Afflux (m)

- Below -0.50
- -0.50 - -0.10
- -0.10 - -0.05
- -0.05 - -0.02
- -0.02 - -0.01
- -0.01 - 0.01
- 0.01 - 0.02
- 0.02 - 0.03
- 0.03 - 0.05
- 0.05 - 0.10
- 0.10 - 0.5
- 0.5 - 2.5

Legend

- Preliminary Proposed Layout
- Existing Boundaries

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ACN 100 817 356

Date: **02/10/2018** Rev: **B** NCE Ref: **TURF0013**

In Association With:
TURNER OWENS GROUP

0 75 150 300
Metres

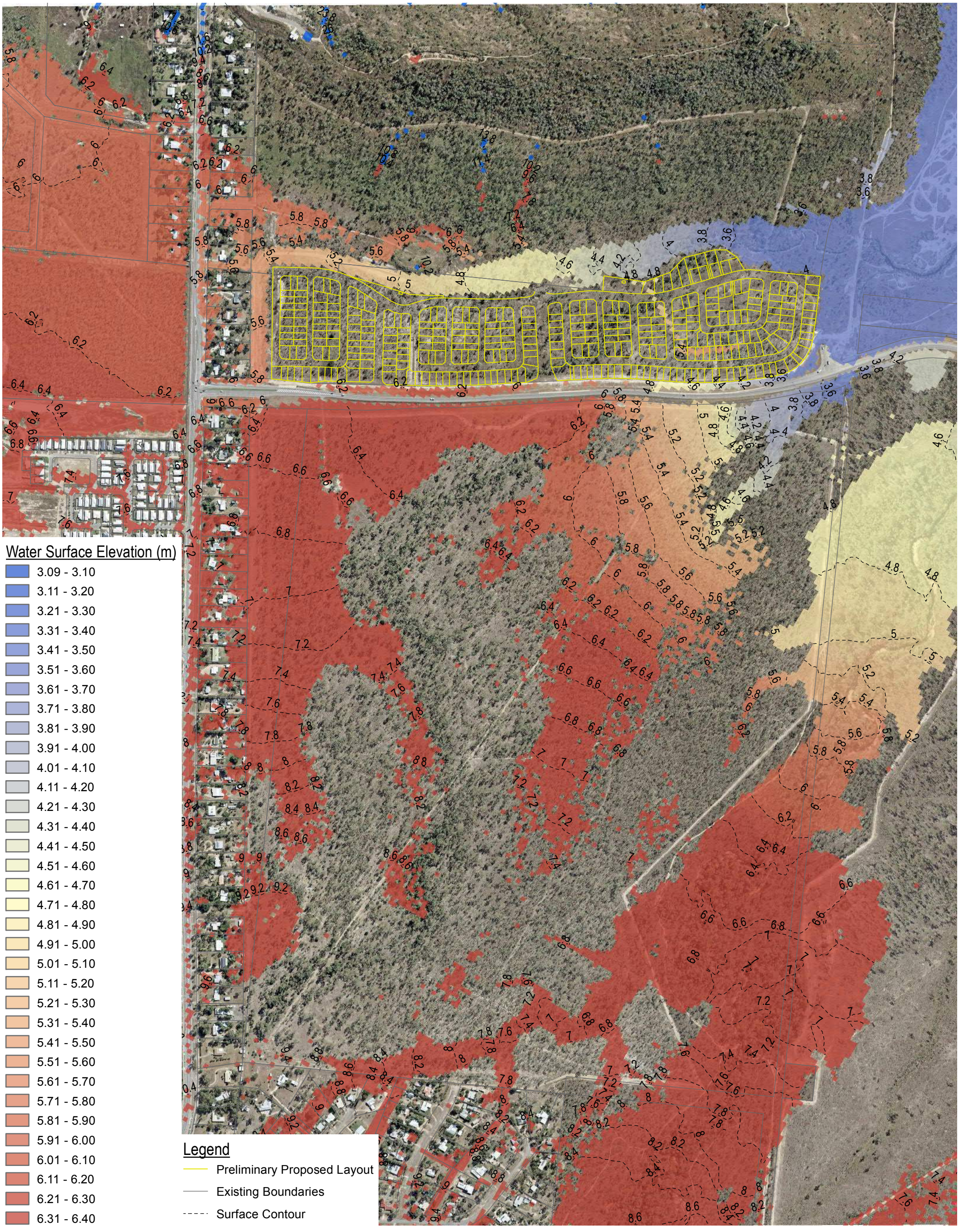
Scale 1:8,000 @ A3

N

MOUNT LOW DEVELOPMENT MASTER PLANNED COMMUNITY FLOOD ASSESSMENT

Afflux 'Developed Ultimate Storm Surge' minus 'Developed Ultimate' 1% AEP 24 hour

TURF0013/B40



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In Association With:
TURNER OWENS GROUP

0 75 150 300
Metres

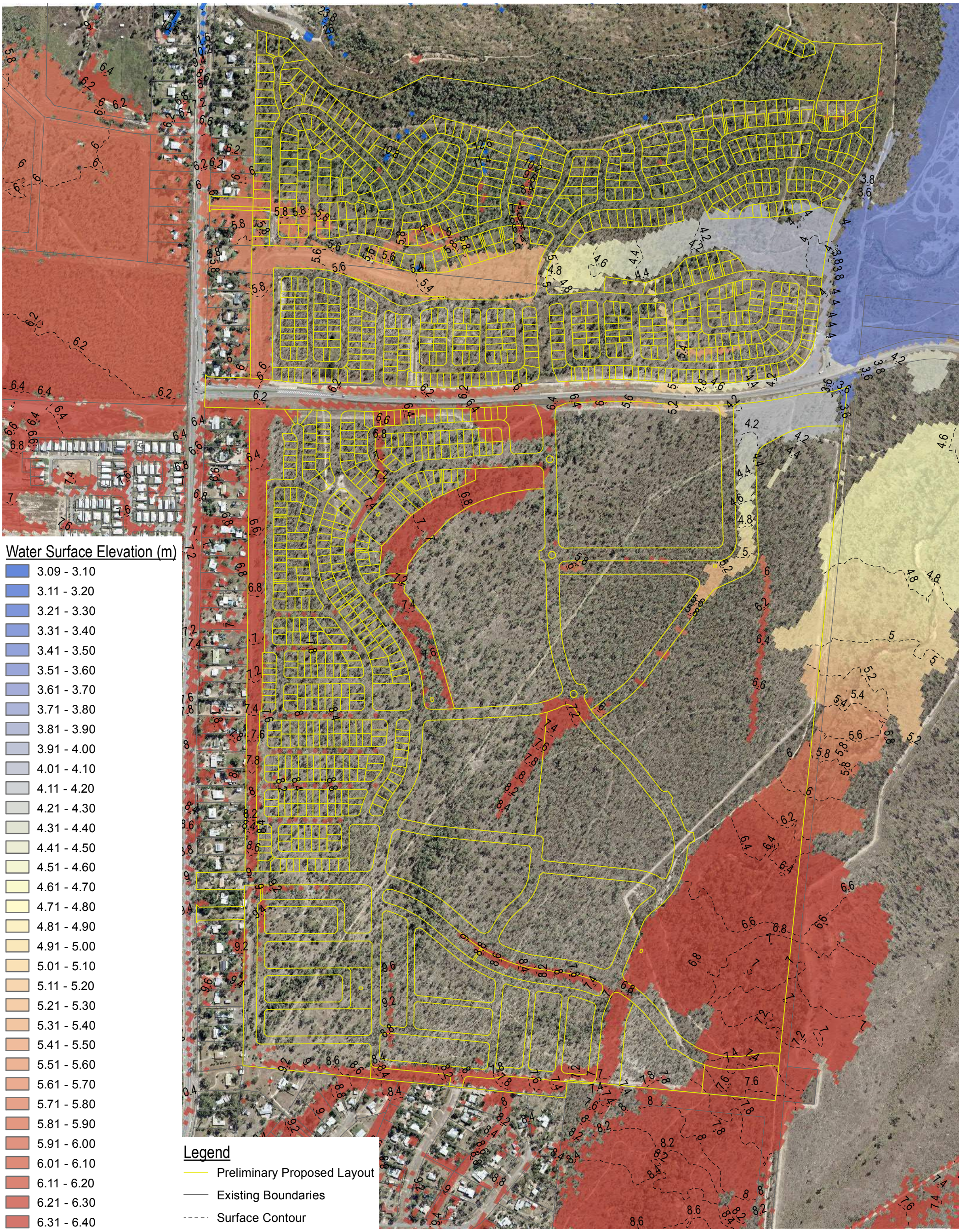
Scale 1:8,000 @ A3

N

MOUNT LOW DEVELOPMENT MASTER PLANNED COMMUNITY FLOOD ASSESSMENT

Developed Precinct B Climate Change Water Surface Elevation 1% AEP 24 hour

TURF0013/B41



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In Association With:
TURNER OWENS GROUP

0 75 150 300
Metres

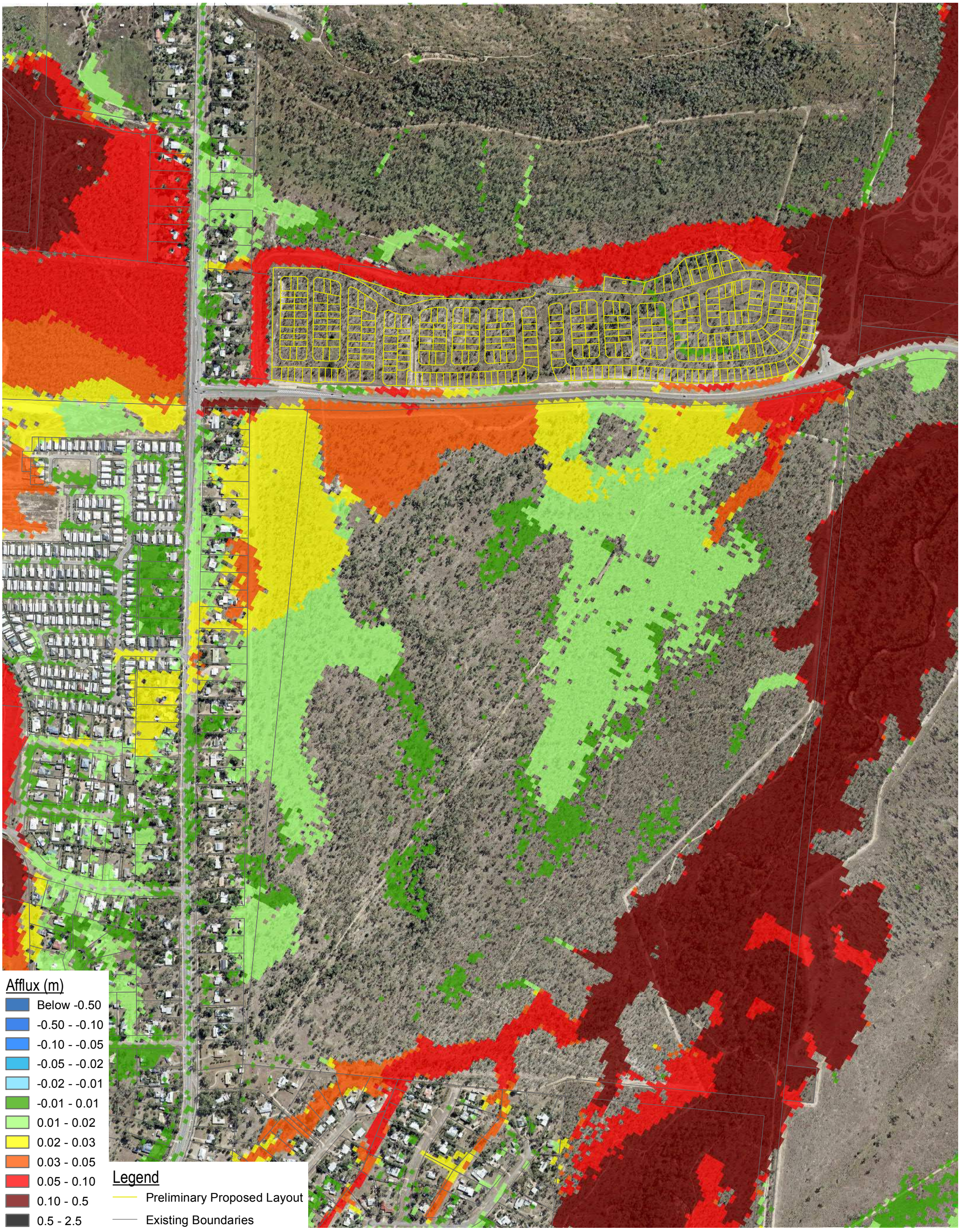
Scale 1:8,000 @ A3

N

MOUNT LOW DEVELOPMENT MASTER PLANNED COMMUNITY FLOOD ASSESSMENT

Developed Ultimate Climate Change Water Surface Elevation 1% AEP 24 hour

TURF0013/B42



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In Association With:
TURNER OWENS GROUP

0 75 150 300
Metres

Scale 1:8,000 @ A3

N

MOUNT LOW DEVELOPMENT MASTER PLANNED COMMUNITY FLOOD ASSESSMENT

Afflux 'Developed Precinct B Climate Change ' minus 'Developed Precinct B' 1% AEP 24 hour

TURF0013/B43

Afflux (m)

- Below -0.50
- -0.50 - -0.10
- -0.10 - -0.05
- -0.05 - -0.02
- -0.02 - -0.01
- -0.01 - 0.01
- 0.01 - 0.02
- 0.02 - 0.03
- 0.03 - 0.05
- 0.05 - 0.10
- 0.10 - 0.5
- 0.5 - 2.5

Legend

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TURNER OWENS GROUP

0 75 150 300
Metres

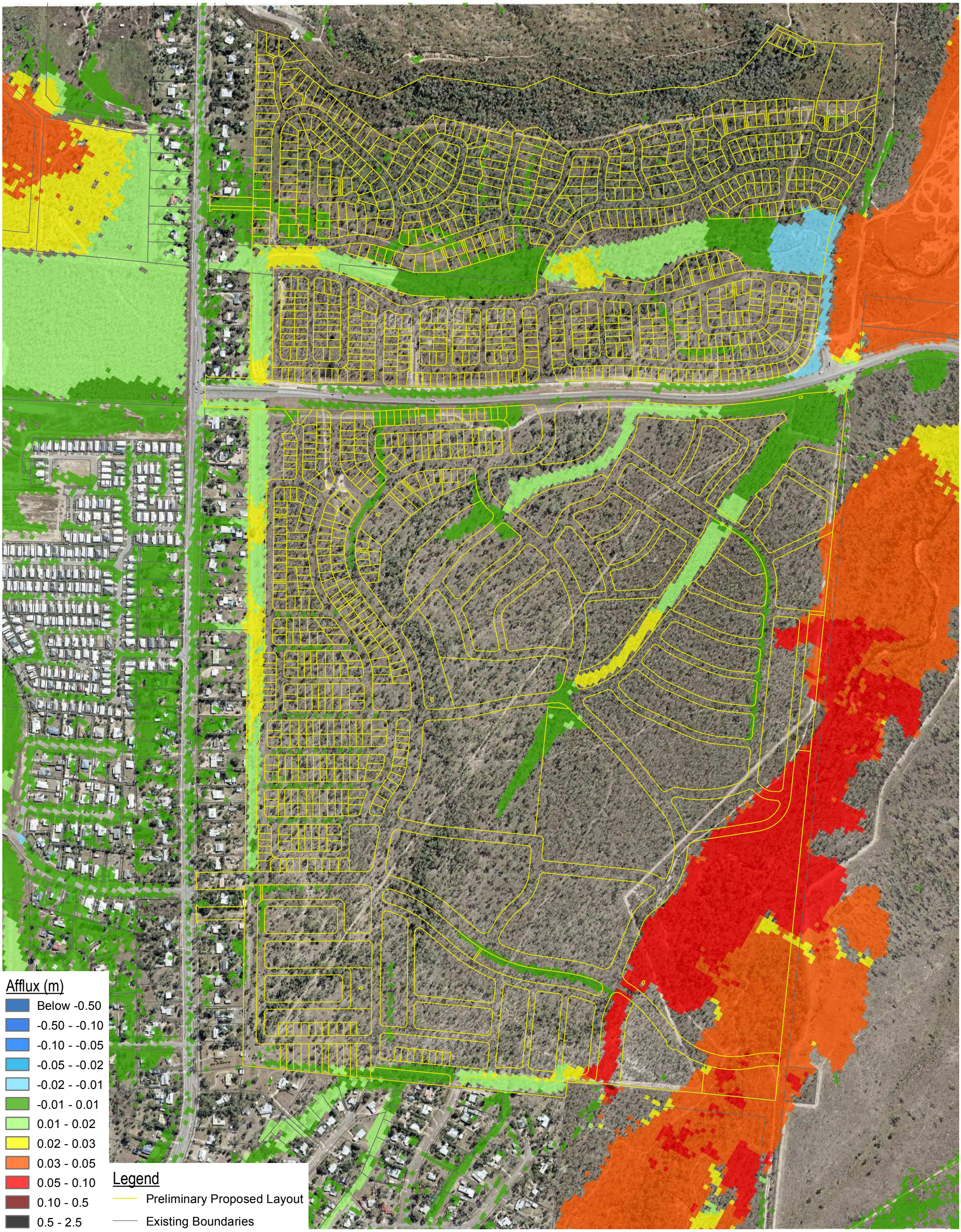
Scale 1:8,000 @ A3

N

MOUNT LOW DEVELOPMENT MASTER PLANNED COMMUNITY FLOOD ASSESSMENT

Afflux 'Developed Ultimate Climate Change ' minus 'Developed Ultimate' 1% AEP 24 hour

TURF0013/B44



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In Association With:
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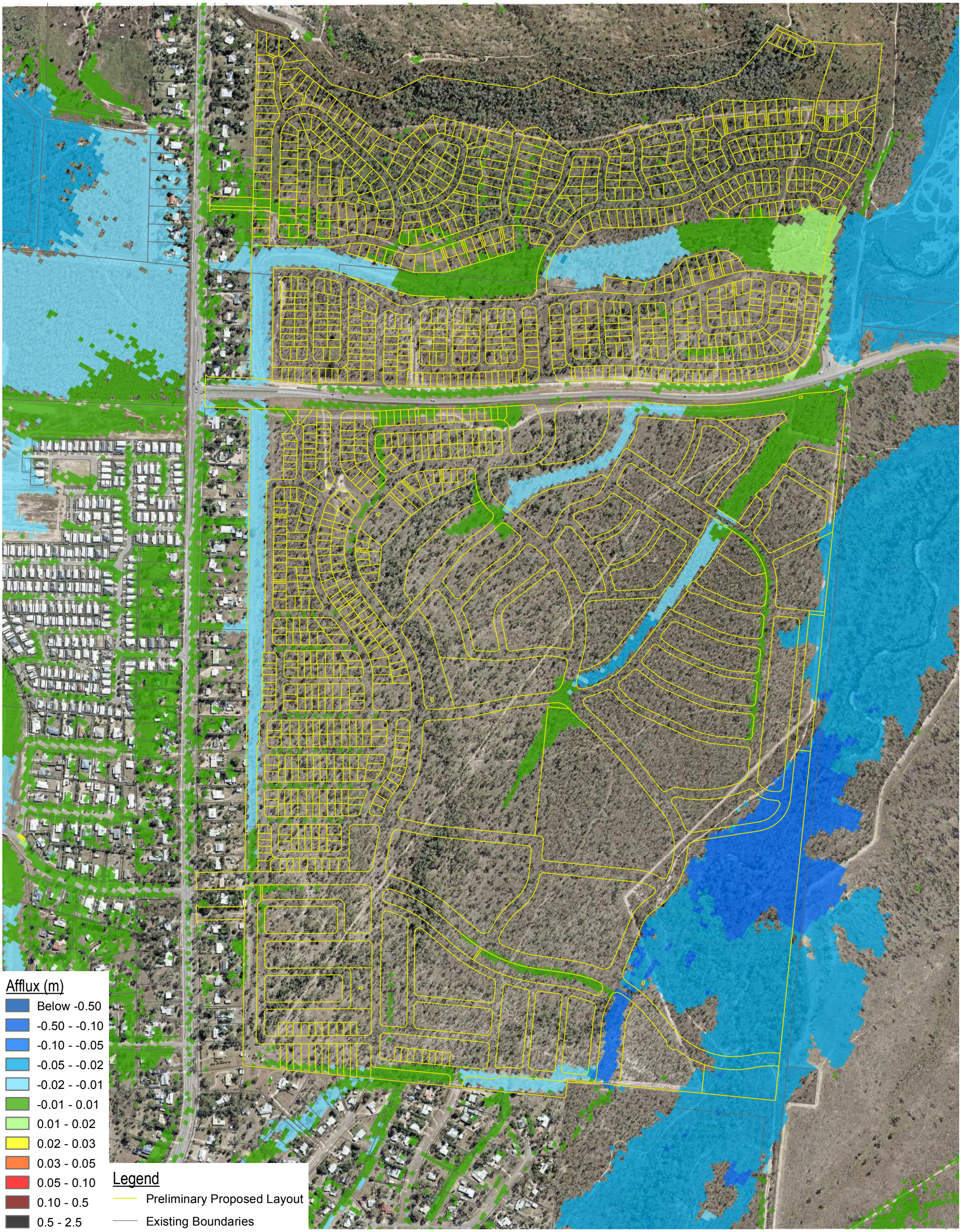
0 75 150 300
Metres
Scale 1:8,000 @ A3

N

MOUNT LOW DEVELOPMENT MASTER PLANNED COMMUNITY FLOOD ASSESSMENT

Afflux 'Developed Ultimate Roughness +10% ' minus 'Developed Precinct B' 1% AEP 24 hour

TURF0013/B45



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0 75 150 300
Metres
Scale 1:8,000 @ A3

N

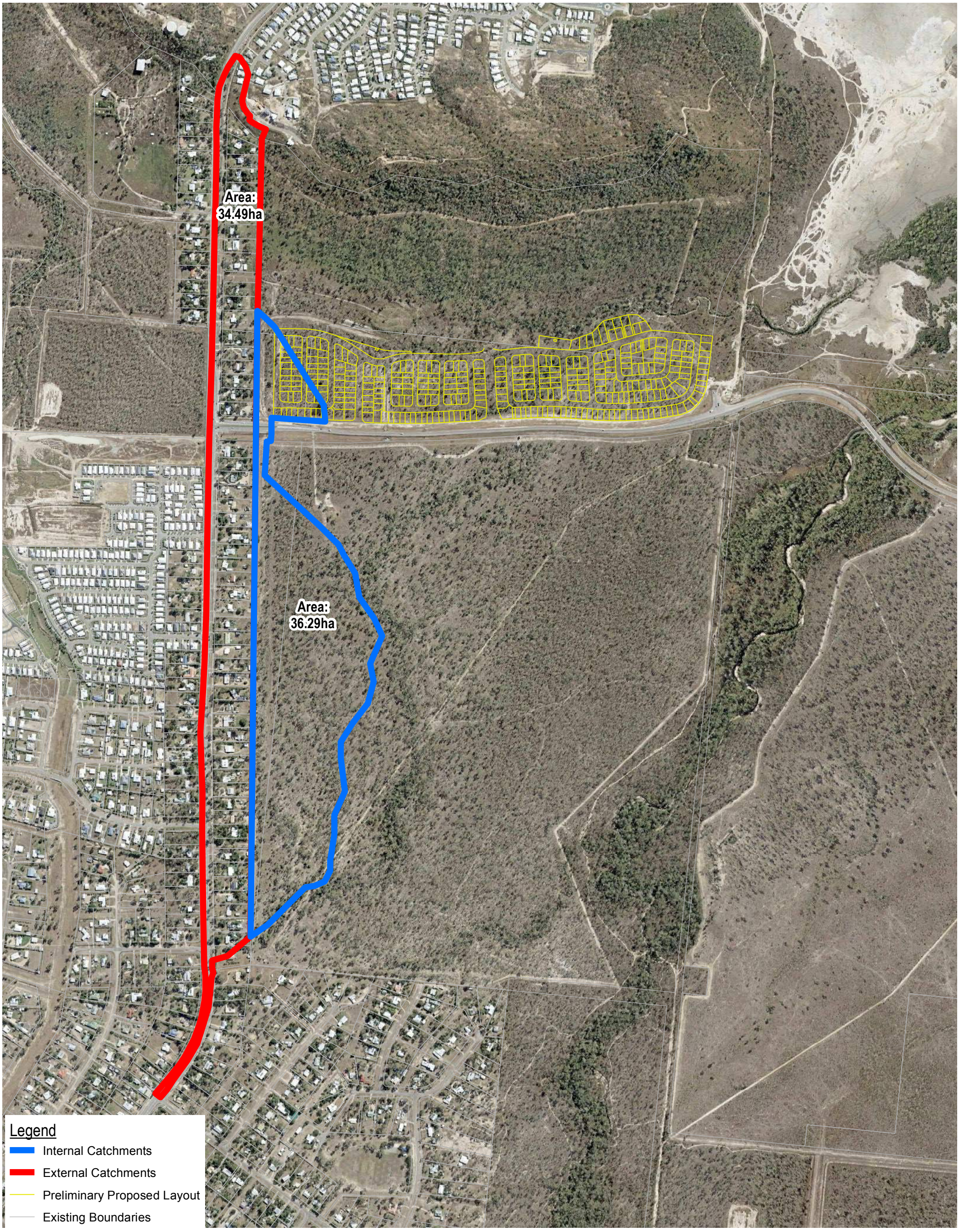
MOUNT LOW DEVELOPMENT MASTER PLANNED COMMUNITY FLOOD ASSESSMENT

Afflux 'Developed Ultimate Roughness -10% ' minus 'Developed Precinct B' 1% AEP 24 hour

TURF0013/B46

APPENDIX C

External Catchment Plans



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In Association With:
TURNER OWENS GROUP

0 100 200 400
Metres

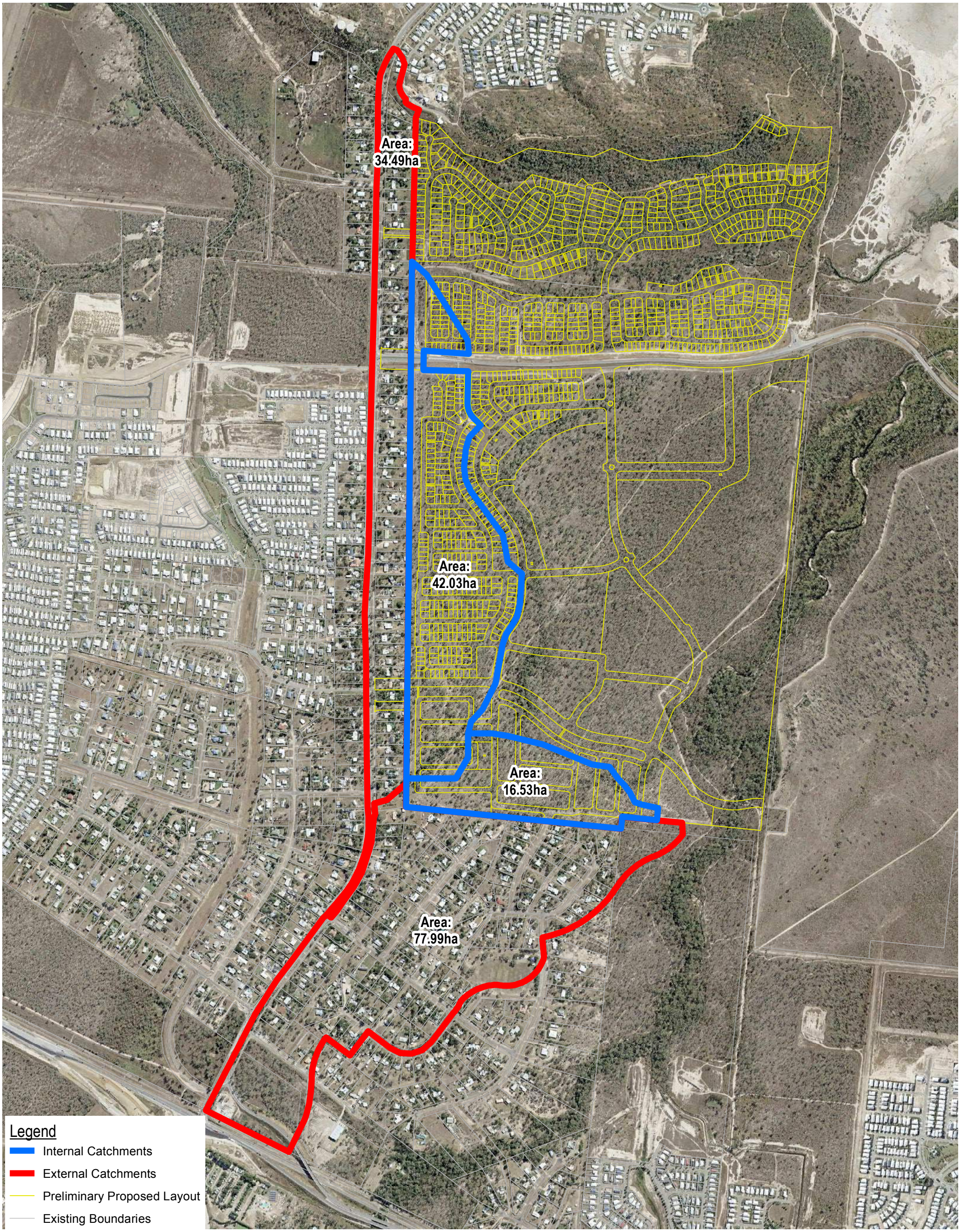
Scale 1:10,000 @ A3

N

MOUNT LOW DEVELOPMENT MASTER PLANNED COMMUNITY FLOOD ASSESSMENT

Developed Precinct B Catchment Plan

TURF0013/C01



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Date: **02/10/2018** Rev: **B** NCE Ref: **TURF0013**

In Association With:
TURNER OWENS GROUP

0 120 240 480
Metres

Scale 1:12,000 @ A3

N

MOUNT LOW DEVELOPMENT MASTER PLANNED COMMUNITY FLOOD ASSESSMENT

Developed Ultimate Western Catchment Plan

TURF0013/C02

APPENDIX C

DPM Water - Water and Sewer Planning

MT LOW DEVELOPMENTS

RIDGE PADDOCK RESIDENTIAL DEVELOPMENT

PRECINCT 1
WATER & SEWERAGE PLANNING

July 2024
(Revision B)

TABLE OF CONTENTS

APPENDICES

DOCUMENT STATUS

Revision	Purpose	Date
A	Initial Report	1/07/2024
B	Updated Report (PS Label Correction)	30/07/24024

DOCUMENT AUTHORISATION

AUTHOR DESMOND MOSELEY

Signature 

1 INTRODUCTION

This planning report assesses the staged water & sewage infrastructure that will be required to service Precinct 1 of the Ridge Paddock master planned residential development. Precinct 1 is located on the northern side of North Shore Boulevard and eastern side of Mt Low Parkway. This development area is currently described Lot 1001 on SP345441 and is illustrated on the proposed lot layout plan below (full version of this plan is provided in Appendix A).

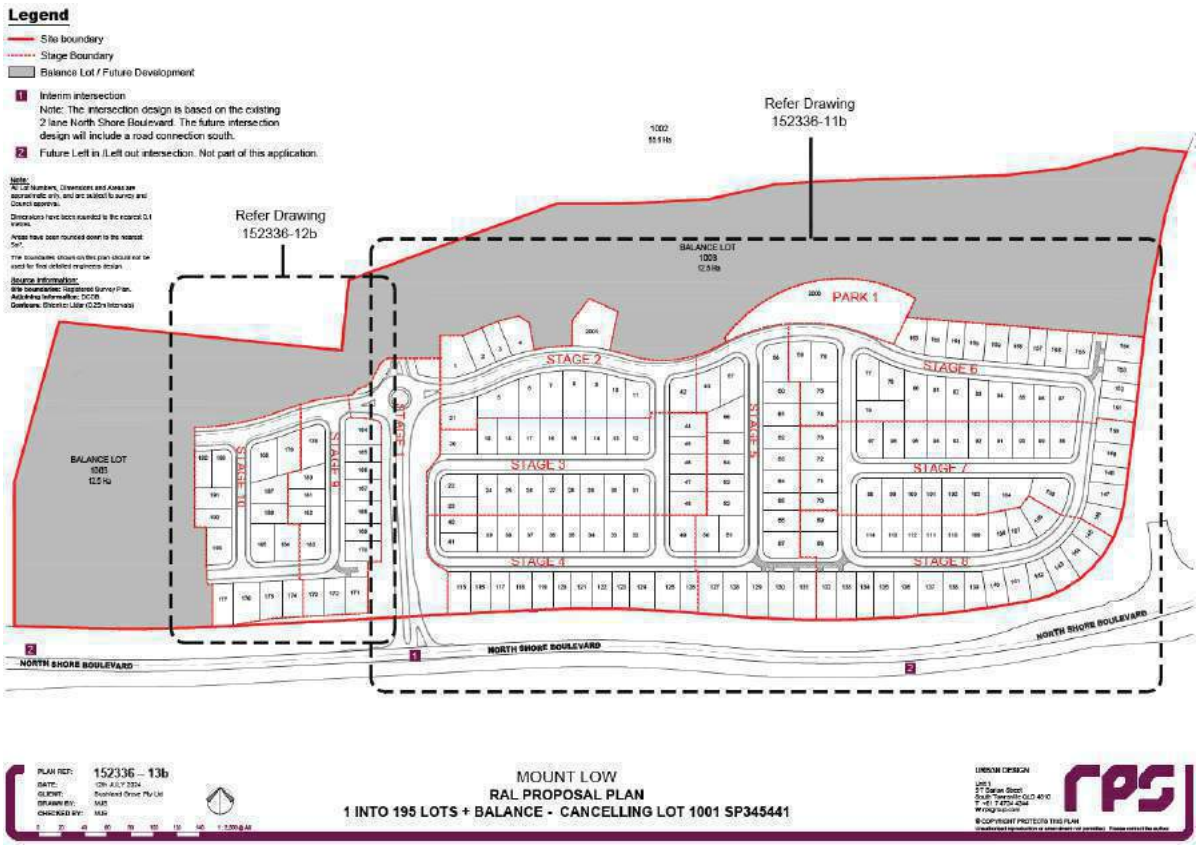


Figure 1 – Ridge Paddock Precinct 1

Precinct 1 of Ridge Paddock will consist of 193 residential lots and a sewage pump station site, that is planned to be constructed over 10 stages, generally as per the figure above.

The Ridge Paddock development will ultimately include the following undeveloped land parcels:

- Lot 1000 on SP 345441 – Large area to the south of North Shore Boulevard.
- Lot 1001 on SP 345441 – Precinct 1 land parcel located on the northern side of North Shore Boulevard and to the west of Lionel Turner Drv reserve.
- Lot 1002 on SP 345441 – Land parcel on the northern side of North Shore Boulevard, eastern side of Mt Low Parkway and up to the southern foothills of Mt Low.

Previous water & sewer master planning has been undertaken for the full Ridge Paddock development in 2018. This previous master planning has generally been incorporated into the Council's Local Government Infrastructure Plans.

The required water and sewer infrastructure to service Precinct 1 of Ridge Paddock is provided in the following report sections.

2 EXISTING SITE

The Ridge Paddock development is located to the east of Mt Low Parkway and to the west of the Garland Rd and Lionel Turner Drv reserves. The northern boundary of the site contains the steep slopes of the Mt Low hill while the southern boundary is the existing park residential developments of Mt Low. The image below from Queensland Globe illustrates the extent of the Ridge Paddock development.

Figure 2 – Existing Land Parcels

The lower reaches of Stony Ck traverse the eastern side of the site, with the topography of the area being quite flat (levels ranging from 12mAHD to 4.5mAHD) with it generally grading downwards to the north east, towards the Bohle River. The northern boundary of the site is very steep and un-developable due to the steep slopes of the Mt Low hill.

Access to Precinct 1 will be off North Shore Boulevard. This sub-arterial road traverses the northern section of the site.

3 POPULATION ASSESSMENT

Precinct 1 of the Ridge Paddock development along with the expansion of the development area on the northern side of North Shore Boulevard will predominantly consist of residential lots. The future development areas to the south of North Shore Boulevard will also likely include commercial areas, a school site along with many residential lots.

The water & sewerage population for the residential lots in Precinct 1 of the development is based on the Townsville Council standards of 2.8 EP/lot.

The following table provides a summary of the equivalent population for Precinct 1 of Ridge Paddock. The equivalent population for the future remaining development area on the northern side of North Shore Boulevard is also summarised in the table below.

Table 3.1 – Precinct 1 & Future Stages - Population Assessment

	Number	Rate	EP
Precinct 1	193 lots	2.8 EP/lot	540 EP
Future Stages (North of NSB & South of Creek)	100 lots	2.8 EP/lot	280 EP
Future Stages (Foothills of Mt Low)	650 lots	2.8 EP/lot	1,820 EP
Total			**2,640 EP**

The above population estimate has been used for the water & sewer planning and infrastructure sizing for Precinct 1 of the Ridge Paddock development. As each stage of the development is finalised the above population assessment and detailed infrastructure modelling and design will be refined (if/as required).

4 WATER SUPPLY

4.1 Full Development Water Strategy

Precinct 1 of the Ridge Paddock development will be provided with a reticulated water supply. The water reticulation system will be designed in detail as part of the staged development applications and approvals.

The previous water master planning for the full Ridge Paddock development along with Council's Plans for Trunk Infrastructure generally detail the full development water infrastructure strategy. This full development infrastructure strategy for Ridge Paddock and the surrounding areas of Burdell and Mt Low generally involves the following existing and future trunk infrastructure:

- Future water reservoirs (Northern Tank Farm) on the southern side of the Bruce Hwy and adjacent to the Holcim Quarry. This is to ultimately include 3 x 41ML reservoirs.
- Trunk outlet main from the reservoirs through to the northern side of the Bruce Hwy. Additional trunk mains will run parallel to the Bruce Hwy to feed the following trunk mains:
    - Existing DN600 DICL trunk main along North Shore Boulevard. A future DN500 and DN450 trunk main will continue to the north and then west along North Shore Boulevard to service the ongoing expansion of the North Shore development. A future DN375 trunk main will continue to the west along North Shore Boulevard through to Mt Low Parkway to connect to the existing DN300 PVC trunk main.
    - Existing DN500 DICL trunk water main on Garland Rd. A future DN500 and DN450 trunk main will extend to the north along Garland Rd to the south east corner of the Ridge Paddock development. A DN450, DN375 and DN300 trunk main will extend generally to the north through the future development stages of the Ridge Paddock development to North Shore Boulevard.

  - Future DN300 trunk water main along Mt Low Parkway. The existing DN375 DICL trunk main will continue to be the delivery main to the Mt Low Reservoirs.
  - Existing DN375 DICL trunk water main on Svensson Rd. This main will be duplicated in the future when the Sanctum west development area progresses.

- The Mt Low reservoirs (2 x 6ML reservoirs) will continue to supply Bushland Beach. These reservoirs currently supply Bushland Beach along with parts of Mt Low (to the south of the Mt Low hills) but ultimately, they will only service the Bushland Beach area. The future Northern Tank Farm and the above listed trunk water mains will service the Mt Low, Burdell and Beach Holm areas.
- The Mt Low reservoirs will also ultimately service the future residential lots in the Ridge Paddock development that are located on the southern foothills of Mt Low. A water main loop will extend from the DN300 main on Mt Low Parkway, through the future Ridge Paddock stages on the Mt Low foothills to Lionel Turner Drv. This main will then extend to the north along the future Lionel Turner Drv reserve and then to the west to connect back to the existing DN200 main at the intersection with Salonika Circuit.

The Council's PFTI Water Maps 7 and 8 (extracts provided below) illustrate the existing and planned trunk water infrastructure in the Mt Low area.

Figure 4.1 – Extracts of Water PFTI

The full versions of these two PFTI water maps are provided in Appendix B.

4.2 Precinct 1 Water Strategy

Precinct 1 of the Ridge Paddock development will be provided with a reticulated water supply. The water strategy for Precinct 1 will involve:

- DN375 water main extension to the east along North Shore Boulevard from the existing DN300 PVC trunk main on Mt Low Parkway. The DN375 trunk main will be around 840 m long.

- DN200 and DN150 extensions off the planned DN375 trunk water main at the entrance road to Stage 1. These two mains will cross under North Shore Boulevard. Two supply mains are required to provide the reliability of supply to the 195 lots in Precinct 1 and to meet Council standards of not supplying more than 40 lots off a single main.
- DN150 & DN100 PVC mains and DN63 PE mains within Precinct 1 of the Ridge Paddock development.
- Initially water will be delivered from the Mt Low reservoirs to the south along the existing DN300 PVC main on Mt Low Parkway. Water will also be directed along the existing DN375 Svensson Rd offtake to the Mt Spec pipeline and then along the DN375 and DN300 trunk water main through the Sanctum development area and the future extension of North Shore Boulevard to the above existing DN300 PVC main on Mt Low Parkway. The actual quantity/flow of water along these existing mains is dependent on the pressure setting that Council has the Svensson Rd PRV set at (this pressure setting is adjusted from time to time for operational reasons but generally have a HGL of around 54 to 58m).
- Water from the above two DN300 mains will then feed into the planned DN375 water main extension to the east along North Shore Boulevard that will deliver water to Precinct 1 of Ridge Paddock.

The extract from the WaterGEMS model below for Precinct 1 of Ridge Paddock illustrates the existing and proposed water infrastructure that will service the initial 193 lots. A larger version of this WaterGEMS model figure is provided in Appendix B.

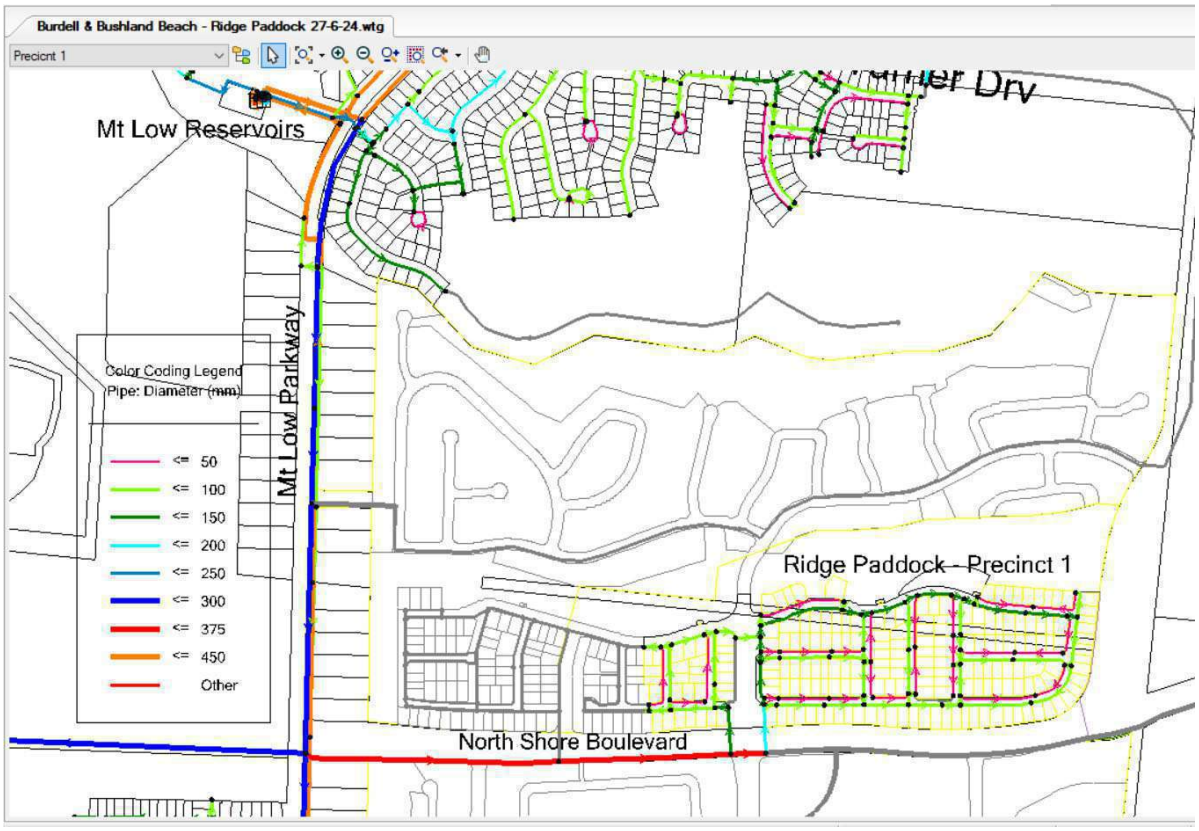


Figure 4.2 – WaterGEMS Model Extract for Precinct 1

The following report sections provide a summary of the capacity of the existing water infrastructure along with the planned DN375 trunk main on North Shore Boulevard and the other planned reticulation mains to service Precinct 1 of Ridge Paddock.

The water reticulation network has been undertaken to satisfy the following conditions:

- Minimum HGL of 22.0m above FSL under Max H conditions; and
- Minimum HGL of 12.0m above FSL under FIREFLOW conditions.

Design Residential Water Demand

Water demands have been calculated in accordance with CTM Code. The maximum hour water demand per EP is 0.033 l/s/EP. The analysis has also included a fire flow requirement of 15 l/s for residential areas.

The WaterGEMS network model has been used to assess the overall water networks performance. The network modelling has included the daily diurnal patterns. The residential diurnal water pattern is illustrated below.

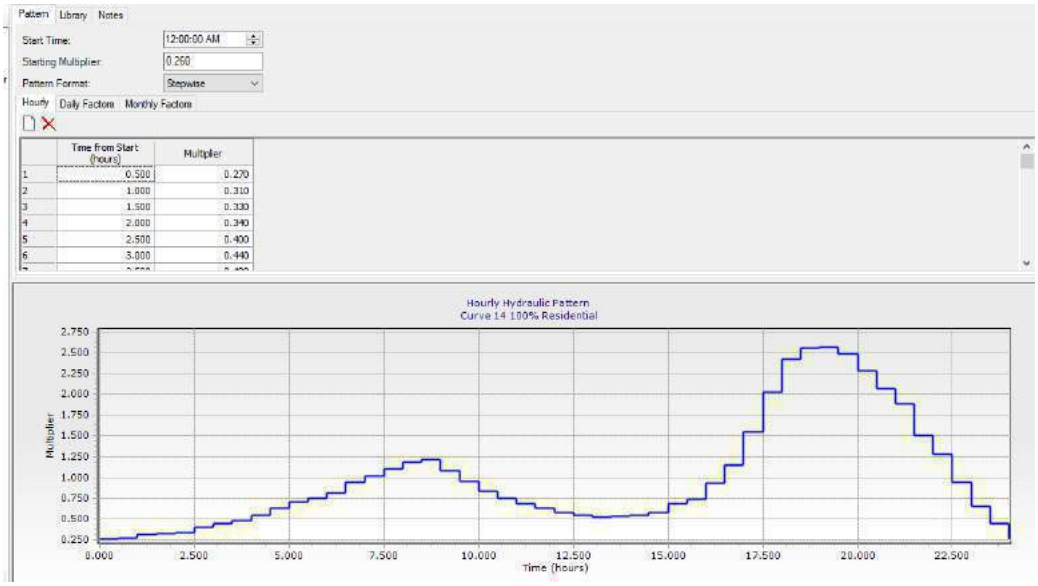


Figure 4.3 - Residential Diurnal Water Pattern (Peaking Factor of 2.57)

4.3 Precinct 1 - Network Modelling & Results

The expected development progression for Precinct 1 of the Ridge Paddock development will be for Stage 1 to Stage 10 to be developed in chronological order generally as illustrated on the staged development plan provided in Appendix A.

The water network modelling has illustrated the following:

- The proposed DN375 trunk water main extension along North Shore Boulevard is adequately sized to service Precinct 1 of Ridge Paddock.
- The peak hour flow along the proposed DN375 trunk main for Precinct 1 is 18.1 l/s. This gives a velocity of 0.16 m/s and headloss gradient of 0.001 m/m so meets the relevant design standards. Figure 4.3 below illustrates the water flows along the planned DN375

main on North Shore Boulevard. It is noted that the flows and velocity is low as the DN375 trunk main is sized for the full development of the Mt Low & Beach Holm areas.

- The velocities and headloss gradient on the reticulation mains that service Precinct 1 all achieve Council's standards and are below 0.54 m/s and 0.005 m/m respectively.
- The water pressures for the residential lots in Precinct 1 are all above 482 kPa and therefore meet the minimum pressure requirement of 220 kPa.
- With the inclusion of 15 l/s residential fire flows at the extremity of Precinct 1, the water pressures were reduced to 427 kPa which meets minimum pressure requirements of 120 kPa.
- The modelling results and WaterGems model figure are provided in Appendix. B.

The following figure from the WaterGems model illustrates the flow, velocity and headloss gradient along the proposed DN375 trunk main on North Shore Boulevard.

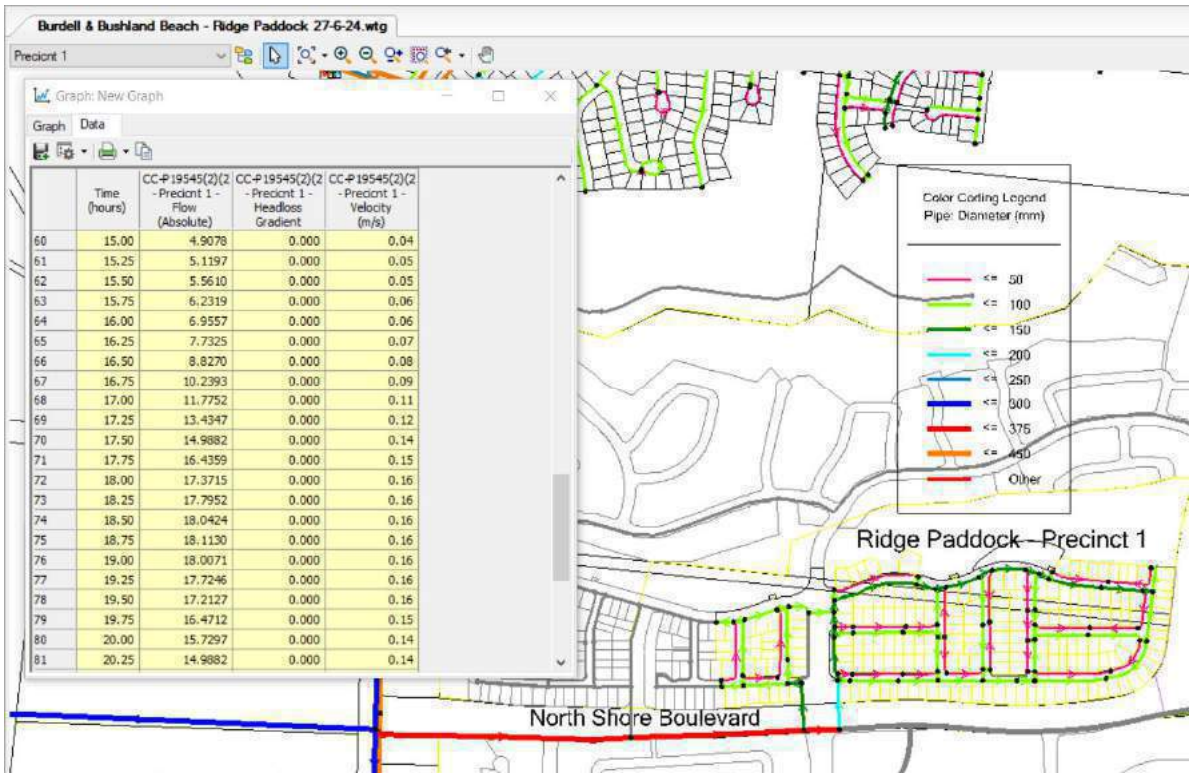


Figure 4.4 - Flow Parameters along DN375 North Shore Boulevard Main

The modelling has illustrated that the proposed Precinct 1 of Ridge Paddock can be serviced from the existing DN300 PVC main on Mt Low Parkway along with the planned DN375 trunk water main extension to the east along North Shore Boulevard.

Additional WaterGEMS modelling was performed to include the future Ridge Paddock residential lots on the northern side of North Shore Boulevard to confirm that the reticulation mains in Precinct 1 are adequately sized for the full development area.

Future staged water network modelling will be undertaken for each stage of the residential development and will include all the local reticulation mains to confirm it meets the required flow and pressure standards.

The proposed DN375 trunk water main that will be constructed along North Shore Boulevard to service Precinct 1 of Ridge Paddock will have significant spare capacity to account for future potential higher density residential development in the future Ridge Paddock precincts on the northern side of North Shore Boulevard. The DN375 trunk water main along with the other future trunk water infrastructure noted in Section 4.1 of this report and the Council's PFTI is sized to service the ultimate development in the Northern Beaches area. The water demands/flows along the DN375 water main are only 18.1 l/s with a velocity of 0.16 m/s for Precinct 1. This pipe would have capacity for around 165 l/s (velocity of 1.5 m/s) being around 5,000 EP. This is almost twice the estimated equivalent population for the northern side of North Shore Boulevard.

5 SEWERAGE RETICULATION

5.1 General Arrangement

The Ridge Paddock development is to be provided with a reticulated sewerage system. The internal sewer system will consist of gravity sewers that direct sewage to a number of local pump stations. The pump stations will discharge the sewage into trunk sewers in the future catchment of major PS ML02 (that will service all of the Ridge Paddock development area). Future major PS ML02 will pump sewage into the common pressure main system on North Shore Boulevard and onto the Mt St John STP.

Precinct 1 of Ridge Paddock will be serviced by a single standard sewage pump station. Council's sewer planning and LGIP has called this pump station PS ML07. PS ML07 will initially pump sewage into either of the existing parallel DN250 PVC and DN450 PE common pressure main on North Shore Boulevard. It is noted that the existing parallel common pressure mains are interconnected with each other in a couple of locations. Figure 5.1 illustrates the Precinct 1 sewer strategy with a larger version of this plan is provided in Appendix C.

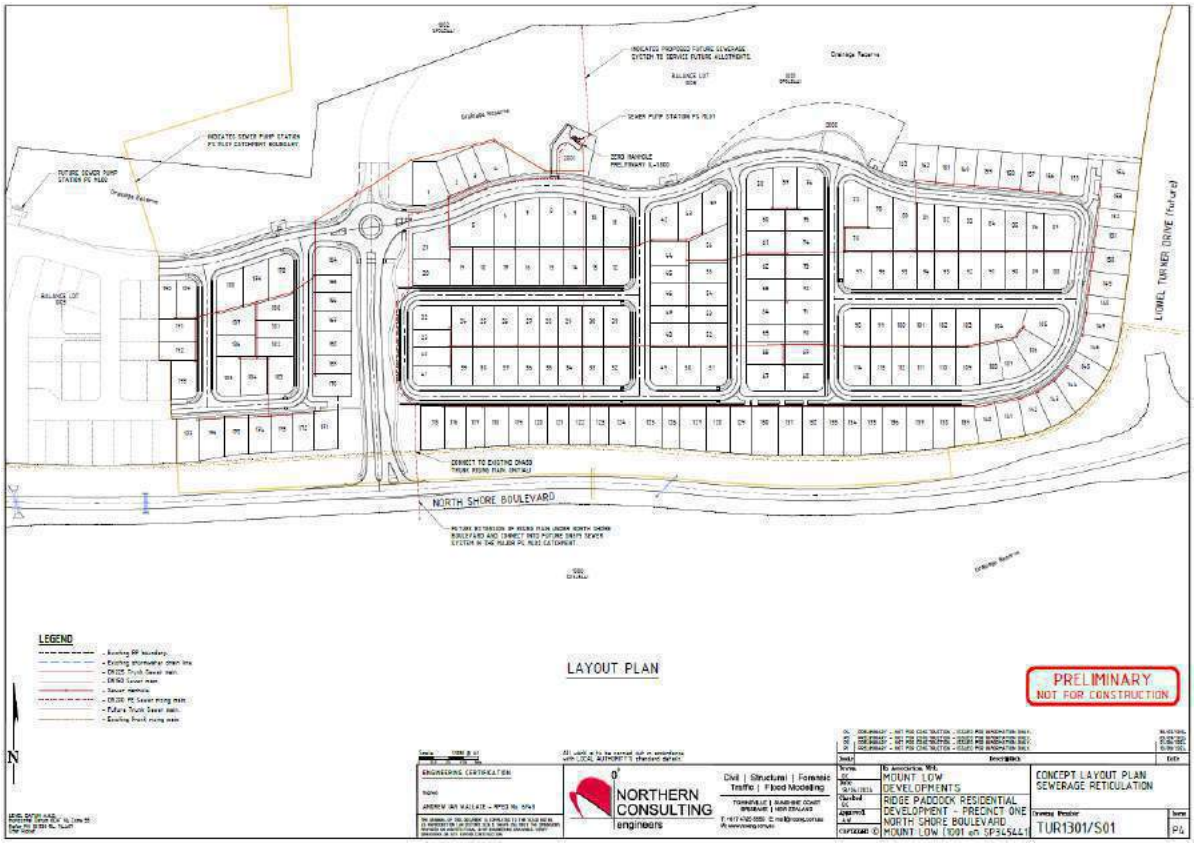


Figure 5.1 – Precinct 1 Sewer Strategy

The following sections of this report detail the proposed trunk sewer infrastructure to service Precinct 1 of Ridge Paddock.

5.2 Overall Sewer Infrastructure Strategy

The overall sewer strategy for the Ridge Paddock development is generally as per the latest overall sewer strategy that has been developed by Townsville City Council for the Northern sewer system. The latest sewer strategy and operating philosophy is generally as follows:

- Gravity sewers will direct sewage to standard TCC sewage pump stations. The Ridge Paddock development is expected to have between 4 to 6 local sewage pump stations. The final location and number of the local pump stations will be confirmed as part of the future development sewer system planning and gravity sewer system design.
- Where practical, the local sewage pump stations will be “lift stations” that direct sewage into an adjacent gravity sewer system. If not practical then sewage will be pumped along a sewer pressure main into a trunk gravity sewer in the catchment of a major pump station. For Ridge Paddock, sewage from the local pump stations will be directed into a trunk sewer system in the catchment of planned major PS ML02. Major PS ML02 will be located on the southern side of North Shore Boulevard and adjacent to Stoney Ck.
- The major pump station will discharge sewage into the common pressure main to the Mt St John STP. This strategy will reduce the number of stations pumping along the common pressure main system. Future duplications of the existing common pressure mains on North Shore Boulevard will occur to cater for the increasing residential development in the Northern sewer area. For the Ridge Paddock development, major PS ML02 will pump into the common pressure main on North Shore Boulevard near the intersection of Lionel Turner Drv.
- The local pump stations will generally be TCC standard pump stations with a 2.4m internal diameter wet well and two submersible sewage pumps. Due to the relatively small catchments to the local pump stations in the Ridge Paddock development, the pumps will be the same size and generally operate in a duty/standby mode with their sizing based on the CTM Code design requirements.

Based on the revised sewer strategy and pump operating philosophy, the sewer infrastructure required for Precinct 1 of Ridge Paddock is provided in the following report sections.

5.3 Precinct 1 Trunk Sewer Strategy

Precinct 1 of the Ridge Paddock will be serviced with a reticulated sewer system. This sewer system will consist of the following infrastructure which is illustrated on the sewer strategy figure in Appendix C and Figure 5.1 above:

- Future PS ML07. This pump station will be located within Precinct 1 of the Ridge Paddock development area. It will be located on a separate land parcel adjacent to the planned drainage reserve on the northern side of the Precinct 1 area. The Precinct 1 sewer strategy figure in Appendix C illustrates the location of PS ML07.
- PS ML07 will pump via a DN200 PE pressure main along the planned development roads to the west and south to initially connect to the existing DN450 PE common pressure main on North Shore Boulevard. PS ML07 will therefore initially pump along the common pressure main system to the Mt St John STP.
- When future major PS ML02 is constructed (which will be sized to service all of the Ridge Paddock development), the DN200 PE pressure main from PS ML07 will be extended to the south under North Shore Boulevard to discharge into a future planned DN450 trunk gravity sewer on the southern side of North Shore Boulevard and in the catchment of major PS ML02. The timing for the construction of major PS ML02 is uncertain and is dependent on the progression of the Ridge Paddock development onto the southern side of North Shore Boulevard.

- Future PS ML08 will service the north west portion of the Ridge Paddock development area (ie the future development area to the west of Precinct 1). Future PS ML08 will be a lift station that will discharge sewage into a DN225 gravity sewer adjacent to the pump station site. The DN225 gravity sewer will extend to the east to PS ML07.

The sewer catchment to PS ML07 is generally illustrated on the Figure 5.2 below and includes:

- Precinct 1 of Ridge Paddock (Stage 1 to 10). All this development area will be directed to PS ML07 via DN150, DN225 and DN300 gravity sewers.
- Future residential lots on the northern side of the drainage reserve from Precinct 1 and up to the southern foothills of Mt Low. This future development area will be serviced via a DN225 gravity sewer from the zero maintenance hole of PS ML07 that will extend to the north under the drainage reserve.
- Pumped flows from future PS ML08. Future PS ML08 will be located adjacent to the drainage reserve and to the west of PS ML07. PS ML08 will service the land area on the northern side of North Shore Boulevard and to the west of the PS ML07 gravity catchment. PS ML08 will be a lift station that will discharge sewage into a DN225 gravity sewer in the PS ML07 catchment.

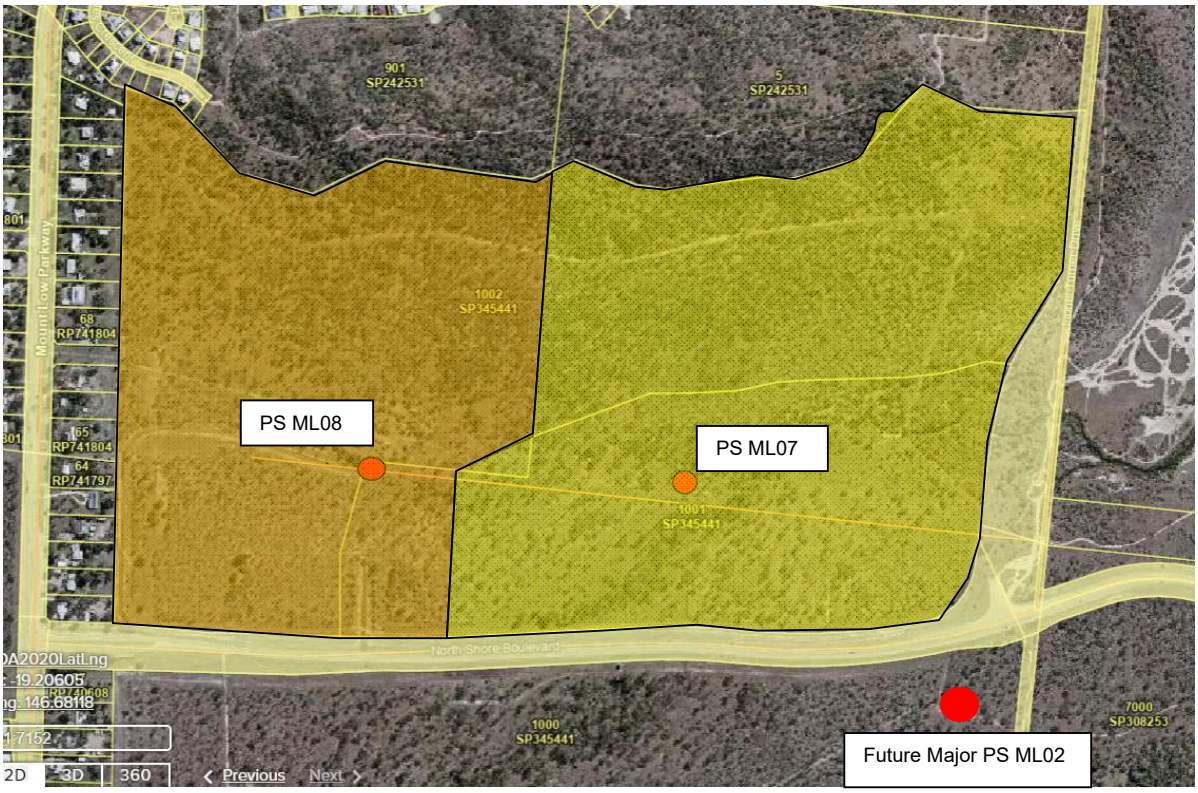


Figure 5.2 – PS ML07 Catchment

The following table provides a summary of the equivalent population that will be directed to PS ML07. It is noted that the equivalent population estimate for the future development areas on the northern side of North Shore Boulevard are preliminary and will be adjusted/conformed as part of the detailed planning and design of the future development stages.

Table 5.1 – PS ML07 Equivalent Population Assessment

	Number	Rate	EP
Precinct 1 (Direct Gravity Catchment)	193 lots	2.8 EP/lot	540 EP
North of Drainage Reserve Lots (Direct Gravity Catchment)	325 lots	2.8 EP/lot	910 EP
Future PS ML08 (via DN225 Sewer)	425 lots	2.8 EP/lot	1,190 EP
Total			**2,640 EP**

The following report section provides an initial analysis of the pump station and pressure main sizing for planned PS ML07 that will service Precinct 1 of Ridge Paddock.

5.4 PS ML07 Preliminary Sizing

The concept sizing for future PS ML07 is summarised below. The concept design is based on:

- The full development equivalent population to PS ML07 (including the future pumped flows from PS ML08).
- The preliminary sewer grading for Precinct 1 of Ridge Paddock.
- The pump station ultimately pumping sewage to the west and south (via development road reserves), under North Shore Boulevard to discharge into a future DN375/450 trunk gravity sewer in the catchment of major PS ML02.

The following Figure 5.3 illustrates the preliminary SewerGEMS network model for all of the Ridge Paddock development. The full development model has PS ML07 pumping under North Shore Boulevard into a future DN375/450 trunk sewer in the catchment of major PS ML02. A larger version of the model figure and the modelling results are provided in Appendix C.

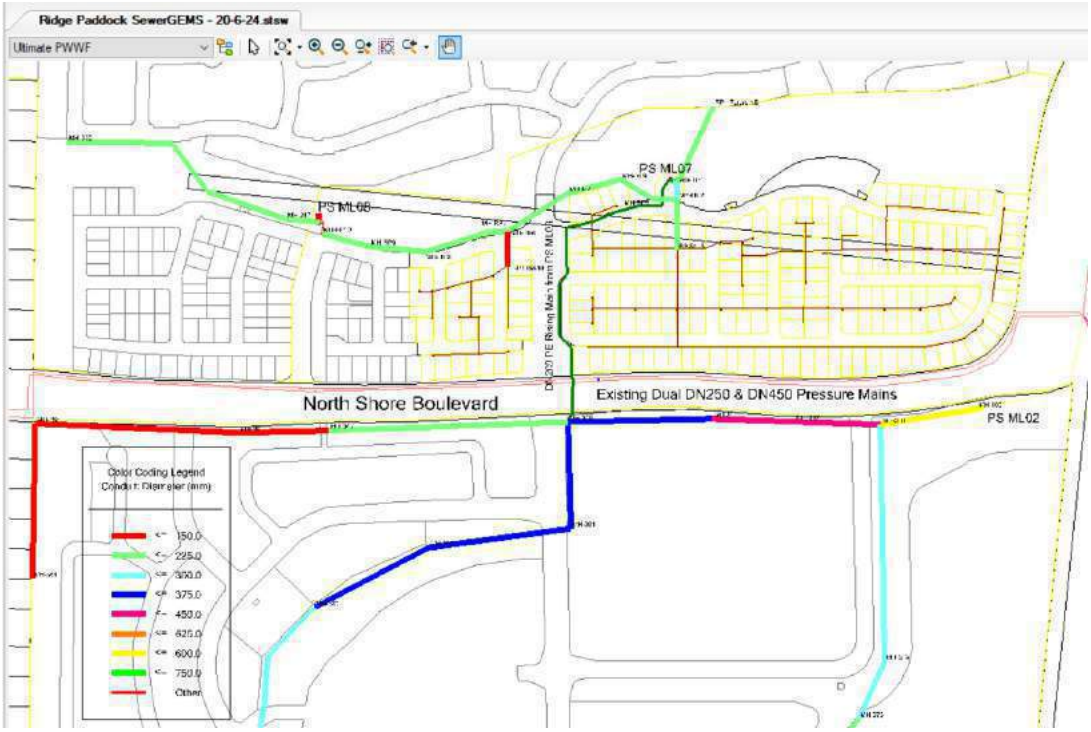


Figure 5.3 – SewerGEMS Network Model

The preliminary design criteria and operational levels for PS ML07 that will service the proposed Ridge Paddock development area on the northern side of North Shore Boulevard is provided in Table 5.2 and Table 5.3 below.

Table 5.2 – Future PS ML07 Pump Station Summary

Item	Description	Details
Station Type	Wet Well Submersible (TCC Standard Pump Station)	2.4 m diameter
Flow Calculations	Equivalent Population	2,640 EP
	Average Dry Weather Flow	7.03 l/s
	C1 Factor = 15 x (EP) $^{-0.1587}$	4.29
	Single Pump Capacity (C1 x ADWF)	30.20 l/s
	Total Pumping Capacity (5xADWF or C1xADWF – whichever is greater)	35.1 l/s
Pump Setup & Sizing (duty/standby)	Single Pump Operation (Based on pumping wet weather flows concurrently with other pump stations)	35.1 l/s @ 17.5 m head (Flygt NP3171-HT3 15kW Pump – Refer Appendix C)
Operational Controls (to be confirmed as part of detailed design)	Ground Level	4.20 mAHD
	Top of Pump Station	4.40 mAHD
	Incoming Sewer Level (based on preliminary sewer grading)	-1.81 mAHD
	Standby Pump Start (0.15m lower)	-1.96 mAHD
	Duty Pump Start (0.15m lower)	-2.11 mAHD
	Operational Volume = (0.9 x PWWF)/N (N=12 for pumps < 100 kW) = (0.9 x 35.1)/12	2.64 m^3
	Operational Depth	0.59 m
	Pump Stop (duty start – operational depth)	-2.70 mAHD
	Pump Station Base (0.5m minimum submergence)	-3.20 mAHD

Table 5.3 – Future PS ML07 Sewer System Summary

Element	Diameter (mm)	Length (m)	Flow (l/s)	Velocity (m/s)	Location
Pressure Main	200 PE (170 ID)	380	35.1 l/s @ 21m	1.54 m/s	This is the proposed pressure main from PS ML07 along internal Precinct 1 road reserves. This pressure main will initially connect to the existing DN450 PE common pressure main on North Shore Boulevard.

		65			This is the extension of the DN200 PE pressure main under North Shore Boulevard to discharge into a DN375/450 sewer in the catchment of future major PS ML02.
Trunk Gravity Sewer	DN300 DN225	25 500	35.1 l/s 17.0 l/s	N/A N/A	From PS ML07 to the south to the junction of the DN225 discharge sewer from future PS ML08 and the DN225 sewer servicing Precinct 1. Discharge gravity sewer from future PS ML08 through to near PS ML07.
Enviro Overflow	300	TBC	N/A	N/A	From the PS zero MH to the adjacent open stormwater drain.
Inter-Area Overflow	N/A	N/A	N/A	N/A	There will be an interarea overflow from future PS ML08 into the PS ML07 catchment.

The initial sizing of the submersible sewage pumps in PS ML07 will be based on it initially pumping into the existing DN450 PE common pressure main on North Shore Boulevard. PS ML07 will pump into the existing common pressure main until major PS ML02 is constructed. Major PS ML02 will service all of the Ridge Paddock development area.

The SewerGEMS modelling based on PS ML07 pumping into the existing common pressure main has shown:

- Peak wet weather flow for the 195 lots being 7.3 l/s.
- Minimum pumping rate of 17.1 l/s. This is required to achieve the 0.75 m/s minimum velocity requirement in the proposed DN200 PE rising main (internal diameter of 170mm).
- Pump duty point of 17.1 l/s @ 40 m head. This high pump head is due to the hydraulic grade line in the existing dual common pressure main on North Shore Boulevard. The preliminary pump selection is a Flygt NP3171 SH3-275 pump with a 22 kW motor. The preliminary pump selection is provided in Appendix C.
- When only PS ML07 is pumping along the common pressure main (ie during normal dry weather operation) the pump rate will be around 28 l/s (subject to actual pump selection). This gives a velocity of 1.2 m/s in the proposed DN200 PE pressure main which is within TCC design standards.
- The DN300, DN225 and DN150 gravity sewers will be adequately sized for the full development sewage flows.

The following Figure 5.4 illustrates the SewerGEMS network model for Precinct 1 of Ridge Paddock that will have PS ML07 pumping into the existing common pressure main. A larger version of the model figure and the modelling results are provided in Appendix C.

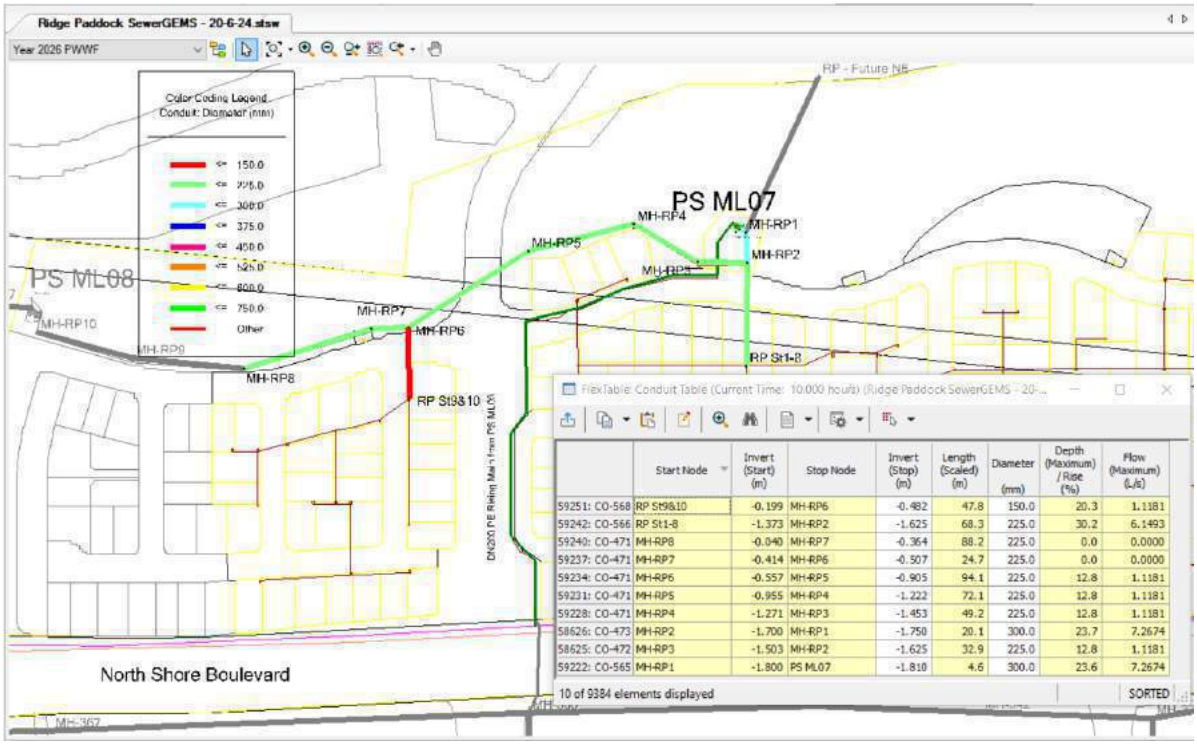


Figure 5.4 – Precinct 1 - SewerGEMS Network Model

The above preliminary design parameters for PS ML07 will be refined as part of the detailed design of Precinct 1 of the Ridge Paddock development.

The initial sizing of the sewer infrastructure to service Precinct 1 of Ridge Paddock has some spare capacity to account for future potential higher density residential development in the future Ridge Paddock precincts on the northern side of North Shore Boulevard as follows:

- The proposed DN300 gravity sewer from proposed PS ML07 to the south has a capacity of around 3,800 EP. This sewer will service the majority of the development area on the northern side of North Shore Boulevard. This sewer capacity is higher than the current full development population estimate of 2,640 EP.
- The DN225 sewer that will extend to the west and will receive pumped flows from future PS ML08 has a capacity of around 1,850 EP. This is well above the current estimated 1,190 EP to PS ML06 and associated local gravity catchment on this DN225 sewer line.
- The DN225 sewer that will extend to the north from PS ML08, under the drainage reserve to service the lots on the northern side will have a capacity of around 1,850 EP. This is well above the current estimated 910 EP from the northern side of the drainage reserve.
- The operational depth of PS ML07 in the preliminary design (refer Table 5.2) is based on the current estimated 2,640 EP. As part of the detailed design the operational depth can be increased to ensure it has spare capacity for future potential higher density development. This would be confirmed as part of the pump station detailed design.
- The DN200 PE sewer pressure main (internal diameter of 170mm) is able to have a velocity of up to around 2.0 m/s. This velocity would equate to a PWWF of 45 l/s being around 3,400 EP. This is well above the current equivalent population estimate of 2,646 EP. Larger pumps would just be required to pump the higher flows.

6 SUMMARY & CONCLUSIONS

This planning report assesses the staged water & sewage infrastructure that will be required to service Precinct 1 of the Ridge Paddock master planned residential development. Precinct 1 is located on the northern side of North Shore Boulevard and eastern side of Mt Low Parkway and will involve 194 residential lots and a sewage pump station site. This development area is currently described Lot 1001 on SP345441 and is illustrated on the proposed lot layout plan that is provided in Appendix A.

The water & sewer infrastructure assessment has illustrated the Precinct 1 of Ridge Paddock is able to be developed and serviced with a reticulated water and sewer system as following.

Water

- The proposed Precinct 1 of Ridge Paddock is able to be adequately supplied with a reticulated water supply to meet TCC standards for peak hour demands and fire flows.
- A DN375 trunk water main will need to be constructed along North Shore Boulevard from the existing DN300 PVC main on Mt Low Parkway to the new entrance road to Precinct 1. The new trunk water main will be around 840 m long. The DN375 trunk water main is included in TCC's Plans for Trunk Infrastructure.
- The Precinct 1 residential lots will be serviced with a network of DN200, DN150, DN100 and DN63 PE water mains.

Sewer

- A new standard Council submersible sewage pump station will be required to service Precinct 1 of Ridge Paddock. This pump station is included on TCC's Plans for Trunk Infrastructure and is called PS ML07.
- The pump station will be 2.4m internal diameter and will have two same sized submersible sewage pumps that operate in a duty/standby arrangement.
- Sewage will initially be pumped via a DN200 PE (internal diameter of 170 mm) along new internal development roads to connect into the existing DN450 PE parallel common pressure mains on North Shore Boulevard.
- When future major PS ML02 is constructed to service all of the Ridge Paddock development, a DN200 PE rising main will be extended under North Shore Boulevard so that the sewage from PS ML07 will then be pumped into the catchment of this major PS.
- A DN300 and DN225 trunk sewer will extend to the south and then west from PS ML07. This trunk sewer will have future pumped flows from planned PS ML08.

The detailed design of the above water and sewer infrastructure will be undertaken following approval of the Precinct 1 development works.

APPENDIX A
INITIAL DEVELOPMENT PRECINCT PLAN

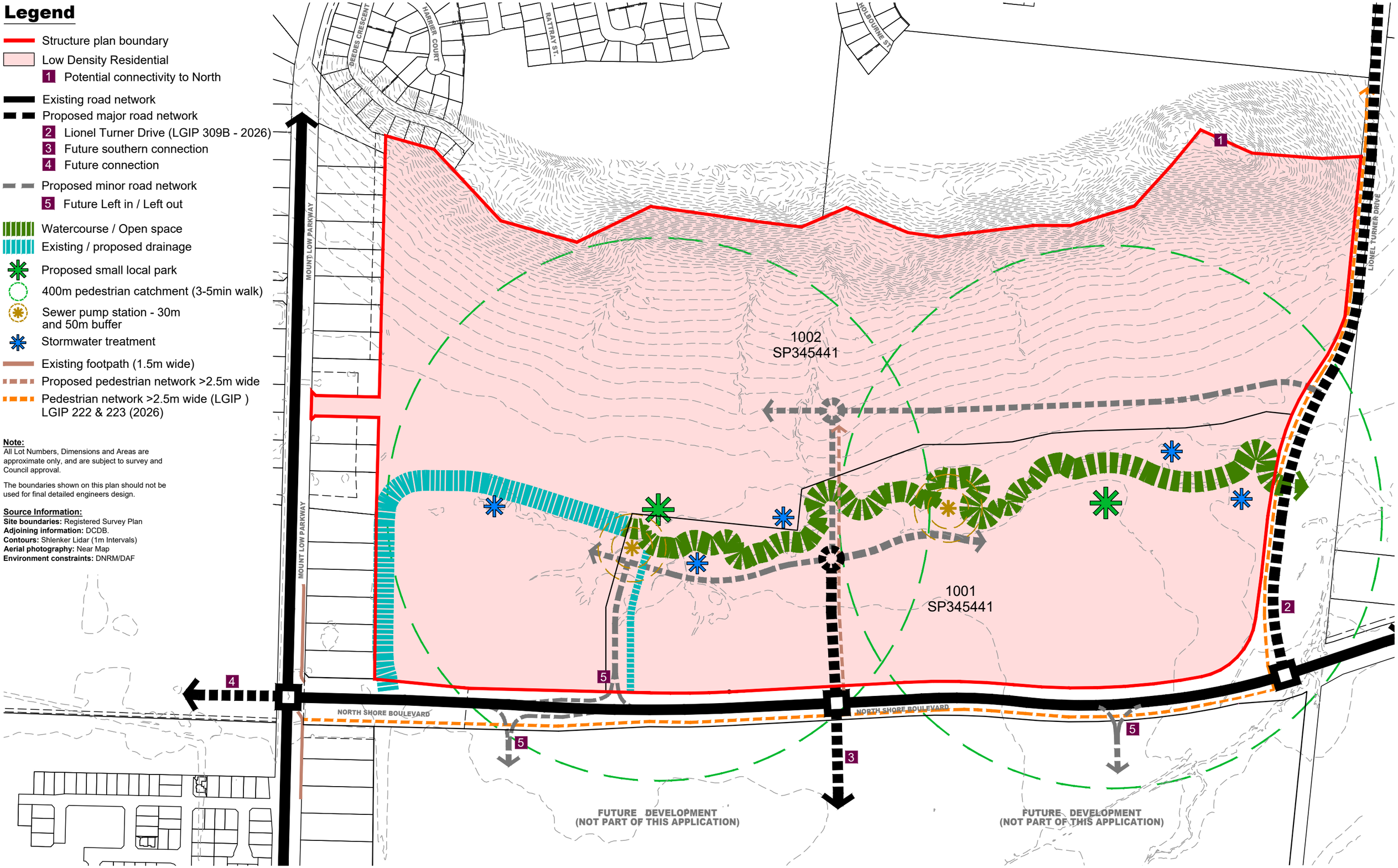
Legend

- Structure plan boundary
- Low Density Residential
  - 1 Potential connectivity to North
- Existing road network
- Proposed major road network
  - 2 Lionel Turner Drive (LGIP 309B - 2026)
  - 3 Future southern connection
  - 4 Future connection
- Proposed minor road network
  - 5 Future Left in / Left out
- Watercourse / Open space
- Existing / proposed drainage
- Proposed small local park
- 400m pedestrian catchment (3-5min walk)
- Sewer pump station - 30m and 50m buffer
- Stormwater treatment
- Existing footpath (1.5m wide)
- Proposed pedestrian network >2.5m wide
- Pedestrian network >2.5m wide (LGIP) LGIP 222 & 223 (2026)

Note:
All Lot Numbers, Dimensions and Areas are approximate only, and are subject to survey and Council approval.

The boundaries shown on this plan should not be used for final detailed engineers design.

Source Information:
Site boundaries: Registered Survey Plan
Adjoining information: DCDB.
Contours: Shlenker Lidar (1m Intervals)
Aerial photography: Near Map
Environment constraints: DNRM/DAF



PLAN REF: 152336 – 09b
DATE: 16th MAY 2024
CLIENT: Bushland Grove Pty Ltd
DRAWN BY: MJB
CHECKED BY: MJB

0 50 100 150 200 250 1 : 5,000 @ A3

MOUNT LOW
STRUCTURE PLAN
EXISTING LOT 1001 & 1002 SP345441

URBAN DESIGN
Unit 1
5-7 Barlow Street
South Townsville QLD 4810
T +61 7 4724 4244
W rpsgroup.com

Lot Type	Lot Size	No.of Lots
	28m Deep	
Premium Traditional	20.0m x 28m	1
	32m Deep	
Courtyard	15.0m x 32m	25
Traditional	18.0m x 32m	41
Premium Traditional	20.0m x 32m	33
Lifestyle	22.0m x 32m	26
	35m+ Deep	
Courtyard	15.0m x 35m	7
Traditional	18.0m x 35m	13
Premium Traditional	20.0m x 35m	13
Lifestyle	22.0m x 35m	4
Total		**163**

Legend

- Site boundary
- Stage boundary
- Watercourse
- Open space & stormwater treatment (within Balance Lot 1003)
- Small local park
- Sewer pump station lot
- Sewer pump station - 30m and 50m buffer

1. Entry statement.
2. 10-14m wide landscaped verge.
3. 2.5m shared footpath.
4. Interim intersection
   Note: The intersection design is based on the existing 2 lane North Shore Boulevard. The future intersection design will include a road connection south.
5. Future Left in / Left out intersection. Not part of this application.
6. Primary stormwater treatment area.
7. Future road connection.

Note:
All Lot Numbers, 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.

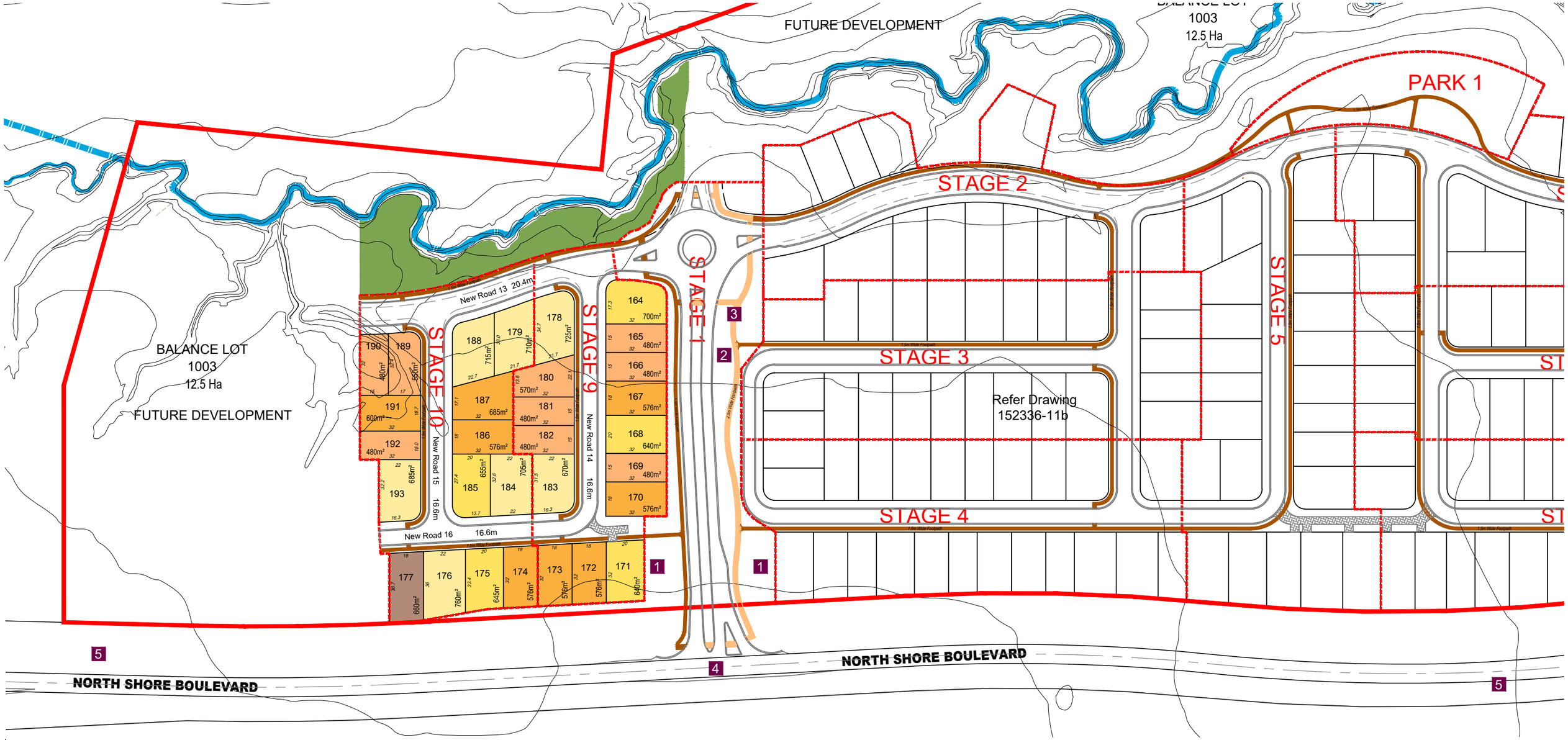
Source Information:
Site boundaries: Registered Survey Plan.
Adjoining information: DCDB.
Contours: Shlenker Lidar (0.25m Intervals)

PLAN REF: 152336 – 11b
DATE: 12th JULY 2024
CLIENT: Bushland Grove Pty Ltd
DRAWN BY: MJB
CHECKED BY: MJB

0 20 40 60 80 100 1 : 2,000 @ A3

MOUNT LOW
RAL PROPOSAL PLAN
1 INTO 195 LOTS + BALANCE - CANCELLING LOT 1001 SP345441

URBAN DESIGN
Unit 1
5-7 Barlow Street
South Townsville QLD 4810
T +61 7 4724 4244
W rpsgroup.com



Lot Type	Lot Size	No. of Lots
	28m Deep	
Lifestyle	22m x 28m	0
	32m Deep	
Courtyard	15.0m x 32m	9
Traditional	18.0m x 32m	8
Premium Traditional	20.0m x 32m	5
Lifestyle	22.0m x 32m	7
	35m+ Deep	
Courtyard	15.0m x 35m	0
Traditional	18.0m x 35m	1
Premium Traditional	20.0m x 35m	0
Lifestyle	22.0m x 35m	0
Total		**30**

Legend

- Site boundary
- Stage boundary
- Watercourse
- Open space & stormwater treatment (within Balance Lot 1003)
- Small local park
- Sewer pump station - 30m and 50m buffer

1. Entry statement.
2. 10-14m wide landscaped verge.
3. 2.5m shared footpath.
4. Interim intersection
   Note: The intersection design is based on the existing 2 lane North Shore Boulevard. The future intersection design will include a road connection south.
5. Future Left in / Left out intersection. Not part of this application.

Note:
All Lot Numbers, 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 Plan.
Adjoining information: DCDB.
Contours: Shlenker Lidar (0.25m Intervals)

PLAN REF: 152336 – 12b
DATE: 12th JULY 2024
CLIENT: Bushland Grove Pty Ltd
DRAWN BY: MJB
CHECKED BY: MJB

0 20 40 60 80 100 1 : 2,000 @ A3

MOUNT LOW
RAL PROPOSAL PLAN
1 INTO 195 LOTS + BALANCE - CANCELLING LOT 1001 SP345441

URBAN DESIGN
Unit 1
5-7 Barlow Street
South Townsville QLD 4810
T +61 7 4724 4244
W rpsgroup.com

Legend

- Site boundary
- Stage Boundary
- Balance Lot / Future Development

1. Interim intersection
   Note: The intersection design is based on the existing 2 lane North Shore Boulevard. The future intersection design will include a road connection south.
2. Future Left in /Left out intersection. Not part of this application.

Note:
All Lot Numbers, 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:
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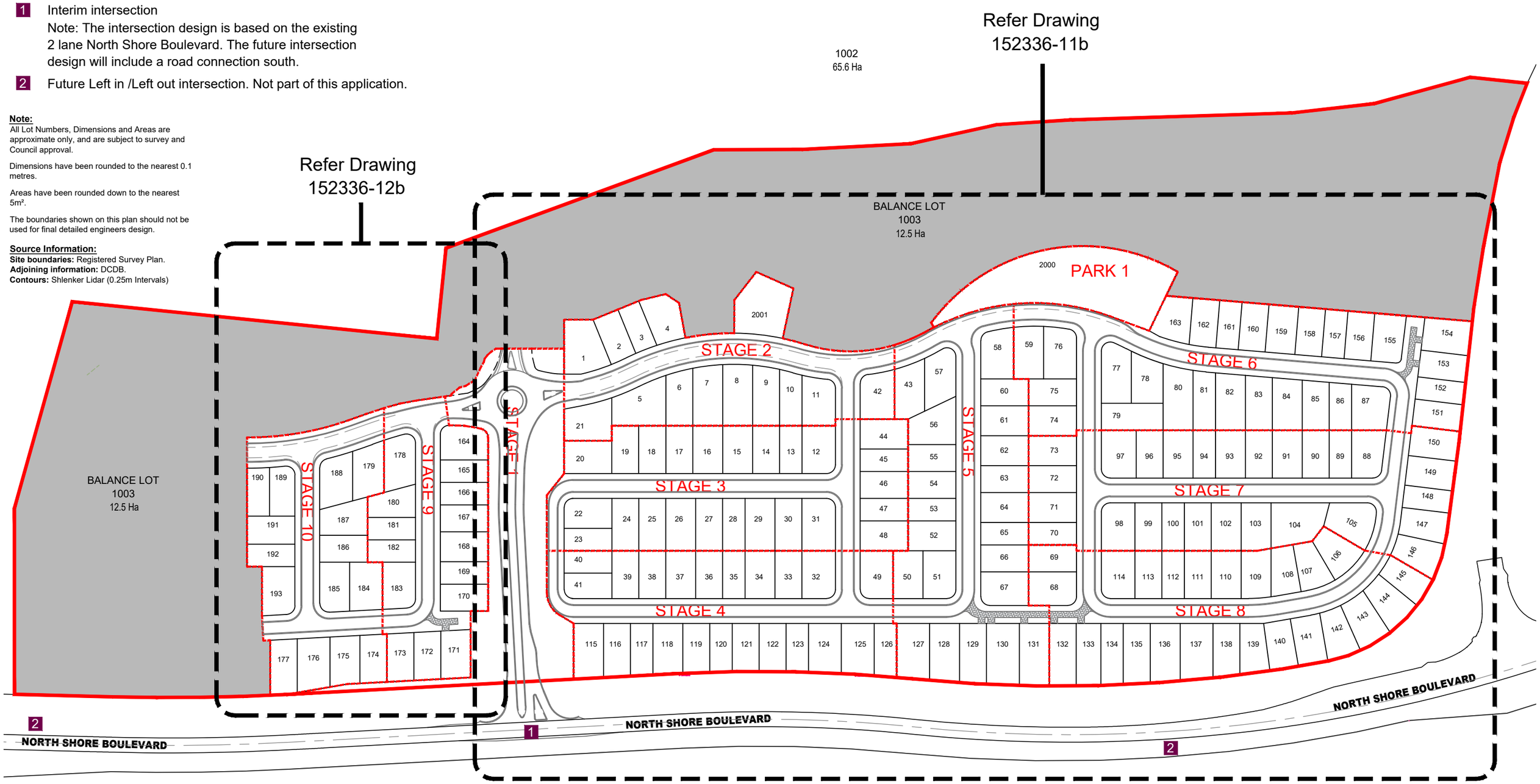
Adjoining information: DCDB.
Contours: Shlenker Lidar (0.25m Intervals)



PLAN REF: 152336 – 13b
DATE: 12th JULY 2024
CLIENT: Bushland Grove Pty Ltd
DRAWN BY: MJB
CHECKED BY: MJB

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MOUNT LOW
RAL PROPOSAL PLAN
1 INTO 195 LOTS + BALANCE - CANCELLING LOT 1001 SP345441

URBAN DESIGN
Unit 1
5-7 Barlow Street
South Townsville QLD 4810
T +61 7 4724 4244
W rpsgroup.com

APPENDIX B
WATER STRATEGY PLANS & WATERGEMS MODELLING RESULTS

LEGEND

- Existing RP boundary.
- Stormwater drain line.
- Existing stormwater drain line.
- DN50 Poly water main.
- DN100 PVC-m water main.
- DN150 PVC-m water main.
- DN200 PVC-m water main.
- DN375 PVC-m trunk water main.
- Possible DN100 PVC-m temporary water main.

N

LEVEL DATUM A.H.D.
Horizontal Datum GDA' 94 Zone 55
Refer PM 131730 RL. 74.407
Star Picket

LAYOUT PLAN

PRELIMINARY
NOT FOR CONSTRUCTION

All work is to be carried out in accordance with LOCAL AUTHORITY'S standard details.

Issue	Description	Date
P4	PRELIMINARY - NOT FOR CONSTRUCTION - ISSUED FOR INFORMATION ONLY.	30/07/2024
P3	PRELIMINARY - NOT FOR CONSTRUCTION - ISSUED FOR INFORMATION ONLY.	03/07/2024
P2	PRELIMINARY - NOT FOR CONSTRUCTION - ISSUED FOR INFORMATION ONLY.	21/06/2024
P1	PRELIMINARY - NOT FOR CONSTRUCTION - ISSUED FOR INFORMATION ONLY.	13/06/2024

ENGINEERING CERTIFICATION

Signed:

ANDREW IAN WALLACE - RPEQ No. 6743

THE ORIGINAL OF THIS DOCUMENT IS COMPLETED TO THE SCALE NOTED. AS REPRODUCTION CAN DISTORT SIZE & SHAPE USE ONLY THE DIMENSIONS PROVIDED ON ARCHITECTURAL &/OR ENGINEERING DRAWINGS. VERIFY DIMENSIONS ON SITE BEFORE CONSTRUCTION.

NORTHERN CONSULTING engineers

Civil | Structural | Forensic
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T: +617 4725 5550 E: mail@nceng.com.au
W: www.nceng.com.au

Drawn	DC
Date	13/06/2024
Checked	AW
Approved	AW

In Association With
MOUNT LOW DEVELOPMENTS

RIDGE PADDOCK RESIDENTIAL DEVELOPMENT - PRECINCT ONE
NORTH SHORE BOULEVARD
MOUNT LOW (1001 on SP345441)

CONCEPT LAYOUT PLAN
WATER RETICULATION

Drawing Number: TUR1301/W01

Issue: P4

TOWNSVILLE CITY COUNCIL

Local Government Infrastructure Plan

WATER

BLACK RIVER

Black River

BEACH HOLM

MOUNT LOW

JENSEN

DEERAGUN

BRUCE HIGHWAY

SVENSSON ROAD

SANCTUM BOULEVARD

EPPING WAY

CONWAY STREET

FREMONT STREET

GUNDABLUEY CRESCENT

SUMMERGOLD STREET

SHOALMARRA DRIVE

BEACH OAK DRIVE

BONNETT ROAD

MOUNT LOW PARKWAY

HAVENWOOD DRIVE

EDEN PARK DRIVE

POWER COURT

VEALES ROAD

DARLING ROAD

371

363 (2019)

284

743

450

306

307

415

414 (2028)

501

372

561

502

417 (2028)

416

421

143

450

406 (2028)

671

LEGEND

Future Water Infrastructure

- C — Chlorinator
- V — Control Valve
- P — Pump Station
- R — Reservoir
- T — Treatment Plant

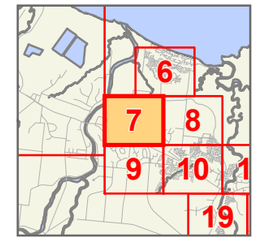
Existing Water Infrastructure

- B — Balance Tank
- C — Chlorinator
- C — Control Building
- V — Control Valve
- D — Dam
- I — Intake
- M — Meter
- P — Pump Station
- R — Reservoir
- S — Stablisation Facility
- S — Standpipe
- T — Treatment Plant
- W — Weir

- Future Water Main
- Existing Water Main
- Service Catchment
- Priority Infrastructure Area

N

City of Townsville



SCALE: 1:10,000 @ A3

Planning Section
Planning & Community Engagement
Date: 12/11/2019
Drawn By: AUD
Digital File: LGIP_Water

Map 7

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TOWNSVILLE CITY COUNCIL

Local Government Infrastructure Plan

WATER

BUSHLAND BEACH

NORTH SHORE BOULEVARD

363 (2019)

239 (2024)

362 (2030)

293 (2026)

MOUNT LOW

407 (2030)

414 (2028)

410 (2030)

409 (2030)

BURDELL

GARLAND ROAD

Stony Creek

NORTH SHORE BOULEVARD

303 (2023)

257 (2027)

255 (2030)

256 (2030)

ROAD

402 (2027)

SYNNOVE DRIVE

401

400

397

404 (2025)

LEGEND

Future Water Infrastructure

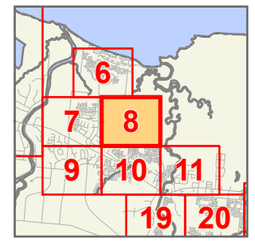
- C — Chlorinator
- V — Control Valve
- P — Pump Station
- R — Reservoir
- T — Treatment Plant

Existing Water Infrastructure

- B — Balance Tank
- C — Chlorinator
- C — Control Building
- V — Control Valve
- D — Dam
- I — Intake
- M — Meter
- P — Pump Station
- R — Reservoir
- S — Stablisation Facility
- S — Standpipe
- T — Treatment Plant
- W — Weir

- Future Water Main
- Existing Water Main
- Service Catchment
- Priority Infrastructure Area

N



SCALE: 1:10,000 @ A3

Planning Section
Planning & Community Engagement

Date: 12/11/2019
Drawn By: AUD
Digital File: LGIP_Water

Map 8

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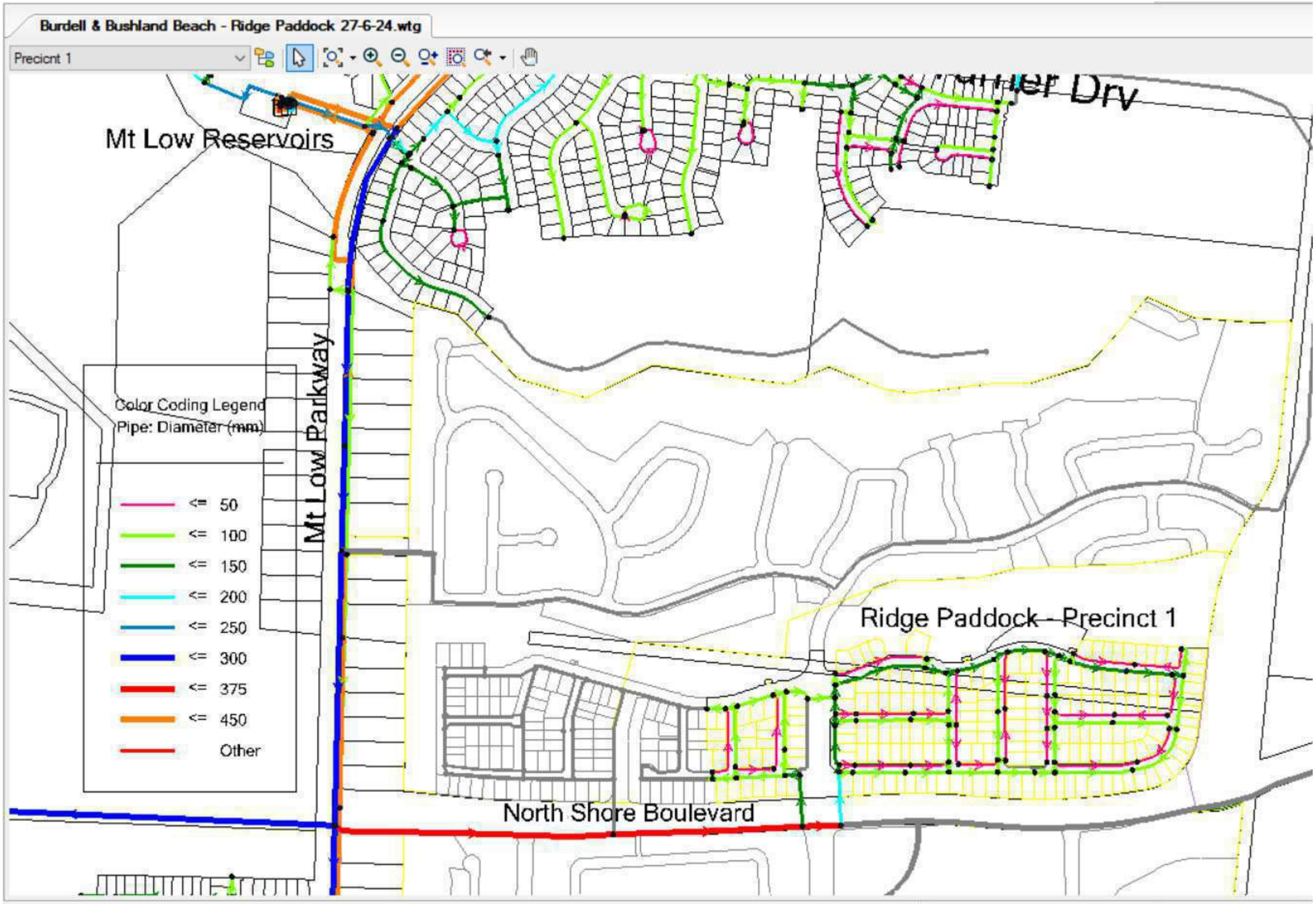
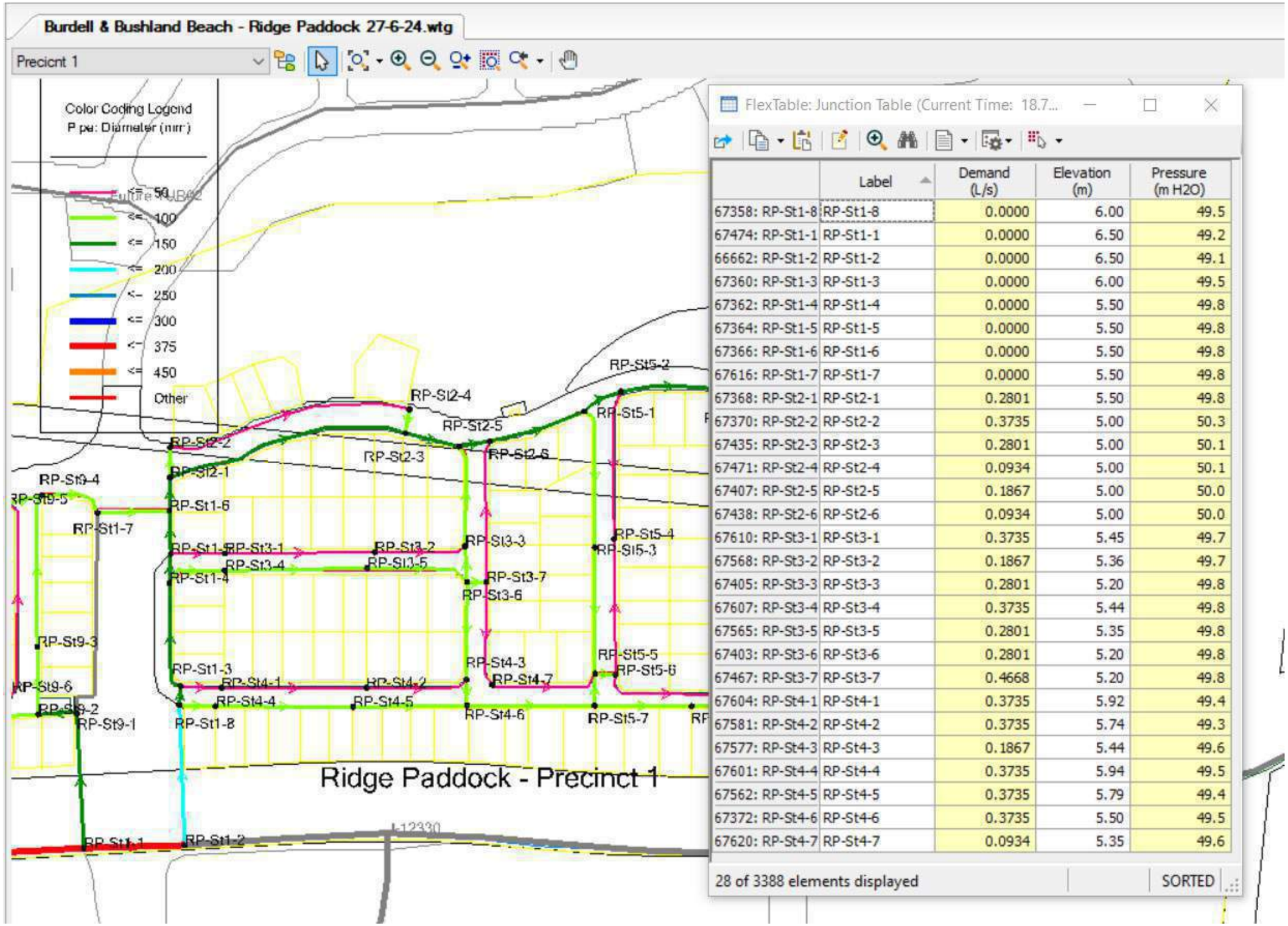
Document Set ID: 25406890
Version: 1, Version Date: 13/08/2024



Ridge Paddock – Precinct 1 WaterGEMS Model

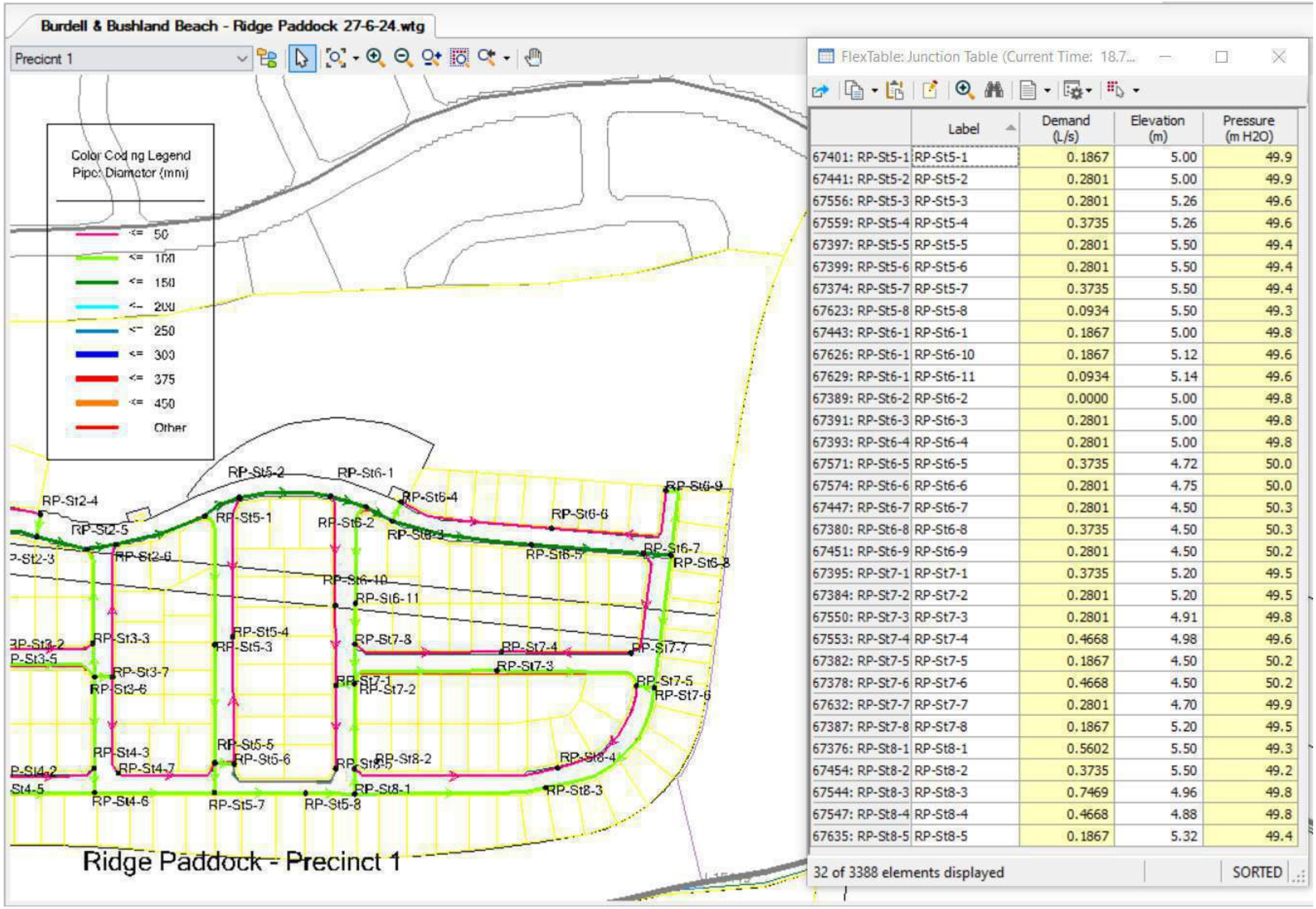


FlexTable: Junction Table (Current Time: 18.7...

	Label	Demand (L/s)	Elevation (m)	Pressure (m H2O)
67358: RP-St1-8	RP-St1-8	0.0000	6.00	49.5
67474: RP-St1-1	RP-St1-1	0.0000	6.50	49.2
66662: RP-St1-2	RP-St1-2	0.0000	6.50	49.1
67360: RP-St1-3	RP-St1-3	0.0000	6.00	49.5
67362: RP-St1-4	RP-St1-4	0.0000	5.50	49.8
67364: RP-St1-5	RP-St1-5	0.0000	5.50	49.8
67366: RP-St1-6	RP-St1-6	0.0000	5.50	49.8
67616: RP-St1-7	RP-St1-7	0.0000	5.50	49.8
67368: RP-St2-1	RP-St2-1	0.2801	5.50	49.8
67370: RP-St2-2	RP-St2-2	0.3735	5.00	50.3
67435: RP-St2-3	RP-St2-3	0.2801	5.00	50.1
67471: RP-St2-4	RP-St2-4	0.0934	5.00	50.1
67407: RP-St2-5	RP-St2-5	0.1867	5.00	50.0
67438: RP-St2-6	RP-St2-6	0.0934	5.00	50.0
67610: RP-St3-1	RP-St3-1	0.3735	5.45	49.7
67568: RP-St3-2	RP-St3-2	0.1867	5.36	49.7
67405: RP-St3-3	RP-St3-3	0.2801	5.20	49.8
67607: RP-St3-4	RP-St3-4	0.3735	5.44	49.8
67565: RP-St3-5	RP-St3-5	0.2801	5.35	49.8
67403: RP-St3-6	RP-St3-6	0.2801	5.20	49.8
67467: RP-St3-7	RP-St3-7	0.4668	5.20	49.8
67604: RP-St4-1	RP-St4-1	0.3735	5.92	49.4
67581: RP-St4-2	RP-St4-2	0.3735	5.74	49.3
67577: RP-St4-3	RP-St4-3	0.1867	5.44	49.6
67601: RP-St4-4	RP-St4-4	0.3735	5.94	49.5
67562: RP-St4-5	RP-St4-5	0.3735	5.79	49.4
67372: RP-St4-6	RP-St4-6	0.3735	5.50	49.5
67620: RP-St4-7	RP-St4-7	0.0934	5.35	49.6

28 of 3388 elements displayed | SORTED

Ridge Paddock Stages 1 to 4 – Peak Hour Node Results



	Label	Demand (L/s)	Elevation (m)	Pressure (m H2O)
67401: RP-St5-1	RP-St5-1	0.1867	5.00	49.9
67441: RP-St5-2	RP-St5-2	0.2801	5.00	49.9
67556: RP-St5-3	RP-St5-3	0.2801	5.26	49.6
67559: RP-St5-4	RP-St5-4	0.3735	5.26	49.6
67397: RP-St5-5	RP-St5-5	0.2801	5.50	49.4
67399: RP-St5-6	RP-St5-6	0.2801	5.50	49.4
67374: RP-St5-7	RP-St5-7	0.3735	5.50	49.4
67623: RP-St5-8	RP-St5-8	0.0934	5.50	49.3
67443: RP-St6-1	RP-St6-1	0.1867	5.00	49.8
67626: RP-St6-1	RP-St6-10	0.1867	5.12	49.6
67629: RP-St6-1	RP-St6-11	0.0934	5.14	49.6
67389: RP-St6-2	RP-St6-2	0.0000	5.00	49.8
67391: RP-St6-3	RP-St6-3	0.2801	5.00	49.8
67393: RP-St6-4	RP-St6-4	0.2801	5.00	49.8
67571: RP-St6-5	RP-St6-5	0.3735	4.72	50.0
67574: RP-St6-6	RP-St6-6	0.2801	4.75	50.0
67447: RP-St6-7	RP-St6-7	0.2801	4.50	50.3
67380: RP-St6-8	RP-St6-8	0.3735	4.50	50.3
67451: RP-St6-9	RP-St6-9	0.2801	4.50	50.2
67395: RP-St7-1	RP-St7-1	0.3735	5.20	49.5
67384: RP-St7-2	RP-St7-2	0.2801	5.20	49.5
67550: RP-St7-3	RP-St7-3	0.2801	4.91	49.8
67553: RP-St7-4	RP-St7-4	0.4668	4.98	49.6
67382: RP-St7-5	RP-St7-5	0.1867	4.50	50.2
67378: RP-St7-6	RP-St7-6	0.4668	4.50	50.2
67632: RP-St7-7	RP-St7-7	0.2801	4.70	49.9
67387: RP-St7-8	RP-St7-8	0.1867	5.20	49.5
67376: RP-St8-1	RP-St8-1	0.5602	5.50	49.3
67454: RP-St8-2	RP-St8-2	0.3735	5.50	49.2
67544: RP-St8-3	RP-St8-3	0.7469	4.96	49.8
67547: RP-St8-4	RP-St8-4	0.4668	4.88	49.8
67635: RP-St8-5	RP-St8-5	0.1867	5.32	49.4

Ridge Paddock Stages 5 to 8 – Peak Hour Node Results

Burdell & Bushland Beach - Ridge Paddock 27-6-24.wtg

Precicnt 1

Color Coding Legend
Pipe: Diameter (mm)

<= 50
<= 100
<= 150
<= 200
<= 250
<= 300
<= 375
<= 450
Other

Future TOR02

RP-St2-2
RP-St2-1
RP-St9-4
RP-St9-5
RP-St1-6
RP-St1-7
RP-St10-7
RP-St10-6
RP-St10-5
RP-St1-5
RP-St1-4
RP-St9-3
RP-St1-3
RP-St10-4
RP-St10-3
RP-St9-6
RP-St10-2
RP-St9-1
RP-St10-1
RP-St10-2
RP-St1-1
RP-St1-2
RP-St5-8

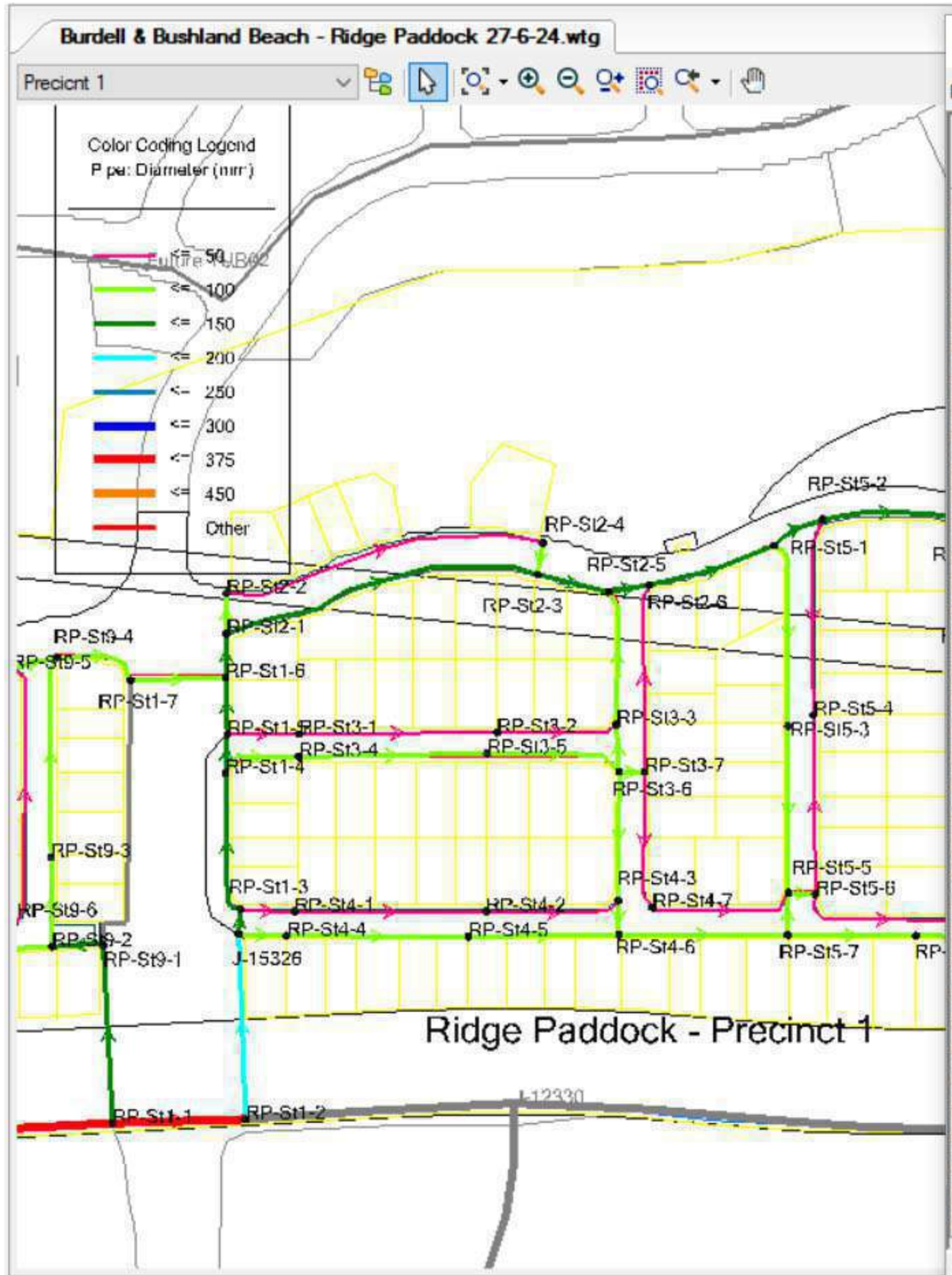
FlexTable: Junction Table (Current Time: 18.7...

	Label	Demand (L/s)	Elevation (m)	Pressure (m H2O)
67474: RP-St1-1	RP-St1-1	0.0000	6.50	49.2
67616: RP-St1-7	RP-St1-7	0.0000	5.50	49.8
67613: RP-St9-1	RP-St9-1	0.0000	6.12	49.5
67428: RP-St9-2	RP-St9-2	0.2801	6.00	49.6
67426: RP-St9-3	RP-St9-3	0.3735	6.00	49.5
67412: RP-St9-4	RP-St9-4	0.2801	5.50	49.9
67414: RP-St9-5	RP-St9-5	0.2801	5.50	49.9
67638: RP-St9-6	RP-St9-6	0.1867	5.83	49.6
67424: RP-St10-	RP-St10-1	0.2801	6.00	49.5
67431: RP-St10-	RP-St10-2	0.0934	6.00	49.4
67422: RP-St10-	RP-St10-3	0.2801	6.00	49.4
67433: RP-St10-	RP-St10-4	0.1867	6.00	49.4
67416: RP-St10-	RP-St10-5	0.2801	5.50	49.9
67418: RP-St10-	RP-St10-6	0.1867	5.50	49.9
67420: RP-St10-	RP-St10-7	0.0934	5.50	49.9

15 of 3388 elements displayed | SORTED

Ridge Paddock - Precinct 1

Ridge Paddock Stages 9 & 10 – Peak Hour Node Results

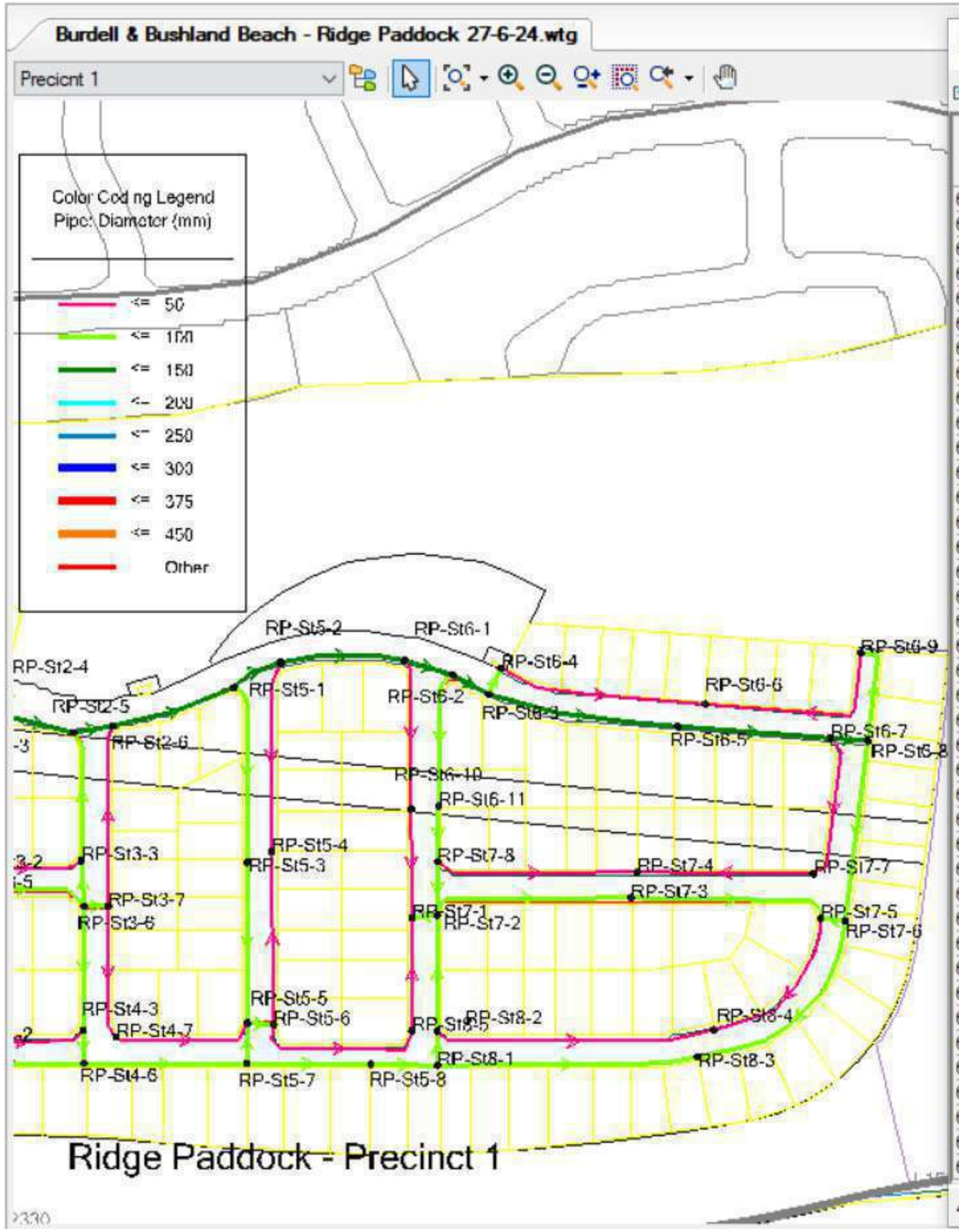


FlexTable: Pipe Table (Current Time: 18.750 hours) (Burdell & Bushland Beach - Ridge Pad...

	Start Node	Stop Node	Length (Scaled) (m)	Diameter (mm)	Material	Flow (Absolute) (L/s)	Velocity (m/s)	Headloss Gradient (m/m)	Hazen-Williams C
67359: P-1922	RP-St1-2	J-15326	87.47	200	PVC	13.2646	0.42	0.001	120.0
67475: TCC-P19	RP-St1-2	RP-St1-1	63.09	375	DICL	13.2646	0.12	0.000	120.0
67361: P-1923	J-15326	RP-St1-3	12.06	150	PVC	9.5333	0.54	0.003	120.0
67602: P-1929(	J-15326	RP-St4-4	22.67	100	PVC	3.7314	0.48	0.004	120.0
67363: P-1924	RP-St1-3	RP-St1-4	68.71	150	PVC	8.6298	0.49	0.002	120.0
67365: P-1925	RP-St1-4	RP-St1-5	18.28	150	PVC	5.8440	0.33	0.001	120.0
67608: P-1949(	RP-St1-4	RP-St3-4	38.85	100	PVC	2.7858	0.35	0.002	120.0
67367: P-1926	RP-St1-5	RP-St1-6	26.99	150	PVC	5.1376	0.29	0.001	120.0
67369: P-1927	RP-St1-6	RP-St2-1	20.75	150	PVC	7.1850	0.41	0.002	120.0
67617: P-1950(	RP-St1-6	RP-St1-7	45.03	100	PVC	2.0474	0.26	0.001	120.0
67371: P-1928	RP-St2-1	RP-St2-2	19.09	100	PVC	0.7126	0.09	0.000	120.0
67436: P-1962	RP-St2-1	RP-St2-3	153.61	150	PVC	6.1923	0.35	0.001	120.0
67472: P-1983	RP-St2-2	RP-St2-4	155.19	50	PE	0.3392	0.17	0.001	120.0
67375: P-1930	RP-St4-6	RP-St5-7	79.86	100	PVC	2.7105	0.35	0.002	120.0
67578: P-1945(	RP-St4-6	RP-St4-3	16.29	100	PVC	0.0995	0.01	0.000	120.0
67406: P-1946	RP-St3-6	RP-St3-3	22.44	100	PVC	0.7031	0.09	0.000	120.0
67470: P-1982	RP-St3-6	RP-St3-7	11.98	100	PVC	1.0193	0.13	0.000	120.0
67408: P-1947	RP-St3-3	RP-St2-5	63.95	100	PVC	0.5692	0.07	0.000	120.0
67569: P-1979(	RP-St3-3	RP-St3-2	57.91	50	PE	0.1462	0.07	0.000	120.0
67439: P-1964	RP-St2-5	RP-St2-6	19.36	150	PVC	6.5405	0.37	0.001	120.0
67437: P-1963	RP-St2-3	RP-St2-5	34.70	150	PVC	6.1580	0.35	0.001	120.0
67440: P-1965	RP-St2-6	RP-St5-1	62.40	150	PVC	6.6277	0.38	0.001	120.0
67468: P-1978(	RP-St2-6	RP-St3-7	88.89	50	PE	0.1806	0.09	0.000	120.0
67621: P-1978(	RP-St3-7	RP-St4-7	65.59	50	PE	0.3718	0.19	0.001	120.0
67473: P-1984	RP-St2-4	RP-St2-3	15.15	100	PVC	0.2458	0.03	0.000	120.0
67476: TCC-P19	RP-St1-1	J-15150	309.98	375	DICL	18.1130	0.16	0.000	120.0
67564: P-1929(	RP-St4-5	RP-St4-6	71.41	100	PVC	2.9845	0.38	0.002	120.0
67567: P-1949(	RP-St3-5	RP-St3-6	66.12	100	PVC	2.1322	0.27	0.001	120.0
67611: P-1979(	RP-St3-2	RP-St3-1	93.80	50	PE	0.3329	0.17	0.001	120.0
67579: P-1945(	RP-St4-3	RP-St3-6	60.85	100	PVC	0.1297	0.02	0.000	120.0
67583: P-2009(	RP-St4-2	RP-St4-3	65.01	50	PE	0.1566	0.08	0.000	120.0
67603: P-1929(	RP-St4-4	RP-St4-5	86.09	100	PVC	3.3579	0.43	0.003	120.0
67606: P-2009(	RP-St4-1	RP-St4-2	90.77	50	PE	0.5300	0.27	0.003	120.0
67609: P-1949(	RP-St3-4	RP-St3-5	89.34	100	PVC	2.4123	0.31	0.002	120.0
67612: P-1979(	RP-St3-1	RP-St1-5	33.84	50	PE	0.7064	0.36	0.005	120.0
67622: P-1978(	RP-St4-7	RP-St5-5	69.70	50	PE	0.2785	0.14	0.001	120.0

36 of 4275 elements displayed | SORTED

Ridge Paddock Stages 1 to 4 – Peak Hour Pipe Results

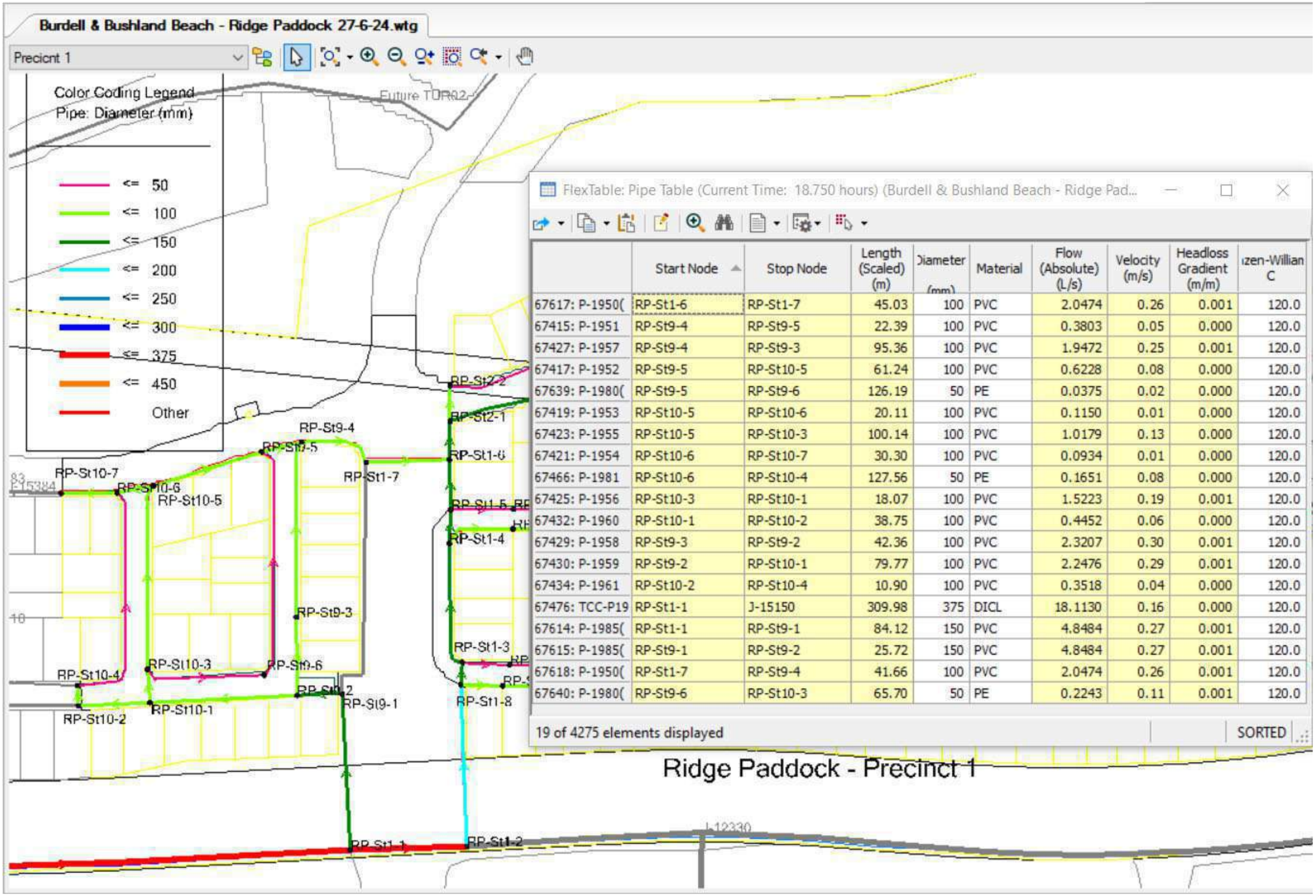


FlexTable: Pipe Table (Current Time: 18.750 hours) (Burdell & Bushland Beach - Ridge Pad...

	Start Node	Stop Node	Length (Scaled) (m)	Diameter (mm)	Material	Flow (Absolute) (L/s)	Velocity (m/s)	Headloss Gradient (m/m)	Hazen-Williams C
67442: P-1966	RP-St5-1	RP-St5-2	26.46	150	PVC	5.5635	0.31	0.001	120.0
67444: P-1967	RP-St5-2	RP-St6-1	61.21	150	PVC	5.0927	0.29	0.001	120.0
67624: P-1931(	RP-St5-7	RP-St5-8	60.87	100	PVC	2.1327	0.27	0.001	120.0
67625: P-1931(	RP-St5-8	RP-St8-1	32.69	100	PVC	2.0393	0.26	0.001	120.0
67445: P-1968	RP-St6-1	RP-St6-2	24.78	150	PVC	4.6256	0.26	0.001	120.0
67634: P-1970(	RP-St7-7	RP-St6-7	73.36	50	PE	0.3953	0.20	0.002	120.0
67392: P-1939	RP-St6-2	RP-St6-3	20.06	150	PVC	3.3086	0.19	0.000	120.0
67631: P-1938(	RP-St6-11	RP-St6-2	67.26	100	PVC	1.3170	0.17	0.001	120.0
67554: P-1970(	RP-St7-8	RP-St7-4	99.78	50	PE	0.3517	0.18	0.001	120.0
67630: P-1938(	RP-St7-8	RP-St6-11	27.25	100	PVC	1.2236	0.16	0.000	120.0
67627: P-1975(	RP-St6-1	RP-St6-10	74.02	50	PE	0.2803	0.14	0.001	120.0
67572: P-1969(	RP-St6-3	RP-St6-5	94.25	150	PVC	2.5475	0.14	0.000	120.0
67549: P-1974(	RP-St8-4	RP-St7-5	83.32	50	PE	0.2524	0.13	0.001	120.0
67456: P-1936(	RP-St8-2	RP-St8-1	16.88	100	PVC	0.8396	0.11	0.000	120.0
67573: P-1969(	RP-St6-5	RP-St6-7	75.05	150	PVC	2.1740	0.12	0.000	120.0
67548: P-1974(	RP-St8-2	RP-St8-4	138.11	50	PE	0.2145	0.11	0.001	120.0
67381: P-1933	RP-St7-6	RP-St6-8	88.77	100	PVC	0.7659	0.10	0.000	120.0
67575: P-1971(	RP-St6-4	RP-St6-6	103.08	50	PE	0.2010	0.10	0.000	120.0
67560: P-1977(	RP-St5-6	RP-St5-4	84.92	50	PE	0.1828	0.09	0.000	120.0
67388: P-1937	RP-St7-2	RP-St7-8	26.14	100	PVC	0.6852	0.09	0.000	120.0
67558: P-1944(	RP-St5-3	RP-St5-1	88.56	100	PVC	0.8775	0.11	0.000	120.0
67636: P-1976(	RP-St7-1	RP-St8-5	55.52	50	PE	0.1505	0.08	0.000	120.0
67561: P-1977(	RP-St5-4	RP-St5-2	93.46	50	PE	0.1907	0.10	0.000	120.0
67449: P-1969(	RP-St6-7	RP-St6-8	18.32	150	PVC	1.4986	0.08	0.000	120.0
67545: P-1932(	RP-St8-1	RP-St8-3	127.86	100	PVC	0.6395	0.08	0.000	120.0
67557: P-1944(	RP-St5-5	RP-St5-3	78.90	100	PVC	0.5974	0.08	0.000	120.0
67394: P-1940	RP-St6-3	RP-St6-4	14.26	100	PVC	0.4811	0.06	0.000	120.0
67400: P-1943	RP-St5-5	RP-St5-6	12.89	100	PVC	0.8001	0.10	0.000	120.0
67633: P-1970(	RP-St7-4	RP-St7-7	86.34	50	PE	0.1152	0.06	0.000	120.0
67552: P-1935(	RP-St7-3	RP-St7-2	99.89	100	PVC	0.5275	0.07	0.000	120.0
67396: P-1941	RP-St7-2	RP-St7-1	12.47	100	PVC	0.1294	0.02	0.000	120.0
67628: P-1975(	RP-St6-10	RP-St7-1	53.11	50	PE	0.0936	0.05	0.000	120.0
67455: P-1936(	RP-St7-2	RP-St8-2	56.76	100	PVC	0.2517	0.03	0.000	120.0
67453: P-1972	RP-St6-9	RP-St6-8	51.07	100	PVC	0.3592	0.05	0.000	120.0
67576: P-1971(	RP-St6-6	RP-St6-9	103.04	50	PE	0.0791	0.04	0.000	120.0
67383: P-1934	RP-St7-6	RP-St7-5	12.10	100	PVC	0.1917	0.02	0.000	120.0
67551: P-1935(	RP-St7-5	RP-St7-3	99.02	100	PVC	0.2474	0.03	0.000	120.0
67546: P-1932(	RP-St8-3	RP-St7-6	107.97	100	PVC	0.1074	0.01	0.000	120.0
67398: P-1942	RP-St5-7	RP-St5-5	19.92	100	PVC	0.2043	0.03	0.000	120.0
67637: P-1976(	RP-St8-5	RP-St5-6	84.00	50	PE	0.3372	0.17	0.001	120.0

40 of 4275 elements displayed | SORTED

Ridge Paddock Stages 5 to 8 – Peak Hour Pipe Results

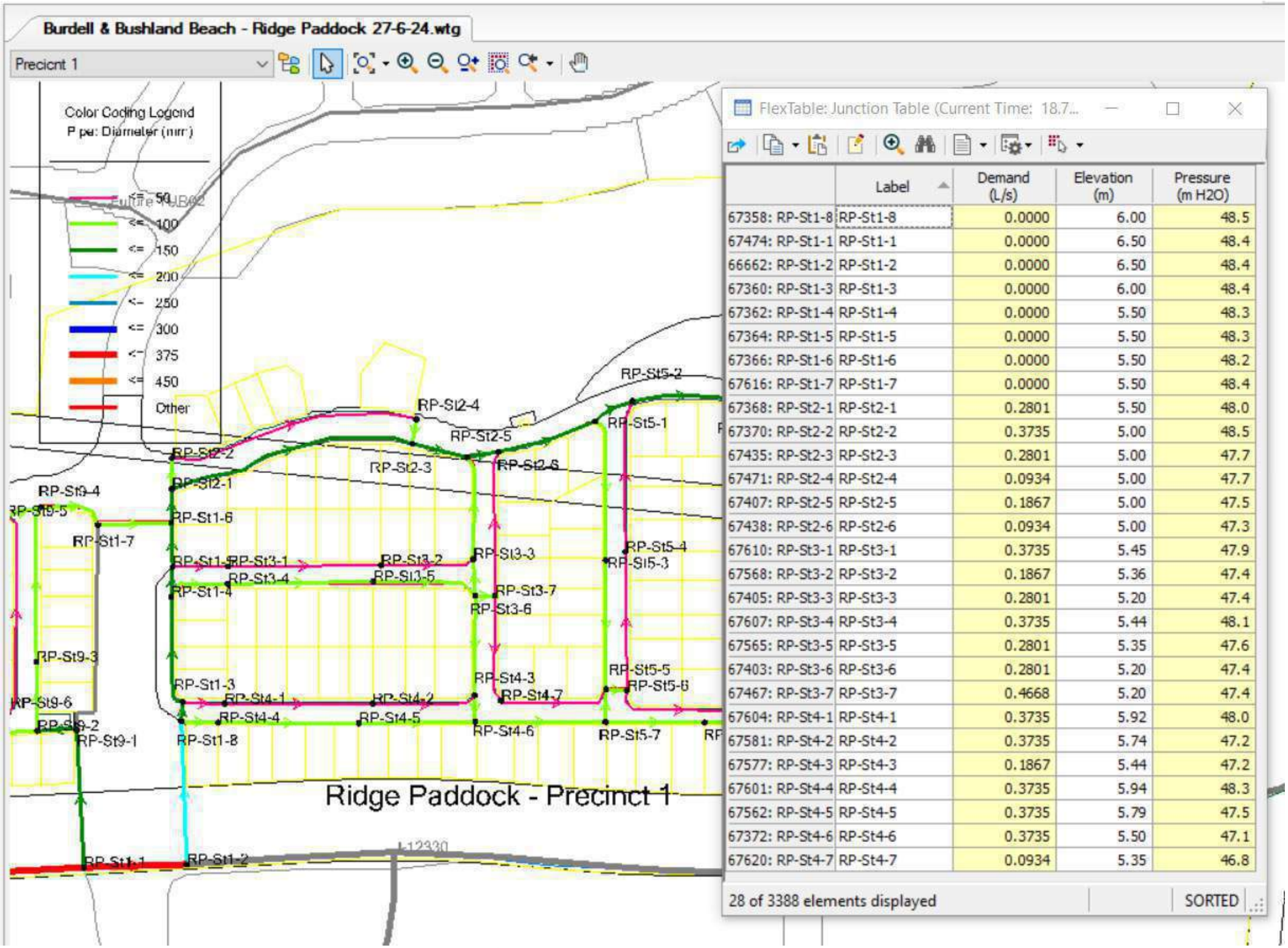


FlexTable: Pipe Table (Current Time: 18.750 hours) (Burdell & Bushland Beach - Ridge Pad...

	Start Node	Stop Node	Length (Scaled) (m)	Diameter (mm)	Material	Flow (Absolute) (L/s)	Velocity (m/s)	Headloss Gradient (m/m)	izen-Willian C
67617: P-1950(	RP-St1-6	RP-St1-7	45.03	100	PVC	2.0474	0.26	0.001	120.0
67415: P-1951	RP-St9-4	RP-St9-5	22.39	100	PVC	0.3803	0.05	0.000	120.0
67427: P-1957	RP-St9-4	RP-St9-3	95.36	100	PVC	1.9472	0.25	0.001	120.0
67417: P-1952	RP-St9-5	RP-St10-5	61.24	100	PVC	0.6228	0.08	0.000	120.0
67639: P-1980(	RP-St9-5	RP-St9-6	126.19	50	PE	0.0375	0.02	0.000	120.0
67419: P-1953	RP-St10-5	RP-St10-6	20.11	100	PVC	0.1150	0.01	0.000	120.0
67423: P-1955	RP-St10-5	RP-St10-3	100.14	100	PVC	1.0179	0.13	0.000	120.0
67421: P-1954	RP-St10-6	RP-St10-7	30.30	100	PVC	0.0934	0.01	0.000	120.0
67466: P-1981	RP-St10-6	RP-St10-4	127.56	50	PE	0.1651	0.08	0.000	120.0
67425: P-1956	RP-St10-3	RP-St10-1	18.07	100	PVC	1.5223	0.19	0.001	120.0
67432: P-1960	RP-St10-1	RP-St10-2	38.75	100	PVC	0.4452	0.06	0.000	120.0
67429: P-1958	RP-St9-3	RP-St9-2	42.36	100	PVC	2.3207	0.30	0.001	120.0
67430: P-1959	RP-St9-2	RP-St10-1	79.77	100	PVC	2.2476	0.29	0.001	120.0
67434: P-1961	RP-St10-2	RP-St10-4	10.90	100	PVC	0.3518	0.04	0.000	120.0
67476: TCC-P19	RP-St1-1	J-15150	309.98	375	DICL	18.1130	0.16	0.000	120.0
67614: P-1985(	RP-St1-1	RP-St9-1	84.12	150	PVC	4.8484	0.27	0.001	120.0
67615: P-1985(	RP-St9-1	RP-St9-2	25.72	150	PVC	4.8484	0.27	0.001	120.0
67618: P-1950(	RP-St1-7	RP-St9-4	41.66	100	PVC	2.0474	0.26	0.001	120.0
67640: P-1980(	RP-St9-6	RP-St10-3	65.70	50	PE	0.2243	0.11	0.001	120.0

19 of 4275 elements displayed | SORTED

Ridge Paddock Stages 9 & 10 – Peak Hour Pipe Results

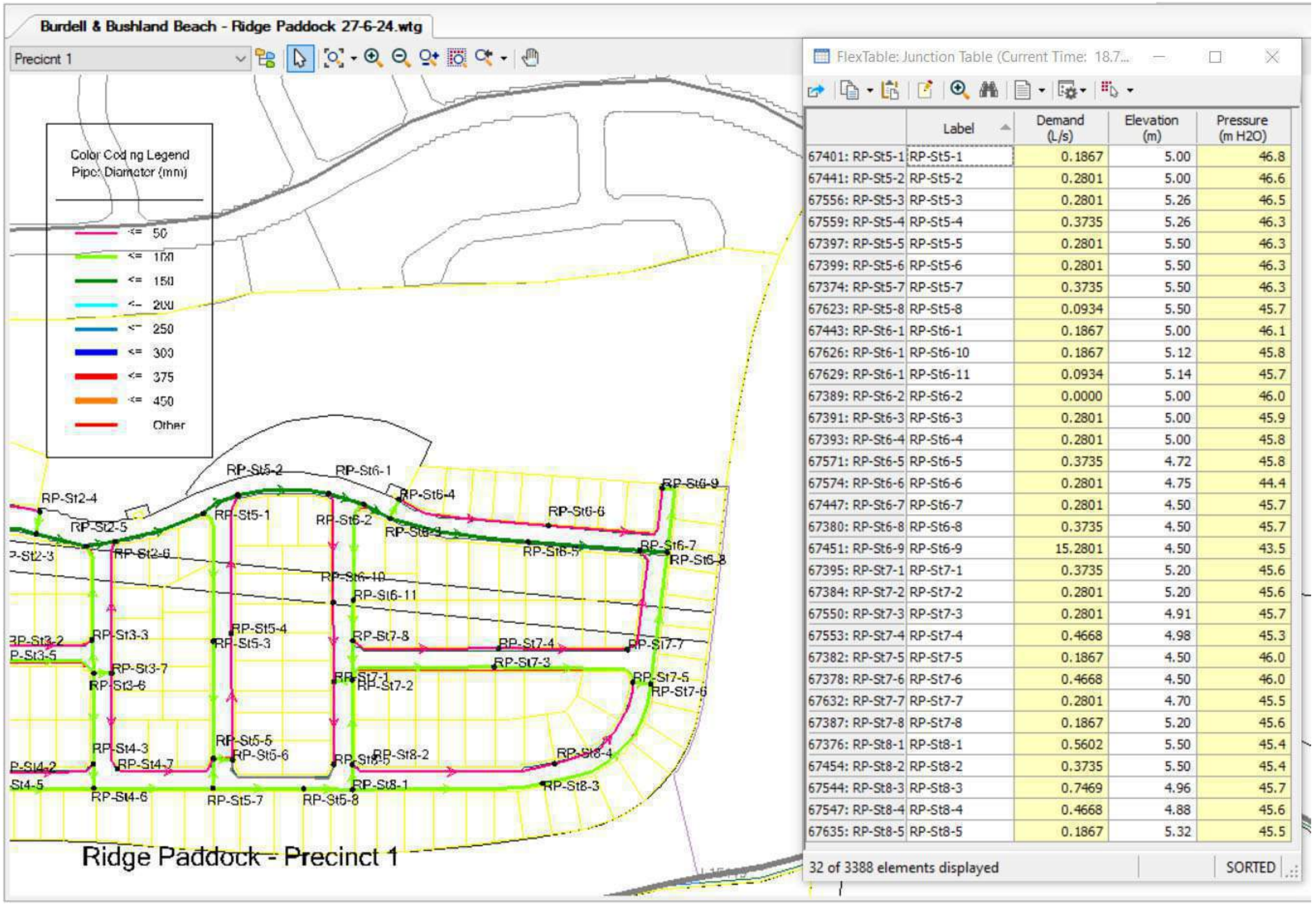


FlexTable: Junction Table (Current Time: 18.7...

	Label	Demand (L/s)	Elevation (m)	Pressure (m H2O)
67358: RP-St1-8	RP-St1-8	0.0000	6.00	48.5
67474: RP-St1-1	RP-St1-1	0.0000	6.50	48.4
66662: RP-St1-2	RP-St1-2	0.0000	6.50	48.4
67360: RP-St1-3	RP-St1-3	0.0000	6.00	48.4
67362: RP-St1-4	RP-St1-4	0.0000	5.50	48.3
67364: RP-St1-5	RP-St1-5	0.0000	5.50	48.3
67366: RP-St1-6	RP-St1-6	0.0000	5.50	48.2
67616: RP-St1-7	RP-St1-7	0.0000	5.50	48.4
67368: RP-St2-1	RP-St2-1	0.2801	5.50	48.0
67370: RP-St2-2	RP-St2-2	0.3735	5.00	48.5
67435: RP-St2-3	RP-St2-3	0.2801	5.00	47.7
67471: RP-St2-4	RP-St2-4	0.0934	5.00	47.7
67407: RP-St2-5	RP-St2-5	0.1867	5.00	47.5
67438: RP-St2-6	RP-St2-6	0.0934	5.00	47.3
67610: RP-St3-1	RP-St3-1	0.3735	5.45	47.9
67568: RP-St3-2	RP-St3-2	0.1867	5.36	47.4
67405: RP-St3-3	RP-St3-3	0.2801	5.20	47.4
67607: RP-St3-4	RP-St3-4	0.3735	5.44	48.1
67565: RP-St3-5	RP-St3-5	0.2801	5.35	47.6
67403: RP-St3-6	RP-St3-6	0.2801	5.20	47.4
67467: RP-St3-7	RP-St3-7	0.4668	5.20	47.4
67604: RP-St4-1	RP-St4-1	0.3735	5.92	48.0
67581: RP-St4-2	RP-St4-2	0.3735	5.74	47.2
67577: RP-St4-3	RP-St4-3	0.1867	5.44	47.2
67601: RP-St4-4	RP-St4-4	0.3735	5.94	48.3
67562: RP-St4-5	RP-St4-5	0.3735	5.79	47.5
67372: RP-St4-6	RP-St4-6	0.3735	5.50	47.1
67620: RP-St4-7	RP-St4-7	0.0934	5.35	46.8

28 of 3388 elements displayed | SORTED

Ridge Paddock Stages 1 to 4 – Fire Flow (15 l/s) Node Results

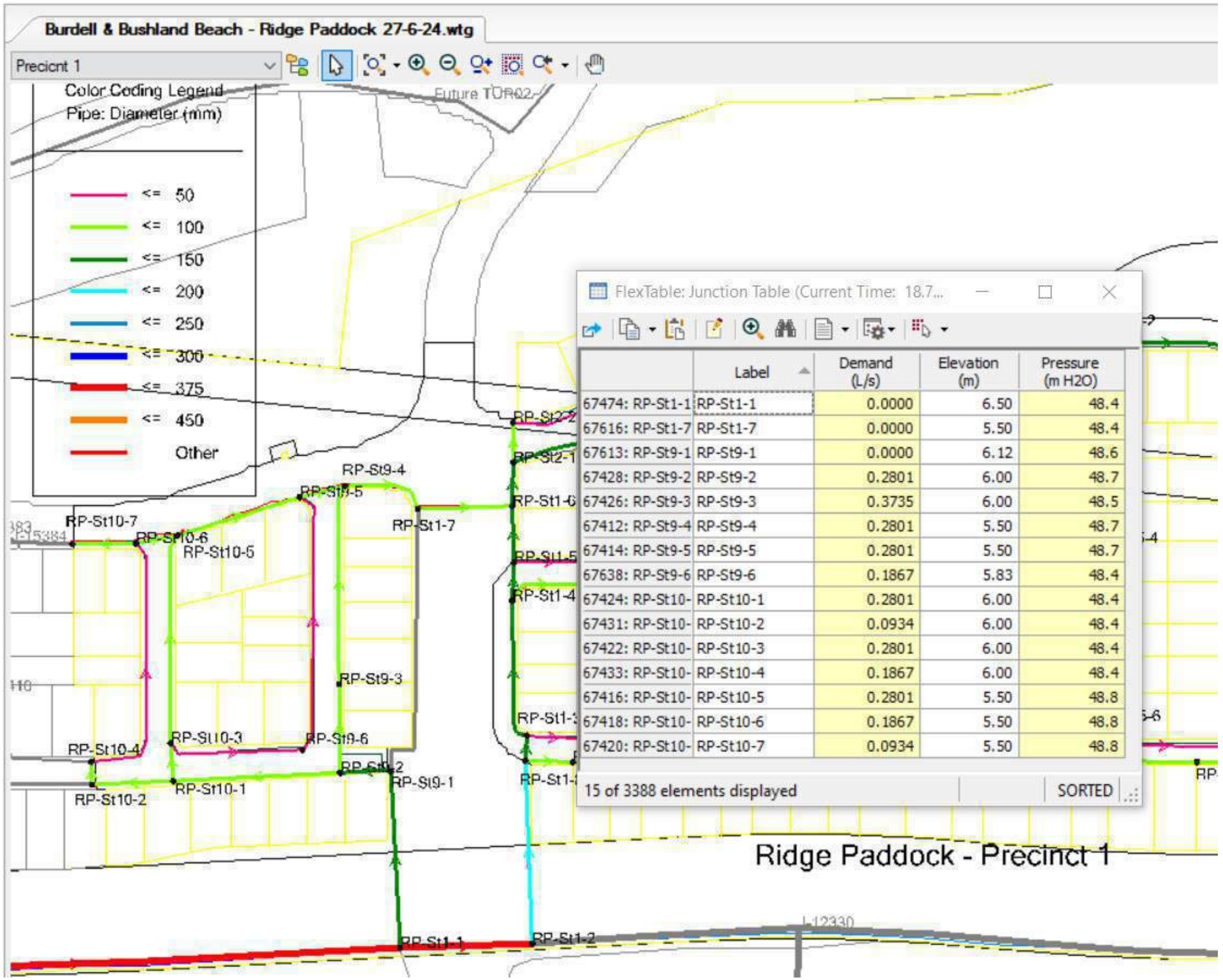


FlexTable: Junction Table (Current Time: 18.7...

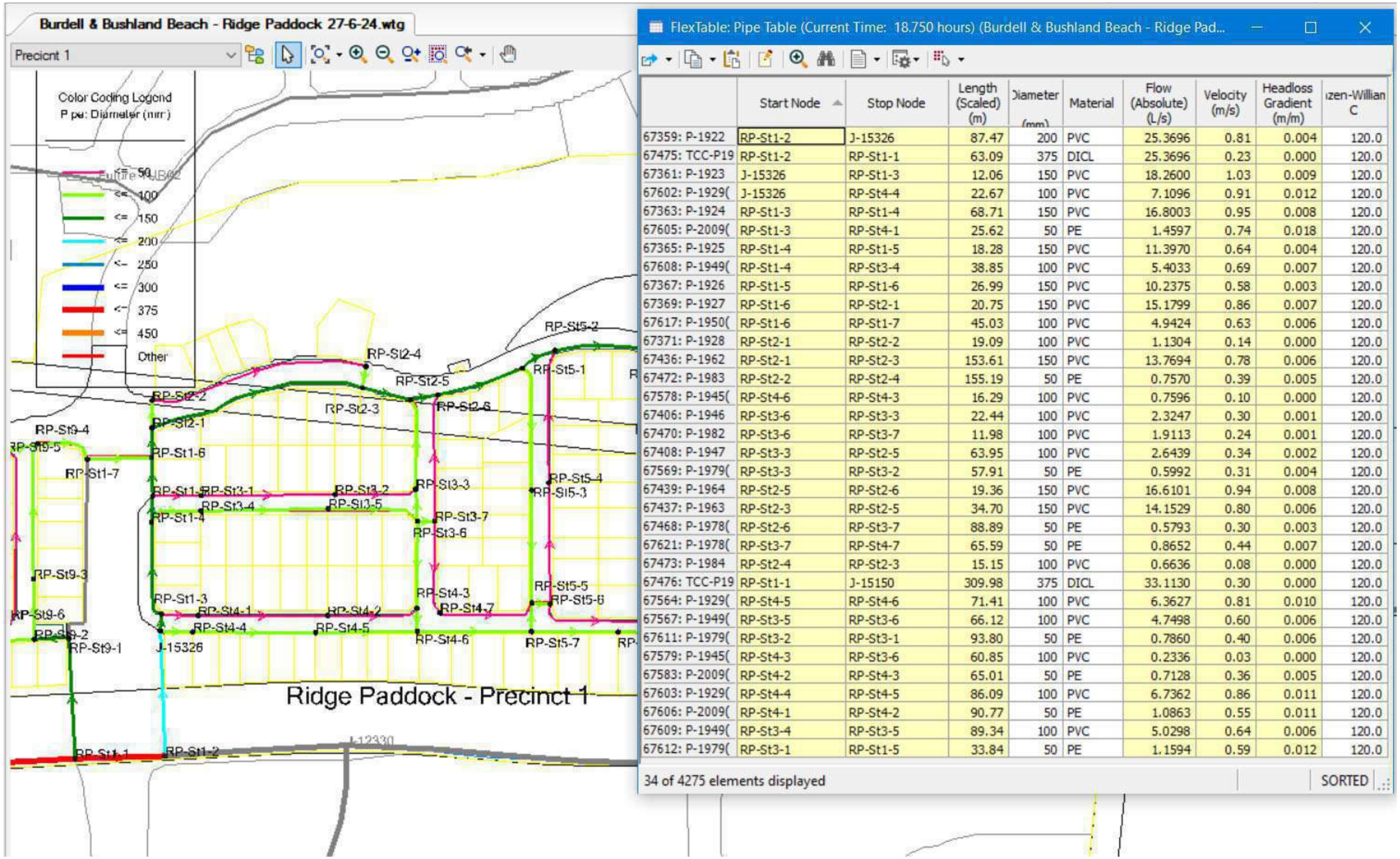
	Label	Demand (L/s)	Elevation (m)	Pressure (m H2O)
67401: RP-St5-1	RP-St5-1	0.1867	5.00	46.8
67441: RP-St5-2	RP-St5-2	0.2801	5.00	46.6
67556: RP-St5-3	RP-St5-3	0.2801	5.26	46.5
67559: RP-St5-4	RP-St5-4	0.3735	5.26	46.3
67397: RP-St5-5	RP-St5-5	0.2801	5.50	46.3
67399: RP-St5-6	RP-St5-6	0.2801	5.50	46.3
67374: RP-St5-7	RP-St5-7	0.3735	5.50	46.3
67623: RP-St5-8	RP-St5-8	0.0934	5.50	45.7
67443: RP-St6-1	RP-St6-1	0.1867	5.00	46.1
67626: RP-St6-1	RP-St6-10	0.1867	5.12	45.8
67629: RP-St6-1	RP-St6-11	0.0934	5.14	45.7
67389: RP-St6-2	RP-St6-2	0.0000	5.00	46.0
67391: RP-St6-3	RP-St6-3	0.2801	5.00	45.9
67393: RP-St6-4	RP-St6-4	0.2801	5.00	45.8
67571: RP-St6-5	RP-St6-5	0.3735	4.72	45.8
67574: RP-St6-6	RP-St6-6	0.2801	4.75	44.4
67447: RP-St6-7	RP-St6-7	0.2801	4.50	45.7
67380: RP-St6-8	RP-St6-8	0.3735	4.50	45.7
67451: RP-St6-9	RP-St6-9	15.2801	4.50	43.5
67395: RP-St7-1	RP-St7-1	0.3735	5.20	45.6
67384: RP-St7-2	RP-St7-2	0.2801	5.20	45.6
67550: RP-St7-3	RP-St7-3	0.2801	4.91	45.7
67553: RP-St7-4	RP-St7-4	0.4668	4.98	45.3
67382: RP-St7-5	RP-St7-5	0.1867	4.50	46.0
67378: RP-St7-6	RP-St7-6	0.4668	4.50	46.0
67632: RP-St7-7	RP-St7-7	0.2801	4.70	45.5
67387: RP-St7-8	RP-St7-8	0.1867	5.20	45.6
67376: RP-St8-1	RP-St8-1	0.5602	5.50	45.4
67454: RP-St8-2	RP-St8-2	0.3735	5.50	45.4
67544: RP-St8-3	RP-St8-3	0.7469	4.96	45.7
67547: RP-St8-4	RP-St8-4	0.4668	4.88	45.6
67635: RP-St8-5	RP-St8-5	0.1867	5.32	45.5

32 of 3388 elements displayed | SORTED

Ridge Paddock Stages 5 to 8 – Fire Flow (15 l/s) Node Results



Ridge Paddock Stages 9 & 10 – Fire Flow (15 l/s) Node Results

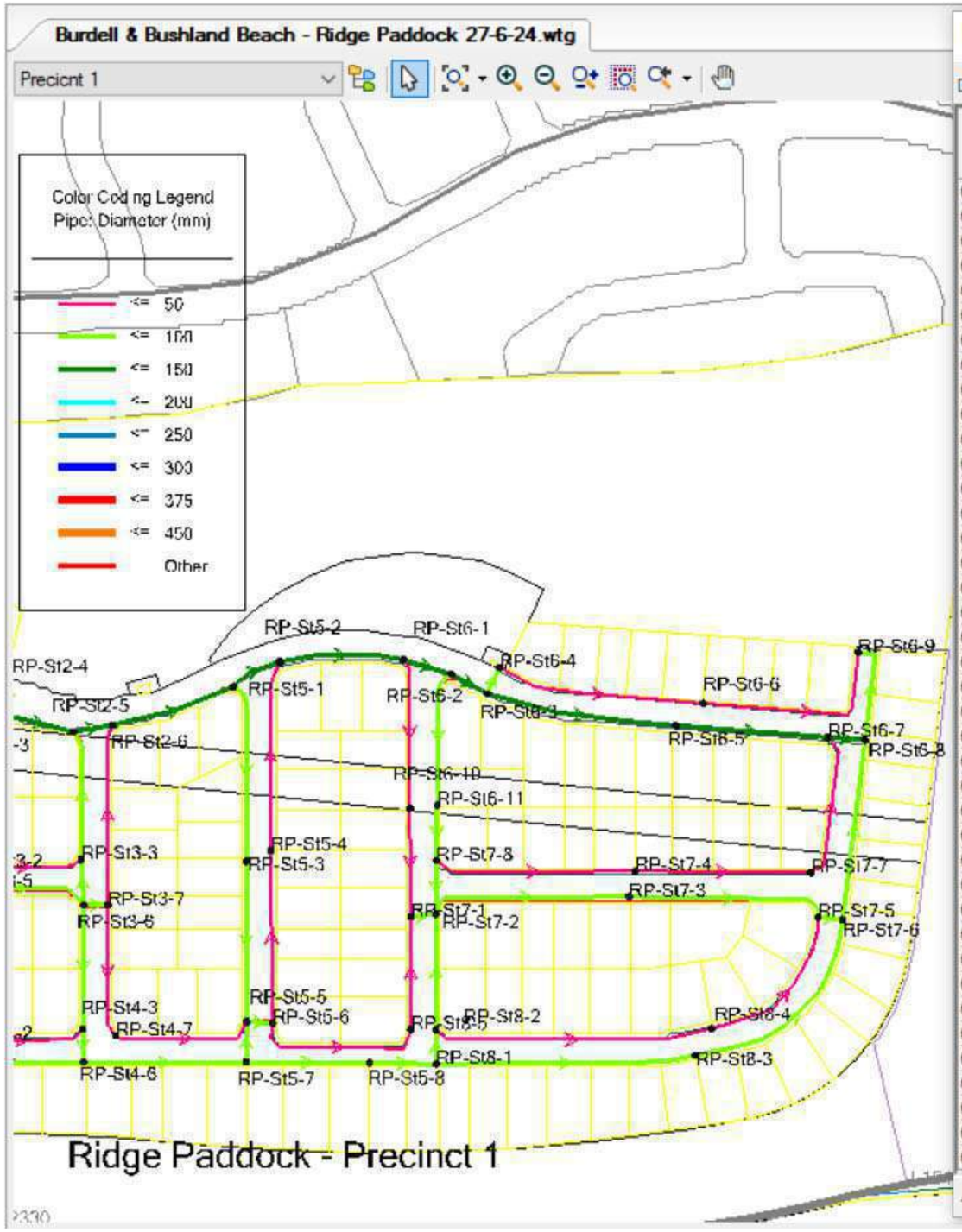


FlexTable: Pipe Table (Current Time: 18.750 hours) (Burdell & Bushland Beach - Ridge Pad...

	Start Node	Stop Node	Length (Scaled) (m)	Diameter (mm)	Material	Flow (Absolute) (L/s)	Velocity (m/s)	Headloss Gradient (m/m)	Hazen-Williams C
67359: P-1922	RP-St1-2	J-15326	87.47	200	PVC	25.3696	0.81	0.004	120.0
67475: TCC-P19	RP-St1-2	RP-St1-1	63.09	375	DICL	25.3696	0.23	0.000	120.0
67361: P-1923	J-15326	RP-St1-3	12.06	150	PVC	18.2600	1.03	0.009	120.0
67602: P-1929(	J-15326	RP-St4-4	22.67	100	PVC	7.1096	0.91	0.012	120.0
67363: P-1924	RP-St1-3	RP-St1-4	68.71	150	PVC	16.8003	0.95	0.008	120.0
67605: P-2009(	RP-St1-3	RP-St4-1	25.62	50	PE	1.4597	0.74	0.018	120.0
67365: P-1925	RP-St1-4	RP-St1-5	18.28	150	PVC	11.3970	0.64	0.004	120.0
67608: P-1949(	RP-St1-4	RP-St3-4	38.85	100	PVC	5.4033	0.69	0.007	120.0
67367: P-1926	RP-St1-5	RP-St1-6	26.99	150	PVC	10.2375	0.58	0.003	120.0
67369: P-1927	RP-St1-6	RP-St2-1	20.75	150	PVC	15.1799	0.86	0.007	120.0
67617: P-1950(	RP-St1-6	RP-St1-7	45.03	100	PVC	4.9424	0.63	0.006	120.0
67371: P-1928	RP-St2-1	RP-St2-2	19.09	100	PVC	1.1304	0.14	0.000	120.0
67436: P-1962	RP-St2-1	RP-St2-3	153.61	150	PVC	13.7694	0.78	0.006	120.0
67472: P-1983	RP-St2-2	RP-St2-4	155.19	50	PE	0.7570	0.39	0.005	120.0
67578: P-1945(	RP-St4-6	RP-St4-3	16.29	100	PVC	0.7596	0.10	0.000	120.0
67406: P-1946	RP-St3-6	RP-St3-3	22.44	100	PVC	2.3247	0.30	0.001	120.0
67470: P-1982	RP-St3-6	RP-St3-7	11.98	100	PVC	1.9113	0.24	0.001	120.0
67408: P-1947	RP-St3-3	RP-St2-5	63.95	100	PVC	2.6439	0.34	0.002	120.0
67569: P-1979(	RP-St3-3	RP-St3-2	57.91	50	PE	0.5992	0.31	0.004	120.0
67439: P-1964	RP-St2-5	RP-St2-6	19.36	150	PVC	16.6101	0.94	0.008	120.0
67437: P-1963	RP-St2-3	RP-St2-5	34.70	150	PVC	14.1529	0.80	0.006	120.0
67468: P-1978(	RP-St2-6	RP-St3-7	88.89	50	PE	0.5793	0.30	0.003	120.0
67621: P-1978(	RP-St3-7	RP-St4-7	65.59	50	PE	0.8652	0.44	0.007	120.0
67473: P-1984	RP-St2-4	RP-St2-3	15.15	100	PVC	0.6636	0.08	0.000	120.0
67476: TCC-P19	RP-St1-1	J-15150	309.98	375	DICL	33.1130	0.30	0.000	120.0
67564: P-1929(	RP-St4-5	RP-St4-6	71.41	100	PVC	6.3627	0.81	0.010	120.0
67567: P-1949(	RP-St3-5	RP-St3-6	66.12	100	PVC	4.7498	0.60	0.006	120.0
67611: P-1979(	RP-St3-2	RP-St3-1	93.80	50	PE	0.7860	0.40	0.006	120.0
67579: P-1945(	RP-St4-3	RP-St3-6	60.85	100	PVC	0.2336	0.03	0.000	120.0
67583: P-2009(	RP-St4-2	RP-St4-3	65.01	50	PE	0.7128	0.36	0.005	120.0
67603: P-1929(	RP-St4-4	RP-St4-5	86.09	100	PVC	6.7362	0.86	0.011	120.0
67606: P-2009(	RP-St4-1	RP-St4-2	90.77	50	PE	1.0863	0.55	0.011	120.0
67609: P-1949(	RP-St3-4	RP-St3-5	89.34	100	PVC	5.0298	0.64	0.006	120.0
67612: P-1979(	RP-St3-1	RP-St1-5	33.84	50	PE	1.1594	0.59	0.012	120.0

34 of 4275 elements displayed | SORTED

Ridge Paddock Stages 1 to 4 – Fire Flow (15 l/s) Pipe Results

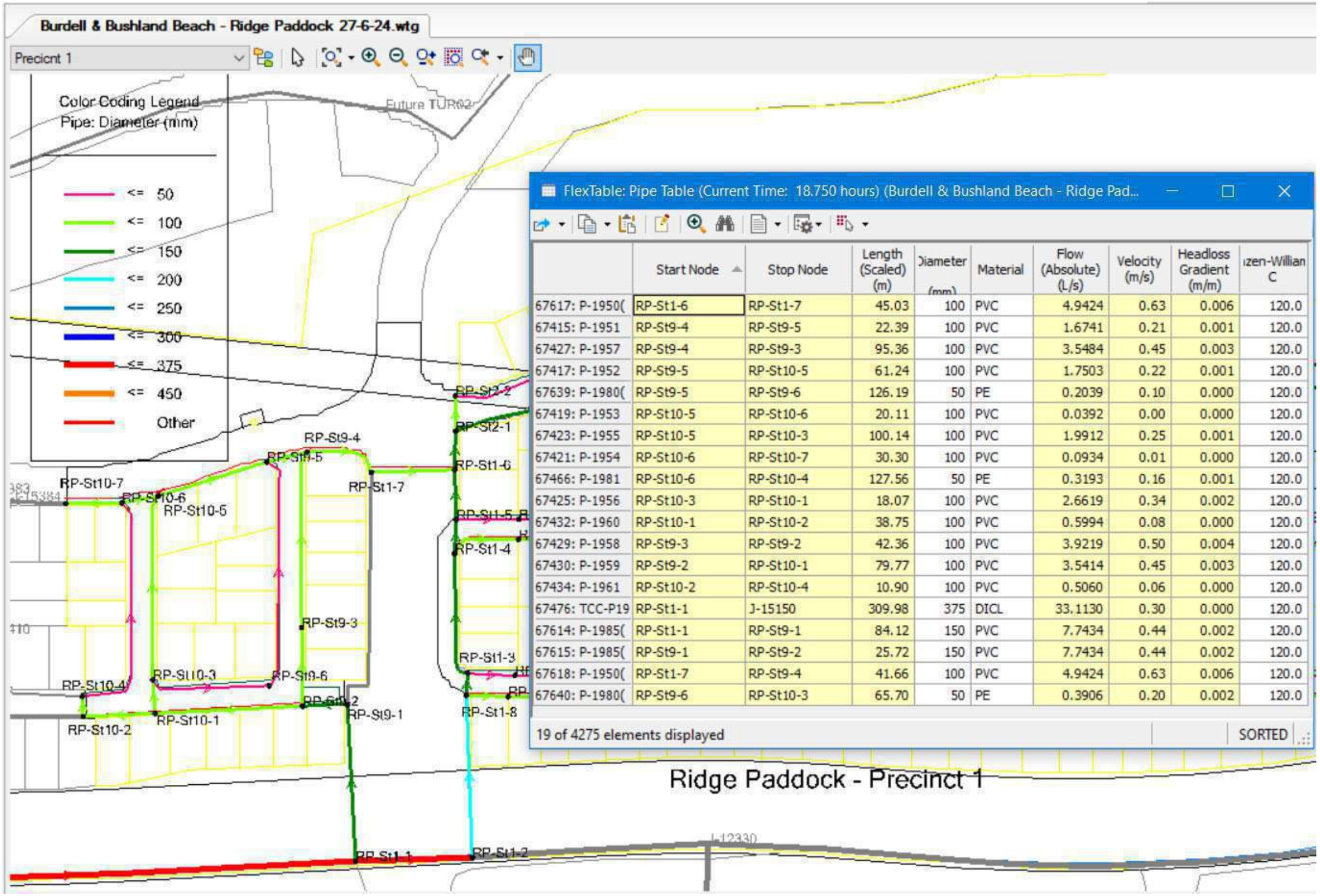


FlexTable: Pipe Table (Current Time: 18.750 hours) (Burdell & Bushland Beach - Ridge Pad...

	Start Node	Stop Node	Length (Scaled) (m)	Diameter (mm)	Material	Flow (Absolute) (L/s)	Velocity (m/s)	Headloss Gradient (m/m)	Hazen-William C
67442: P-1966	RP-St5-1	RP-St5-2	26.46	150	PVC	15.9812	0.90	0.007	120.0
67444: P-1967	RP-St5-2	RP-St6-1	61.21	150	PVC	15.7369	0.89	0.007	120.0
67624: P-1931(	RP-St5-7	RP-St5-8	60.87	100	PVC	5.9570	0.76	0.008	120.0
67625: P-1931(	RP-St5-8	RP-St8-1	32.69	100	PVC	5.8636	0.75	0.008	120.0
67445: P-1968	RP-St6-1	RP-St6-2	24.78	150	PVC	15.0389	0.85	0.007	120.0
67634: P-1970(	RP-St7-7	RP-St6-7	73.36	50	PE	0.0216	0.01	0.000	120.0
67392: P-1939	RP-St6-2	RP-St6-3	20.06	150	PVC	13.2128	0.75	0.005	120.0
67631: P-1938(	RP-St6-11	RP-St6-2	67.26	100	PVC	1.8260	0.23	0.001	120.0
67554: P-1970(	RP-St7-8	RP-St7-4	99.78	50	PE	0.7685	0.39	0.006	120.0
67630: P-1938(	RP-St7-8	RP-St6-11	27.25	100	PVC	1.7327	0.22	0.001	120.0
67627: P-1975(	RP-St6-1	RP-St6-10	74.02	50	PE	0.5113	0.26	0.003	120.0
67572: P-1969(	RP-St6-3	RP-St6-5	94.25	150	PVC	11.2691	0.64	0.004	120.0
67549: P-1974(	RP-St8-4	RP-St7-5	83.32	50	PE	0.0542	0.03	0.000	120.0
67456: P-1936(	RP-St8-2	RP-St8-1	16.88	100	PVC	2.4116	0.31	0.002	120.0
67573: P-1969(	RP-St6-5	RP-St6-7	75.05	150	PVC	10.8957	0.62	0.004	120.0
67548: P-1974(	RP-St8-2	RP-St8-4	138.11	50	PE	0.5211	0.27	0.003	120.0
67381: P-1933	RP-St7-6	RP-St6-8	88.77	100	PVC	3.9130	0.50	0.004	120.0
67575: P-1971(	RP-St6-4	RP-St6-6	103.08	50	PE	1.3835	0.70	0.017	120.0
67560: P-1977(	RP-St5-6	RP-St5-4	84.92	50	PE	0.4092	0.21	0.002	120.0
67388: P-1937	RP-St7-2	RP-St7-8	26.14	100	PVC	0.7774	0.10	0.000	120.0
67558: P-1944(	RP-St5-3	RP-St5-1	88.56	100	PVC	0.9280	0.12	0.000	120.0
67636: P-1976(	RP-St7-1	RP-St8-5	55.52	50	PE	0.6820	0.35	0.004	120.0
67561: P-1977(	RP-St5-4	RP-St5-2	93.46	50	PE	0.0358	0.02	0.000	120.0
67449: P-1969(	RP-St6-7	RP-St6-8	18.32	150	PVC	10.6371	0.60	0.003	120.0
67545: P-1932(	RP-St8-1	RP-St8-3	127.86	100	PVC	2.8919	0.37	0.002	120.0
67557: P-1944(	RP-St5-5	RP-St5-3	78.90	100	PVC	0.6479	0.08	0.000	120.0
67394: P-1940	RP-St6-3	RP-St6-4	14.26	100	PVC	1.6636	0.21	0.001	120.0
67400: P-1943	RP-St5-5	RP-St5-6	12.89	100	PVC	1.5580	0.20	0.001	120.0
67633: P-1970(	RP-St7-4	RP-St7-7	86.34	50	PE	0.3017	0.15	0.001	120.0
67552: P-1935(	RP-St7-3	RP-St7-2	99.89	100	PVC	2.6475	0.34	0.002	120.0
67396: P-1941	RP-St7-2	RP-St7-1	12.47	100	PVC	0.6331	0.08	0.000	120.0
67628: P-1975(	RP-St6-10	RP-St7-1	53.11	50	PE	0.3246	0.17	0.001	120.0
67455: P-1936(	RP-St7-2	RP-St8-2	56.76	100	PVC	1.5170	0.19	0.001	120.0
67453: P-1972	RP-St6-9	RP-St6-8	51.07	100	PVC	14.1767	1.81	0.042	120.0
67576: P-1971(	RP-St6-6	RP-St6-9	103.04	50	PE	1.1034	0.56	0.011	120.0
67383: P-1934	RP-St7-6	RP-St7-5	12.10	100	PVC	2.2349	0.28	0.001	120.0
67551: P-1935(	RP-St7-5	RP-St7-3	99.02	100	PVC	2.3674	0.30	0.002	120.0
67546: P-1932(	RP-St8-3	RP-St7-6	107.97	100	PVC	2.1449	0.27	0.001	120.0
67398: P-1942	RP-St5-7	RP-St5-5	19.92	100	PVC	0.4184	0.05	0.000	120.0
67637: P-1976(	RP-St8-5	RP-St5-6	84.00	50	PE	0.8687	0.44	0.007	120.0

40 of 4275 elements displayed | SORTED

Ridge Paddock Stages 5 to 8 – Fire Flow (15 l/s) Pipe Results



FlexTable: Pipe Table (Current Time: 18.750 hours) (Burdell & Bushland Beach - Ridge Pad...

	Start Node	Stop Node	Length (Scaled) (m)	Diameter (mm)	Material	Flow (Absolute) (L/s)	Velocity (m/s)	Headloss Gradient (m/m)	izen-Willian C
67617: P-1950(	RP-St1-6	RP-St1-7	45.03	100	PVC	4.9424	0.63	0.006	120.0
67415: P-1951	RP-St9-4	RP-St9-5	22.39	100	PVC	1.6741	0.21	0.001	120.0
67427: P-1957	RP-St9-4	RP-St9-3	95.36	100	PVC	3.5484	0.45	0.003	120.0
67417: P-1952	RP-St9-5	RP-St10-5	61.24	100	PVC	1.7503	0.22	0.001	120.0
67639: P-1980(	RP-St9-5	RP-St9-6	126.19	50	PE	0.2039	0.10	0.000	120.0
67419: P-1953	RP-St10-5	RP-St10-6	20.11	100	PVC	0.0392	0.00	0.000	120.0
67423: P-1955	RP-St10-5	RP-St10-3	100.14	100	PVC	1.9912	0.25	0.001	120.0
67421: P-1954	RP-St10-6	RP-St10-7	30.30	100	PVC	0.0934	0.01	0.000	120.0
67466: P-1981	RP-St10-6	RP-St10-4	127.56	50	PE	0.3193	0.16	0.001	120.0
67425: P-1956	RP-St10-3	RP-St10-1	18.07	100	PVC	2.6619	0.34	0.002	120.0
67432: P-1960	RP-St10-1	RP-St10-2	38.75	100	PVC	0.5994	0.08	0.000	120.0
67429: P-1958	RP-St9-3	RP-St9-2	42.36	100	PVC	3.9219	0.50	0.004	120.0
67430: P-1959	RP-St9-2	RP-St10-1	79.77	100	PVC	3.5414	0.45	0.003	120.0
67434: P-1961	RP-St10-2	RP-St10-4	10.90	100	PVC	0.5060	0.06	0.000	120.0
67476: TCC-P19	RP-St1-1	J-15150	309.98	375	DICL	33.1130	0.30	0.000	120.0
67614: P-1985(	RP-St1-1	RP-St9-1	84.12	150	PVC	7.7434	0.44	0.002	120.0
67615: P-1985(	RP-St9-1	RP-St9-2	25.72	150	PVC	7.7434	0.44	0.002	120.0
67618: P-1950(	RP-St1-7	RP-St9-4	41.66	100	PVC	4.9424	0.63	0.006	120.0
67640: P-1980(	RP-St9-6	RP-St10-3	65.70	50	PE	0.3906	0.20	0.002	120.0

19 of 4275 elements displayed SORTED

Ridge Paddock Stages 9 & 10 – Fire Flow (15 l/s) Pipe Results

APPENDIX C
SEWER STRATEGY PLANS & SEWERGEMS MODELLING RESULTS

1002
SP345441

INDICATES PROPOSED FUTURE SEWERAGE SYSTEM TO SERVICE FUTURE ALLOTMENTS.

Drainage Reserve

BALANCE LOT
1003

1001
SP345441

Drainage Reserve

SEWER PUMP STATION PS ML07

2000

INDICATES SEWER PUMP STATION PS ML07 CATCHMENT BOUNDARY.

2001

ZERO MANHOLE
PRELIMINARY IL=1.800

FUTURE SEWER PUMP STATION PS ML08

Drainage Reserve

BALANCE LOT
1003

LIONEL TURNER DRIVE (future)

CONNECT TO EXISTING DN450 TRUNK RISING MAIN. (INITIAL)

NORTH SHORE BOULEVARD

FUTURE EXTENSION OF RISING MAIN UNDER NORTH SHORE BOULEVARD AND CONNECT INTO FUTURE DN375 SEWER SYSTEM IN THE MAJOR PS ML02 CATCHMENT.

1000
SP345441

Drainage Reserve

LEGEND

- Existing RP boundary.
- Existing stormwater drain line.
- DN225 Trunk Sewer main.
- DN150 Sewer main.
- Sewer manhole.
- DN200 PE Sewer rising main.
- Future Trunk Sewer main.
- Existing trunk rising main

N

LEVEL DATUM A.H.D.
Horizontal Datum GDA' 94 Zone 55
Refer PM 131730 RL. 74.407
Star Picket

LAYOUT PLAN

PRELIMINARY
NOT FOR CONSTRUCTION

Scale 1:1250 @ A1
0 12.5 25 37.5 50m

All work is to be carried out in accordance with LOCAL AUTHORITY'S standard details.

Issue	Description	Date
P4	PRELIMINARY - NOT FOR CONSTRUCTION - ISSUED FOR INFORMATION ONLY.	30/07/2024
P3	PRELIMINARY - NOT FOR CONSTRUCTION - ISSUED FOR INFORMATION ONLY.	03/07/2024
P2	PRELIMINARY - NOT FOR CONSTRUCTION - ISSUED FOR INFORMATION ONLY.	21/06/2024
P1	PRELIMINARY - NOT FOR CONSTRUCTION - ISSUED FOR INFORMATION ONLY.	13/06/2024

ENGINEERING CERTIFICATION

Signed:

ANDREW IAN WALLACE - RPEQ No. 6743

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BRISBANE | NEW ZEALAND

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W: www.nceng.com.au

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Date: 13/06/2024
Checked: DC
Approved: AW

In Association With
MOUNT LOW DEVELOPMENTS

RIDGE PADDOCK RESIDENTIAL DEVELOPMENT - PRECINCT ONE
NORTH SHORE BOULEVARD
MOUNT LOW (1001 on SP345441)

CONCEPT LAYOUT PLAN
SEWERAGE RETICULATION

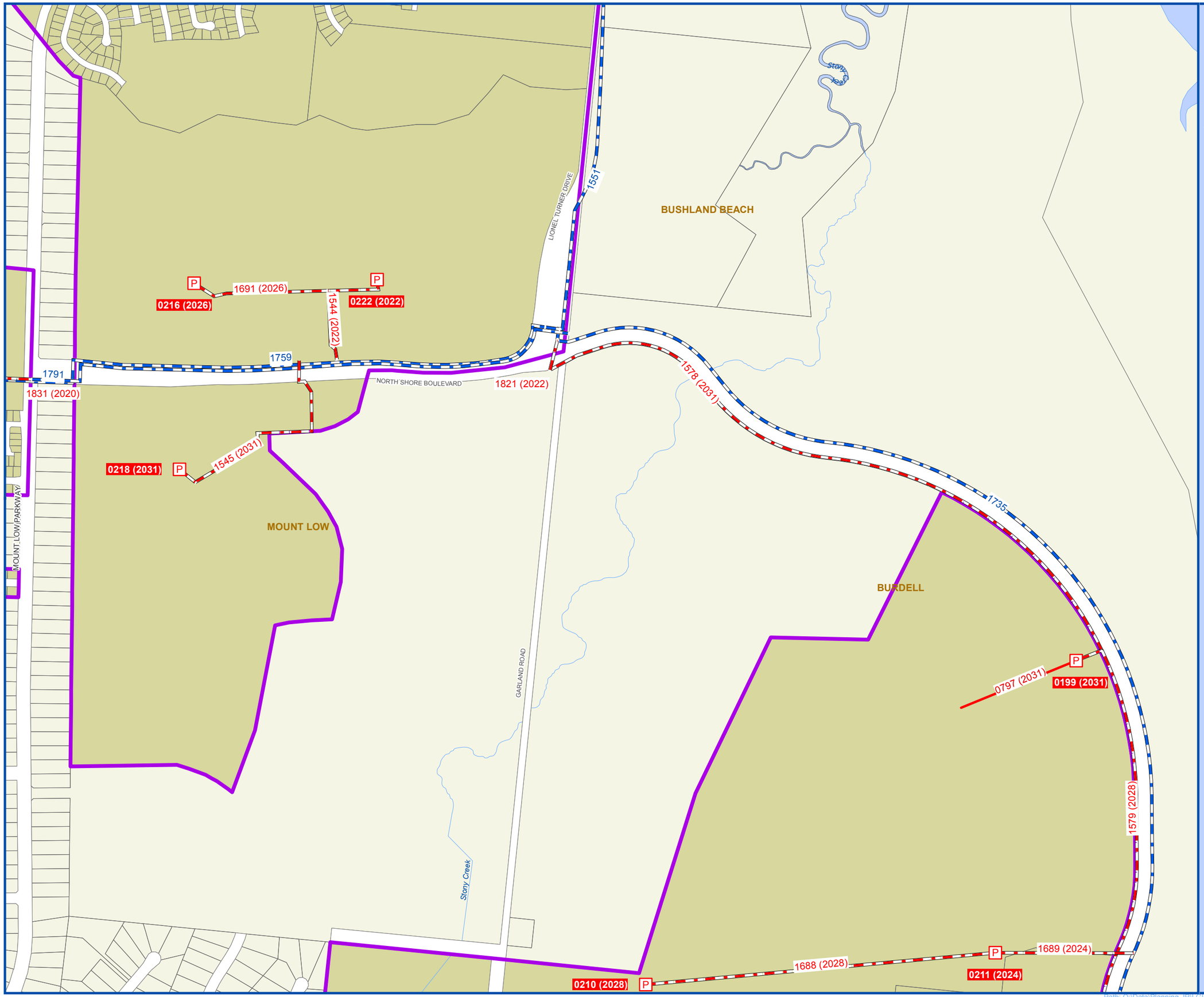
Drawing Number: TUR1301/S01

Issue: P4

TOWNSVILLE CITY COUNCIL

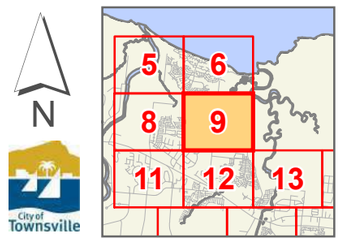
Local Government Infrastructure Plan

SEWERAGE



LEGEND

- Future Pump Station
- Future Decommissioned Pump Station
- Future Treatment Plant
- Future Decommissioned Treatment Plant
- Existing Pump Station
- Existing Treatment Plant
- Existing Reuse Irrigation Area
- Existing Reuse Pump Stn. and Storage
- Existing Reuse Pump Stn. and Storage Lagoon
- Existing Effluent Reuse Main
- Future Rising Main
- Future Decommissioned Rising Main
- Existing Rising Main
- Future Gravity Main
- Existing Gravity Main
- Service Catchment
- Priority Infrastructure Area



0 0.1 0.2 0.3 0.4 0.5
Kilometers

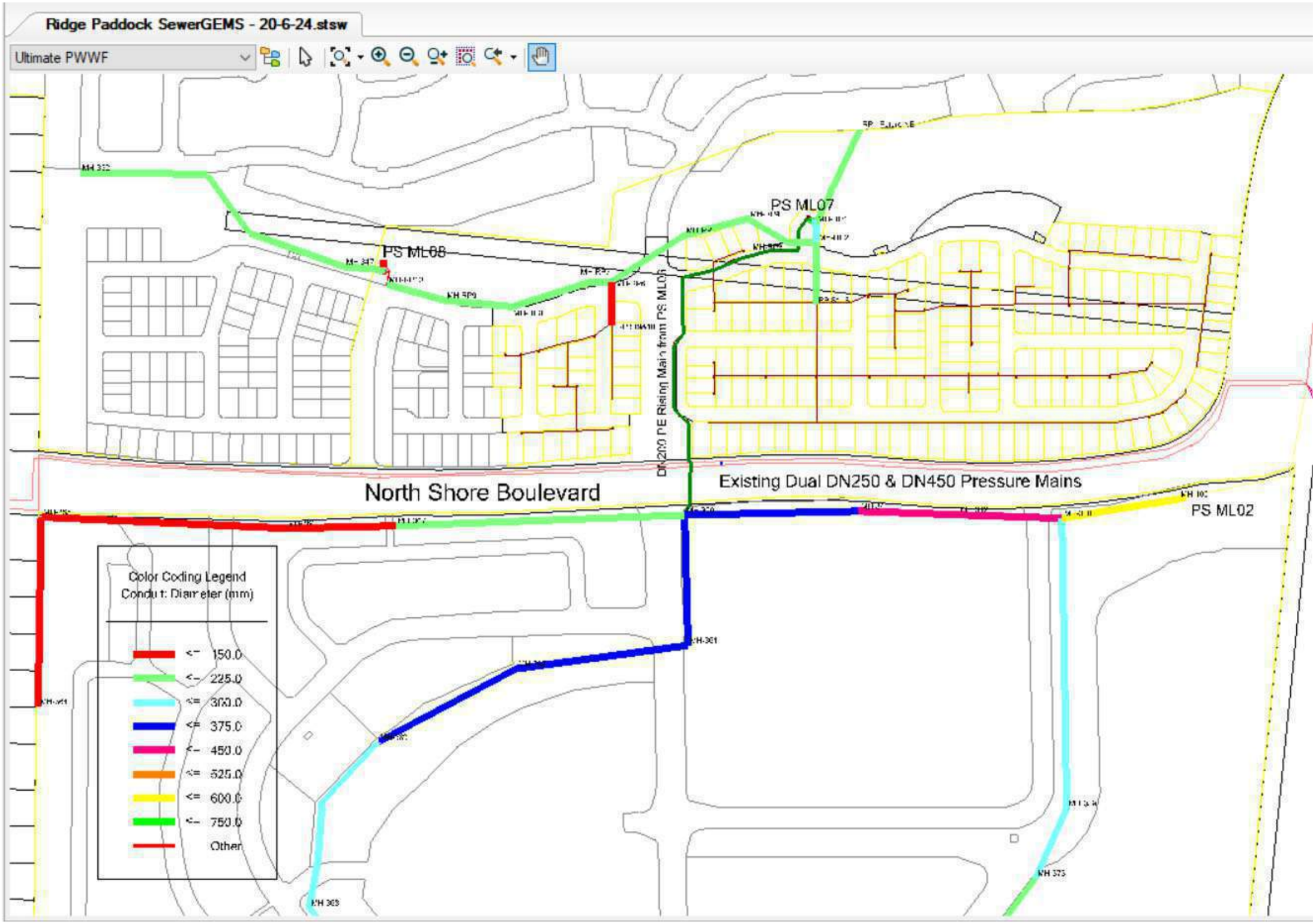
SCALE: 1:10,000 @ A3

Planning Section
Planning & Community Engagement

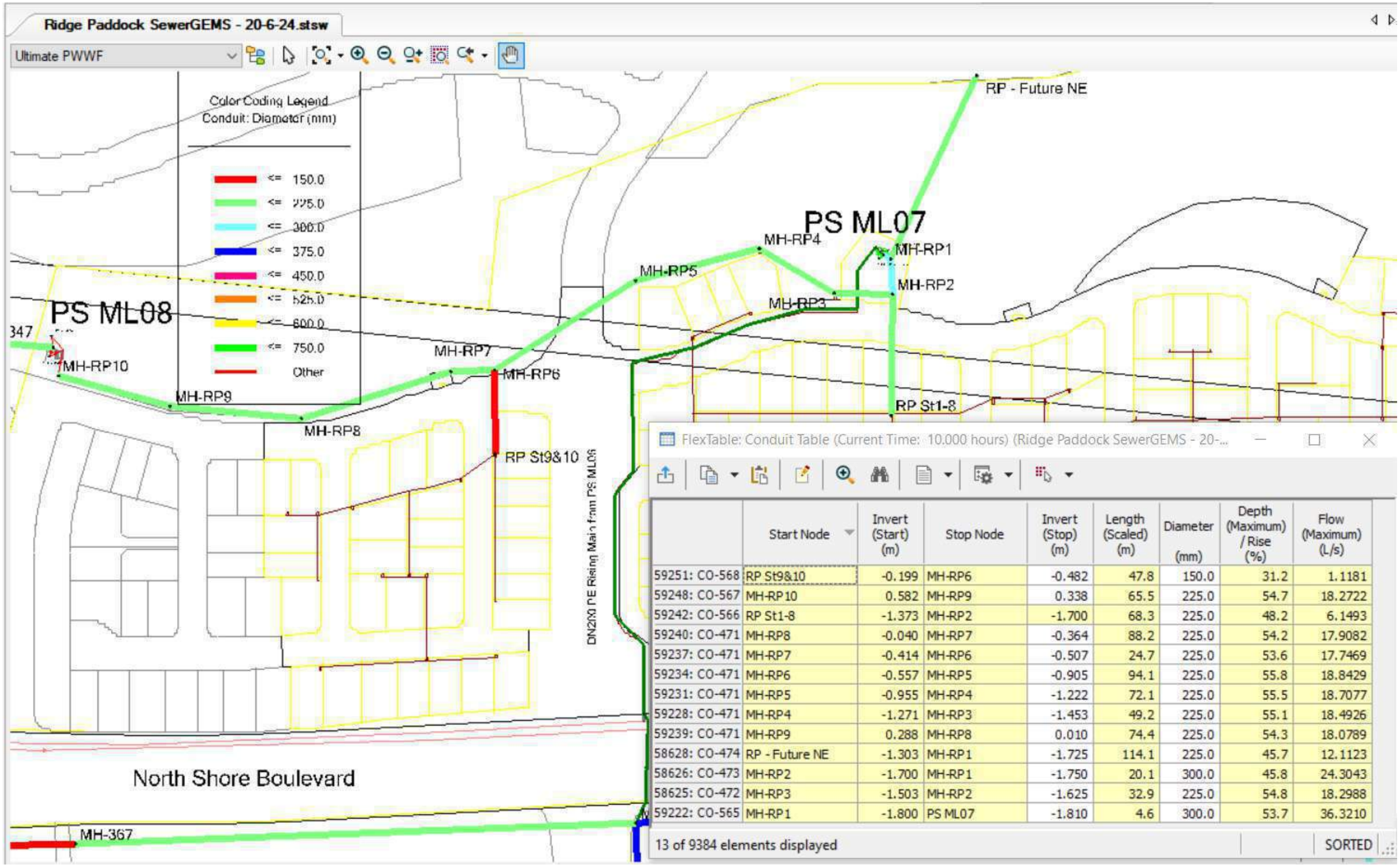
Date: 12/11/2019
Drawn By: AUD
Digital File: LGIP_Sewer

Map 9

Path: O:\Data\Planning_IP\LGIPs & charges\Spatial Data\LGIP\Maps\Sewerage\LGIP_Sewer.mxd



RIDGE PADDOCK – OVERALL SEWERGEMS MODEL FIGURE

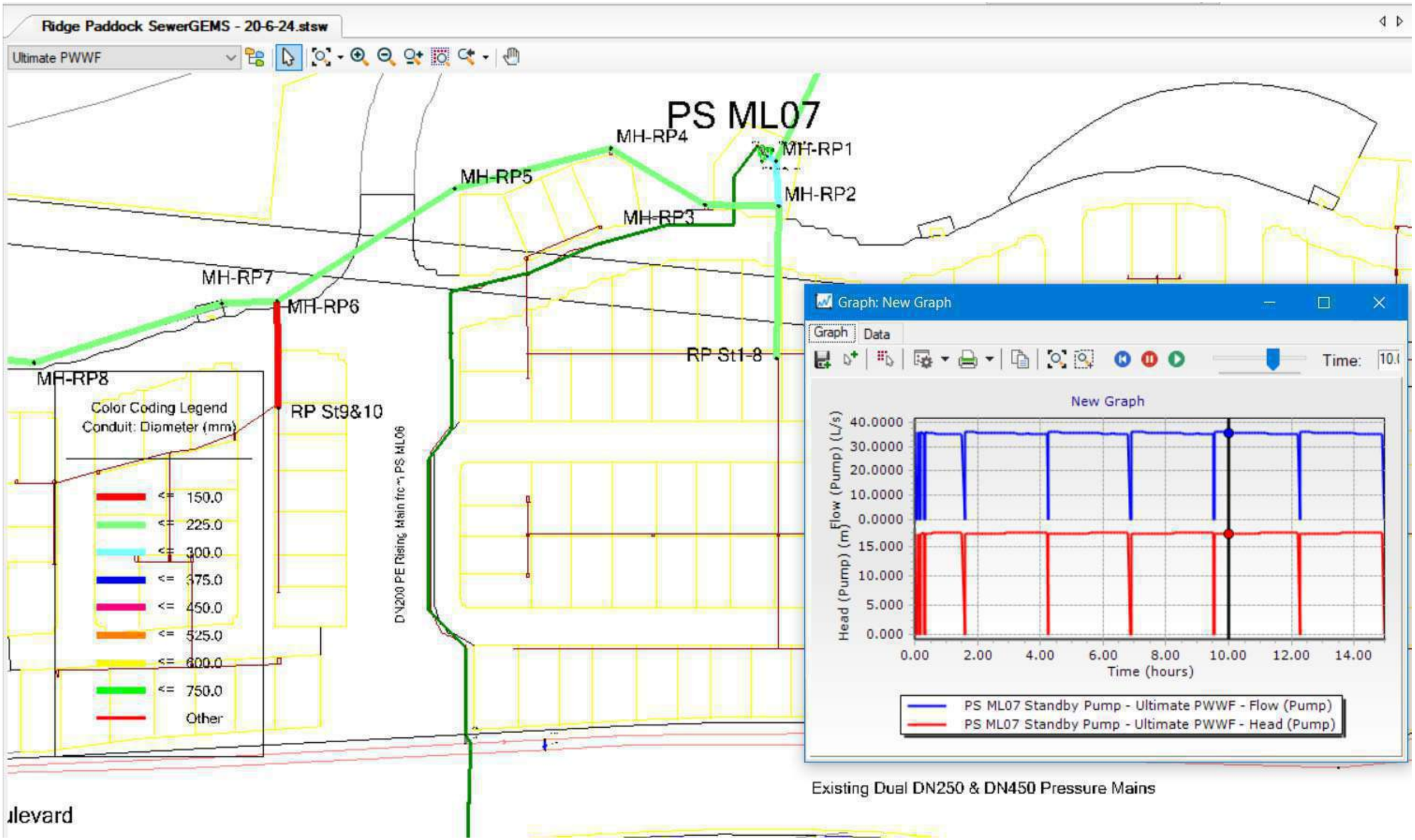


FlexTable: Conduit Table (Current Time: 10.000 hours) (Ridge Paddock SewerGEMS - 20-...

	Start Node	Invert (Start) (m)	Stop Node	Invert (Stop) (m)	Length (Scaled) (m)	Diameter (mm)	Depth (Maximum) / Rise (%)	Flow (Maximum) (L/s)
59251: CO-568	RP St9&10	-0.199	MH-RP6	-0.482	47.8	150.0	31.2	1.1181
59248: CO-567	MH-RP10	0.582	MH-RP9	0.338	65.5	225.0	54.7	18.2722
59242: CO-566	RP St1-8	-1.373	MH-RP2	-1.700	68.3	225.0	48.2	6.1493
59240: CO-471	MH-RP8	-0.040	MH-RP7	-0.364	88.2	225.0	54.2	17.9082
59237: CO-471	MH-RP7	-0.414	MH-RP6	-0.507	24.7	225.0	53.6	17.7469
59234: CO-471	MH-RP6	-0.557	MH-RP5	-0.905	94.1	225.0	55.8	18.8429
59231: CO-471	MH-RP5	-0.955	MH-RP4	-1.222	72.1	225.0	55.5	18.7077
59228: CO-471	MH-RP4	-1.271	MH-RP3	-1.453	49.2	225.0	55.1	18.4926
59239: CO-471	MH-RP9	0.288	MH-RP8	0.010	74.4	225.0	54.3	18.0789
58628: CO-474	RP - Future NE	-1.303	MH-RP1	-1.725	114.1	225.0	45.7	12.1123
58626: CO-473	MH-RP2	-1.700	MH-RP1	-1.750	20.1	300.0	45.8	24.3043
58625: CO-472	MH-RP3	-1.503	MH-RP2	-1.625	32.9	225.0	54.8	18.2988
59222: CO-565	MH-RP1	-1.800	PS ML07	-1.810	4.6	300.0	53.7	36.3210

13 of 9384 elements displayed | SORTED

RIDGE PADDOCK – FULL DEVELOPMENT SEWERGEMS MODELLING – SEWER PERFORMANCE



RIDGE PADDOCK – FULL DEVELOPMENT SEWERGEMS MODELLING – PUMP PERFORMANCE

Ridge Paddock SewerGEMS - 20-6-24.stsw

Year 2026 PWWF

Color Coding Legend
Conduit: Diameter (mm)

<= 150.0
<= 225.0
<= 300.0
<= 375.0
<= 450.0
<= 525.0
<= 600.0
<= 750.0
Other

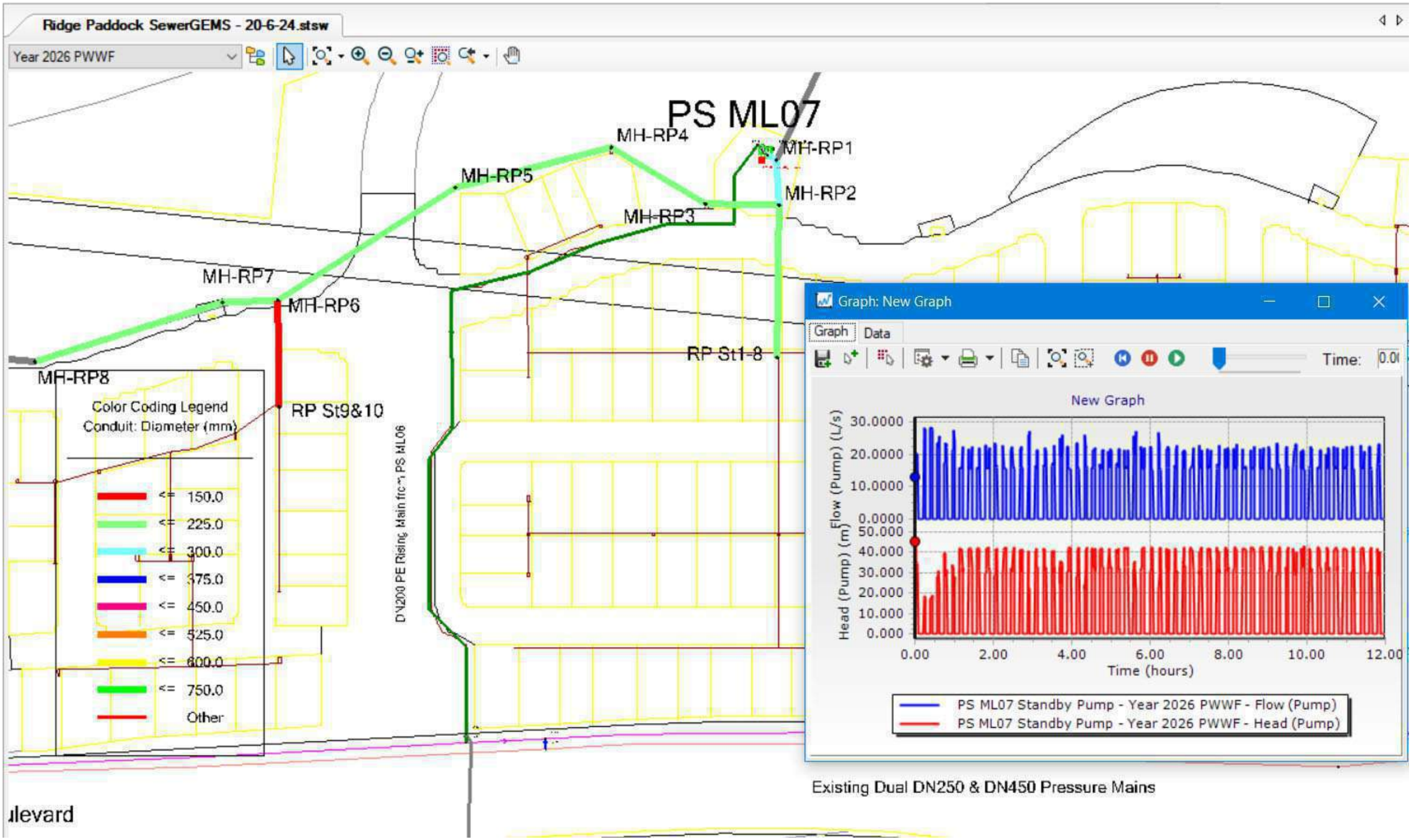
PS ML08
PS ML07
RP - Future NE
MH-RP1
MH-RP2
MH-RP3
MH-RP4
MH-RP5
MH-RP6
MH-RP7
MH-RP8
MH-RP9
MH-RP10
RP St1-8
RP St9&10
DN2M DE Rising Main from PS ML06
North Shore Boulevard
MH-367

FlexTable: Conduit Table (Current Time: 10.000 hours) (Ridge Paddock SewerGEMS - 20-...

	Start Node	Invert (Start) (m)	Stop Node	Invert (Stop) (m)	Length (Scaled) (m)	Diameter (mm)	Depth (Maximum) / Rise (%)	Flow (Maximum) (L/s)
59251: CO-568	RP St9&10	-0.199	MH-RP6	-0.482	47.8	150.0	20.3	1.1181
59242: CO-566	RP St1-8	-1.373	MH-RP2	-1.625	68.3	225.0	30.2	6.1493
59240: CO-471	MH-RP8	-0.040	MH-RP7	-0.364	88.2	225.0	0.0	0.0000
59237: CO-471	MH-RP7	-0.414	MH-RP6	-0.507	24.7	225.0	0.0	0.0000
59234: CO-471	MH-RP6	-0.557	MH-RP5	-0.905	94.1	225.0	12.8	1.1181
59231: CO-471	MH-RP5	-0.955	MH-RP4	-1.222	72.1	225.0	12.8	1.1181
59228: CO-471	MH-RP4	-1.271	MH-RP3	-1.453	49.2	225.0	12.8	1.1181
58626: CO-473	MH-RP2	-1.700	MH-RP1	-1.750	20.1	300.0	23.7	7.2674
58625: CO-472	MH-RP3	-1.503	MH-RP2	-1.625	32.9	225.0	12.8	1.1181
59222: CO-565	MH-RP1	-1.800	PS ML07	-1.810	4.6	300.0	23.6	7.2674

10 of 9384 elements displayed | SORTED

RIDGE PADDOCK – PRECINCT 1 SEWERGEMS MODELLING – SEWER PERFORMANCE



RIDGE PADDOCK – PRECINCT 1 SEWERGEMS MODELLING – PUMP PERFORAMNCE

APPENDIX E

Northern Consulting Engineers – Concept Engineering Drawings

PRELIMINARY
NOT FOR CONSTRUCTION

LOCALITY PLAN

All work is to be carried out in accordance with LOCAL AUTHORITY'S standard details.

N

LEVEL DATUM A.H.D.
Horizontal Datum GDA' 94 Zone 55
Refer PM 131730 RL. 74.407
Star Picket

Issue	Description	Date
P2	PRELIMINARY - NOT FOR CONSTRUCTION - ISSUED FOR INFORMATION ONLY.	30/07/2024
P1	PRELIMINARY - NOT FOR CONSTRUCTION - ISSUED FOR INFORMATION ONLY.	09/07/2024

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Signed:

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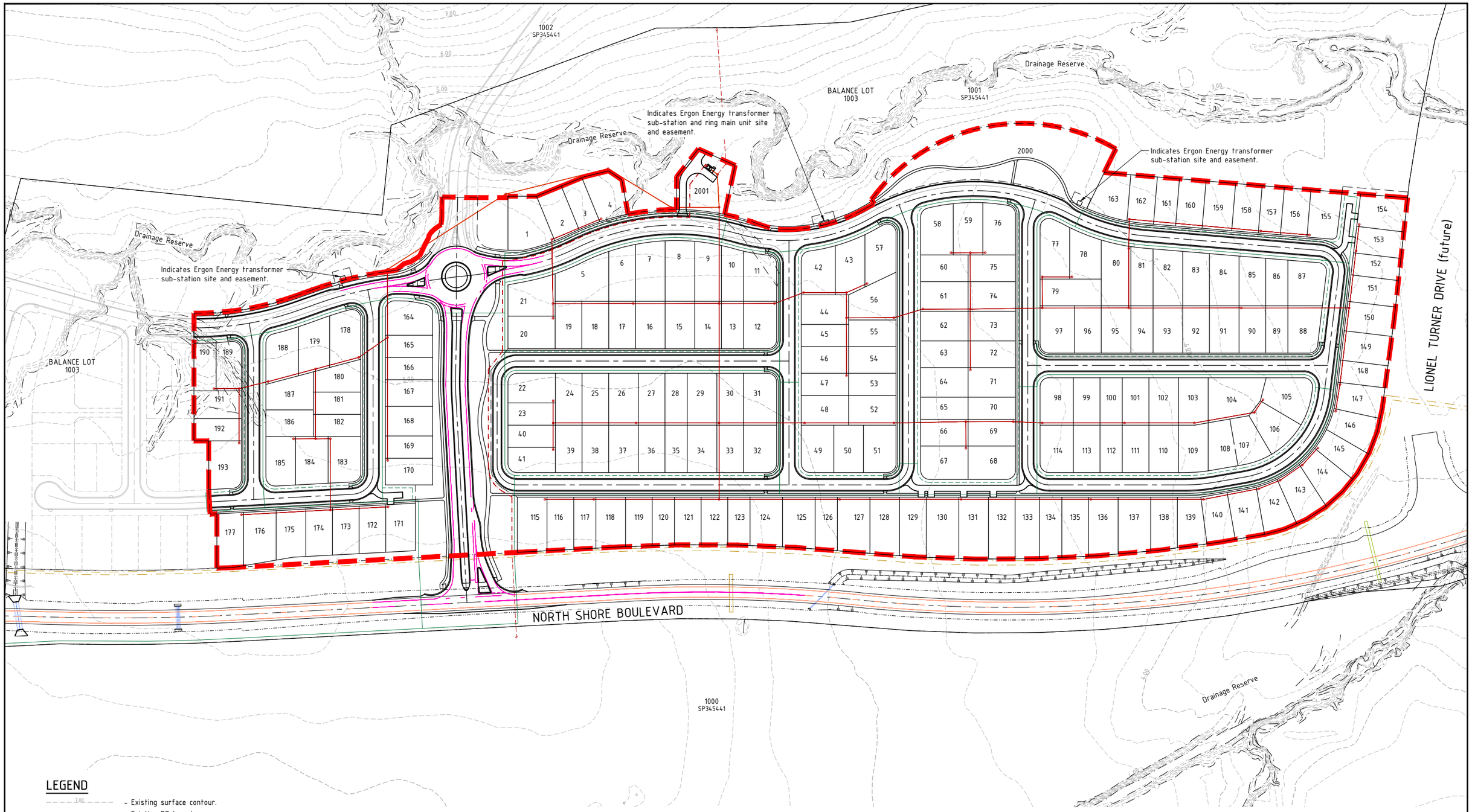
In Association With
MOUNT LOW DEVELOPMENTS

RIDGE PADDOCK RESIDENTIAL DEVELOPMENT - PRECINCT ONE
NORTH SHORE BOULEVARD
MOUNT LOW (1001 on SP345441)

CONCEPT LOCALITY PLAN

Drawing Number: TUR1301/A00

Issue: P2



LEGEND

- Existing surface contour.
- Existing RP boundary.
- Top of batter.
- Toe of batter.
- Invert of open drain/creek.
- Stormwater drain line.
- Existing stormwater drain line.
- Trunk Sewer main.
- Sewer main.
- Sewer manhole.
- Sewer rising main.
- Future Trunk Sewer main.
- Existing trunk rising main
- PVC-m water main.
- Poly water main.
- Precinct boundary.

N

LEVEL DATUM A.H.D.
Horizontal Datum GDA' 94 Zone 55
Refer PM 131730 RL. 74.407
Star Picket

LAYOUT PLAN

PRELIMINARY
NOT FOR CONSTRUCTION

Scale 1:1250 @ A1
0 12.5 25 37.5 50m

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RIDGE PADDOCK RESIDENTIAL DEVELOPMENT - PRECINCT ONE
NORTH SHORE BOULEVARD
MOUNT LOW (1001 on SP345441)

CONCEPT LAYOUT PLAN
OVERALL

Drawing Number	Issue
TUR1301/A01	P2

1002
SP345441

Drainage Reserve

BALANCE LOT
1003

1001
SP345441

Drainage Reserve

Drainage Reserve

2000

STAGE 11

STAGE 2

2001

STAGE 1

STAGE 6

STAGE 5

STAGE 9

STAGE 10

STAGE 3

STAGE 7

STAGE 4

STAGE 8

LIONEL TURNER DRIVE (future)

BALANCE LOT
1003

NORTH SHORE BOULEVARD

1000
SP345441

Drainage Reserve

LEGEND

- Existing RP boundary.
- Stage boundary.

LAYOUT PLAN

PRELIMINARY
NOT FOR CONSTRUCTION

N

LEVEL DATUM A.H.D.
Horizontal Datum GDA' 94 Zone 55
Refer PM 131730 RL. 74.407
Star Picket

Scale 1:1250 @ A1
0 12.5 25 37.5 50m

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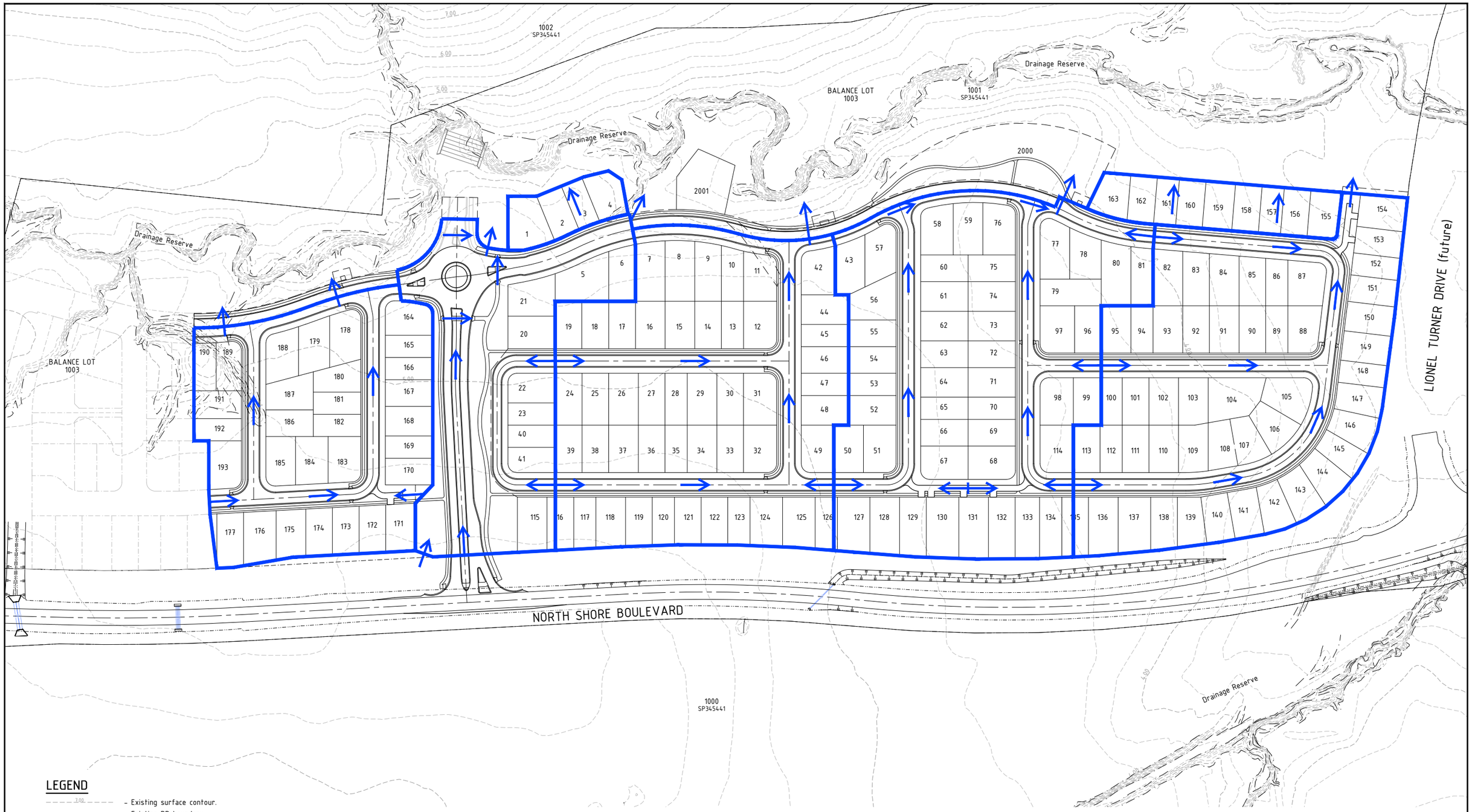
RIDGE PADDOCK RESIDENTIAL DEVELOPMENT - PRECINCT ONE
NORTH SHORE BOULEVARD
MOUNT LOW (1001 on SP345441)

CONCEPT LAYOUT PLAN
STAGING

Drawing Number: TUR1301/A02

Issue: P2



LEGEND

- Existing surface contour.
- Existing RP boundary.
- Top of batter.
- Toe of batter.
- Invert of open drain/creek.
- Stormwater low path.
- Stormwater catchment boundary.
- Stormwater drain line.
- Existing stormwater drain line.

N

LEVEL DATUM A.H.D.
Horizontal Datum GDA' 94 Zone 55
Refer PM 131730 RL. 74.407
Star Picket

LAYOUT PLAN

PRELIMINARY
NOT FOR CONSTRUCTION

Scale 1:1250 @ A1
0 12.5 25 37.5 50m

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Drawn: DC
Date: 25/06/2024
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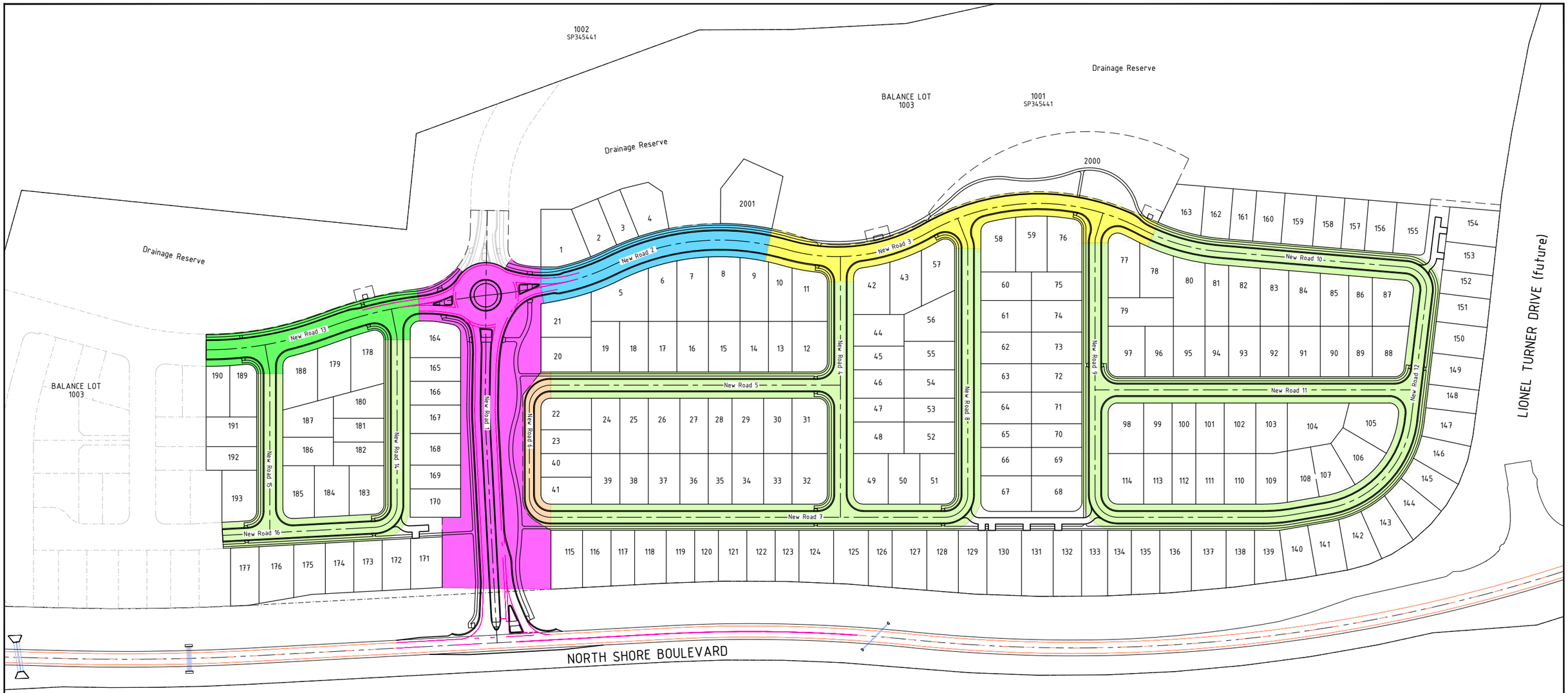
RIDGE PADDOCK RESIDENTIAL DEVELOPMENT - PRECINCT ONE
NORTH SHORE BOULEVARD
MOUNT LOW (1001 on SP345441)

CONCEPT LAYOUT PLAN
STORMWATER CATCHMENT AND FLOW PATHS

Drawing Number: TUR1301/H01
Issue: P2



LEGEND

	– Access Place Modified	– 11.5m road reserve	– 5.4m Asphalt Surfacing
	– Access Street Modified	– 15.5m road reserve	– 7.4m Asphalt Surfacing
	– Access Street	– 16.6m road reserve	– 7.4m Asphalt Surfacing
	– Minor Collector Street Modified	– 20.4m road reserve	– 11.8m Asphalt Surfacing
	– Minor Collector Street	– 21.0m road reserve	– 11.8m Asphalt Surfacing
	– Entrance Statement Divided Road	– Varies road reserve	– Varies Asphalt Surfacing

LAYOUT PLAN

PRELIMINARY
NOT FOR CONSTRUCTION

N

LEVEL DATUM A.H.D.
Horizontal Datum GDA' 94 Zone 55
Refer PM 131730 RL. 74.407
Star Picket

Scale 1:1250 @ A1
0 12.5 25 37.5 50m

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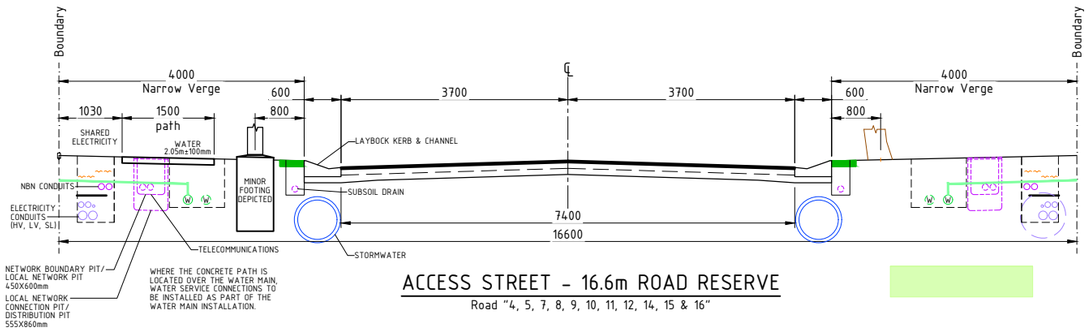
RIDGE PADDOCK RESIDENTIAL DEVELOPMENT – PRECINCT ONE
NORTH SHORE BOULEVARD
MOUNT LOW (1001 on SP345441)

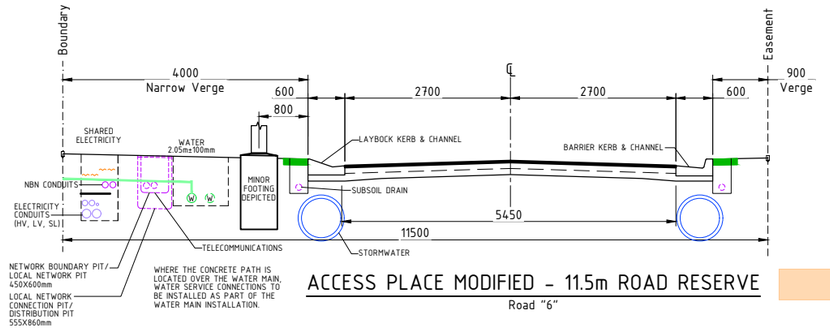
CONCEPT LAYOUT PLAN
ROAD CLASSIFICATION

Drawing Number: TUR1301/R01
Issue: P2



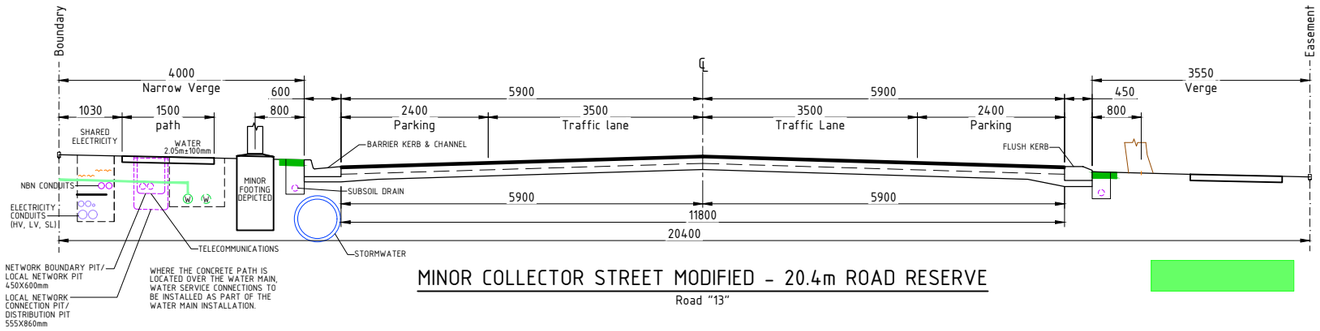
ACCESS STREET – 16.6m ROAD RESERVE

Road "4, 5, 7, 8, 9, 10, 11, 12, 14, 15 & 16"



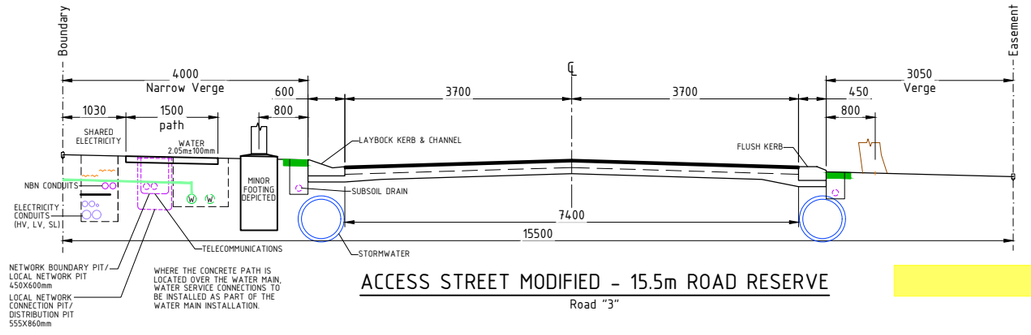
ACCESS PLACE MODIFIED – 11.5m ROAD RESERVE

Road "6"



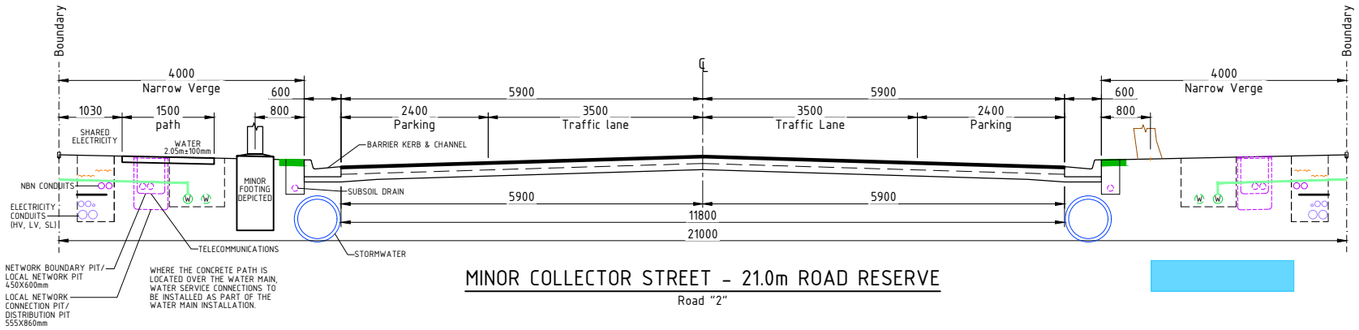
MINOR COLLECTOR STREET MODIFIED – 20.4m ROAD RESERVE

Road "13"



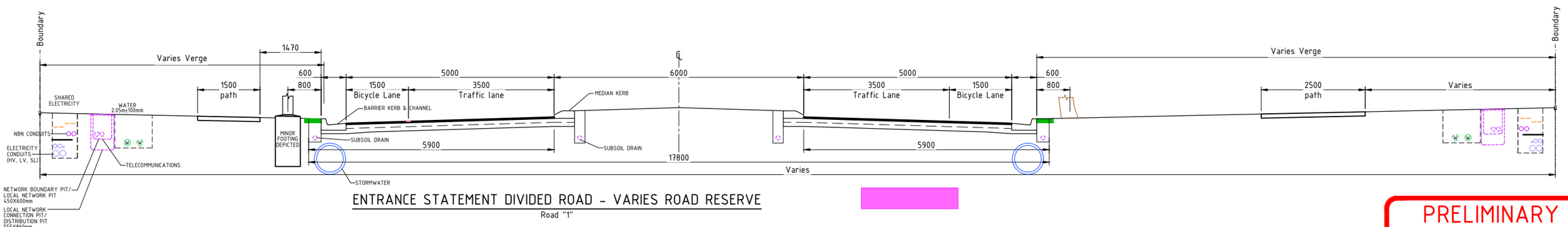
ACCESS STREET MODIFIED – 15.5m ROAD RESERVE

Road "3"



MINOR COLLECTOR STREET – 21.0m ROAD RESERVE

Road "2"



ENTRANCE STATEMENT DIVIDED ROAD – VARIES ROAD RESERVE

Road "1"

PRELIMINARY
NOT FOR CONSTRUCTION

TYPICAL ROAD CROSS SECTIONS

Scale 1:50 @ A1
0 0.5 1.0 1.5 2m

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RIDGE PADDOCK RESIDENTIAL DEVELOPMENT – PRECINCT ONE
NORTH SHORE BOULEVARD
MOUNT LOW (1001 on SP345441)

CONCEPT
ROAD CROSS SECTIONS

Drawing Number TUR1301/R02

Issue P2

LEVEL DATUM A.H.D.
Horizontal Datum GDA' 94 Zone 55
Refer PM 131730 RL. 74.407
Star Picket

1002
SP345441

INDICATES PROPOSED FUTURE SEWERAGE SYSTEM TO SERVICE FUTURE ALLOTMENTS.

Drainage Reserve

BALANCE LOT
1003

1001
SP345441

Drainage Reserve

SEWER PUMP STATION PS ML07

2000

INDICATES SEWER PUMP STATION PS ML07 CATCHMENT BOUNDARY.

2001

ZERO MANHOLE
PRELIMINARY IL=1.800

FUTURE SEWER PUMP STATION PS ML08

Drainage Reserve

BALANCE LOT
1003

LIONEL TURNER DRIVE (future)

CONNECT TO EXISTING DN450 TRUNK RISING MAIN. (INITIAL)

NORTH SHORE BOULEVARD

FUTURE EXTENSION OF RISING MAIN UNDER NORTH SHORE BOULEVARD AND CONNECT INTO FUTURE DN375 SEWER SYSTEM IN THE MAJOR PS ML02 CATCHMENT.

1000
SP345441

Drainage Reserve

LEGEND

- Existing RP boundary.
- Existing stormwater drain line.
- DN225 Trunk Sewer main.
- DN150 Sewer main.
- Sewer manhole.
- DN200 PE Sewer rising main.
- Future Trunk Sewer main.
- Existing trunk rising main

N

LEVEL DATUM A.H.D.
Horizontal Datum GDA' 94 Zone 55
Refer PM 131730 RL. 74.407
Star Picket

LAYOUT PLAN

PRELIMINARY
NOT FOR CONSTRUCTION

Scale 1:1250 @ A1
0 12.5 25 37.5 50m

All work is to be carried out in accordance with LOCAL AUTHORITY'S standard details.

Issue	Description	Date
P4	PRELIMINARY - NOT FOR CONSTRUCTION - ISSUED FOR INFORMATION ONLY.	30/07/2024
P3	PRELIMINARY - NOT FOR CONSTRUCTION - ISSUED FOR INFORMATION ONLY.	03/07/2024
P2	PRELIMINARY - NOT FOR CONSTRUCTION - ISSUED FOR INFORMATION ONLY.	21/06/2024
P1	PRELIMINARY - NOT FOR CONSTRUCTION - ISSUED FOR INFORMATION ONLY.	13/06/2024

ENGINEERING CERTIFICATION

Signed:

ANDREW IAN WALLACE - RPEQ No. 6743

THE ORIGINAL OF THIS DOCUMENT IS COMPLETED TO THE SCALE NOTED. AS REPRODUCTION CAN DISTORT SIZE & SHAPE USE ONLY THE DIMENSIONS PROVIDED ON ARCHITECTURAL &/OR ENGINEERING DRAWINGS. VERIFY DIMENSIONS ON SITE BEFORE CONSTRUCTION.

NORTHERN CONSULTING engineers

Civil | Structural | Forensic
Traffic | Flood Modelling

TOWNSVILLE | SUNSHINE COAST
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Drawn: DC
Date: 13/06/2024
Checked: DC
Approved: AW

In Association With
MOUNT LOW DEVELOPMENTS

RIDGE PADDOCK RESIDENTIAL DEVELOPMENT - PRECINCT ONE
NORTH SHORE BOULEVARD
MOUNT LOW (1001 on SP345441)

CONCEPT LAYOUT PLAN
SEWERAGE RETICULATION

Drawing Number: TUR1301/S01

Issue: P4

LEGEND

- Existing RP boundary.
- Stormwater drain line.
- Existing stormwater drain line.
- DN50 Poly water main.
- DN100 PVC-m water main.
- DN150 PVC-m water main.
- DN200 PVC-m water main.
- DN375 PVC-m trunk water main.
- Possible DN100 PVC-m temporary water main.

N

LEVEL DATUM A.H.D.
Horizontal Datum GDA' 94 Zone 55
Refer PM 131730 RL. 74.407
Star Picket

LAYOUT PLAN

PRELIMINARY
NOT FOR CONSTRUCTION

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MOUNT LOW DEVELOPMENTS

RIDGE PADDOCK RESIDENTIAL DEVELOPMENT - PRECINCT ONE
NORTH SHORE BOULEVARD
MOUNT LOW (1001 on SP345441)

CONCEPT LAYOUT PLAN
WATER RETICULATION

Drawing Number: TUR1301/W01

Issue: P4

MILFORD PLANNING

Appendix 7

MOUNT LOW DEVELOPMENT ECOLOGICAL ASSESSMENT

Lyndel Owens

202207-2

Mount Low Development Ecological Assessment

16/07/2024

Document status

Project No	Version	Document name	Client	Author	Reviewer	Review date
202207-2	Draft	Mount Low Development Ecological Assessment	Lyndel Owens	Anton Fitzgerald	L. Liessmann	28/10/2022
202207-2	V1	Mount Low Development Ecological Assessment	Lyndel Owens	Anton Fitzgerald	L. Liessmann	16/07/2024

Approval for issue

Approver	Signature	Approval date
A. Fitzgerald		16/07/2024

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1 INTRODUCTION

Terra Solutions Pty Ltd (Terra Solutions) was engaged by Lyndel Owens of Mount Low Developments to undertake an ecological assessment of land proposed for part of the Mount Low residential subdivision within the Townsville City Council Local Government Area. The proposed development involves the cancelling of Lot 1001 on SP345441 and reconfiguration into 195 lots plus balance land.

This ecological assessment report describes the environmental values present within and adjacent to the project area with a focus on Matters of National Environmental Significance (MNES) pursuant to the *Environment Protection and Biodiversity Conservation Act 1999* and threatened species under the *Nature Conservation Act 1992*.

The subject land is located to the near east of the Mt Low Parkway, Mt Low. The total area of the subject land is approximately 300 hectares and located within a rapidly urbanising part of northern Townsville city.

The land assessed is formally described as part of Lot 1001 on SP345441 (Lot 1001) and Lot 1002 on SPSP345441 (Lot 1002) and occupies approximately 18.8 ha (**Figure 1**). These lots have recently been reconfigured from parts of Lot 91 on SP222103 (Lot 91), Lot 92 on SP282784 (Lot 92) and the entirety of Lot 93 on SP222103 (Lot 93).

1.1 Project Background

Mt. Low Developments has previously lodged several Development Applications with Townsville City Council (TCC) for the Mt. Low masterplanned community. The applications at that time proposed to develop a community comprising a combination of higher density and larger lot area residential precincts, mixed uses (Mt Low Urban Village Precinct) and green space (natural area precincts). It is now intended to develop part of this land for new residential development.

During the assessment and approvals process, Mt. Low Developments sought advice regarding the application from the former Commonwealth Department of Environment, Water, Heritage and the Arts (DEWHA) (now Department of Climate Change, Energy, the Environment and Water (DCCEEW)) in relation to MNES. DCCEEW advised that MNES which are relevant to the application included the black-throated finch (*Poephila cincta cincta*) (BTF) which is listed as endangered under the EPBC Act.

In 2010, Austecology was commissioned by Mt. Low Developments to undertake detailed investigations and reporting regarding the site's value to BTF and the implications of development on the values identified.

This document was provided to DCCEEW as supporting information to the EPBC Act referral submitted in April 2012 (Bushland Grove Pty Ltd /Residential development/Mt Low/QLD/Mt Low Developments Master Planned Community Reference Number: 2012/6351).

During the assessment period, Austecology was requested by Mt. Low Developments to provide a review of the previous work to provide the Department with an updated assessment of the subject land's values regarding BTF. The requirement to provide this assessment was due to the lengthy decision timeframe and the potential for ecological change to occur within the four years since the previous assessment.

Conditioned approval for the development was issued by for the project on 28 October 2016, which has since been varied to extend the period in which Mt Low Developments must commence the action (i.e. within seven years of 26 October 2021).

It is noted that the EPBC referral relates to the entire project area which consists of Lot 91 on SP222103 (Lot 91), Lot 92 on SP282784 (Lot 92) and Lot 93 on SP222103 (Lot 93), some of which have been recently reconfigured.

1.2 Project Description

This component of the aforementioned project relates to part of the proposed Mount Low Residential Development, specifically Lot 1001 on SP345441 and Lot 1002 on SPSP345441. The land assessed is bounded to the south by North Shore Boulevard, the west by Mount Low Parkway, the north by a tributary of Stony Creek (the watercourse) and the east by the proposed Lionel Turner Drive.

The proposed layout of the residential development is presented in **Appendix A** – RaL Proposal Plan (RPS 2024). The layout includes areas typical of a residential subdivision including the proposed location of saleable land (9.50 ha), roads (3.88 ha), stormwater treatment area, greenspace and a riparian protection area.

A proposed pump station is proposed to be situated within future Lot 2001 north of New Road 2 (**Appendix A**). This site was selected to balance noise-related impacts to future residents whilst maintaining riparian habitat values associated with the watercourse. Recommendations on methods to reduce noise to residents and local fauna are provided in **Section 6**.

The majority of the subject area is mapped as high or very high environmental importance on TCC's overlay map OM-08.0 Natural Assets Environmental Importance which related to natural features that include, but are not limited to:

- *Vegetation Management Act 1999* (VMA) least concern remnant vegetation.
- VMA essential habitat for the endangered eastern curlew, and
- DCCEEW modelled BTF habitat.