



ROCKHAMPTON REGIONAL COUNCIL
APPROVED PLANS
 These plans are approved subject to the
 current conditions of approval associated with
 Development Permit No.: D/1117-2017
 Dated: 12 September 2018

	Lot Types											
	Terrace Lots 7.5m - 9.9m frontage		Villa Lots 10.0m - 12.4m frontage		Premium Villa Lots 12.5m - 14.9m frontage		Courtyard Lots 15m - 17.4m frontage		Premium Courtyard Lots 17.5m - 18.9m frontage		Traditional & Lifestyle Lots 19m frontage and Greater	
	Ground Floor	First Floor	Ground Floor	First Floor	Ground Floor	First Floor	Ground Floor	Ground Floor	First Floor	First Floor	Ground Floor	First Floor
Front Setback*	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Garage Setback*	4.5	n/a	4.5	n/a	4.5	n/a	4.5	n/a	4.5	n/a	6.0	n/a
Rear Setback*	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Side Setbacks*	Built to Boundary	0.0	1.0	0.0	1.0	0.0	1.0	0.0	1.0	0.0	1.0	1.0
	Non Built to Boundary	1.0	1.0	1.0	1.0	1.0	1.0	1.5	1.5	2.0	1.5	2.0
Corner Lots / Secondary Frontage	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Laneway Lots*	Rear	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Garage	0.5	0.0	0.5	0.0	0.5	0.0	0.5	0.0	0.5	0.5	0.0
Onsite parking requirements	1 space per dwelling to be covered and enclosed		1 space per dwelling to be covered and enclosed		1 space per dwelling to be covered and enclosed		1 space per dwelling to be covered and enclosed		1 space per dwelling to be covered and enclosed		1 space per dwelling to be covered and enclosed	
	Single or tandem garage acceptable		Single or tandem garage acceptable		Single, tandem or double garage acceptable		Single, tandem or double garage acceptable		Single, tandem or double garage acceptable		Single, tandem or double garage	
	Double garages only permitted on laneway		Double garages only permitted on laneway or two storey allotments								acceptable	
Garage Location	Garage to be located along built to boundary wall		Garage to be located along built to boundary wall		Garage to be located along built to boundary wall		Garage to be located along built to boundary wall		Garages are preferred to be located along the western or southern boundary		Garages are preferred to be located along the western or southern boundary	
Maximum Site Cover	75%		60%		60%		60%		60%		50%	
Maximum Built to Boundary Wall length	85%		85%		50%		50%		50%		50%	

* Setbacks are measured to the wall

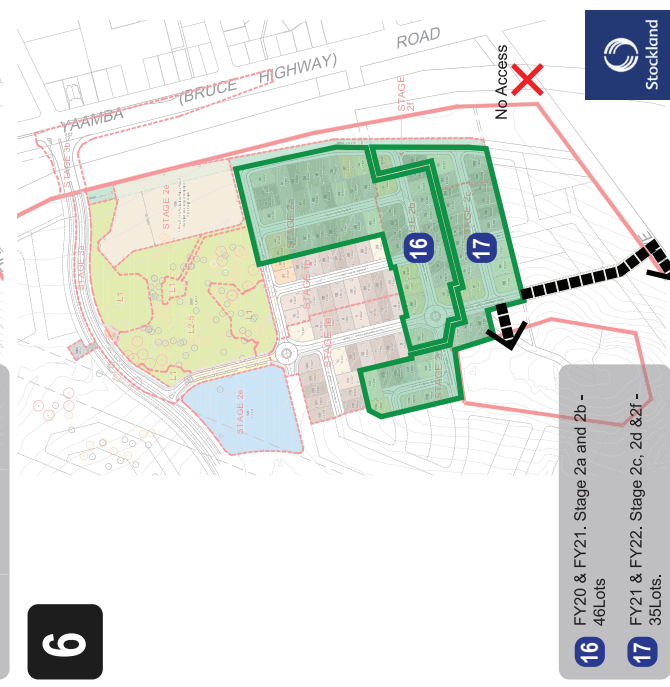
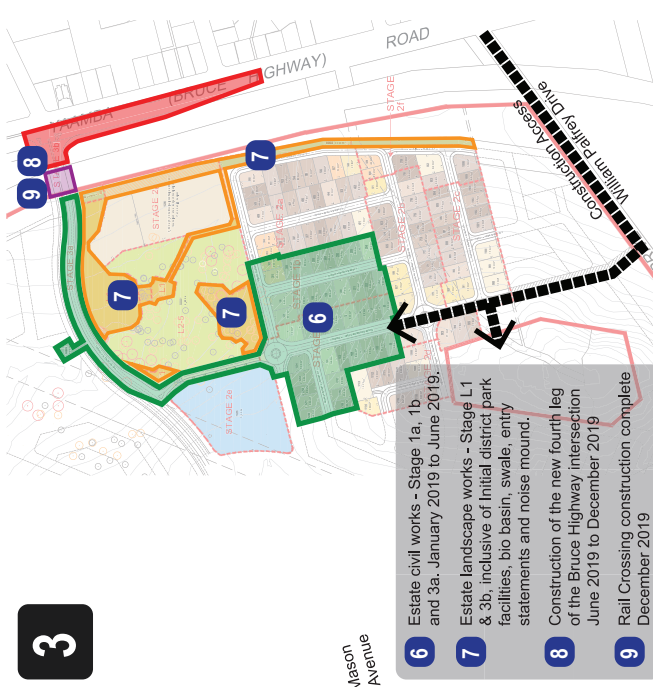
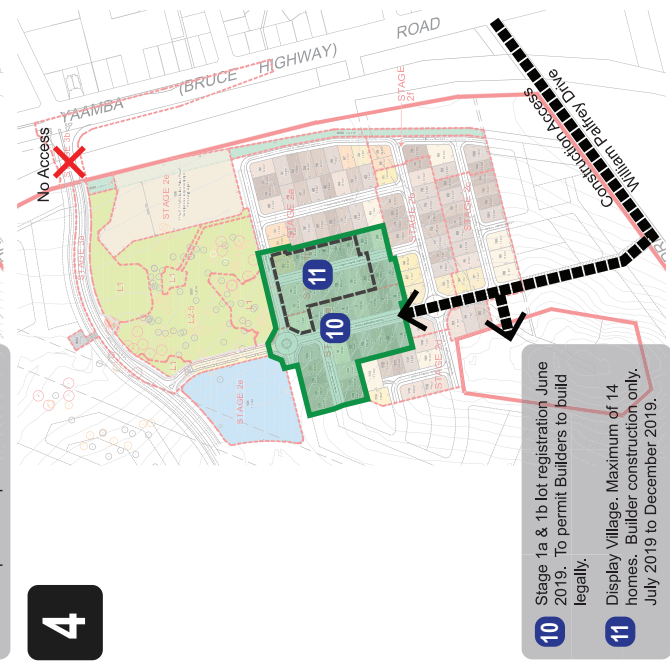
Legend

- Site Boundary
- Stage Boundary
- Balance Lot
- Open Space (Active & Passive)
- Lot Types 28m Deep
 - Courtyard Allotment
 - Premium Courtyard Allotment
 - Traditional Allotment
 - Premium Traditional Allotment
 - Lifestyle Allotment
- Lot Types 32m Deep
 - Premium Villa Allotment
 - Courtyard Allotment
 - Premium Courtyard Allotment
 - Traditional Allotment
 - Premium Traditional Allotment
 - Lifestyle Allotment

Note:
 All dimensions and areas are approximate only, and are subject to survey and Council approval.
 Dimensions have been rounded to the nearest 0.1 metres.
 Areas have been rounded down to the nearest 5m².
 The boundaries shown on this plan should not be used for final detailed engineers design.
Source Information:
 Site boundaries: Registered Survey Plans.
 Adjoining information: DCDB.
 Contours: Capricorn Survey.
 Aerial photography: NA.
 Environment constraints: RPS / DNRM.
 Flood: Browns Consulting



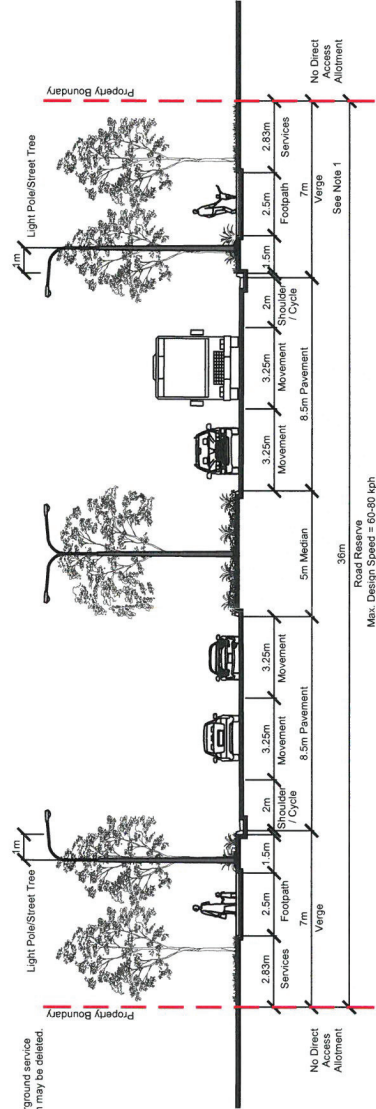
REVISION	Level Datum	Date	11th SEPTEMBER 2017	CLIENT	STOCKLAND PROPOSED SUBDIVISION STAGES 1-3 RESIDENTIAL SETBACKS PLAN	PROJECT ELLIDA	Plan Ref 109116-112	Rev	RPS Australia East Pty Ltd ACN 140 292 762 ABN 44 140 292 762 Urban Design Suite 1, Ground Floor, Central Plaza 370 Rindos Mall (PO Box 927) Townsville QLD Australia 4810 T +61 7 4142 4244 F +61 7 4142 4144 W rpsgroup.com.au
	Origin	Comp By	MJB						
		DWG Name	109116-112						
		Local Authority	ROCKHAMPTON REGIONAL COUNCIL						
Scale	1:1000	Sheet	A1	Locality	ROCKHAMPTON				
		Job Reference	109116						



Ellida, Rockhampton
Indicative Staging Plan

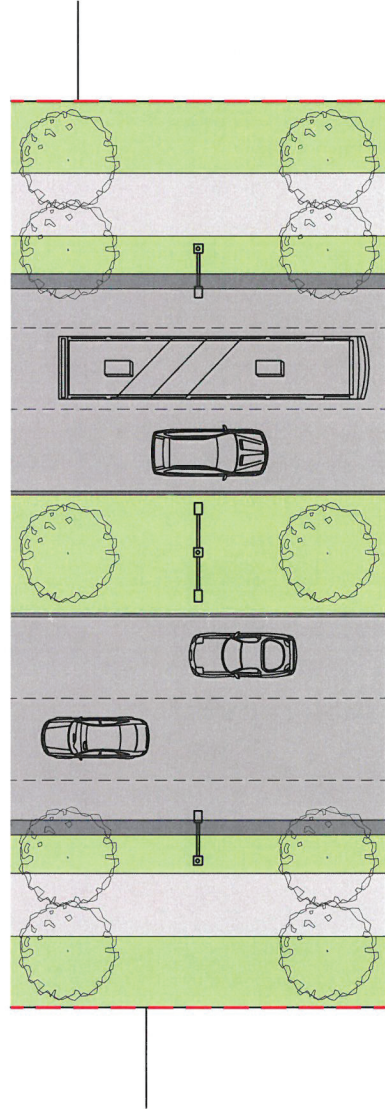
RPS





Note:
Where adjacent to open spaces and if no underground service corridor is required, the service corridor provision may be deleted.

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RPS
 DATE : 23 April 2018

SCALE 1 : 200 @ A4
 0 2 4 6 8 10 12
 DWG NAME : 109116-84e Road Cross-Sections

Urban Arterial

Ellida

Note:
1. Where adjacent to open space and if no underground service corridor is required, the service corridor provision may be deleted.

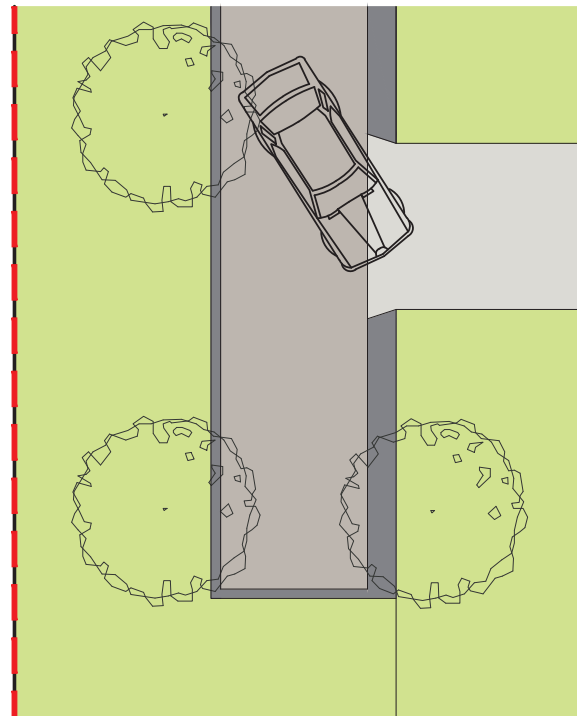
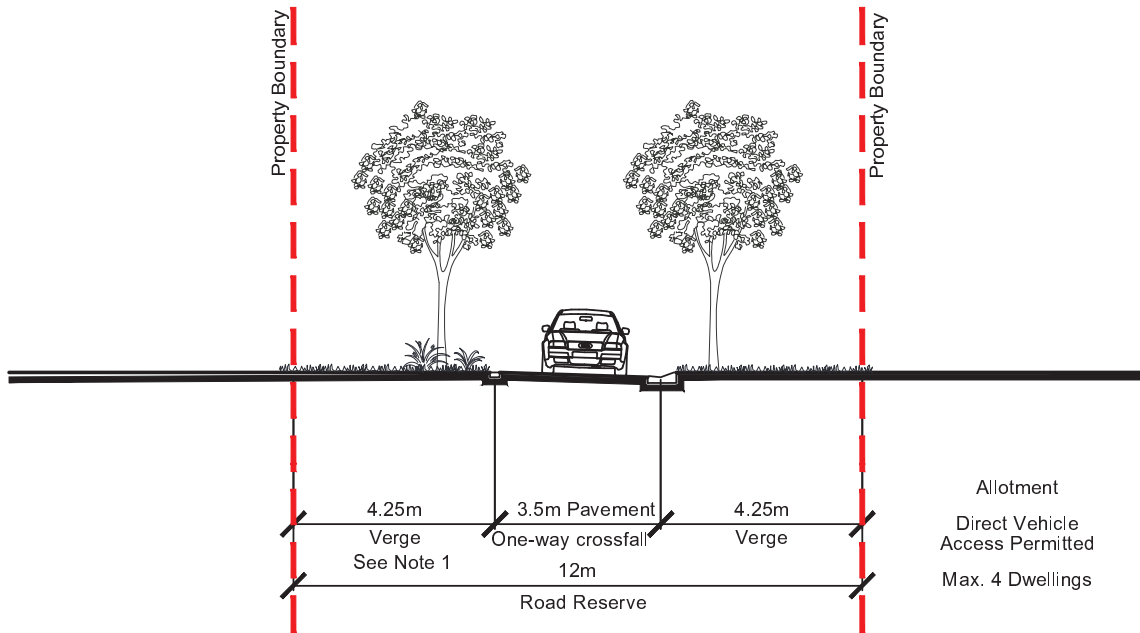
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Development Permit No.: D/117-2017

Dated: 12 September 2018



SCALE 1 : 150 @ A4

0 1 2 4 6 8

DATE : 15 January 2018 DWG NAME : 109116-84e Road Cross-Sections

Driveway
Ellida

Note:

1. Where adjacent to open space and if no underground service corridor is required, the service corridor provision may be deleted.

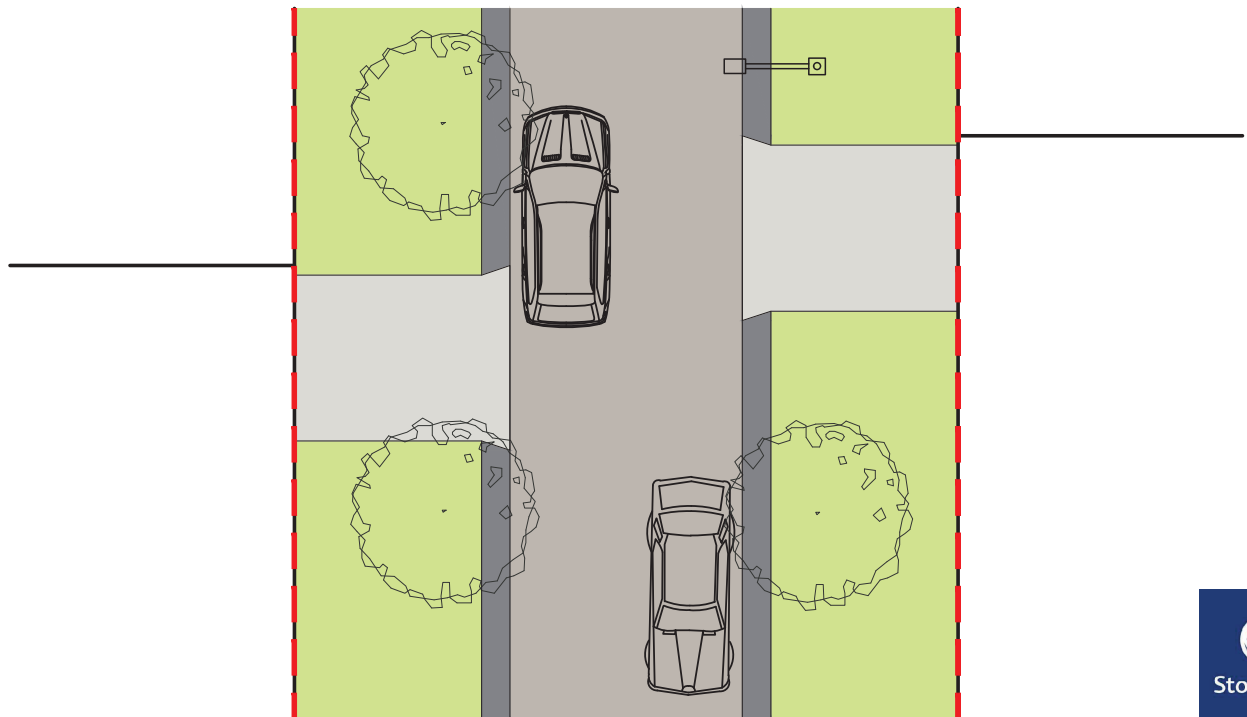
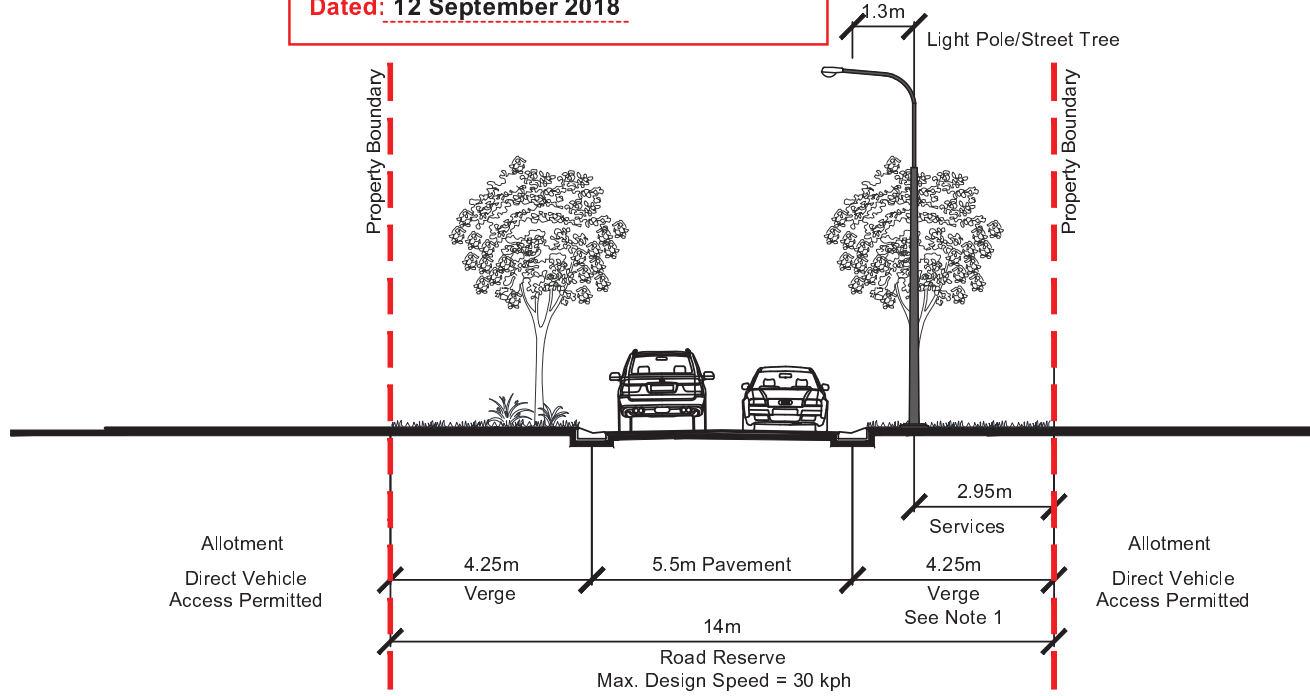
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SCALE 1 : 150 @ A4
0 1 2 4 6 8

DATE : 15 January 2018 DWG NAME : 109116-84e Road Cross-Sections

Access Place
Ellida

ROCKHAMPTON REGIONAL COUNCIL

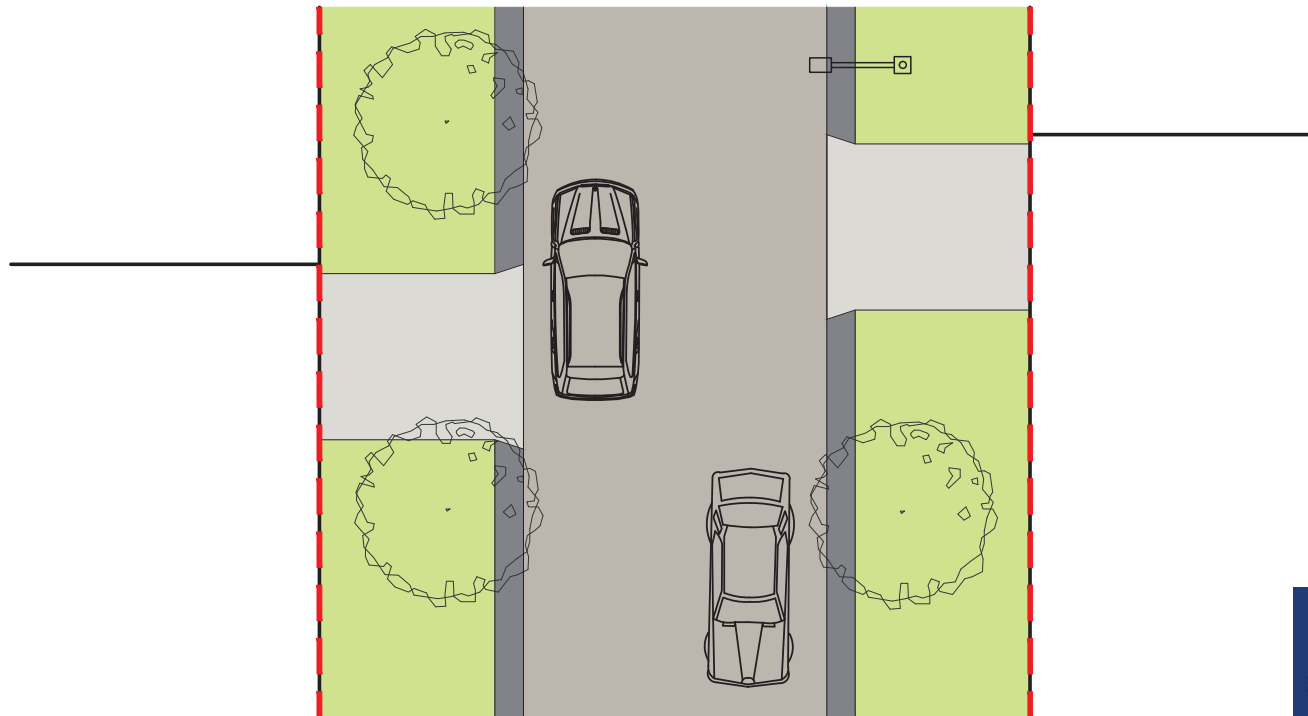
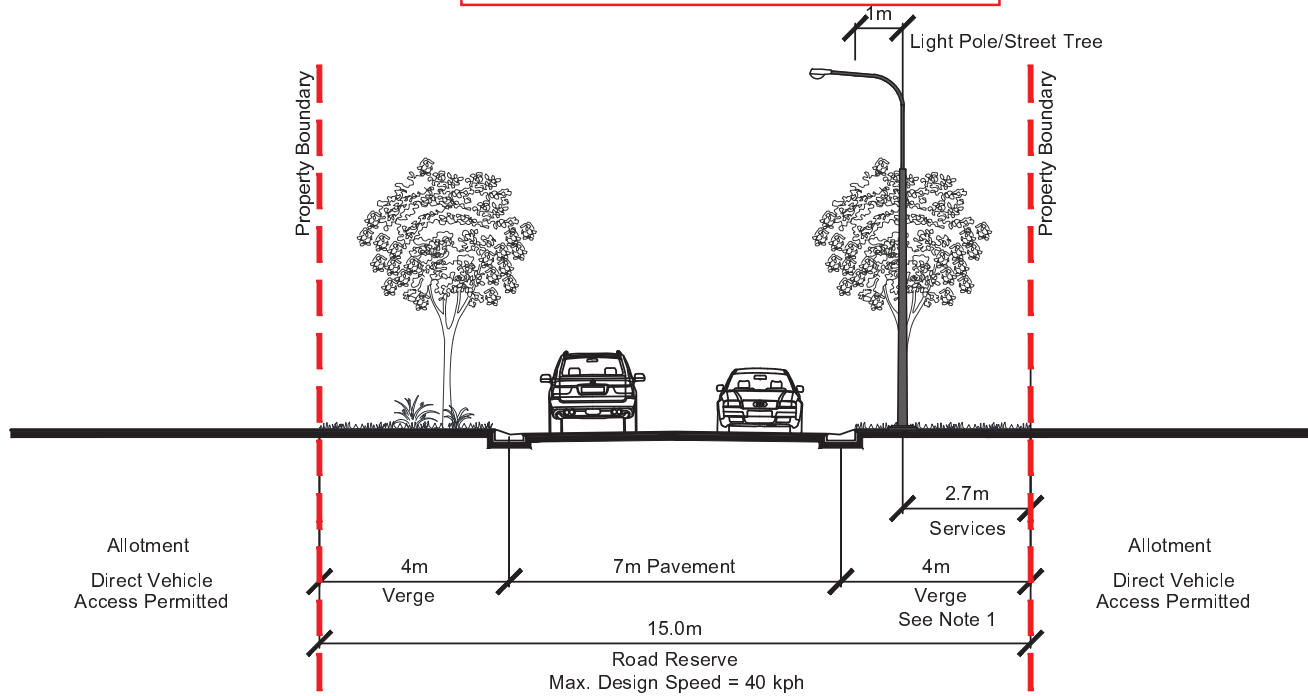
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Note:
1. Where adjacent to open space and if no underground service corridor is required, the service corridor provision may be deleted.



SCALE 1 : 150 @ A4
0 1 2 4 6 8

Access Street
Ellida

ROCKHAMPTON REGIONAL COUNCIL

Note:

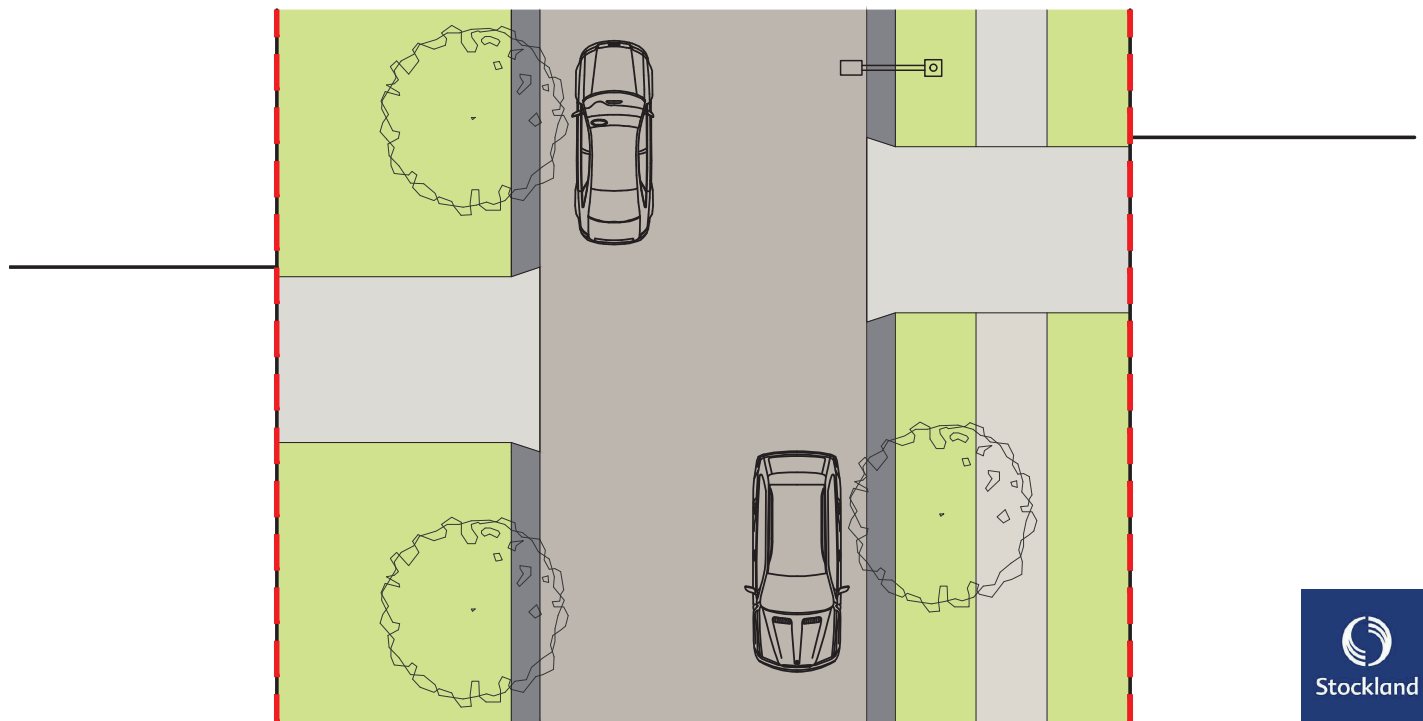
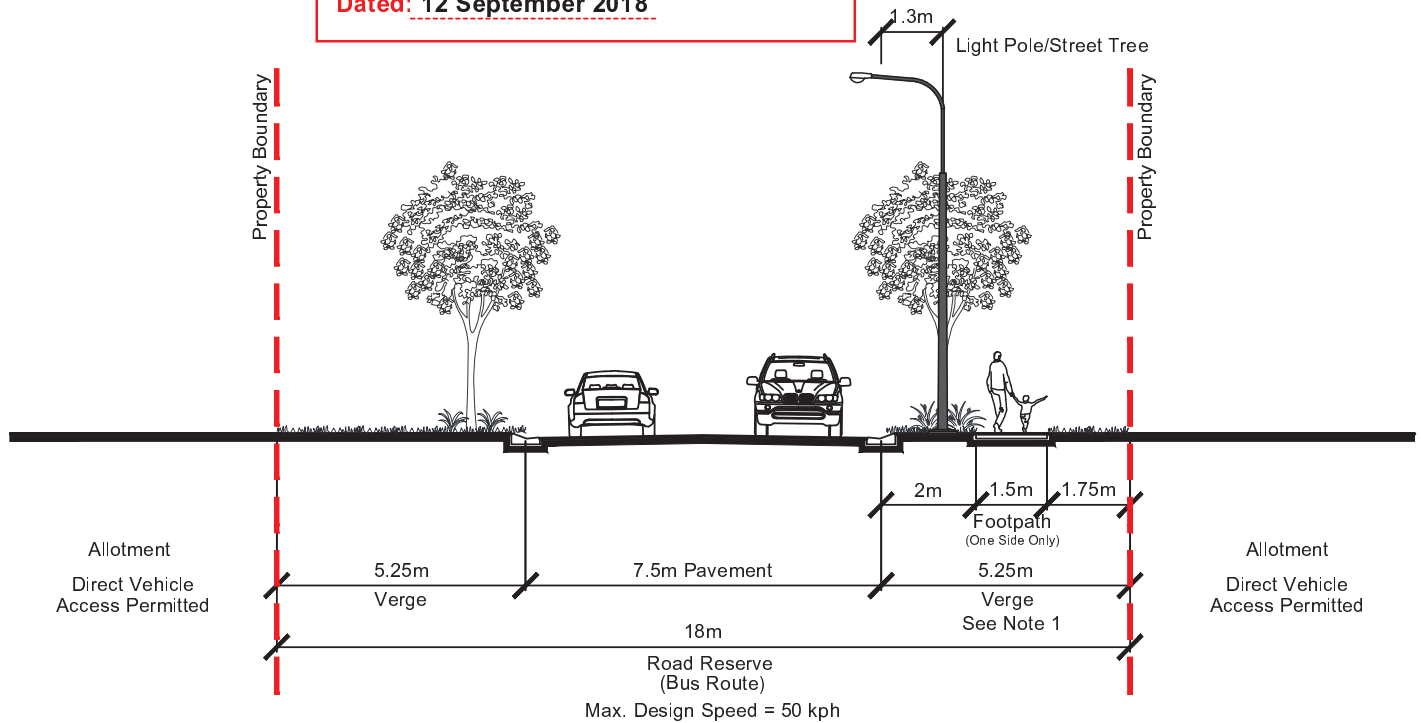
1. Where adjacent to open space and if no underground service corridor is required, the service corridor provision may be deleted.

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SCALE 1 : 150 @ A4



Minor Collector (Type 1)

Ellida

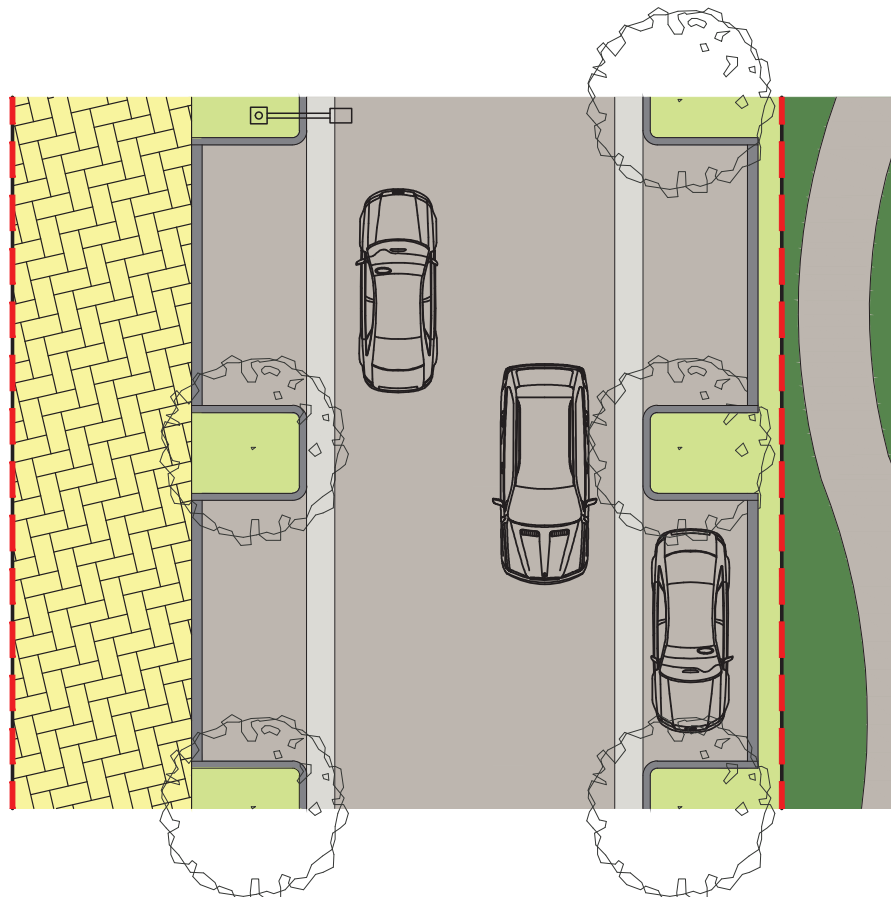
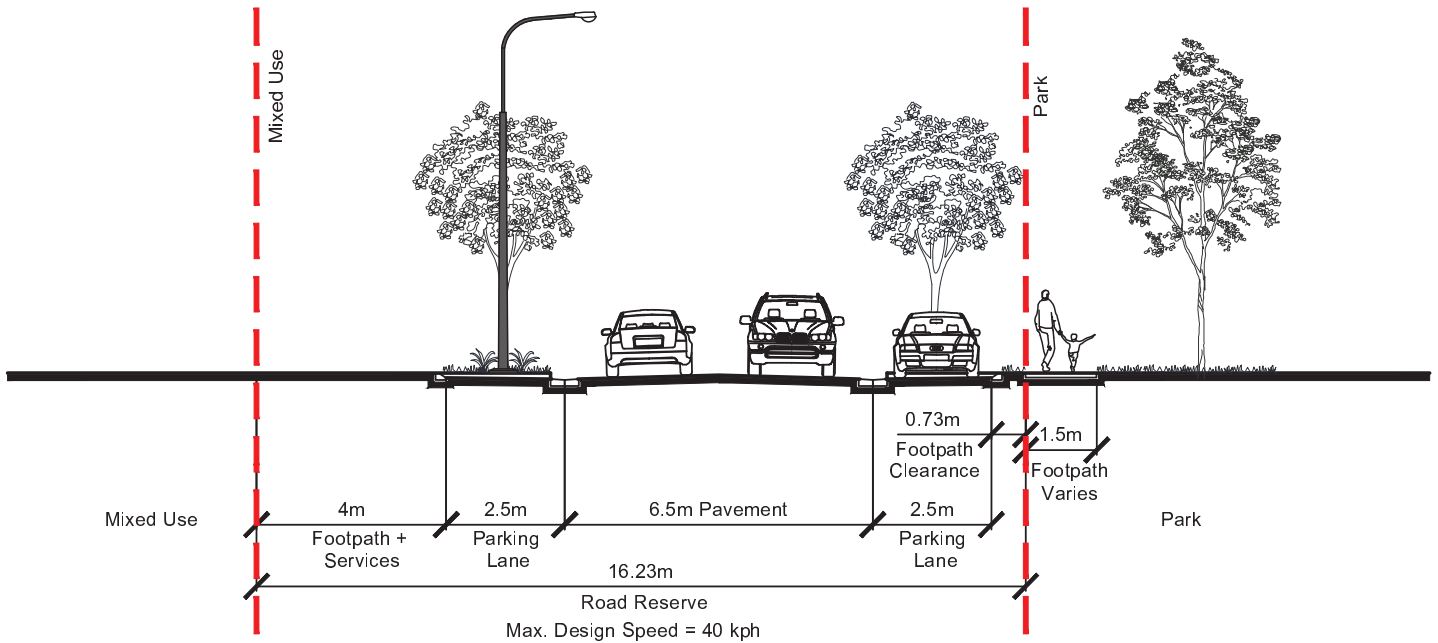
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Dated: 12 September 2018



SCALE 1 : 150 @ A4
0 1 2 4 6 8

Minor Collector (Type 2 - Main St)

Ellida

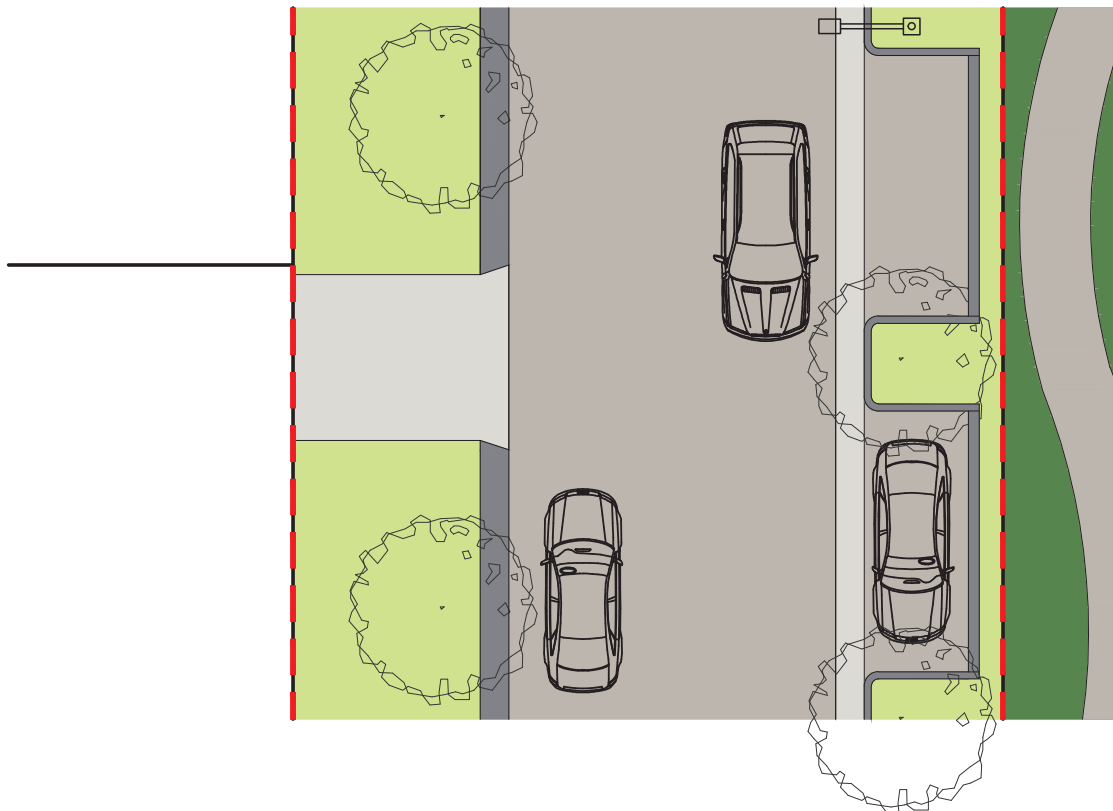
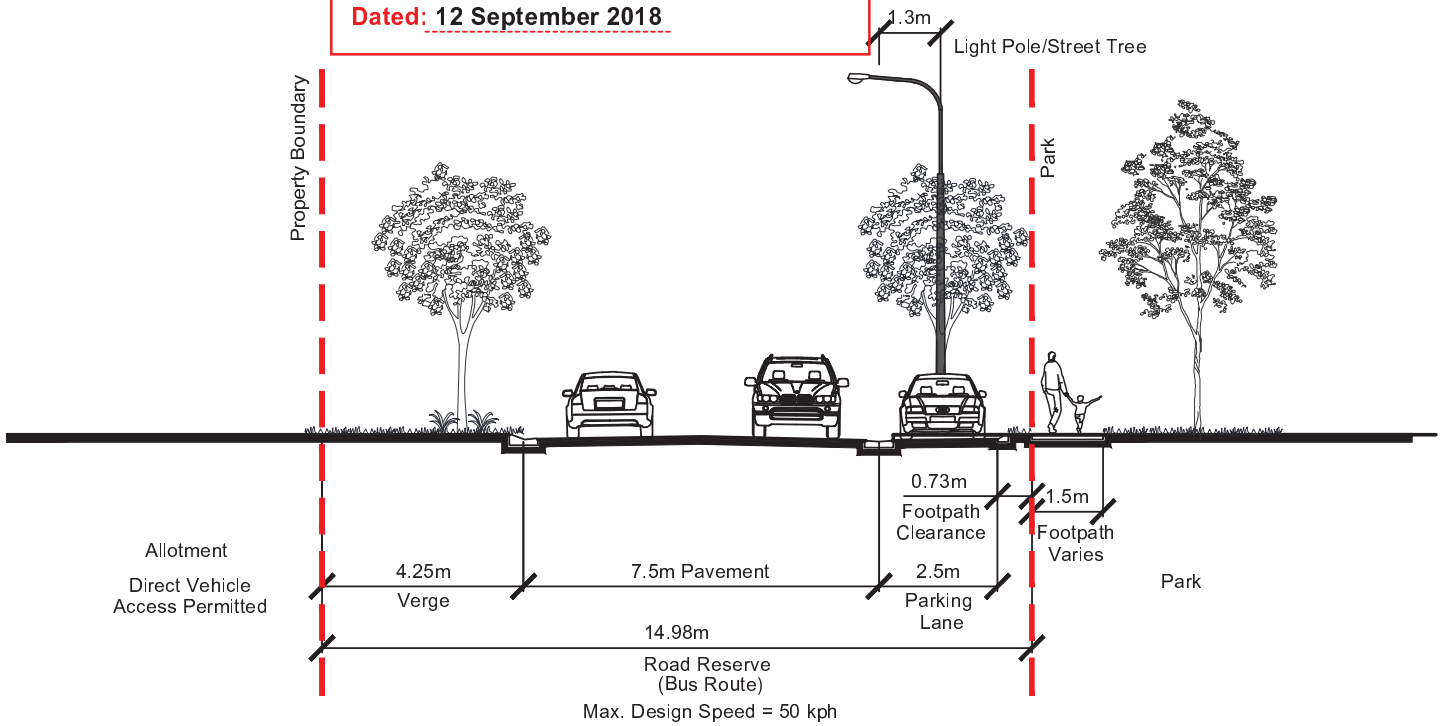
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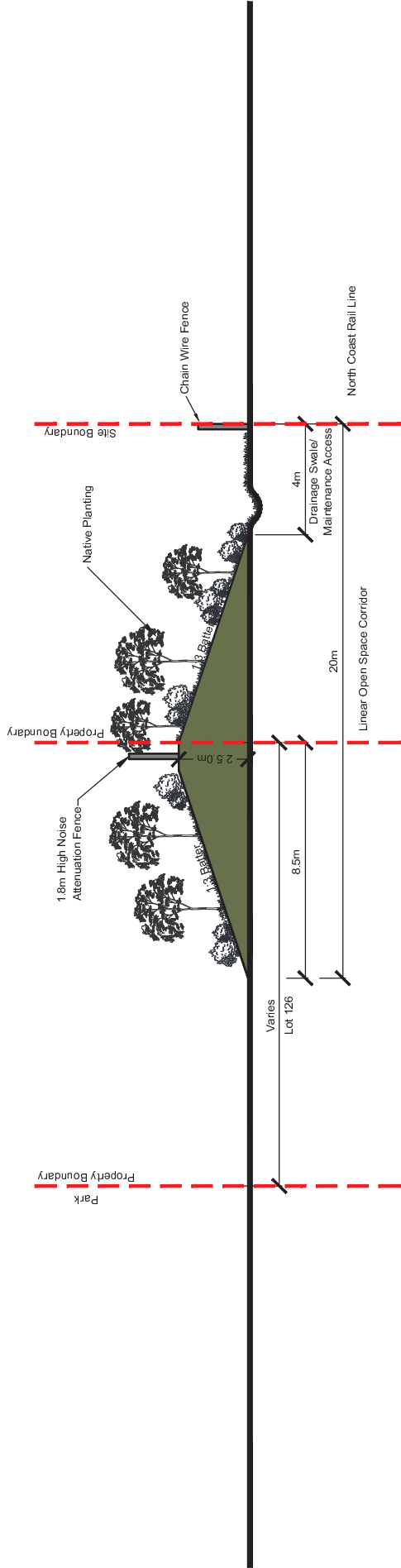
SCALE 1 : 150 @ A4

0 1 2 4 6 8

Minor Collector (Type 3 - Park)

Ellida

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Ellida, Parkhurst Water & Wastewater Network Investigation



PREPARED FOR STOCKLAND DEVELOPMENT PTY LTD

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DOCUMENT CONTROL

ISSUE	DATE	ISSUE DETAILS	AUTHOR	CHECKED	APPROVED
A	16.02.2018	For Council Approval	DH	TC / JG	MM (RPEQ 13357)
B	23.03.2018	RFI Response	DH	JG	MM (RPEQ 13357)
C	04.04.2018	Wastewater Yield Note Included	DH	JG	MM (RPEQ 13357)
D	11.04.2018	Wasterwater Updates	JG	JG	MM (RPEQ 13357)

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Executive Summary

Stockland Development Pty Ltd has engaged Calibre to undertake a water and wastewater network assessment for the proposed Stages 1 to 3 of the Ellida development in Parkhurst, Rockhampton. The proposed development is located within the Rockhampton Regional Council (RRC) Local Government Area with Fitzroy River Water (FRW) the responsible water utility.

Water supply and wastewater network modelling has concluded that the proposed infrastructure has been sized to adequately service the proposed development across Stages 1 to 3 with consideration to future external catchment demands. Water and wastewater network infrastructure has been conceptually designed in accordance with the Capricorn Municipal Development Guidelines (CMDG) Desired Standards of Service (DSS).

The current connection application comprises of Stages 1 to 3, which form part of the overall Ellida development. Stages 1 to 3 of the development are outlined on RPS drawing no. 1091160-90 attached within *Appendix A*. Stages 1 to 3 have a total demand loading of 789 EP for water and 678 EP for wastewater. The ultimate development has a total of 2,350 residential lots with a development loading of 8,144 EP for water and 7,300 EP for wastewater.

Water network modelling for Peak Hour (PH) and Fire Flow (FF) conditions was undertaken using InfoWater Software. Water modelling has confirmed that proposed network has adequate capacity to service Stages 1 to 3 and future development Stages. It is proposed that Stages 1 to 3 will be serviced via a network of DN100 water mains connected to a future Council planned DN450 trunk water main WAT-45 as outlined in *Map 41-1* attached within *Appendix B*. The proposed water servicing strategy is outlined on drawing no. 17-002720-GIS001 within *Appendix D*.

Wastewater network modelling was undertaken using InfoSWMM Software under Peak Wet Weather Flow (PWWF) conditions to determine the infrastructure required to service Stages 1 to 3 of the development sites and preliminary ultimate trunk infrastructure. It is proposed Stages 1 to 3 will be serviced via a network of DN150 gravity mains conveying wastewater north, discharging into RRC proposed sewer pump station SEW-100. The proposed wastewater servicing strategy is outlined on drawing no. 17-002720-GIS002 within *Appendix D*. SEW-100 is proposed to capture the eastern catchment, with the total dwellings and EP's outlined within drawing no. 17-002720-GIS002 attached within *Appendix D*.

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Appendix D	Calibre Drawings
Appendix E	RRC Boundary Conditions

1 Introduction

Stockland Development Pty Ltd engaged Calibre to prepare this Water Supply and Wastewater Network Investigation report for the proposed Ellida residential development located in Parkhurst, Rockhampton. The development sites are located within the Rockhampton Regional Council (RRC) Local Government Area with Fitzroy River Water (FRW) the responsible water utility.

This water and wastewater network analysis was developed to support the initial development application for Stages 1 to 3 with consideration to the ultimate Ellida development. This report outlines the proposed strategies and infrastructure required to service the development in accordance with the Capricorn Municipal Development Guidelines (CMDG).

Stages 1 to 3 of the proposed development consists of approximately 125 residential allotments and 1 mixed use allotment as detailed in the RPS Proposal Plan *Drawing No. 109116-90* within Appendix A. Unlike Stages 1 to 3, the ultimate development layout is yet to be finalised. Assessment has therefore been undertaken to reflect the proposed ultimate demand of 2,350 residential dwellings inclusive of the initial Stages 1 to 3 development yields.

2 Site Characteristics

2.1 Location

The proposed development is located in Parkhurst within the RRC Local Government Area. The ultimate development is bound by Ramsay Creek to the north, the Bruce Highway and the North Coast Railway Line to the east, and grazing land to the south and west. As seen in *Figure 2-1* below, Stages 1 to 3 of the development are situated in the eastern portion of the site with the remainder of the Ellida development to occur outside of the initial stages.

The 278.4 hectare site comprises of five rural allotments, which are described by the following Real Property Descriptions:

1. Lot 1 on RP602376;
2. Lot 2 on RP608099;
3. Lot 5 on SP238731; and
4. Lots 37 and 38 on RP600698.



Figure 2-1: Approximate Location of North Parkhurst and Stages 1 to 3 (Source: Google Maps)

For a detailed plan of Stages 1 to 3 refer to the Stockland Development Pty Ltd Proposal Plan Drawing No. 109116-90 in Appendix A.

3 Assumptions

This section provides an overview of the key assumptions adopted in developing the water and wastewater servicing strategies to support the proposed development application.

3.1 Information Sources

The following information sources were utilised to support the water and wastewater assessment for the proposed development:

- W&WW network Analysis Report for the proposed development completed by Brown Consulting (QLD): B11007.W-02H, 2013 Water and Wastewater Network Analysis Report North Parkhurst Rockhampton;
- Capricorn Municipal Development Guidelines – Issue Rev. G, 2017, D11, Water Reticulation Design Guideline;
- Capricorn Municipal Development Guidelines – Issue Rev. H, 2017, D12, Sewerage Reticulation Design Guideline; and Rockhampton City Plan, 2005, Planning Scheme for the City of Rockhampton – Planning Policy No.11; and
- Rockhampton Region Planning Scheme – Version 1.1, 2015.

3.2 Desired Level of Service

A network analysis was undertaken in accordance with the CMDG Desired Standards of Service (DSS) and the RRC Planning Scheme. The assessment was completed for existing and future loads whilst maintaining no disadvantage to existing customers. The key criteria are outlined below.

3.2.1 Water Standards

- Average Day Demand (AD): 500 L/EP/Day;
- Residential Fire Flow: 15 L/s at 2 hours;
- Commercial Fire Flow: 30L/s at 4 hours;
- Minimum Service Pressure: 22m;
- Desired Maximum Service Pressure: 50m; and
- Absolute Maximum Service Pressure: 80m.

3.2.2 Wastewater Standards

- Average Dry Weather Flow (ADWF): 540 L/d/ET, 200 L/d/EP;
- Peak Dry Weather Flow (PDWF): 2.5 x ADWF;
- Peak Wet Weather Flow (PWWF): 5 x ADWF;
- Manning's 'n' value: 0.0128;
- Gravity Main Minimum Velocity: 0.7 m/s (self-cleansing velocity at PDWF); and
- Gravity Main Maximum Velocity: 2.0 m/s (self-cleansing velocity at WWF).

3.3 Development Yield

A water and wastewater demand assessment was undertaken for Stages 1 to 3 and the ultimate development. Stages 1 to 3 were assessed based upon the RPS Proposal Plan Drawing No. 109116-90 in Appendix A, whilst the ultimate development demand assessment was undertaken in accordance with advice from Stockland and the previously completed analysis report (B11007.W-0.2H).

3.3.1 Stages 1 to 2 Yield

Stage 3 has been excluded from this assessment as it is urban arterial and minor collector road infrastructure and is not subject to demand loadings. The proposed Stage 1 to 2 yields are outlined within *Table 3-1*.

For this assessment a 10% contingency factor has been applied to account for potential future demand increases. Equivalent Population (EP) factors of 3.0 and 2.7 EP per dwelling unit were adopted for water and wastewater respectively in accordance with RRC Planning Scheme and CMDG specifications.

Table 3-1 – Stages 1 to 2 Dwelling Entitlements and Development Loading

Stage	Dwelling Entitlement	Water EP/Lot	Wastewater EP/Lot	Yield (Lots)	Water EP	Wastewater EP	Water EP + 10%	Wastewater EP + 10%
1A	Residential	3.0	2.7	22	66	59	73	65
1B	Residential	3.0	2.7	18	54	49	59	54
2A	Residential	3.0	2.7	27	81	73	89	80
2B	Residential	3.0	2.7	19	57	51	63	56
2C	Residential	3.0	2.7	19	57	51	63	56
2D	Residential	3.0	2.7	9	27	24	30	26
2F	Residential	3.0	2.7	7	21	19	23	21
2E	Group Housing		2.7	81 ¹		219		241
		Water EP/ha	Wastewater EP/ha	Yield (ha)	Water EP	Wastewater EP	Water EP + 10%	Wastewater EP + 10%
2E	Group Housing	120		1.82	218		240	
2E	Local Commercial	75	55.38	1.3	98	72	108	79
2 L1-5	Public Open Space	10		3.65	37		41	
Total				202	679	617	789	678

Notes: 1) 3.0 EP/ET conversion rate for water adopted from CMDG, unit equivalencies;
2) 2.7 EP/ET conversion rate for wastewater adopted from CMDG, unit equivalencies;
3) Dwelling Entitlement EP allocation from the CMDG Rev. G, 2017, D11, Water Retention Design Guideline;
4) Assumed density of 46¹ EP/ha for "super block" Drawing No. 109116-90 in Appendix A; and
5) In the absence of detail plans assumed 'Mixed Use' lot as central business area as per table D12.C.01 CMDG, 2017, EP 55.38/ha.

A maximum demand of 789 EP for water and 678 EP for wastewater has been assessed for Stages 1 to 2 of Ellida.

3.3.2 Ultimate Development Yield

The ultimate development demands have been estimated in accordance with advice provided by Stockland indicating that the ultimate development will consist of a maximum 2,350 residential dwellings. From this advice the following water and wastewater EPs have been calculated. The total EP's are outlined in *Table 3-2*.

Table 3-2 – Ultimate Development Demand Assessment

Development Land Use	Count	Unit	Water EP + 10%	Wastewater EP + 10%
Detached Residential	2,350	Dwellings	7,755	6,980
High Density Residential	1.82	Hectares	240	241
Public Open Space	3.67	Hectares	41	-
Commercial/Mixed Use	1.6	Hectares	108	79
Total (Ultimate Development)	-	-	8,144	7,300

Notes: 1) 3.1 EP/ET conversion rate for Water adopted from CMDG, unit equivalencies;
2) 2.6 EP/ET conversion rate for Wastewater adopted from CMDG, unit equivalencies; and
3) All values have been rounded to the nearest whole number.

A maximum demand of 8,144 EP for water and 7,300 EP for wastewater is projected for the ultimate Ellida development. For this assessment, a 10% contingency has been applied to account for potential future demand increases.

4 Water Service Strategy

A water network assessment was undertaken to assess the infrastructure required to service the Ellida development for Stages 1 to 3. The following water service strategy is conceptual only and remains subject to detailed engineering design. This water service strategy supersedes the previous strategy presented in Brown Consulting Water and Wastewater Analysis Report (B11007.W-02H).

The water and wastewater network analysis was carried out to demonstrate that the existing networks have the capacity to service Stages 1 to 3 and achieve CMDG DSS obligations. The ultimate development area service strategy is subject to further refinement as lot layouts and densities are verified for stages beyond Stages 1 to 3.

4.1 Methodology

Water network modelling was undertaken using InfoWater Suite 14.5, and utilised a newly created model with boundary conditions provided by RRC on 30 January 2018, attached within Appendix E.

Assessment of the water network was undertaken during Peak Hour (PH) and Fire Flow (FF) conditions for Stages 1 to 3 and the ultimate development. The projected demands (*Table 3-1* and *Table 3-2*) have been applied to the network demand model with infrastructure assessed against the CMDG DSS outlined within Section 3.2.

4.2 Water Demand Projection

Water demands for Stages 1 to 2 of the Stockland development site have been estimated in accordance with the CMDG Guidelines. Development demand loadings have not been included for Stage 3 as it is urban arterial and minor collector road infrastructure, and as such it has been excluded from the water demand assessment detailed in *Table 4-1*.

Table 4-1 –Water Demand Projection

Precinct	Demand, EP	Average Day Demand, L/s	MDMM, L/s	Peak Day, L/s	Peak Hour, L/s	Fire Flow, L/s
1A	73	0.42	0.59	0.80	0.067	15
1B	59	0.34	0.48	0.65	0.054	15
2A	89	0.52	0.72	0.98	0.082	15
2B	63	0.36	0.51	0.69	0.058	15
2C	63	0.36	0.51	0.33	0.058	15
2D	30	0.17	0.24	0.33	0.027	15
2E (Com)	108	0.63	0.88	1.19	0.099	30
2E (Res)	240	1.39	1.94	2.64	0.220	15
2F	23	0.13	0.19	0.25	0.021	15
2 L1-5	41	0.24	0.33	0.45	0.038	15
Stages 1-2 Total	789	4.56	6.39	8.63	0.723	
Ultimate Development	8,144	47.13	65.98	89.08	7.462	

Notes: 1) Ultimate Development include demand from Stages 1 to 3; and
2) 125 EP allowance allocated to Lot 1 SP281965 as per RRC information request D/117-2017.

Stages 1 to 2 have a design PH demand of 0.72 L/s, whilst the projected ultimate development PH demand is 7.46 L/s (inclusive of Stages 1 to 2). FF requirements for both Stages 1 to 2 and the ultimate development will require 15 L/s for residential development and 30 L/s for the commercial allotments.

4.3 Proposed Water Service Strategy

The proposed water service strategy for Stages 1 to 3 is illustrated on Drawing No. 17-002720-GIS001 within *Appendix D* and reflects the following service strategy. Map 41-1 in *Appendix B* illustrates the current RRC trunk water network plans for trunk infrastructure for the Parkhurst region.

It is proposed to service the ultimate development via the proposed DN450 (WAT-45) trunk main which intersects the north-west and eastern boundaries of the Stockland Development lot SP238731 (refer figure 2-1 & Map 41-1 Appendix B). Construction of WAT-45 is due to commence in 2021, however it is proposed that the construction of WAT-45 trunk main be brought forward from 2021 to the anticipated construction of Stages 1 to 3 in 2019.

The proposed water reticulation network for Stages 1 to 3 consists of DN200 branch water mains, DN150 water mains and DN100 water mains. To achieve suitable pressures within the Stage 1 to 3 network, a Pressure Reducing Valve (PRV) is proposed adjacent to the connection of the DN450 trunk water main and DN200 branch water main as outlined within 17-002720-GIS001 attached within *Appendix D*.

The internal water reticulation network for Stages 1 to 3 has not been designed in detail as this will be undertaken in the Operational Works stage. It is expected however that the internal services will consist of pipe diameters with a minimum of DN100. Detailed survey of the site will be required prior to detail engineering design of the proposed internal water infrastructure to confirm the viability of the proposed network.

4.4 Internal Water Network Assessment

For the purpose of network modelling, minimum network pressures were modelled under PH and FF conditions. Network modelling was conducted with a fixed head of 80 metres in accordance with boundary condition advice from RRC attached within *Appendix E*. Either assessment was completed for Stages 1 to 3 and preliminary ultimate development with the results outlined in Table 4-2.

Table 4-2 - Internal Network Modelling Results

Development Area	Minimum PH Pressure	Maximum PH Pressure	Minimum FF Pressure	Commercial FF Pressure
Stages 1 to 3	43.99 m	53.65 m	31.78m	30.18 m
Ultimate Development	39.92 m	43.88 m	27.08 m	29.31 m

Notes: 1) Lot 1 SP281965 included in internal network assessment.

Water network modelling indicates that the proposed water supply network has sufficient capacity to service the development under Stages 1 to 3 and ultimate development scenarios. It is noted that ultimate development results are conceptual only and are subject to a revised assessment following the ultimate lot layout finalisation.

Water network modelling of Stages 1 and 2 demonstrates a minimum PH service pressure of approximately 43.99 m, which is above the required minimum of 22 m. The maximum PH pressure identified, 53.65 m is under the required absolute maximum pressure of 80 m. The minimum fire flow pressure identified was 29.33 m, which is above the 12 m minimum pressure required.

Ultimate development trunk infrastructure was also deemed to meet PH and FF requirements.

5 Wastewater Service Strategy

Assessment of the existing and proposed wastewater network infrastructure was undertaken to confirm that the proposed development can be serviced in accordance with the CMDG. The assessment was undertaken for the Ellida development Stage 1 to 2 demand of 678 EP with consideration also being made for the ultimate development wastewater demand of 7,300 EP. The following wastewater service strategy is conceptual only and remains subject to detailed engineering design.

5.1 Methodology

Wastewater network modelling was undertaken with the use of InfoSWMM Suite 14.5. The network was assessed for PWWF conditions against CMDG DSS outlined in Section 3.1. The modelling analysis was undertaken between the proposed developments to the proposed RRC pump station (SEW-100) located north of Stages 1 to 2.

5.2 Wastewater Load Projections

The design wastewater loads for Stages 1 to 2 and the ultimate development were calculated based on the population projections in *Table 3-1*. Development demand loadings have not been included for Stage 3 as it is urban arterial and minor collector road infrastructure, and as such it has been excluded from the wastewater load assessment detailed in *Table 5-1*.

Table 5-1 – Projected Wastewater Loads

Precinct	Demand EP	ADWF, L/s	PDWF, L/s	PWWF, L/s
1A	65	0.150	0.376	0.75
1B	54	0.125	0.313	0.63
2A	80	0.185	0.463	0.93
2B	56	0.130	0.324	0.65
2C	56	0.130	0.324	0.65
2D	26	0.060	0.150	0.30
2E (Commercial)	79	0.183	0.457	0.91
2E (Residential)	241	0.558	1.395	2.79
2F	21	0.049	0.122	0.24
Total	678	1.569	3.924	7.85

Notes: 1) Wastewater flow projections were calculated in accordance with the CMDG Sewerage Network D12 Design and Construction Guideline;
 2) The design water demands for Stages 1 to 3 were determined using an Average Day demand of 500 L/EP/day;
 3) Peak Dry Weather Flow (PDWF) = 2.5 x ADWF as per CMDG Sewerage Network D12 Design and Construction Guideline;
 4) Peak Wet Weather Flow (PWWF) = 5 x ADWF as per CMDG Sewerage Network D12 Design and Construction Guideline; and,
 5) For modelling purposes, 50 EP has been allocated to the connection point provided for Lot 1 on SP281965.

The proposed Stage 1 to 2 sites generate a combined maximum projected Peak Wet Weather Flow (PWWF) of 7.85 L/s.

5.3 Proposed Wastewater Servicing Strategy

The site generally grades towards the north, therefore it is proposed to utilise an internal gravity network to convey flows towards the northern boundary of Stages 1 to 3. The proposed wastewater service strategy for Stages 1 to 3 is illustrated on Drawing No. 17-002720-GIS002 attached within *Appendix D*.

The internal gravity network will connect to the proposed RRC Sewage Pump Station (SEW-100 SPS) situated to the north of Stages 1 to 3 as illustrated in RRC planned infrastructure Map 41-2 attached within *Appendix B*. It is anticipated that SPS SEW-100 will be located immediately north of the Stage 1 to 3 access road and remain outside of the Q100 extents subject to detailed design. Construction of SEW-100 is due to commence in 2021, however it is proposed that the construction of SEW-100 pump station and relevant connecting infrastructure be brought forward from 2021 to the anticipated construction of Stages 1 to 3 in 2019.

As per advice from RRC, it is noted that the SEW-100 SPS will only be sized to accommodate the eastern catchment of the Ellida development (inclusive of Stages 1 to 3). The extent of the eastern catchment is outlined within drawing no. 17-002720-GIS003 attached within *Appendix D*.

The internal wastewater network has been designed at minimum grade for modelling purposes. It is proposed that the development will be serviced via an internal network consisting of DN150 gravity mains, which will convey wastewater north to the aforementioned SEW-100 wastewater pump station. Detailed survey of the site will be required prior to detailed design to confirm the viability of proposed internal gravity mains.

5.4 Wastewater Network Assessment

Network analysis indicates that the proposed DN150 wastewater gravity network has sufficient capacity to service Stages 1 to 3 of the Ellida development with additional capacity to service residual allotments within the ultimate development. As illustrated on Drawing No. 17-002720-GIS002 within *Appendix D*, additional demands have been applied to the upstream network and assessed to account for future development beyond Stages 1 to 3.

The Hydraulic Grade Line (HGL) profile for Control Line 1 was extracted from the InfoSWMM model to illustrate the proposed gravity network performance under PWWF conditions. The Control Line 1 HGL plot is attached within *Appendix C* demonstrates adequate capacity to service Stages 1 to 3 of the development and does not exceed 58% capacity.

The strategies proposed as part of this report are conceptual only and require detailed engineering design during the operational works phase.

5.5 Sewage Pump Station

An analysis was undertaken for the proposed SEW-100 SPS to determine the required capacity for Stages 1 to 3 of the Ellida development and the ultimate eastern catchment loading. The eastern catchment loading inclusive of Stages 1 to 3 is 1,585 EP as outlined within drawing no. 17-002720-GIS003 attached within *Appendix D*. SPS requirements were calculated based off information provided in Section D12.27 of the CMDG: Design Criteria – Pumps and Wet Wells as well as Water Services Association (WSA) Sewer Pumping Station Code of Australia (2005) Standards. The projected SEW-100 pump capacity and operating storage requirements are outlined in *Table 5-2*.

Table 5-2: SPS Operation Requirements

Pump Station	Total Demand	PDWF	PWWF	Single Pump Capacity	Dual Pump Capacity	Operating Storage	Emergency Storage
SEW-100 (Interim)	678 ⁴ EP	4.2 L/s	8.4 L/s	7.1 L/s	10.2 L/s	0.5 m ³	24.3 kL
SEW-100 (Ultimate)	1,585 ⁴ EP ¹	9.8 L/s	19.5 L/s	13.0 L/s	19.0 L/s	2.9 m ³	56.2 kL

Note: 1) Total Catchment demand has been provided in drawing no. 17-002720-GIS003 attached within *Appendix D*;
2) Emergency Storage requirements calculated for 4 hours ADF storage as per CMG design criteria;
3) It is proposed that the pump stations will operate under 1 pump for PDWF and 2 pumps for PWWF; and,
4) 50 EP has been included under each Pump Station horizon to account for Lot 1 on SP281965.

It is anticipated that staging of the pumps and mechanical components will be required and is to be further considered during detailed design.

5.6 Rising Main

The rising main was conceptually sized; the calculated velocities and detention times under the interim and ultimate SPS horizons are as outlined in *Table 5-3*.

Table 5-3: Rising Main Performance Assessment

Rising Main Description	Diameter	Approx. Length	Velocity	Detention Time
SEW-101 (Interim)	ID150	840 m	0.58 m/s	2.71 hrs
SEW-101 & SEW-123 (Ultimate)	ID150	840 m	1.08 m/s	0.49 hrs

It is recommended that the rising main be a ID150 to ensure that the velocity and detention time are within the allowed WSA Sewer Pumping Station Code of Australia (2005) standards. Discussions with RRC have indicated that installing the ultimate rising main upfront is preferable to reduce costs of upgrading at a later date. Diameter of the rising mains remain subject to system performance, which is to be determined during detailed design.

6 Conclusion

Water & wastewater network analysis has been undertaken in support of the proposed Ellida development Stages 1 to 3 with consideration of the ultimate development.

Water network modelling was undertaken using InfoWater for Stages 1 to 3 and ultimate development trunk infrastructure. It is proposed that the development will be serviced via an internal network of DN100 water mains connecting to the RRC proposed DN450 trunk main (WAT-42-1). It is noted that the planned construction (or partial construction) of the D450 trunk water main will need to be brought forward to service Stages 1 to 3 of the development.

The proposed internal water network is illustrated on Drawing No. *17-002720-GIS001* within *Appendix D*. Water network analysis has confirmed that the proposed network has sufficient capacity to service the development in accordance with the CMDG DSS.

Wastewater network modelling was undertaken using InfoSWMM during Peak Wet Weather Flow conditions. It is proposed that Stages 1 to 3 will be serviced via an internal network consisting of DN150 gravity mains conveying wastewater north to the proposed RRC wastewater pump station SEW-100.

It is noted that the construction SEW-100 pump station and associated infrastructure will need to be brought forward to service Stages 1 to 3 of the development. It is anticipated that the staging of SEW-100 pumps will be required to service the larger eastern catchment; however, the ultimate rising main will be installed initially to reduce upgrade costs as the area develops. The eastern catchment associated with the SEW-100 pump station is illustrated in drawing no. *17-002720-GIS003* attached within *Appendix D*.

Wastewater network modelling indicates that the proposed internal DN150 gravity network has adequate capacity to service Stages 1 to 3. The proposed internal wastewater network is illustrated on Drawing No. *17-002720-GIS002* attached within *Appendix D*.

Water and wastewater modelling of the Stage 1 to 3 infrastructure networks demonstrates that the proposed service strategies provide sufficient capacity to service the development. Whilst network modelling was also undertaken for the ultimate development, no strategies have been developed and results should be considered conceptual only and remain subject to detailed engineering design.

7 Recommendations

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

- Adopt the Stages 1 to 3 water service strategy illustrated on Drawing No. 17-002720-GIS001 within *Appendix D*;
- Adopt the Stages 1 to 3 wastewater service strategy illustrated on Drawing No. 17-002720-GIS002 within *Appendix D*;
- Adopt the eastern wastewater catchment demands illustrated on Drawing No. 17-002720-GIS003 within *Appendix D*;
- Bring forward the construction of the planned DN450 trunk water main (WAT-45) to coincide with Ellida Stages 1 to 3;
- Bring forward the construction of the planned wastewater pump station (SEW -100) from 2021 to coincide with Ellida Stages 1 to 3;
- Undertake detailed design in accordance with the proposed water and wastewater service strategies.

Calibre recommends that the Water and Wastewater Network Investigation report be approved by Rockhampton Regional Council for Stages 1 to 3 of the Ellida development.

WATER & WASTEWATER NETWORK INVESTIGATION

Appendix A Development Area Plan

STOCKLAND DEVELOPMENT PTY LTD

WATER & WASTEWATER NETWORK INVESTIGATION

Appendix B Rockhampton Regional Council – Water & Wastewater Network Plans for Infrastructure

STOCKLAND DEVELOPMENT PTY LTD

Trunk Infrastructure - Sewerage

Locality Boundaries

Priority Infrastructure Area

Cadastral Parcels

Future Sewerage Trunk Infrastructure

Future Pump Station

Future Treatment Plant

Future Sewerage Main

Existing Sewerage Trunk Infrastructure

Existing Pump Station

Existing Treatment Plant

Existing Sewerage Trunk Main

STP

STP

SEW-10

SEW-11

SEW-12

SEW-13

SEW-14

SEW-15

SEW-16

SEW-17

SEW-18

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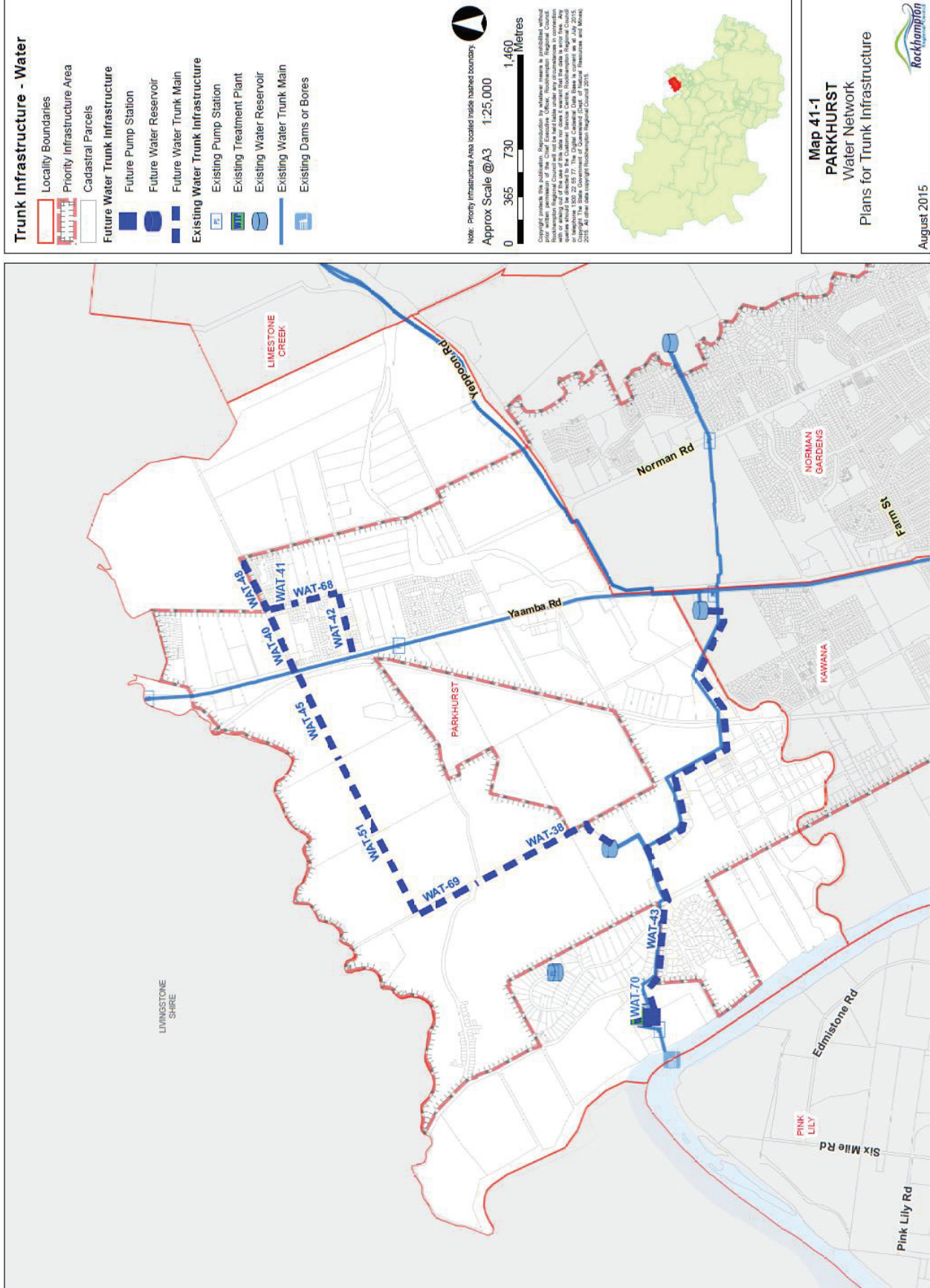
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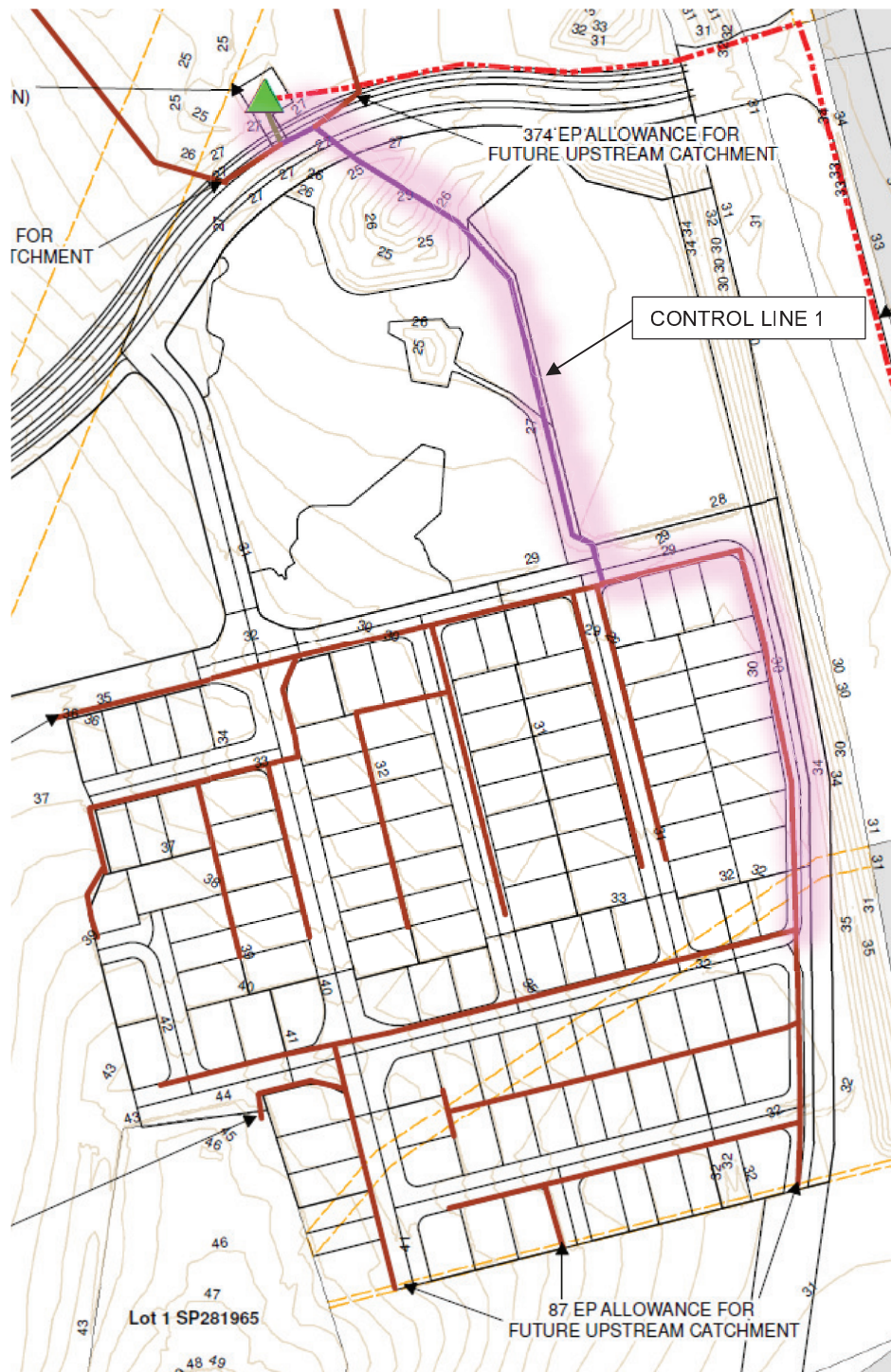


WATER & WASTEWATER NETWORK INVESTIGATION

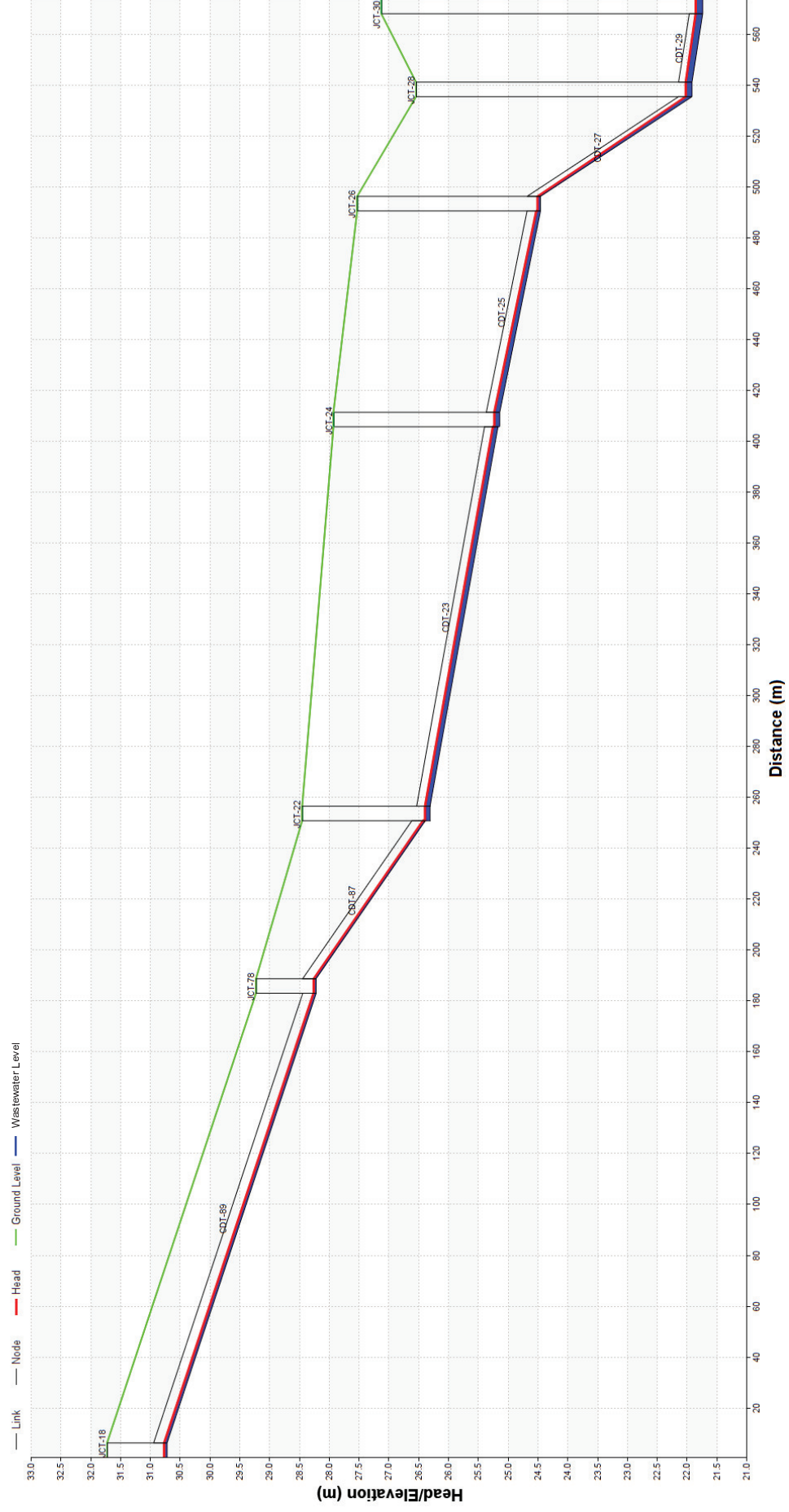
Appendix C InfoSWMM HGL – Control Line 1

STOCKLAND DEVELOPMENT PTY LTD

Appendix C1: Control Line 1



HGL Profile - Control Line 1



WATER & WASTEWATER NETWORK INVESTIGATION

Appendix D Calibre Drawings

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PROPOSED PRESSURE
REDUCING VALVE

WATER

INFRASTRUCTURE

DN100 PROPOSED WATER
MAIN

DN150 PROPOSED WATER
MAIN

DN200 PROPOSED WATER
MAIN

DN450 PROPOSED TRUNK
WATER MAIN

DN600 RNAU PROPOSED
TRUNK WATER MAIN

CADASTRE

LOTS

INTERSECTION

ROAD

WATER BODY

EASEMENT

NOTES:

1. INFRASTRUCTURE SHOWN IS INDICATIVE ONLY AND IS SUBJECT TO DETAILED DESIGN.
2. THIS DRAWING IS CONCEPTUAL AND HAS BEEN PRODUCED FOR DISCUSSION PURPOSES.

3. ASSUMED CONNECTION TO PROPOSED RNAU DN600 TRUNK MAIN, IF CONNECTION NOT POSSIBLE CONNECTION TO BE MADE TO EXISTING DN600 MAIN ON THE EASTERN SIDE OF YAAMBA RD.



PROJECT:

ELLIDA, PARKHURST

CLIENT:

STOCKLAND DEVELOPMENT PTY LTD

Drawing Title:

WATER INFRASTRUCTURE STRATEGY

DRAWING NO:

17-002720-GIS001

ISSUE:

A

ISS | BY | CHK | DATE | DETAILS

A | DH | JG | 31.01.18 | DRAFT ISSUE

B | DH | JG | 23.03.18 | UPDATED MAIN SIZE

REFER NOTE 3

YAAMBA ROAD (BRUCE HIGHWAY)

RRC PLANNED TRUNK MAIN
(WAT-45) INDICATIVE ALIGNMENT

7654 EP ALLOWANCE FOR
FUTURE UPSTREAM CATCHMENT

50 EP ALLOWANCE FOR
FUTURE UPSTREAM CATCHMENT

50 EP ALLOWANCE FOR
FUTURE UPSTREAM CATCHMENT

WATER RETICULATION CONNECTION
PROVIDED FOR 1/SP281965

Lot 1 SP281965

97 EP ALLOWANCE FOR
FUTURE UPSTREAM CATCHMENT

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



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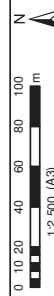
WASTEWATER INFRASTRUCTURE

- DN150 PROPOSED GRAVITY MAIN
- DN225 PROPOSED GRAVITY MAIN
- DN300 PROPOSED GRAVITY MAIN
- ID120 PROPOSED TRUNK RISING MAIN
- DN300 EXISTING COUNCIL GRAVITY MAIN
- PROPOSED SEW-100 WASTEWATER PUMP STATION

CADASTRE

- LOTS
- INTERSECTION
- ROAD
- WATER BODY
- EASEMENT
- CONTOURS

NOTES:
1. INFRASTRUCTURE SHOWN IS INDICATIVE ONLY AND IS SUBJECT TO DETAILED DESIGN.
2. THIS DRAWING IS CONCEPTUAL AND HAS BEEN PRODUCED FOR DISCUSSION PURPOSES.



PROJECT:

ELLIDA, PARKHURST

CLIENT:

STOCKLAND DEVELOPMENT PTY LTD

Drawing Title:

WASTEWATER INFRASTRUCTURE
STRATEGY

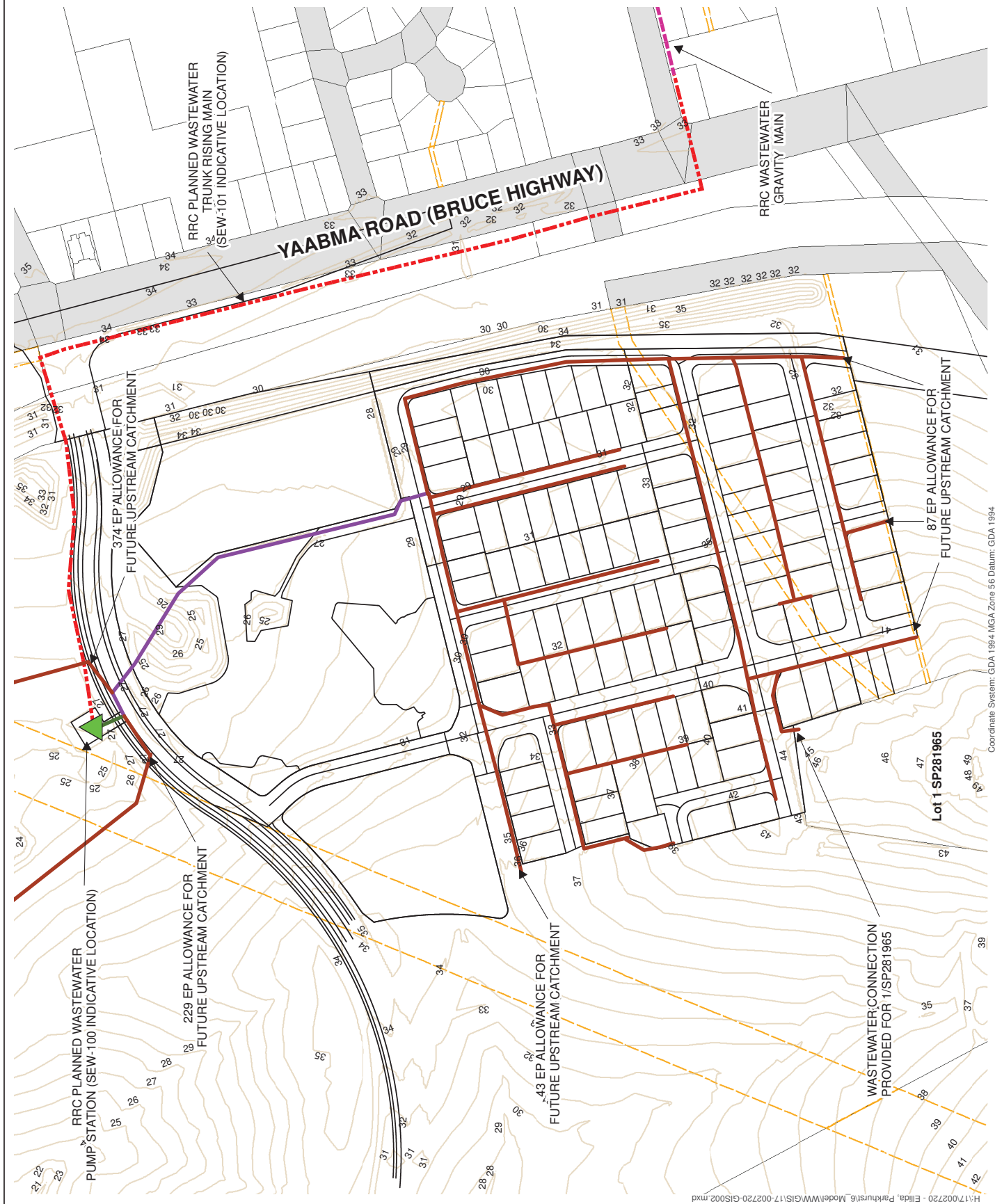
DRAWING NO:

17-002720-GIS002

ISSUE:

C

ISS	BY	CHK	DATE	DETAILS
A	DH	JG	31.01.18	DRAFT ISSUE
B	DH	JG	22.03.18	UPDATED MAIN ALIGNMENTS
C	DH	JG	11.04.18	UPDATED MAIN SIZE





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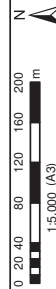
WASTEWATER INFRASTRUCTURE

- DN150 GRAVITY MAIN
- DN225 GRAVITY MAIN
- DN300 GRAVITY MAIN
- ID120 SEW-101 WASTEWATER
RISING MAIN
- DN300 EXISTING COUNCIL
GRAVITY MAIN
- PROPOSED SEW-100
WASTEWATER PUMP
STATION

CADASTRE

- LOTS
- INTERSECTION
- ROAD
- WATER BODY
- EASEMENT
- CONTOURS
- CATCHMENT AREAS

- NOTES:**
- INFRASTRUCTURE SHOWN IS INDICATIVE ONLY AND IS SUBJECT TO DETAILED DESIGN.
 - THIS DRAWING IS CONCEPTUAL AND HAS BEEN PRODUCED FOR DISCUSSION PURPOSES.
 - DENSITY OF CATCHMENT AREAS IS BASED ON CURRENT ELLIDA DENSITY OF 18 DWELLINGS PER HECTARE.
 - A RATE OF 2.7 EP PER DWELLING INCLUSIVE OF 10% CONTINGENCY.



PROJECT:

ELLIDA, PARKHURST

CLIENT:

STOCKLAND DEVELOPMENT PTY LTD

Drawing Title:

WASTEWATER CATCHMENTS

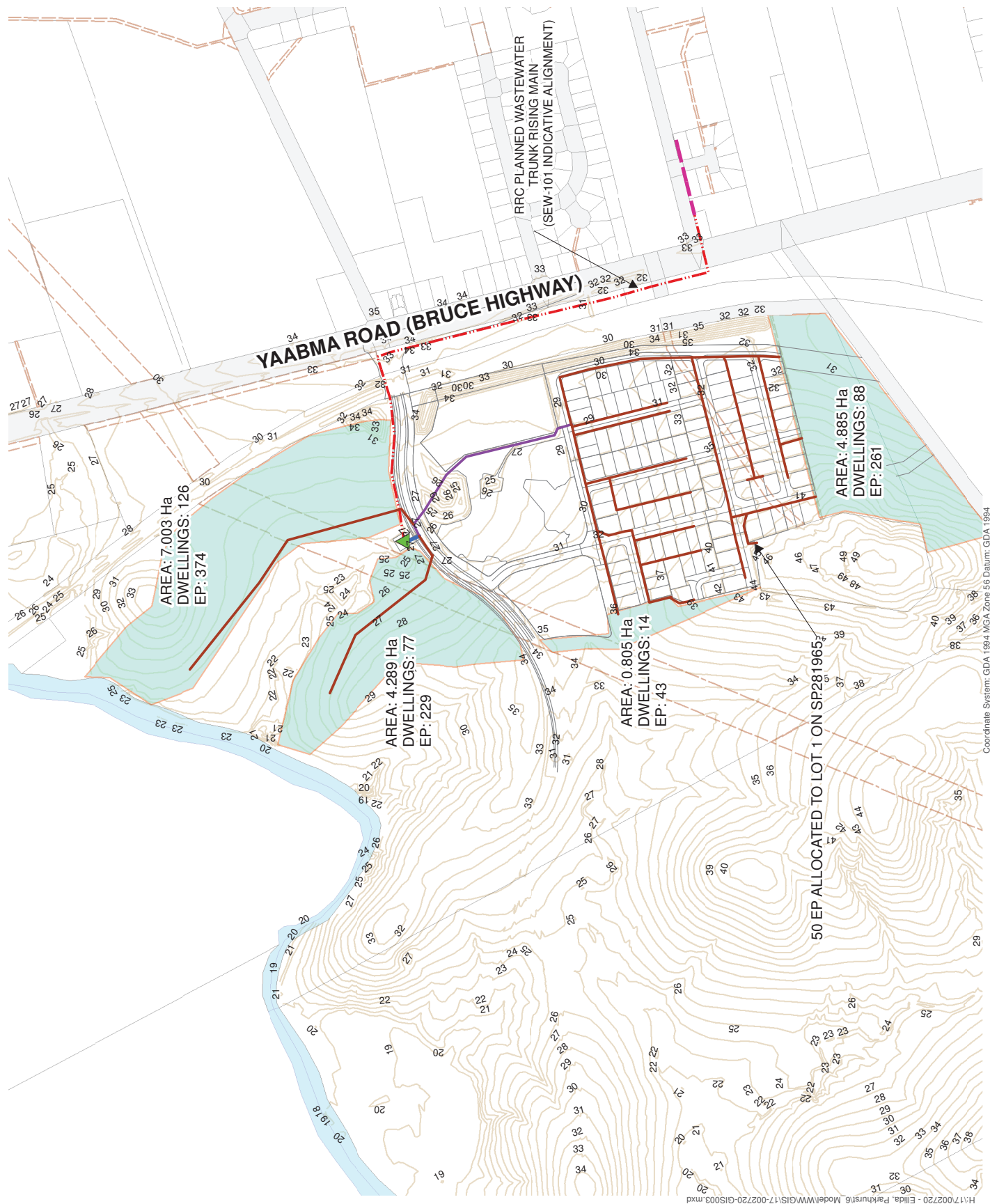
DRAWING NO:

17-002720-GIS003

ISSUE:

C

ISS	BY	CHK	DATE	DETAILS
A	DH	JG	22.03.18	ORIGINAL
B	DH	JG	03.04.18	UPDATED EP ALLOCATION
B	JG	JG	11.04.18	UPDATED MAIN SIZE



Coordinate System: GDA 1984 MGA zone 56 Datum: GDA 1984