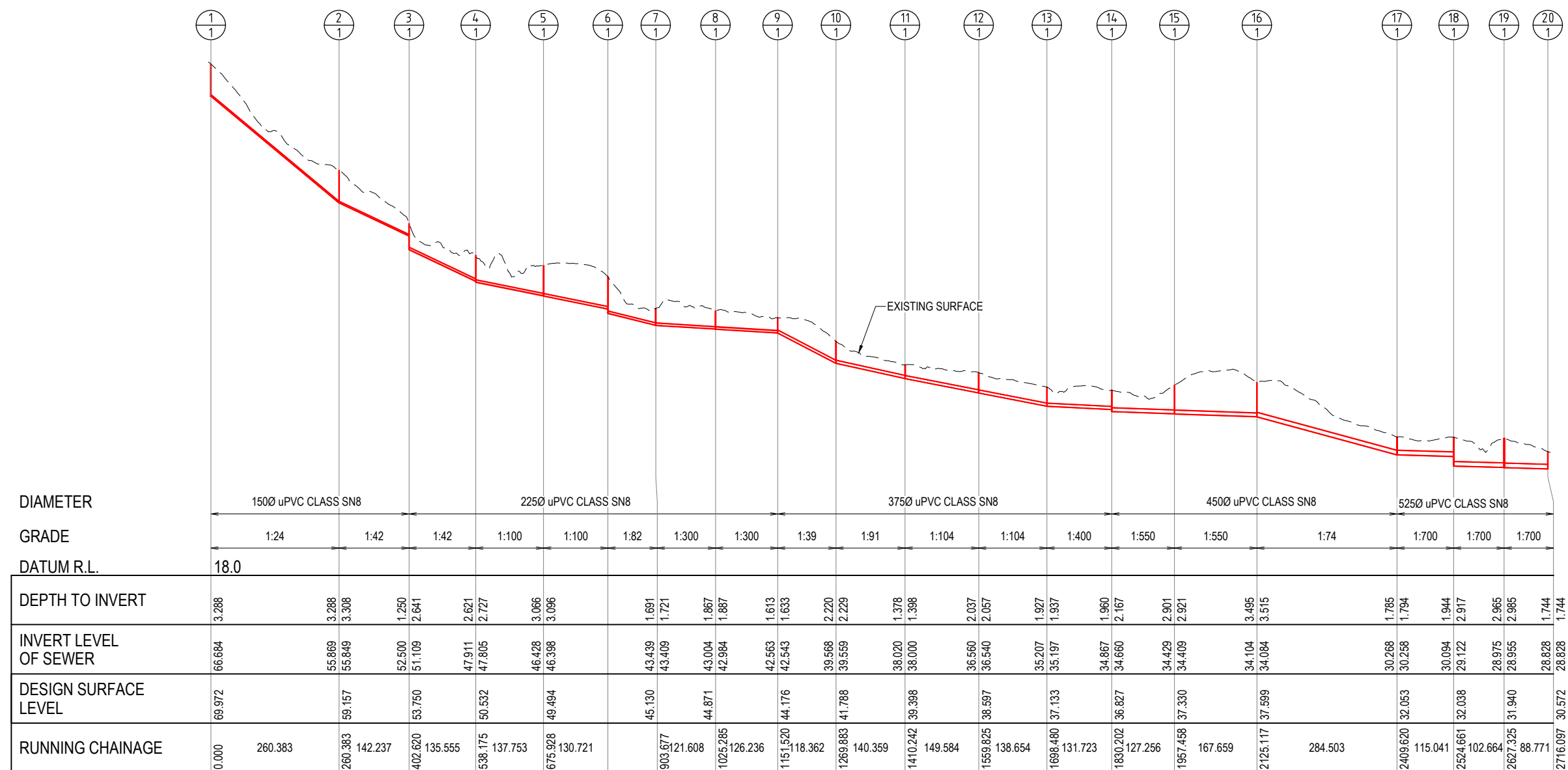
DATE: 16/03/2017



CONCEPT SEWER GRAVITY MAINS
LAYOUT PLAN

B13343.W-SK200

B



SEWER GRAVITY ALIGNMENT 1
HORIZONTAL SCALE 1:5000
VERTICAL SCALE 1:250

NOTES:
1. FOR NOTES REFER TO DRAWING No. B13343.W-SK200.

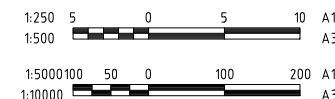


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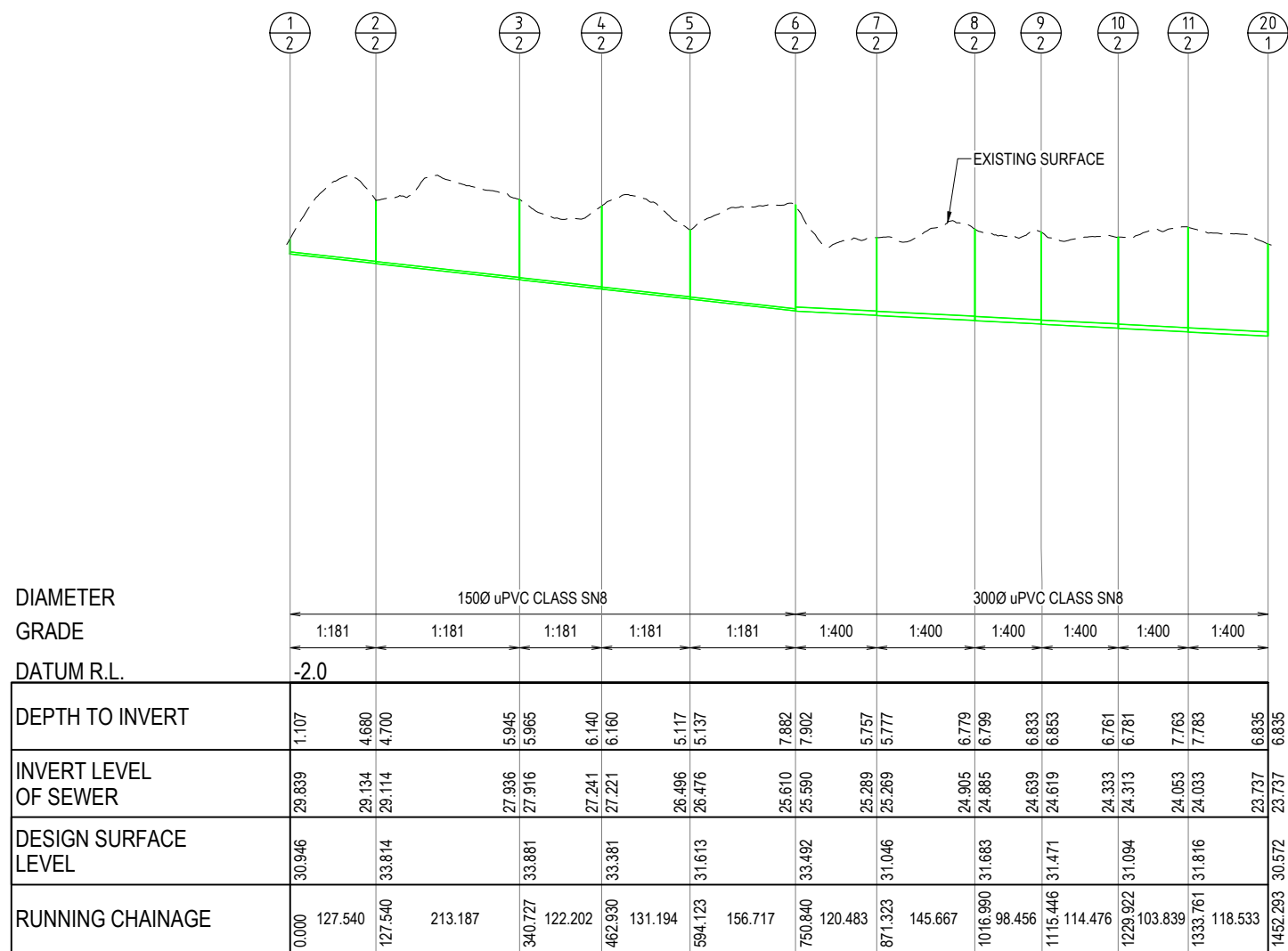
JIMBOOMBA CELESTINO

DRAWN BY:
S. LINDE
DATE: 23/02/2017

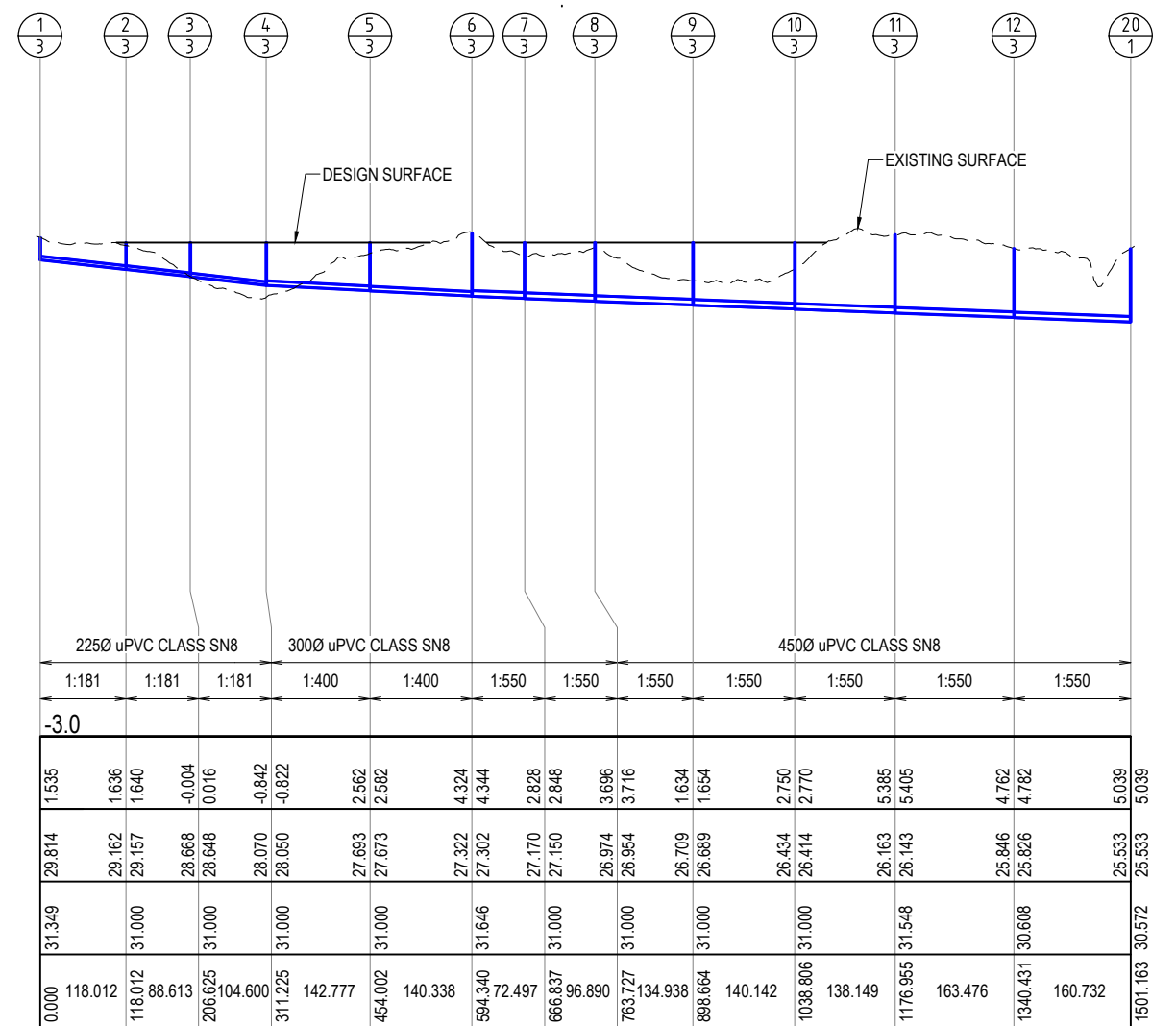


CONCEPT SEWER GRAVITY MAINS
ALIGNMENT 1 LONGITUDINAL SECTION

B13343.W-SK201 B



SEWER GRAVITY ALIGNMENT 2
HORIZONTAL SCALE 1:5000
VERTICAL SCALE 1:250



SEWER GRAVITY ALIGNMENT 3
HORIZONTAL SCALE 1:5000
VERTICAL SCALE 1:250

NOTES:
1. FOR NOTES REFER TO DRAWING No. B13343.W-SK200.

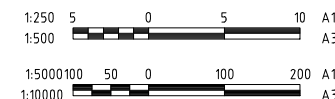


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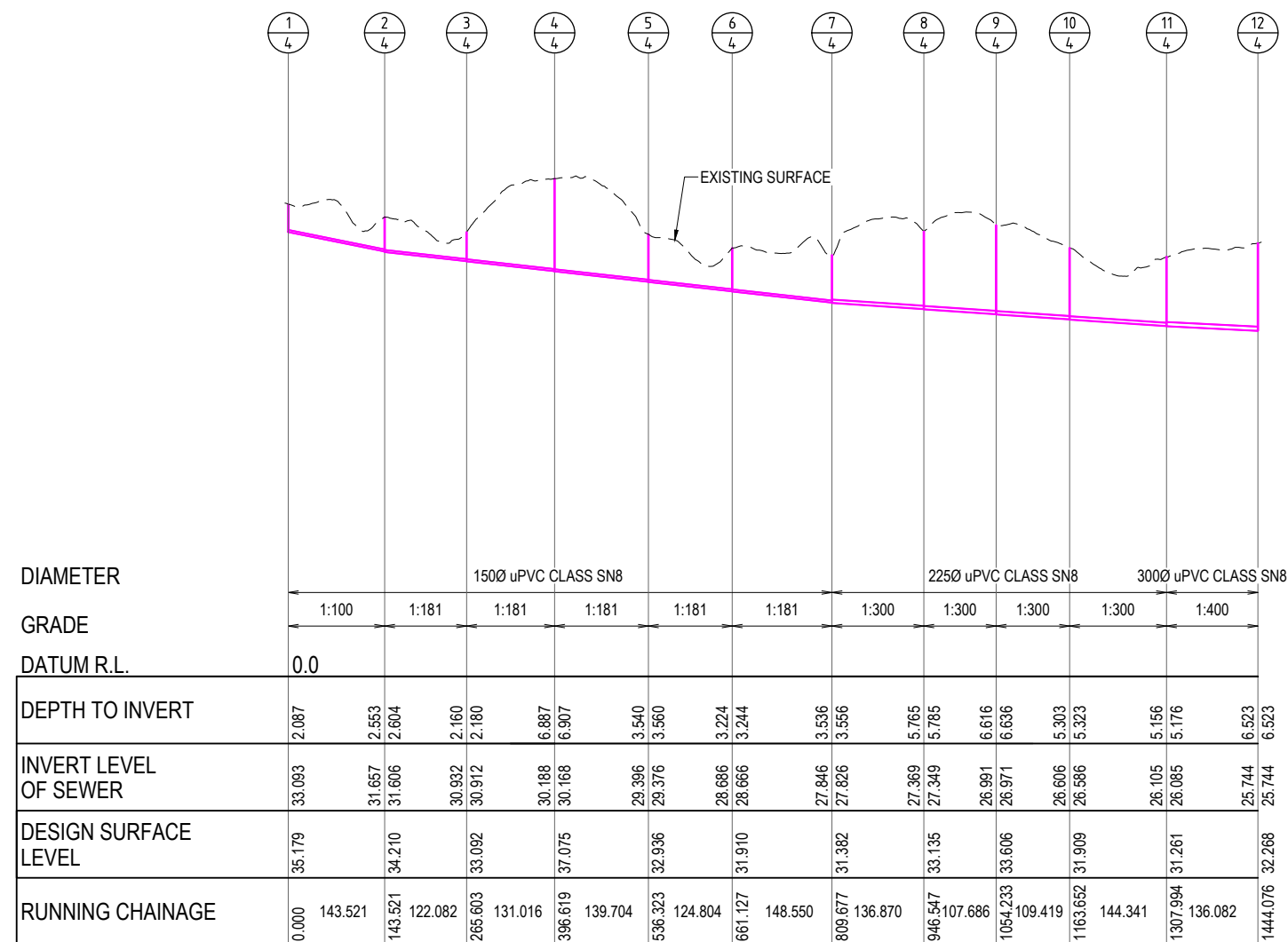
DRAWN BY:
S. LINDE
DATE: 23/02/2017



**CONCEPT SEWER GRAVITY MAINS
ALIGNMENT 2 & 3 LONGITUDINAL SECTION**

B13343.W-SK202

B



SEWER GRAVITY ALIGNMENT 4
HORIZONTAL SCALE 1:5000
VERTICAL SCALE 1:250

NOTES:
1. FOR NOTES REFER TO DRAWING No. B13343.W-SK200.

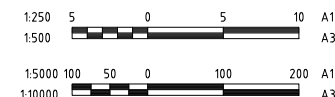


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JIMBOOMBA CELESTINO

DRAWN BY:
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DATE: 19/10/2016



CONCEPT SEWER GRAVITY MAINS
ALIGNMENT 4 LONGITUDINAL SECTION

B13343.W-SK203 A

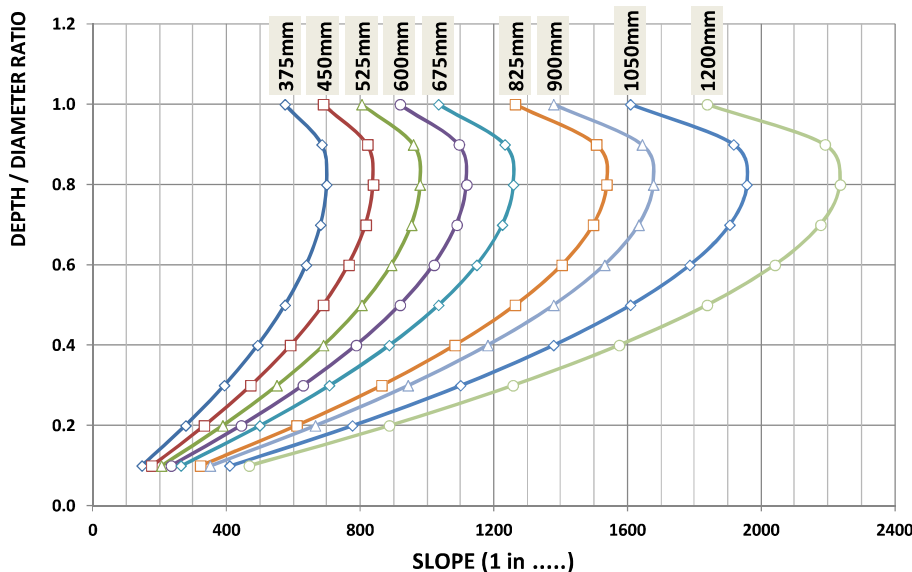
APPENDIX D LOGAN CITY COUNCIL DSS

WATER NETWORK DSS				
Parameter	Criteria			
Water demand				
Average Day Demand (ADD)	On demand areas - 190 L/EP/d. Based on 165 L/EP/d residential consumption + allowance for leakage/losses (25 L/EP/d).			
	Constant flow areas - 150 L/EP/d. Based on 120 L/EP/d residential consumption + allowance for leakage/losses (30L/EP/d).			
Peaking factors	Category	MDMM/AD	MD/AD	PH/AD
Guidance Note: Peaking factors are to be applied to the residential component of demand, i.e. 165 & 120 L/EP/d. Leakage /loss levels will remain constant throughout all demand categories and should only be appended after any peaking escalation has occurred.	Residential detached	1.3	1.7	3.1
	Residential attached	1.3	1.6	2.6
	Rural residential	1.3	1.7	CF services 70L/hr/property
	Commercial	1.2	1.3	2.0
	Industry	1.2	1.3	1.7
	Parks / Open space	1.2	1.3	1.7
System planning				
Bulk supply and reticulation	3 days of MDMM. Reservoirs to have a net positive inflow and capable of continuous operation and not fall below the emergency level.			
	3 days of MD. Reservoirs should not fall below the emergency level.			
	5 days of AD. Reservoirs should fill from empty to full.			
Service pressures				
Minimum operating pressure at PH	On demand areas – 22m at the property boundary based on reservoir at minimum operating level (MOL). MOL defined as 15% of storage height or top of emergency storage.			
	Constant flow areas – 10m at the property boundary based on reservoir at minimum operating level (MOL) MOL defined as 15% of storage height or top of emergency storage.			
Maximum operating pressure	80 m at the property boundary based on the reservoir at TWL			
Target maximum operating pressure	55 m at the property boundary based on the reservoir level at TWL			

Fire fighting		
System pressure	On demand areas	12 m minimum at property boundary
	Constant flow areas	no fire service provided
Fire flow	Constant flow areas	no fire service provided
	Rural Residential	7.5 L/s for 2 hrs
	Rural Commercial / Industrial	15 L/s for 2 hrs
	Residential	15 L/s for 2 hrs
	Commercial & Industrial	30 L/s for 4 hrs
	Special risk / hazard	to be advised by Logan City Council (LCC)
Background demand	2/3 PH (as per DEWS requirements)	
Reservoir level	Minimum Operating Level (MOL)	
Water quality		
Drinking water quality	Drinking water to comply with the NHMRC Australian Drinking Water Guidelines	
Reservoir storage		
Ground level storage capacity	3 (MD - MDMM) + (Greater of emergency storage/fire fighting reserve) Emergency Storage = 4 hr MDMM demand in zone or 0.5 ML whichever is greater. <i>Fire Fighting reserve =</i> > 4800EP: • rural residential 108 kL • industry 540 kL • otherwise 216 kL < 4800 EP: • rural residential 54 kL • industry 432 kL • otherwise 108 kL	
Elevated storage capacity	6 (PH - 1/12 MDMM) + minimum fire fighting reserve. <i>Fire Fighting reserve =</i> > 4800EP: • rural residential 108 kL • industry 540 kL • otherwise 216 kL	
Guidance Note:		
In-line pressure booster pumping without high-level storage shall be considered where satisfactory pressures can be provided by gravity flow during low	• rural residential 108 kL • industry 540 kL • otherwise 216 kL	

demand periods or booster failure can be mitigated to an acceptable level (risk assessment required) and where there is no other feasible means of providing adequate pressure.	< 4800 EP: - rural residential 54 kL - industry 432 kL - otherwise 108 kL			
Pumping capacity				
Pump supplying a ground level reservoir	MDMM over 20 hrs			
Pump supplying an elevated reservoir	(6PH – operating volume) / (6 x 3600)			
Standby pump capacity	To match duty, except where more than one duty pump or as determined by risk assessment.			
Reticulation booster pumps/pumped system	PH + fire flow			
Pipeline assessment & design				
Main capacity	Raw water mains & trunk feeding ground level reservoir : MDMM for a gravity supply and MDMM over 20hrs for a pumped supply Trunk Mains feeding elevated reservoir: capacity of pumps: Reticulation Mains: PH + fire flow.			
Mains size	Constant flow areas - where mains terminate in short runs such as cu- de-sacs minimum sizes that may be acceptable are: DN 63 up to 150 m from main DN 80 up to 350 m from main			
Guidance Note: New CF areas are not permitted by LCC.	On demand areas - minimum reticulation main 100mm in residential areas and 150mm in commercial and industrial areas.			
Friction default value	Existing Infrastructure		Future Infrastructure	
	Colebrook White k values (mm)		The design shall be conducted to achieve less than the following head losses: (a) 5 m head/km for ≤DN 150 (CIOD) or ≤DN 180 (ISO). (b) 3 m head/km for ≥DN 200 (CIOD) or ≥DN 250 (ISO). Head loss shall be calculated using computer models or hydraulic formulas.	
	Pipe Material	Pipeline Age (years)		
	< 10	10 to 25		> 25
Asbestos Cement	0.15	0.3		0.3
Plastic (UPVC, MDPE, Hobas, etc)	0.06	0.06		0.15
MSCL/DICL	0.3	0.3	0.6	
CICL	0.3	0.3	0.6	
Maximum velocity	2.5 m/s At peak hour for trunk mains and at peak hour including fire flow for reticulation.			

WASTEWATER NETWORK DSS	
Parameter	Criteria
Sewage load	
ADWF	165 L/EP/day
PDWF	Use actual flow data; or $d \times 165 \quad \text{L/EP/d or;} \\ d \times 0.00191 \times EP \quad \text{L/s}$ Where: $d = 0.01(\log A)^4 - 0.19(\log A)^3 + 1.4(\log A)^2 - 4.66\log A + 7.57$ $d = \text{dry weather peaking factor}$ $A = \text{gross plan area of development catchment, in hectares}$ Refer to WSAA Sewerage Code of Australia; Part 1 Planning and Design
Containment standard for assessment of existing networks	Network to contain a 1 year ARI storm event, for critical storm duration. This is an overflow containment standard rather than a conveyance standard. For those catchments that fail the standard, mitigation measures such as I/I reduction and wet weather storage should be considered in addition to any capacity increases.
PWWF	Residential 1300 L/EP/d
	For Common Effluent Discharge PWWF = 660 L/EP/d
	Commercial 1300 L/EP/d
	Light Industrial 1000 L/EP/d
	Heavy Industrial 840 L/EP/d

Gravity sewer design		
Flow equation	Colebrook White to be used for all applications – design and modelling	
Pipe roughness general	Colebrook White k = 1.5mm	
Maximum velocity @ PWWF	3 m/s	
Depth of flow @ PWWF - Existing	Up to 1m below MH surface level and no spillage through overflow structures	
Depth of flow @ PWWF - Proposed/ new sewers	100% of pipe depth	
Depth of flow @ PDWF – Existing and new sewers	Maximum 60% of pipe depth	
Slime Stripping	It is desirable where gradients permit to achieve slime stripping. A wall shear of 3.85 Pa is required to achieve slime stripping.	
Minimum grades for self cleansing	Diameter (mm)	Grades (mm, 1 in X)
	150	180 (80 in last section between last manholes or to an end)
	225	300
	300	400
	375 - 1200	Minimum Grades are to be based on achieving Self Cleansing Shear Stress of 1.6 Pa at PDWF, refer formula and figure below. $S_{min} = \frac{\tau}{\rho \cdot g \cdot R_p}$ Where: S_{min} = Minimum Grade τ = Self Cleansing Shear Stress = 1.6 Pa τ = Slime Stripping Shear Stress = 3.85 Pa ρ = Density of Water = 1000 kg/m³ g = Gravitational constant = 9.8 m²/s R_p = Hydraulic Radius Partial Full Pipe (m) = Wetted Perimeter / Cross sectional flow area  Note: Depth/Diameter ratio is based on flow conditions at PDWF

Sewerage pump stations	
Wet well operating requirements	$V \text{ (kL)} = \frac{0.9 \times \text{pump rate (L/s)}}{N}$ Where N is the acceptable number of starts per hour Pump Rate (L/s) = capacity of the largest duty pump N = 12 for motors ≤ 15 kW N = 8 for motors 15kW - 200 kW N = 5 for motors > 200 kW Control levels shall be based on Table 5.1 of WSA04-2005. The minimum depth between duty start and duty off is 100mm and ideally should be 300mm or greater.
Emergency storage	Emergency storage volume requirement to be based on containment of 2 hours of PDWF. Where actual measured flow data is available, then volume should be based on containing 2 hrs measured PDWF provided it takes into account any future growth. Except where otherwise specified to meet the requirements of the overflow risk assessment If there is an overflow pipe - storage in the system is measured between the high level alarm and overflow pipe invert level. If there is no overflow pipe - storage is measured between the high level alarm and 300mm below the lowest upstream manhole or top of wet well.
Pump capacity	If PWWF <20L/s, then 2 pumps (duty/standby arrangement) shall be provided, with each pump being capable of delivering PWWF. If PWWF >20L/s and <200L/s, then 2 pumps (duty/duty assist arrangement) shall be provided, with each pump being sized such that the two pumps running in parallel are capable of delivering PWWF. The minimum single pump capacity shall be not less than the calculated PDWF, where PDWF is a minimum of 2.5xADWF. If calculated PDWF has a peaking factor <2.5xADWF then 2.5 shall be used. If PWWF >200L/s, then minimum of 3 pumps (duty/duty assist/duty assist/.... arrangement) shall be provided. The minimum single pump capacity shall be not less than the calculated PDWF, where PDWF is a minimum of 2.5xADWF. If calculated PDWF has a peaking factor <2.5xADWF then 2.5 shall be used. All pumps operating shall be capable of delivering PWWF with each pump being sized in consultation with LCC.
Pump operation	VSD shall only be used, subject to special approval from Logan City Council. If approved by Logan City Council, the VSD operating regime shall be selected to ensure sufficient self-cleansing velocities, and shall meet the pump supplier's requirements.
NPSH	Refer Clause 6.4 of WSA04-2005

Rising mains	
Flow equation	Colebrook White to be used for all applications
Friction mains	For preliminary design a Colebrook White Roughness (k) of 0.6 mm is to be used. For detailed design, roughness shall be based on velocity and pipe roughness at end of pump design life. However, pumps should be able to operate (not necessarily meet design flow) for Colebrook White roughness's between manufacturers specified roughness for new pipes and 0.6 mm
Minimum velocity	Minimum Velocity to be based on achieving an absolute minimum Self Cleansing Shear Stress of 1.6 Pa at Single Pump Flow. However it is desirable to achieve a Slime Stripping Shear Stress of 3.85 Pa. The wall shear is to be calculated using the following equation: $\tau = \rho \cdot g \cdot (D/4) \times (HL/L)$ Where: τ = Wall Shear Stress (minimum of 1.6 Pa required for self cleansing) HL = Frictional loss over main length of L based on Colebrook White (m) L = Length of main (m) ρ = Density of Water = 1000 kg/m ³ g = Gravitational constant = 9.8 m ² /s D = Internal Diameter of Pipe (m)
Maximum velocity	3.0 m/s proposed systems Manufacturer's specifications for new systems
Max detention time	Maximum time of detention in pressure main and SPS wet well is 6 hours [2 hours in wet well and 4 hours in rising main] (based on daily average flows) to minimise potential for odour / hydrogen sulphide generation. Where high retention times are likely to occur, odour / sulphide control measures will be required to the satisfaction of Logan City Council. (Refer WSA 07-2007-1.1 section 3.15)
Reduced infiltration gravity sewers (RIGS)	
As per gravity sewers except	Not permitted without Logan City Council approval
PWWF	Reticulation system to be designed for 1000 L/EP/day Trunk systems to be designed for minimum 1300 L/EP/day
Total PS Capacity	1300L/EP/d
Low pressure sewers / vacuum pumps	
Low pressure sewers / vacuum pumps	Are not preferred and will only be allowed subject to approval from Logan City Council.
Private pump stations and rising mains	
	Private pump stations and rising mains are permitted for single users only and no connection or sharing will be permitted without approval from Logan City Council
Common effluent discharge	
Common effluent discharge (CED)	Not permitted without approval from Logan City Council.