H2ONE

PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL
Approval no: DEV2025/1695
Date: 19 May 2026
Queensland
Government

Riverbend, Qld - Precinct 1

Water Supply and Sewer Precinct Network Plan (PNP) Modelling Assessment

FINAL Report V1 - 24 March, 2026

H2One Pty Ltd

Water, Sewer and Stormwater Engineering Specialists

H2ONE

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Version	Date	Author	Reviewer
DRAFT - V1	24 March, 2026	J Meesamphan	J May
FINAL - V1	24 March, 2026	J Meesamphan	J May

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1 INTRODUCTION

1.1 Background

Colliers Pty Ltd developed a water supply and sewer Precinct Network Plan (PNP) for Precinct 1 of the 'Riverbend' property, located within the broader Flagstone Priority Development Area (PDA). This was to progress initial development of the properties owned by Celestino Development Pty Ltd, consisting of Lots 101, 102, 104, 105 and 106 on SP254145 and Lot 800 on SP247625, as shown in Figure 1 below.

Figure 1. Location of the ultimate development area (Source: Colliers Pty Ltd, 2024)

Economic Development Queensland (EDQ) requested a modelling assessment of the "Riverbend, Precinct 1" PNP, to confirm the overall service strategy and size of relevant infrastructure. A summary of the service strategy developed by Colliers Pty Ltd and H2One Pty Ltd, as part of this study, is presented below. Refer to Appendix 1 for the layout and staging plan of Precinct 1.

- *Sewer*: Precinct 1 will be serviced by a DN150 to DN525 gravity sewer network discharging to two (2) Sewer Pump Stations (SPS). The primary SPS, located to the eastern side of the site, will convey the full catchment loading directly to the Sewage Treatment Plant (STP) situated south of the Logan River. A secondary, smaller SPS will be constructed to the north to service areas where surface levels fall away from the central SPS catchment.

  The central SPS, together with the upstream trunk gravity system, is intended to ultimately service the broader Riverbend development at ultimate build-out.

- *Water Supply*: Precinct 1 will be serviced via dual DN375 and DN300 PVC trunk water mains constructed within the primary road corridor through the development site, extending south from the existing DN375 main along Teviot Road. A Pressure Reducing Valve (PRV) will regulate supply to the internal reticulation network, effectively establishing Precinct 1 as a single District Metered Area (DMA).

  At ultimate development, the broader Riverbend area is intended to operate under approximately eight DMA's. The lower-lying areas will be supplied from the future Flagstone storage reservoirs located west of Riverbend, while the elevated areas will be supplied from the Round Mountain reservoir to the north. A temporary booster pump station is proposed to service the higher-elevation properties until the Flagstone reservoirs are constructed (currently anticipated around 2040).

Riverbend Precincts 1 and 2 will be gravity supplied from the Round Mountain reservoir, with the temporary booster pump station to be implemented from the progression of Precinct 3.

On behalf of Colliers Pty Ltd, H2One Pty Ltd was engaged to undertake a modelling assessment of the proposed PNP's, in accordance with Logan Water Alliance's (LWA) minimum Desired Standards of Service (DSS), refer to Appendix 2 for relevant details. The results of the study are presented in this report.

1.2 Objectives

The main objectives of the project were as follows.

1. Introduce the proposed PNP's to LCC's latest InfoWorks planning models, at the 2031 planning horizon.
2. Undertake a hydraulic analysis of the proposed PNP's to confirm feasibility and size relevant assets, as per LWA's minimum Desired Standards of Service.
3. Report on findings.

1.3 Demand Assessment

A demand assessment of the development was undertaken to determine the approximate potable water and sewage demands attributed to the proposed land-use type and density. This was calculated using LCC's adopted Equivalent Person (EP) unit rates and average "per capita" demands for potable water @ 190 L/EP/day, and sewage @ 165 L/EP/day. A summary of the estimated site demands are as follows.

Table 1. Estimated water supply and sewage demands for Precinct 1

			Water Supply		Sewage	
Site Land Use and Density	**Demand Rate**	**EP**	**AD (L/s)**	**PH (L/s)**	**ADWF (L/s)**	**PWWF (L/s)**
855 x res. freehold lots	2.8 EP/lot	2,394.0	5.26	14.87	4.57	22.86
119 x MDR lots	2 EP/dwel.	238.0	0.52	1.48	0.45	2.27
Primary school 14,100 m^2 GFA	0.66 EP/100 m^2 GFA	94.0	0.21	0.58	0.18	0.90
	TOTAL	**2,726.0**	**5.99**	**16.93**	**5.21**	**26.03**

Note 1: For water supply, demand estimates were based on 165 L/EP/day, with 25 L/EP/day non-revenue water. AD to PH factor of 3.1.

Note 2: For sewage, discharge estimates are based on 165 L/EP/day for ADWF and 1,000 L/EP/day for PWWF.

Note 3: Demand estimates for the residential freehold lots and medium density residential (MDR) lots are based on the latest staging plans for Precinct 1 (refer to Appendix 1). School demands were sourced from the Water Supply and Sewer Infrastructure Master Plan (IMP) report (2025), prepared by H2One Pty Ltd.

As previously discussed, this study was undertaken on the 2031 planning horizon, as it is relevant to early stages of development (Precinct 1) for Riverbend. The ultimate Riverbend catchment area has already been assessed and approved via the Infrastructure Master Plan (IMP). PNP's will be developed in due course for precincts subsequent to that of Precinct 1.

LCC's hydraulic models had no planning demands (EP) allocated to the subject site at the 2031 planning horizon, therefore the demands in Table 1 were simply introduced to the models, with no changes to the native demand set.

2 METHODOLOGY

2.1 Desired Standards of Service

The minimum DSS adopted for the hydraulic assessment were based on LWA's latest DSS, issued by LWA for the purpose of this study. A summary of the relevant provisions is as follows, refer to Appendix 2 for further details.

Table 2. DSS adopted for the modelling assessment

	Provision	Specification
Sewerage	Average Dry Weather Flow (ADWF)	165 L/EP/day
	Peak Wet Weather Flow (PWWF)	1000 L/EP/day (residential) 840 L/EP/day (non-residential)
	Single pump capacity	C1 x ADWF (L/s) where; C1 = 3.5 to 5.0 C1 = 15 x $(EP)^{-0.1587}$
	Pump station operational storage (kL)	0.9 x Q / N where; Q = Single pump capacity (L/s) N = Number of pump starts per hour, where N = 12 for duty pump motor < 100 kW N = 8 for duty pump motor 100 – 200 kW N = 5 for duty pump motor > 200 kW
	Pump station emergency storage (kL)	4 hours ADWF
	Total pump station capacity (L/s)	PWWF
	Maximum depth of gravity flow (proposed gravity mains)	75% pipe diameter
	Maximum pressure main flow velocity	3.0 m/s
Water Supply	Average Day Demand	165 L/EP/day consumption + 25 L/EP/day leakage/loss
	Maximum trunk pipe flow velocity	2.5 m/s
	Standard flow minimum network pressure and background demand	22m at the property boundary at PH demand (on demand area) 10m at the property boundary at PH demand (constant flow area)
	Residential fire flow minimum network pressure and background demand	12m at 2/3 PH demand for on demand areas Reservoir at Minimum Operating Level (15%)
	Fire flows	Residential - 15L/s for 2 hours Commercial/industrial - 30L/s for 4 hours

2.2 Hydraulic Modelling Assessment

2.2.1 Sewer Network

The methodology adopted for the assessment of the sewer PNP is as follows.

1. LCC issued the "*IP0022 Logan South Master Plan*" InfoWorks ICM hydraulic model to H2One Pty Ltd, and permitted its use for planning assessments. The scenario adopted for the assessment of the ultimate development was "*A_LS22_2031_Mains_Load_2031*".

2. The proposed sewer network was translated to shape files and introduced to the hydraulic model as a background layer. Manholes, pipes, pump stations etc. were drawn manually and relevant data entered for each element. The shape files were sourced from the latest DWG design files provided by Colliers Pty Ltd.
3. Property demands (EP) were distributed within the model based on lots draining to the minor pump station located in the northern area of Precinct 1, and the remaining network gravitating to the primary pump station central to the ultimate Riverbend catchment. Details are as follows.
    - Northern SPS catchment @ 909 EP: 260 × residential freehold lots, 68 × MDR dwellings, and Primary School Connection 1
    - Central SPS catchment @ 1,817 EP: 595 × residential freehold lots, 51 × MDR dwellings, and Primary School Connection 2

    Within each catchment, demands associated with single-family residential (SFR) lots were distributed evenly across model manholes, with preference given to upstream nodes to provide a conservative assessment of gravity pipe capacity.

    For the MDR lots and primary school site, demands were assigned to the nearest manhole, representing the most likely connection locations. Given the large footprint of the school site, the demand was distributed across two on-site manholes to reflect the likelihood of multiple sewer connections.

    The MDR demand allocations were based on the proportional land area of each lot relative to the total number of dwellings (119) identified in the staging plans (refer to Appendix 1). This resulted in the following EP allocations:
    - Northern MDR lot @ 0.69 ha (26%): 61.3 EP
    - Central MDR lot @ 0.82 ha (31%): 72.8 EP
    - Southern MDR lot @ 1.17 ha (44%): 103.9 EP
4. The surface levels were also added to each node, in addition to pipe invert levels based on LWA's minimum grade requirements (refer below) and assumed minimum ground cover of 900 mm from the surface level.
    - DN150 @ 1:180
    - DN225 @ 1:290
    - DN375 @ 1:550
    - DN450 @ 1:700
    - DN525 @ 1:900

    The trunk gravity pipeline upstream of the proposed central pump station was sourced from Colliers design plans (refer to Appendix 3 for the relevant design plans).
5. A final review of the model setup was undertaken and any identified errors rectified.
6. For the ultimate sewer network of Precinct 1, a hydraulic capacity assessment was undertaken on the gravity pipes, where identified deficiencies were resolved via changes to the overall PNP, e.g. increase in pipe size, changes to pipe alignments etc.
7. Modelling results were reviewed and findings reported.

2.2.2 Water Supply Network

The methodology adopted for the assessment of the water supply PNP is as follows.

1. LCC issued the "*PL-2022-01*" InfoWorks WS Pro hydraulic model to H2One Pty Ltd, and permitted its use for the assessment. The scenarios adopted for the assessment of Precinct 1 was "*2031*".
2. The proposed water supply network was translated to shape files and introduced to the hydraulic model as a background layer. Nodes, pipes, pump station etc. were drawn manually and relevant data entered for each element. The shape files were sourced from the latest DWG design files provided by Colliers Pty Ltd.
3. All pipes were assigned the relevant diameter and Colebrook–White roughness coefficient of 0.06 mm for PVC and 0.3 mm for DICL. It was assumed that all trunk mains and pipes crossing major road corridors were DICL with a roughness coefficient of 0.3 mm. Nominal pipe diameter was assumed to be equal to the internal diameter, which was considered acceptable given the network will be predominantly constructed of PVC pipe.

   Surface levels were assigned to each node based on the design levels, and the total site demand (2,726 EP) was evenly distributed across the relevant nodes on the reticulation network, with exception of the MDR sites and the school which was allocated to the nearest node.
4. A review of the model setup was undertaken and any identified errors were rectified.
5. A standard flow and fire flow (15 L/s at 2/3 peak hour demand) modelling analysis was undertaken to appropriately size the proposed pipework at each development stage. Any network deficiencies identified during the analysis were addressed by increasing pipe diameters and/or improving network connectivity.

   An assessment of the external network was not undertaken, as this was addressed in detail within the recent IMP report. The IMP assessment utilised the same hydraulic model, planning horizon, service strategy, and a similar EP estimate for Precinct 1.
6. Modelling results were reviewed and findings reported.

3 RESULTS

3.1 Sewer Precinct Network Plan (PNP)

The proposed sewer PNP was modelled for Precinct 1, as per the design drawings prepared by Colliers Pty Ltd. The hydraulic analysis determined the following.

- All gravity pipes operated below the 75% d/D flow depth requirement, with the maximum being 64.3% for the DN150 gravity mains between node P1-MH10 and P1-MH8.
- The proposed sewer network will comprise approximately 11.8 km of gravity pipes and 600 m of pressure pipes, excluding the downstream system beyond the proposed central pump station, which will be delivered by Logan City Council (LCC). A summary of the proposed sewer infrastructure required to service the development is provided in Table 3.

Table 3. Summary of proposed sewer infrastructure to service Precinct 1

Description	Location	Pipe Diameter (DN mm)	Length (m)
Northern SPS (minor)	Northern extremity of Precinct 1	N/A	N/A
Central SPS (minor) – to be delivered by LCC	Eastern extremity of Precinct 1	N/A	N/A
Rising main downstream of minor northern SPS	Northern area of Precinct 1	100	600
Retic. gravity pipe	Throughout Precinct 1	150	10,100
Trunk gravity pipe	Pipeline downstream of the northern (minor) SPS discharge	225	740
Trunk gravity pipe	Primary pipeline grading west to east towards the central (major) pump station	375	200
Trunk gravity pipe	Primary pipeline grading west to east towards the central (major) pump station	450	420
Trunk gravity pipe	Primary pipeline grading west to east towards the central (major) pump station	525	320

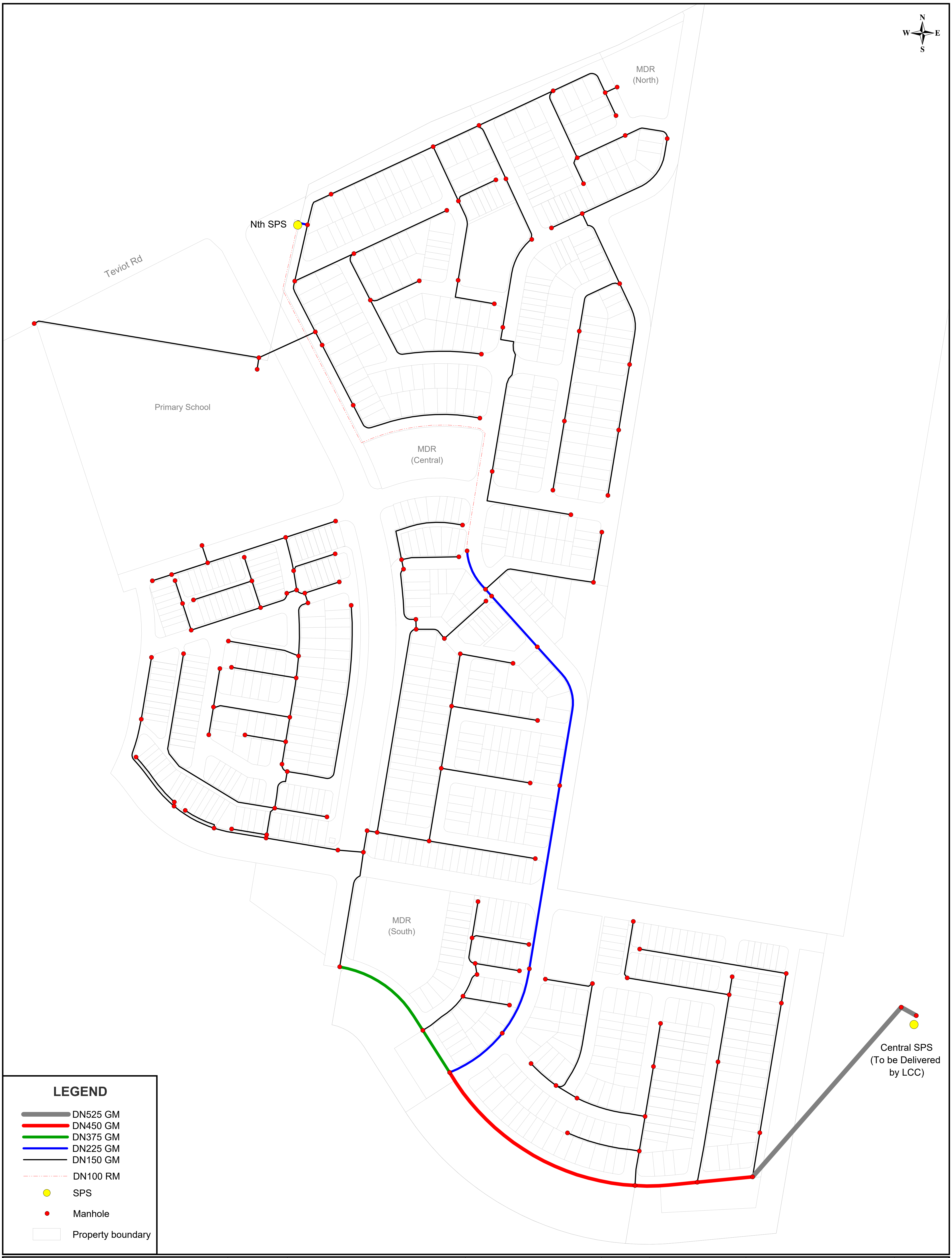
- The gravity trunk main is estimated to reach a maximum depth of approximately 9.2 m below ground level within the DN525 pipeline immediately upstream of the central SPS. The maximum depth within the reticulation network is estimated at 3.8 m at manhole P1-MH75, located on the DN225 pipeline upstream of the northern SPS.
- The northern SPS is estimated to require a wet well depth of approximately 4.0 m. The pump station is assumed to comprise two pumps operating in a duty–standby configuration, with an estimated duty point of 11.5 L/s at approximately 32.0 m total pressure head.

  This duty point is based on a static head of approximately 18.0 m (RL 39.0 m to RL 57.0 m) and an estimated friction loss of approximately 14.0 m within the DN100 rising main over a length of approximately 600 m.

  Under single duty-standby pump operation, the anticipated flow velocity within the DN100 rising main is approximately 1.3 m/s, which is in compliance with minimum velocity requirements.

  Final pump selection and motor sizing will be undertaken during the detailed design stage.

Refer to Figure 2 below for a schematic of the proposed sewer network and Appendix 4 for detailed modelling results.



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H2ONE PM:	J May

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Logan City DC QLD 4114

Precinct 1 - Riverbend QLD Water Supply and Sewer PNP Modelling Assessment

Figure 2. Concept layout of the sewer PNP for Precinct 1

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3.2 Water Supply Precinct Network Plan (PNP)

The proposed water supply PNP was modelled at ultimate development of Precinct 1, with a subsequent staging analysis to ensure minimum DSS are achieved at each development stage. This was undertaken on the basis that the future "MPR-T1002" and "MPR-T1005" Flagstone storage tanks are not yet operational. Key outcomes are as follows.

- The proposed water supply network will consist of approximately 16.7 km's of water supply mains. Refer to Table 4 below for further details.

Table 4. Summary of proposed water supply infrastructure to service the development

Description	Location	Pipe Diameter (DN mm)	Length (m)
Retic. water pipe	Throughout Precinct 1	DN100	6,900
Retic. water pipe	Throughout Precinct 1	DN150	6,050
Trunk water pipe	Primary road running west to east	DN250	1,870
Trunk water pipe	Primary road access running north to south from Teviot Rd	DN300	1,050
Trunk water pipe	Primary road access running north to south from Teviot Rd	DN375	840

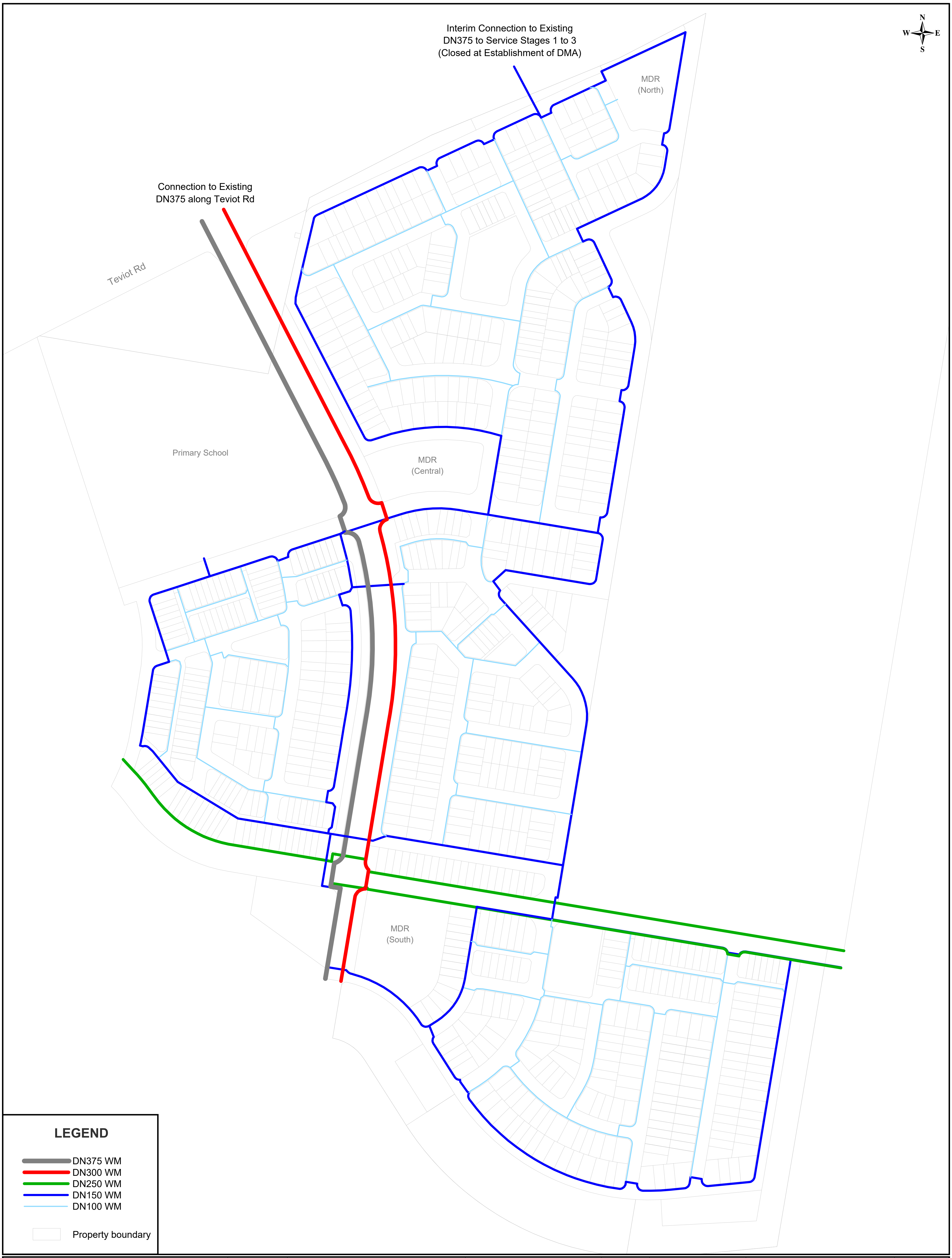
- Across all development scenarios for Precinct 1, the minimum standard flow and fire flow pressures were 34.6 m (node P1-53) and 40.1 m (node P1-85), respectively. These results comply with LWA's minimum pressure requirements of 22 m under standard flow and 12 m under fire flow conditions.
- The maximum pipe velocity recorded within the network was 0.7 m/s, with a maximum friction loss of 3.13 m/km occurring in pipe "P1-11.P1-92.1". Both values are within LWA's design criteria.
- The planned DN300 and DN375 trunk mains along the primary road corridor are anticipated to be installed as part of Stage 4 development. In the interim, a DN150 connection is proposed at the entrance to Stage 1 to supply the reticulation network servicing Stages 1 to 3. This arrangement will remain in place until the trunk mains are constructed, at which point the connection will be closed with the establishment of the DMA boundary. This connection is planned to remain permanent and provide an additional level of redundancy to the local network.
- As identified in H2One's Riverbend IMP report, the Water Treatment Plant (WTP) pump station located immediately south of Riverbend is critical to the performance of the wider Round Mountain supply network. This is because the Round Mountain tanks do not have sufficient head to overcome friction losses through the existing trunk main system.

  This was further confirmed through the assessment of the Precinct 1 PNP, where the WTP pumps were required to operate during the peak demand event to maintain minimum pressures within both Riverbend and the wider network. For example, approximately 45 nodes within Precinct 1 experienced a momentary drop below the minimum standard flow pressure requirement (22 m), with the lowest pressure observed at 13.0 m.

  It is therefore recommended that LWA ensures appropriate operational controls (e.g. pressure controls) are in place at the WTP pump station, prior to the installation of the Flagstone storage tanks. Operation of the pumps based solely on reservoir levels may not be sufficient under certain demand conditions, such as when the tanks are full and a temporary increase in peak demand occurs.

- Precinct 1 will include the construction of trunk pipelines that will initially experience limited utilisation, as these assets are being installed in readiness to service subsequent precincts. To mitigate potential water quality issues associated with low flows, it is recommended that a scheduled flushing program be implemented following commissioning of the assets and/or temporary cross-connections to the reticulation network be constructed to promote improved network circulation.

Refer to Figure 3 below for the proposed water supply PNP layout, and Appendix 5 for detailed modelling results.



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Precinct 1 - Riverbend QLD
Water Supply and Sewer
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Figure 3. Concept layout of the water supply PNP for Precinct 1

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4 CONCLUSION

Colliers Pty Ltd developed a water supply and sewer Precinct Network Plan (PNP) for Precinct 1 of the 'Riverbend' property, located within the broader Flagstone Priority Development Area (PDA). This was to progress initial development of the properties owned by Celestino Development Pty Ltd, consisting of Lots 101, 102, 104, 105 and 106 on SP254145 and Lot 800 on SP247625, as shown in Figure 4 below.

Figure 4. Location of the ultimate development area (Source: Colliers Pty Ltd, 2024)

Economic Development Queensland (EDQ) requested a modelling assessment of the "Riverbend, Precinct 1" PNP, to confirm the overall service strategy and confirm sizing of the relevant infrastructure. A summary of the service strategy developed by Colliers Pty Ltd and H2One Pty Ltd, as part of this study, is presented below.

- *Sewer*: Precinct 1 will be serviced by a DN150 to DN525 gravity sewer network discharging to two (2) Sewer Pump Stations (SPS). The primary SPS, located to the eastern side of the site, will convey the full catchment loading directly to the Sewage Treatment Plant (STP) situated south of the Logan River. A secondary, smaller SPS will be constructed to the north to service areas where surface levels fall away from the central SPS catchment.

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  At ultimate development, the broader Riverbend area is intended to operate under approximately eight DMA's. The lower-lying areas will be supplied from the future Flagstone storage reservoirs located west of Riverbend, while the elevated areas will be supplied from the Round Mountain reservoir to the north. A temporary booster pump station is proposed to service the higher-elevation properties until the Flagstone reservoirs are constructed (currently anticipated around 2040).

Riverbend Precincts 1 and 2 will be gravity supplied from the Round Mountain reservoir, with the temporary booster pump station to be implemented from the progression of Precinct 3.

On behalf of Colliers Pty Ltd, H2One Pty Ltd was engaged to undertake a modelling assessment of the proposed PNP's, in accordance with Logan Water Alliance's (LWA) minimum Desired Standards of Service (DSS). The hydraulic analysis identified that the proposed PNP's should theoretically operate within LWA's minimum design standard, prior to the installation of the Flagstone Tanks anticipated for the 2041 planning horizon.

It is therefore recommended that EDQ and LWA review the PNP's presented in this report and approve the general service strategy and infrastructure sizing. The findings in this report were based on LWA's latest planning model and may not consider recent changes to infrastructure and/or development timing within the greater Flagstone area.

Detailed modelling results and concept layout plans can be observed in Appendices 1 through 5.

5 REFERENCE LIST

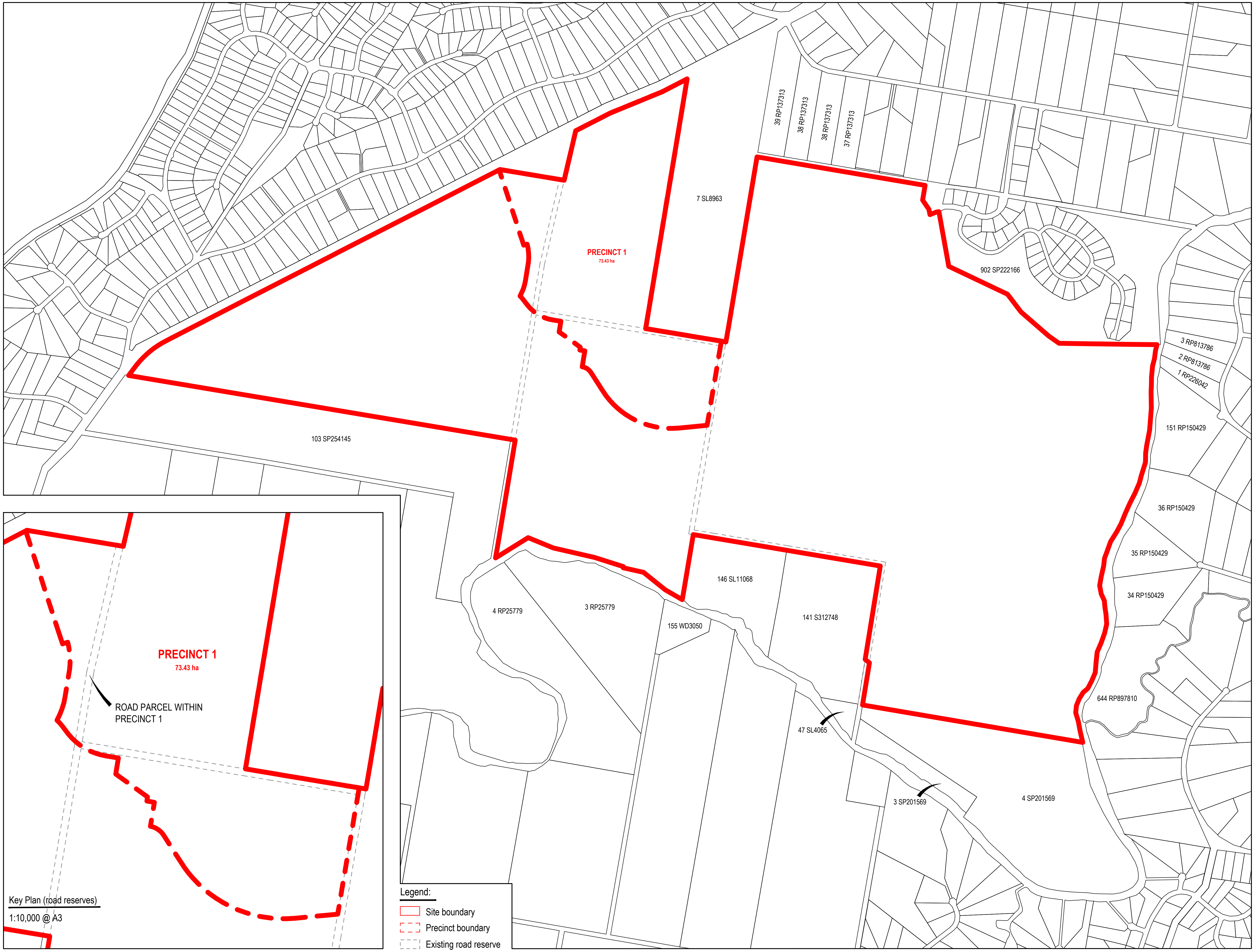
LWA. (2025). *Desired Standards of Service*. Logan City QLD

Colliers Pty Ltd. (2024) *Riverbend Water and Wastewater Infrastructure Master Plan*. Buddina QLD

H2One Pty Ltd. (2025) *Riverbend, Qld Water Supply and Sewer Infrastructure Master Plan (IMP) Modelling Assessment*. Sunshine Coast QLD

6 APPENDICES

Appendix 1. Riverbend Precinct 1 development and staging layout plans



place design group.

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PROJECT

RIVERBEND

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CELESTINO

NOTES

ALL LOT NUMBER AND DIMENSIONS (INCLUDING AREAS) ARE APPROXIMATE ONLY AND SUBJECT TO FURTHER DESIGN DEVELOPMENT.

ALL DIMENSIONS HAVE BEEN ROUNDED TO THE NEAREST 0.1 METRES AND ALL AREAS HAVE BEEN ROUND TO THE NEAREST SQUARE METRE.

THE BOUNDARIES ON THIS PLAN SHOULD NOT BE USED FOR THE FINAL DESIGN AND ARE SUBJECT TO FINAL DETAILED DESIGN BY ENGINEERS.

INFORMATION ON THIS PLAN ARE FROM THE FOLLOWING SOURCES:

SITE BOUNDARIES: COLLIERS (JANUARY 2026)
ADJOINING CADASTRE: QSPATIAL
DESIGN CONTOURS: COLLIERS (FEBRUARY 2026)
EXISTING CONTOURS: COLLIERS (JANUARY 2026)

ISSUE	CODE	ISSUE DESCRIPTION	BY	CHK	DATE
-	PRE	DRAFT ISSUE	NV	NV	05/09/2025
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B	PRE	FINAL ISSUE	NV	NV	30/09/2025
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E	PRE	FINAL ISSUE	NV	NV	10/03/2026
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PRE - Preliminary | CA - Council Approval | T - Tender | CON - Construction

DRAWING TITLE

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OVERALL PRECINCT 1

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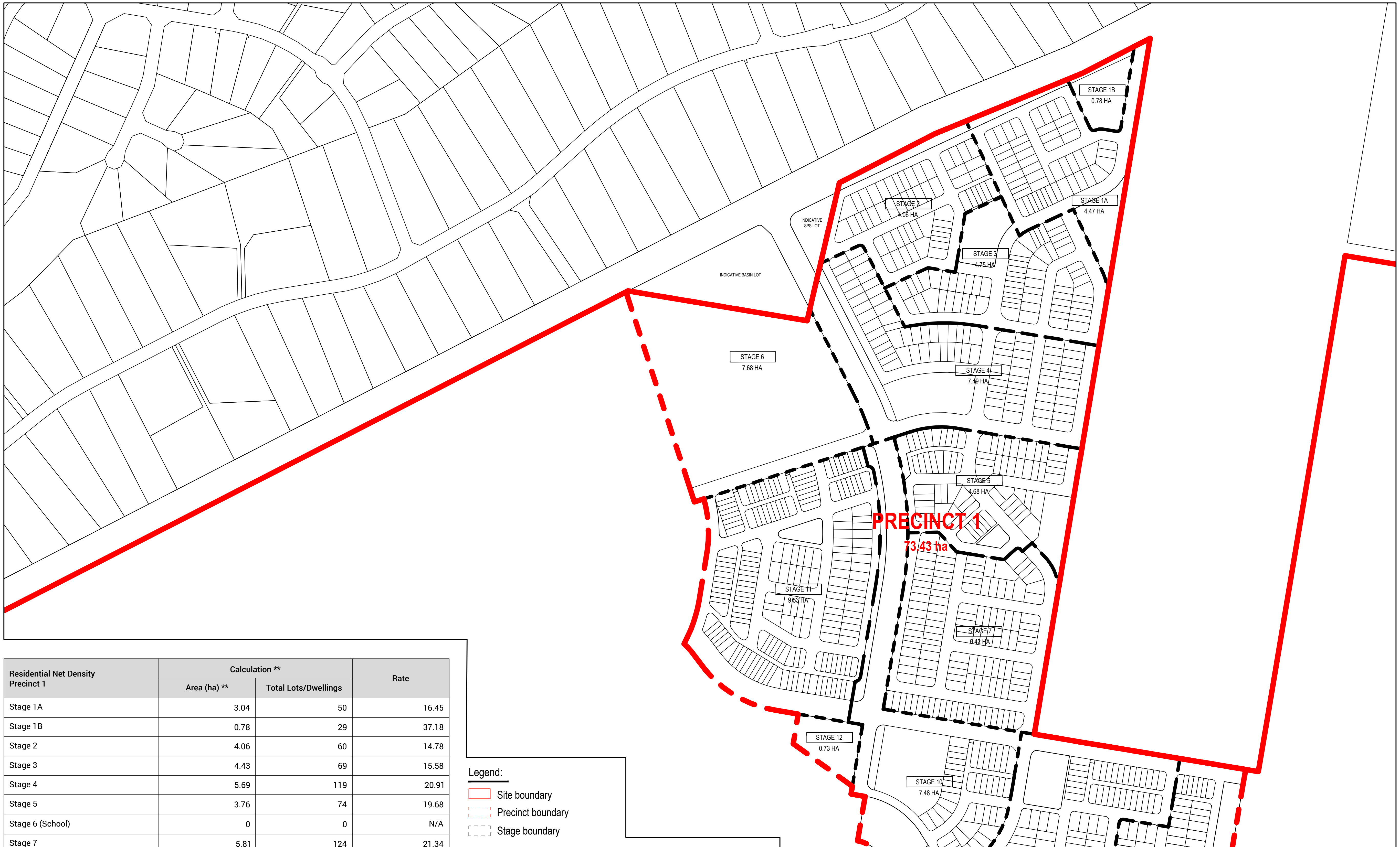
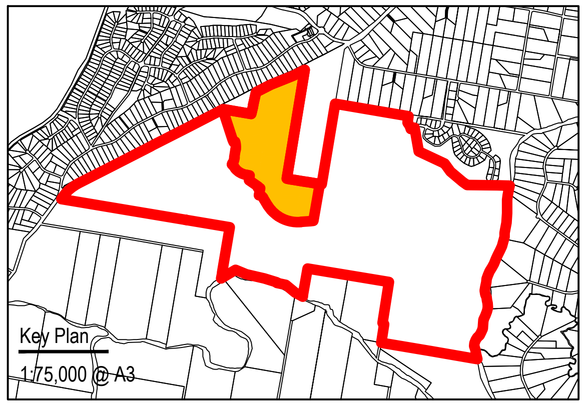


Residential Net Density Precinct 1	Calculation **		Rate
	Area (ha) **	Total Lots/Dwellings	
Stage 1A	3.04	50	16.45
Stage 1B	0.78	29	37.18
Stage 2	4.06	60	14.78
Stage 3	4.43	69	15.58
Stage 4	5.69	119	20.91
Stage 5	3.76	74	19.68
Stage 6 (School)	0	0	N/A
Stage 7	5.81	124	21.34
Stage 8	6.50	100	15.38
Stage 9	3.86	83	21.50
Stage 10	3.97	90	22.67
Stage 11	8.55	176	20.58
Stage 12 (Temp. Stormwater Basin)	0	0	N/A
Precinct 1 Total	**50.45**	**974**	**19.31**

** EDQ PDA Guideline No. 01 (Residential 30) definition of net residential density: the number of residential lots/dwellings divided by the area of residential lots/dwellings, local roads and local parks

Legend:

- Site boundary
- Precinct boundary
- Stage boundary



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C	PRE	DRAFT ISSUE	NV	NV	02/02/2026
D	PRE	FINAL ISSUE	NV	NV	04/03/2026
E	PRE	FINAL ISSUE	NV	NV	10/03/2026
F	PRE	FINAL ISSUE	NV	NV	12/03/2026

PRE - Preliminary | CA - Council Approval | T - Tender | CON - Construction

DRAWING TITLE

PRECINCT 1 -
STAGING PLAN

DESIGN : TD
DOCUMENT : TD / NV
PROJECT : 4123001
1:6,000 @ A3

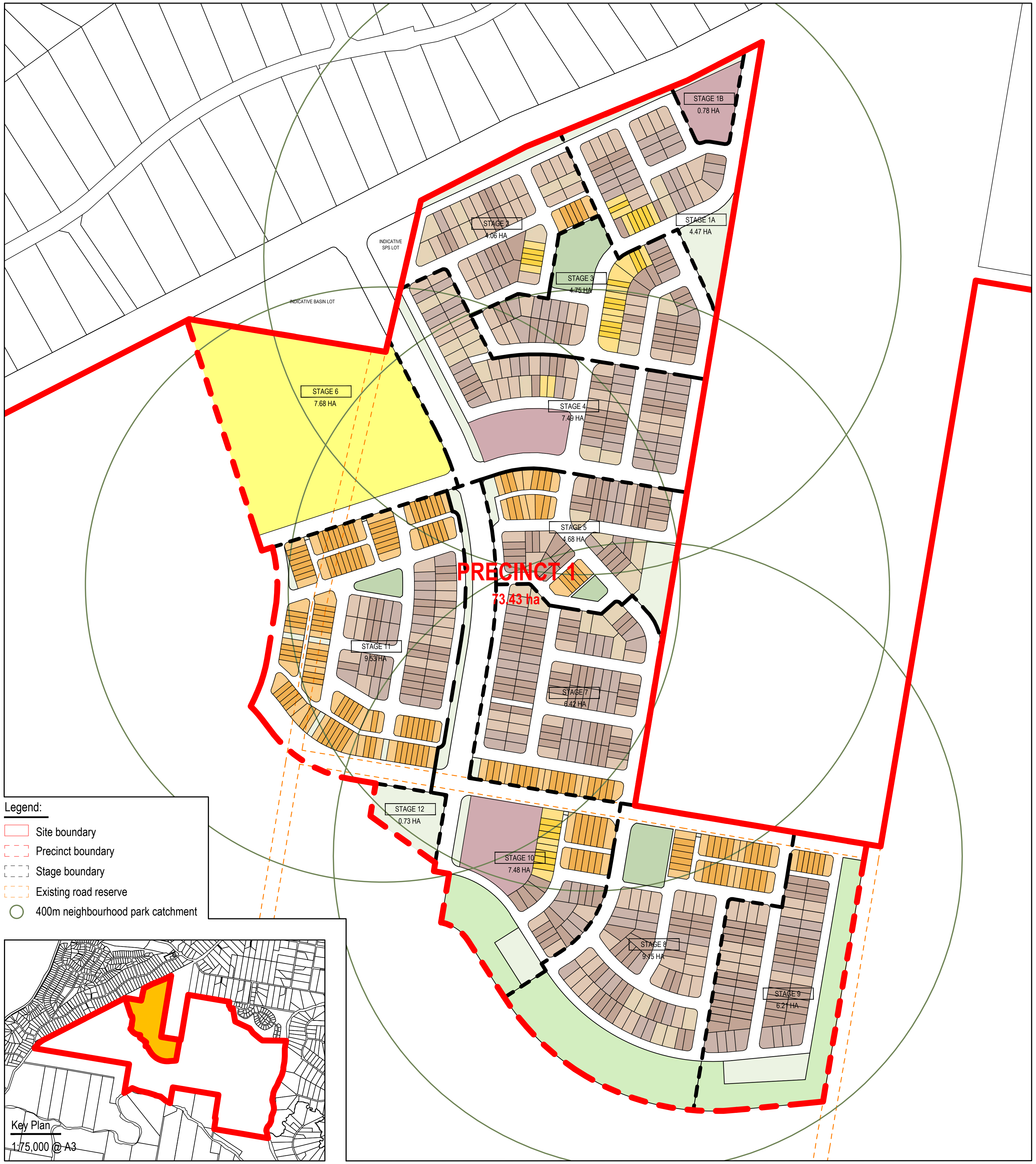
NORTH

0 50 100 150 200

DRAWING NUMBER 4123001 - 27
REVISION F

Yield Summary Precinct 1 Summary	Typical Dimensions	Typical Area	Precinct 1		
			No. of Lots	%	Area (ha)
Lot Type					
30m Deep Attached (Terrace) Allotment (30 dw/ha)					
7.5m Front-Loaded Terrace Allotment	7.5m x 30.0m	225m²	22	2.53%	0.52
9.0m Front-Loaded Terrace Allotment	9.0m x 30.0m	270m²	20	2.30%	0.68
7.5m Rear-Loaded Terrace Allotment	7.5m x 30.0m	225m²	148	16.99%	3.72
9.0m Rear-Loaded Terrace Allotment	9.0m x 30.0m	270m²	74	8.50%	2.53
Sub Total			**264**	**30.31%**	**7.45**
30m Deep Detached Allotment (18 dw/ha)					
10.0m Villa Allotment	10.0m x 30.0m	300m²	241	27.67%	7.72
12.5m Premium Villa Allotment	12.5m x 30.0m	375m²	157	18.03%	6.33
14.0m Courtyard Allotment	14.0m x 30.0m	420m²	157	18.03%	7.05
16.0m Premium Courtyard Allotment	16.0m x 30.0m	480m²	36	4.13%	2.04
Sub Total			**591**	**67.85%**	**23.14**
Sub Total Residential Allotment Yield			**855**	**98.16%**	**30.59**
Additional Allotment Type					
Medium Density Site	-	-	3	0.34%	2.68
Primary School	-	-	1	0.11%	7.00
Local Linear Park	-	-	3	0.34%	4.66
Local and Neighbourhood Recreation Park	-	-	4	0.46%	1.38
Stormwater Management	-	-	5	0.57%	2.52
Total Additional Allotment Type Yield			**16**	**1.84%**	**18.24**
Total Allotments			**871**	**100.00%**	**48.83**
Maximum Potential Residential Dwellings					
Optional Duplex Allotments	-	-	12	-	-
Medium Density Sites (site density 40 dw/ha)	-	-	107	-	-
Sub Total Maximum Potential Residential Dwellings			**119**	-	-
Total Maximum Potential Residential Dwellings			**974**	-	**33.27**
Maximum Potential Net Residential Density				19.31 dw/ha	

Land Budget Summary Precinct 1 Summary	Summary	
	Area (ha)	%
Land Use Type		
Residential		
Low Density Residential	23.14	31.51%
Low-Medium Density Residential	7.45	10.15%
Medium Density Site	2.68	3.65%
Sub Total	**33.27**	**45.31%**
Open Space		
Local Linear Parks	4.66	6.35%
Local and Neighbourhood Recreation Parks	1.38	1.88%
Linear Pockets (incl. Earth Mounds and Pedestrian Links)	1.80	2.45%
Stormwater Management	2.52	3.43%
Sub Total	**10.36**	**14.11%**
Education		
Primary School	7.00	9.53%
Sub Total	**7.00**	**9.53%**
Services and Street Network		
Trunk and Neighbourhood Connectors	8.80	11.98%
Local Street Network	14.00	19.07%
Sub Total	**22.80**	**31.05%**
Proposed Total	**73.43**	**100.00%**
Existing road reserve	*-2.80*	-
Proposed total area less existing road reserve	*70.63*	-



place design group.

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PROJECT

RIVERBEND

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NOTES

ALL LOT NUMBER AND DIMENSIONS (INCLUDING AREAS) ARE APPROXIMATE ONLY AND SUBJECT TO FURTHER DESIGN DEVELOPMENT.

ALL DIMENSIONS HAVE BEEN ROUNDED TO THE NEAREST 0.1 METRES AND ALL AREAS HAVE BEEN ROUND TO THE NEAREST SQUARE METRE.

THE BOUNDARIES ON THIS PLAN SHOULD NOT BE USED FOR THE FINAL DESIGN AND ARE SUBJECT TO FINAL DETAILED DESIGN BY ENGINEERS.

INFORMATION ON THIS PLAN ARE FROM THE FOLLOWING SOURCES:

SITE BOUNDARIES: COLLIERS (JANUARY 2026)
ADJOINING CADASTRE: QSPATIAL
DESIGN CONTOURS: COLLIERS (FEBRUARY 2026)
EXISTING CONTOURS: COLLIERS (JANUARY 2026)

ISSUE	CODE	ISSUE DESCRIPTION	BY	CHK	DATE
-	PRE	DRAFT ISSUE	NV	NV	05/09/2025
A	PRE	DRAFT ISSUE	NV	NV	12/09/2025
B	PRE	FINAL CONSULTANT ISSUE	NV	NV	24/09/2025
C	PRE	FINAL CONSULTANT ISSUE	NV	NV	26/09/2025
D	PRE	FINAL ISSUE	NV	NV	30/09/2025
E	PRE	DRAFT ISSUE	NV	NV	02/02/2026
F	PRE	FINAL ISSUE	NV	NV	04/03/2026
G	PRE	FINAL ISSUE	NV	NV	10/03/2026
H	PRE	FINAL ISSUE	NV	NV	12/03/2026

PRE - Preliminary | CA - Council Approval | T - Tender | CON - Construction

DRAWING TITLE

PRECINCT 1 -
PLAN OF SUBDIVISION

DESIGN : TD
DOCUMENT : TD / NV
PROJECT : 4123001
1:6,000 @ A3

NORTH

0 50 100 150 200

DRAWING NUMBER 4123001 - 28
REVISION H

Yield Summary
Precinct 1

Yield Summary Precinct 1	Typical Dimensions	Typical Area	Stage 1A		Stage 1B		Stage 2		Stage 3		Stage 4		Stage 5		Stage 6		Stage 7		Stage 8		Stage 9		Stage 10		Stage 11		Stage 12		Total	
			No. of Lots	Area (ha)	No. of Lots	Area (ha)	No. of Lots	Area (ha)	No. of Lots	Area (ha)	No. of Lots	Area (ha)	No. of Lots	Area (ha)	No. of Lots	Area (ha)	No. of Lots	Area (ha)	No. of Lots	Area (ha)	No. of Lots	Area (ha)	No. of Lots	Area (ha)	No. of Lots	Area (ha)	No. of Lots	Area (ha)	No. of Lots	Area (ha)
Residential Allotment Type																														
30m Deep Attached (Terrace) Allotment (30 dw/ha)																														
7.5m Front-Loaded Terrace Allotment	7.5m x 30.0m	225m²	5	0.11	0	0.00	3	0.07	8	0.18	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	6	0.16	0	0.00	0	0.00	22	0.52
9.0m Front-Loaded Terrace Allotment	9.0m x 30.0m	270m²	4	0.12	0	0.00	2	0.06	8	0.30	2	0.06	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	4	0.14	0	0.00	0	0.00	20	0.68
7.5m Rear-Loaded Terrace Allotment	7.5m x 30.0m	225m²	0	0.00	0	0.00	4	0.10	0	0.00	0	0.00	13	0.35	0	0.00	14	0.38	21	0.57	5	0.11	10	0.33	81	1.88	0	0.00	148	3.72
9.0m Rear-Loaded Terrace Allotment	9.0m x 30.0m	270m²	0	0.00	0	0.00	2	0.08	0	0.00	0	0.00	10	0.33	0	0.00	8	0.23	10	0.30	2	0.07	4	0.18	38	1.34	0	0.00	74	2.53
Sub Total			**9**	**0.23**	**0**	**0.00**	**11**	**0.31**	**16**	**0.48**	**2**	**0.06**	**23**	**0.68**	**0**	**0.00**	**22**	**0.61**	**31**	**0.87**	**7**	**0.18**	**24**	**0.81**	**119**	**3.22**	**0**	**0.00**	**264**	**7.45**
30m Deep Detached Allotment (18 dw/ha)																														
10.0m Villa Allotment	10.0m x 30.0m	300m²	7	0.23	0	0.00	11	0.41	23	0.75	19	0.58	29	0.91	0	0.00	46	1.39	26	0.89	44	1.39	12	0.43	24	0.74	0	0.00	241	7.72
12.5m Premium Villa Allotment	12.5m x 30.0m	375m²	18	0.70	0	0.00	4	0.15	12	0.54	33	1.30	7	0.26	0	0.00	31	1.19	14	0.58	16	0.67	5	0.23	17	0.71	0	0.00	157	6.33
14.0m Courtyard Allotment	14.0m x 30.0m	420m²	14	0.64	0	0.00	24	1.06	13	0.59	23	1.03	8	0.39	0	0.00	16	0.70	24	1.10	16	0.68	3	0.15	16	0.71	0	0.00	157	7.05
16.0m Premium Courtyard Allotment	16.0m x 30.0m	480m²	2	0.10	0	0.00	7	0.39	2	0.12	10	0.52	4	0.27	0	0.00	6	0.38	5	0.26	0	0.00	0	0.00	0	0.00	0	0.00	36	2.04
Sub Total			**41**	**1.67**	**0**	**0.00**	**46**	**2.01**	**50**	**2.00**	**85**	**3.43**	**48**	**1.83**	**0**	**0.00**	**99**	**3.66**	**69**	**2.83**	**76**	**2.74**	**20**	**0.81**	**57**	**2.16**	**0**	**0.00**	**591**	**23.14**
Sub Total Residential Allotment Yield			**50**	**1.90**	**0**	**0.00**	**57**	**2.32**	**66**	**2.48**	**87**	**3.49**	**71**	**2.51**	**0**	**0.00**	**121**	**4.27**	**100**	**3.70**	**83**	**2.92**	**44**	**1.62**	**176**	**5.38**	**0**	**0.00**	**855**	**30.59**
Additional Allotment Type																														
Medium Density Site	-	-	0	0.00	1	0.69	0	0.00	0	0.00	1	0.82	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	1.17	0	0.00	0	0.00	3	2.68
Primary School	-	-	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	7.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	7.00
Local Linear Park	-	-	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	2.05	1	1.70	1	0.91	0	0.00	0	0.00	3	4.66
Local and Neighbourhood Recreation Park	-	-	0	0.00	0	0.00	0	0.00	1	0.61	0	0.00	1	0.10	0	0.00	0	0.00	1	0.50	0	0.00	0	0.00	1	0.17	0	0.00	4	1.38
Stormwater Management	-	-	1	0.61	0	0.00	0	0.00	0	0.00	0	0.00	1	0.48	0	0.00	0	0.00	0	0.00	1	0.41	1	0.29	0	0.00	1	0.73	5	2.52
Total Additional Allotment Type Yield			**1**	**0.61**	**1**	**0.69**	**0**	**0.00**	**1**	**0.61**	**1**	**0.82**	**2**	**0.58**	**1**	**7.00**	**0**	**0.00**	**2**	**2.55**	**2**	**2.11**	**3**	**2.37**	**1**	**0.17**	**1**	**0.73**	**16**	**18.24**
Total Allotments			**51**	**2.51**	**1**	**0.69**	**57**	**2.32**	**67**	**3.09**	**88**	**4.31**	**73**	**3.09**	**1**	**7.00**	**121**	**4.27**	**102**	**6.25**	**85**	**5.03**	**47**	**3.99**	**177**	**5.55**	**1**	**0.73**	**871**	**48.83**
Maximum Potential Residential Dwellings																														
Optional Duplex Allotments	-	-	0	-	0	-	3	-	3	-	0	-	3	-	0	-	3	-	0	-	0	-	0	-	0	-	0	-	12	-
Medium Density Sites (site density 40 dw/ha)	-	-	0	-	29	-	0	-	0	-	32	-	0	-	0	-	0	-	0	-	0	-	46	-	0	-	0	-	107	-
Sub Total Maximum Potential Residential Dwellings			**0**	**-**	**29**	**-**	**3**	**-**	**3**	**-**	**32**	**-**	**3**	**-**	**0**	**-**	**3**	**-**	**0**	**-**	**0**	**-**	**46**	**-**	**0**	**-**	**0**	**-**	**119**	**-**
Total Maximum Potential Residential Dwellings			**50**	**1.90**	**29**	**0.69**	**60**	**2.32**	**69**	**2.48**	**119**	**4.31**	**74**	**2.51**	**0**	**0.00**	**124**	**4.27**	**100**	**3.70**	**83**	**2.92**	**90**	**2.79**	**176**	**5.38**	**0**	**0.00**	**974**	**33.27**
Maximum Potential Net Residential Density			16.45 dw/ha		37.18 dw/ha		14.78 dw/ha		15.58 dw/ha		20.91 dw/ha		19.68 dw/ha		N/A		21.34 dw/ha		15.38 dw/ha		21.50 dw/ha		22.67 dw/ha		20.58 dw/ha		N/A		19.31 dw/ha	

Land Budget Summary
Precinct 1

Land Budget Summary Precinct 1	Stage 1A		Stage 1B		Stage 2		Stage 3		Stage 4		Stage 5		Stage 6		Stage 7		Stage 8		Stage 9		Stage 10		Stage 11		Stage 12		Total	
	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%
Land Use Type																												
Residential																												
Low Density Residential	1.67	37.36%	0.00	0.00%	2.01	49.51%	2.00	42.11%	3.43	45.79%	1.83	39.10%	0.00	0.00%	3.66	57.01%	2.83	30.93%	2.74	44.12%	0.81	10.83%	2.16	22.67%	0.00	0.00%	23.14	31.51%
Low-Medium Density Residential	0.23	5.15%	0.00	0.00%	0.31	7.64%	0.48	10.11%	0.06	0.80%	0.68	14.53%	0.00	0.00%	0.61	9.50%	0.87	9.51%	0.18	2.90%	0.81	10.83%	3.22	33.79%	0.00	0.00%	7.45	10.15%
Medium Density Site	0.00	0.00%	0.69	88.46%	0.00	0.00%	0.00	0.00%	0.82	10.95%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	1.17	15.64%	0.00	0.00%	0.00	0.00%	2.68	3.65%
Sub Total	**1.90**	**42.51%**	**0.69**	**88.46%**	**2.32**	**57.14%**	**2.48**	**52.21%**	**4.31**	**57.54%**	**2.51**	**53.63%**	**0.00**	**0.00%**	**4.27**	**66.51%**	**3.70**	**40.44%**	**2.92**	**47.02%**	**2.79**	**37.30%**	**5.38**	**56.45%**	**0.00**	**0.00%**	**33.27**	**45.31%**
Open Space																												
Local Linear Parks	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	2.05	22.40%	1.70	27.38%	0.91	12.17%	0.00	0.00%	0.00	0.00%	4.66	6.35%
Local and Neighbourhood Recreation Parks	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.61	12.84%	0.00	0.00%	0.10	2.14%	0.00	0.00%	0.00	0.00%	0.50	5.46%	0.00	0.00%	0.00	0.00%	0.17	1.78%	0.00	0.00%	1.38	1.88%
Linear Pockets (incl. Earth Mounds and Pedestrian Links)	0.19	4.25%	0.09	11.54%	0.32	7.88%	0.00	0.00%	0.32	4.27%	0.10	2.14%	0.00	0.00%	0.08	1.25%	0.00	0.00%	0.00	0.00%	0.56	7.49%	0.14	1.47%	0.00	0.00%	1.80	2.45%
Stormwater Management	0.61	13.65%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.48	10.26%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.41	6.60%	0.29	3.88%	0.00	0.00%	0.73	100.00%	2.52	3.43%
Sub Total	**0.80**	**17.90%**	**0.09**	**11.54%**	**0.32**	**7.88%**	**0.61**	**12.84%**	**0.32**	**4.27%**	**0.68**	**14.53%**	**0.00**	**0.00%**	**0.08**	**1.25%**	**2.55**	**27.87%**	**2.11**	**33.98%**	**1.76**	**23.53%**	**0.31**	**3.25%**	**0.73**	**100.00%**	**10.36**	**14.11%**
Education																												
Primary School	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	7.00	91.15%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	7.00	9.53%
Sub Total	**0.00**	**0.00%**	**0.00**	**0.00%**	**0.00**	**0.00%**	**0.00**	**0.00%**	**0.00**	**0.00%**	**0.00**	**0.00%**	**7.00**	**91.15%**	**0.00**	**0.00%**	**0.00**	**0.00%**	**0.00**	**0.00%**	**0.00**	**0.00%**	**0.00**	**0.00%**	**0.00**	**0.00%**	**7.00**	**9.53%**
Services and Street Network																												
Trunk and Neighbourhood Connectors	0.82	18.34%	0.00	0.00%	0.00	0.00%	0.32	6.74%	1.80	24.03%	0.44	9.40%	0.68	8.85%	0.61	9.50%	0.60	6.56%	0.24	3.86%	2.31	30.88%	0.98	10.28%	0.00	0.00%	8.80	11.98%
Local Street Network	0.95	21.25%	0.00	0.00%	1.42	34.98%	1.34	28.21%	1.06	14.15%	1.05	22.44%	0.00	0.00%	1.46	22.74%	2.30	25.14%	0.94	15.14%	0.62	8.29%	2.86	30.01%	0.00	0.00%	14.00	19.07%
Sub Total	**1.77**	**39.60%**	**0.00**	**0.00%**	**1.42**	**34.98%**	**1.66**	**34.95%**	**2.86**	**38.18%**	**1.49**	**31.84%**	**0.68**	**8.85%**	**2.07**	**32.24%**	**2.90**	**31.69%**	**1.18**	**19.00%**	**2.93**	**39.17%**	**3.84**	**40.29%**	**0.00**	**0.00%**	**22.80**	**31.05%**
Proposed Total	4.47	100.00%	0.78	100.00%	4.06	100.00%	4.75	100.00%	7.49	100.00%	4.68	100.00%	7.68	100.00%	6.42	100.00%	9.15	100.00%	6.21	100.00%	7.48	100.00%	9.53	100.00%	0.73	100.00%	73.43	100.00%
Existing road reserve	*0.00*	-	*0.00*	-	*0.00*	-	*0.00*	-	*0.00*	-	*0.00*	-	*-0.52*	-	*0.00*	-	*-0.50*	-	*-0.21*	-	*-0.50*	-	*-1.07*	-	*0.00*	-	*-2.80*	-
Proposed total area less existing road reserve	*4.47*	-	*0.78*	-	*4.06*	-	*4.75*	-	*7.49*	-	*4.68*	-	*7.16*	-	*6.42*	-	*8.65*	-	*6.00*	-	*6.98*	-	*8.46*	-	*0.73*	-	*70.63*	-

place design group.

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PROJECT

RIVERBEND

CLIENT

CELESTINO

NOTES

ALL LOT NUMBER AND DIMENSIONS (INCLUDING AREAS) ARE APPROXIMATE ONLY AND SUBJECT TO FURTHER DESIGN DEVELOPMENT.

ALL DIMENSIONS HAVE BEEN ROUNDED TO THE NEAREST 0.1 METRES AND ALL AREAS HAVE BEEN ROUND TO THE NEAREST SQUARE METRE.

THE BOUNDARIES ON THIS PLAN SHOULD NOT BE USED FOR THE FINAL DESIGN AND ARE SUBJECT TO FINAL DETAILED DESIGN BY ENGINEERS.

INFORMATION ON THIS PLAN ARE FROM THE FOLLOWING SOURCES:

SITE BOUNDARIES: COLLIERS (JANUARY 2026)
ADJOINING CADASTRE: QSPATIAL
DESIGN CONTOURS: COLLIERS (FEBRUARY 2026)
EXISTING CONTOURS: COLLIERS (JANUARY 2026)

ISSUE	CODE	ISSUE DESCRIPTION	BY	CHK	DATE
-	PRE	DRAFT ISSUE	NV	NV	05/09/2025
A	PRE	DRAFT ISSUE	NV	NV	12/09/2025
B	PRE	FINAL CONSULTANT ISSUE	NV	NV	24/09/2025
C	PRE	FINAL CONSULTANT ISSUE	NV	NV	26/09/2025
D	PRE	FINAL ISSUE	NV	NV	30/09/2025
E	PRE	DRAFT ISSUE	NV	NV	02/02/2026
F	PRE	FINAL ISSUE	NV	NV	04/03/2026
G	PRE	FINAL ISSUE	NV	NV	10/03/2026
H	PRE	FINAL ISSUE	NV	NV	12/03/2026

PRE - Preliminary | CA - Council Approval | T - Tender | CON - Construction

DRAWING TITLE

PRECINCT 1 ROL - DEVELOPMENT STATISTICS

DESIGN : TD
DOCUMENT : TD / NV
PROJECT : 4123001
N / A

NORTH

DRAWING NUMBER 4123001 - 29
REVISION H

Appendix 2. LCC Desired Standards of Service

<table>
<tr><th colspan="5">Water Network Desired Standards of Service (DSS)</th></tr>
<tr><th>Parameter</th><th colspan="4">Criteria</th></tr>
<tr><td colspan="5">Water demand</td></tr>
<tr><td rowspan="2">Average Day Demand (ADD)</td><td colspan="4">On demand areas - 190 L/EP/d. Based on 165 L/EP/d residential consumption + allowance for leakage/losses (25 L/EP/d).</td></tr>
<tr><td colspan="4">Constant flow areas -190 L/EP/d. Based on 165 L/EP/d residential consumption + allowance for leakage/losses (25 L/EP/d).</td></tr>
<tr><td>Peaking factors</td><td>Category</td><td>MDMM/AD</td><td>MD/AD</td><td>PH/AD</td></tr>
<tr><td rowspan="6">Guidance Note:
Peaking factors are to be applied to the residential component of demand, i.e. 165 L/EP/d. Leakage /loss levels will remain constant throughout all demand categories and should only be appended after any peaking escalation has occurred.</td><td>Residential detached</td><td>1.3</td><td>1.7</td><td>3.1</td></tr>
<tr><td>Residential attached</td><td>1.3</td><td>1.6</td><td>2.6</td></tr>
<tr><td>Rural residential / Constant flow</td><td>1</td><td>1</td><td>1.5</td></tr>
<tr><td>Commercial</td><td>1.2</td><td>1.3</td><td>2.0</td></tr>
<tr><td>Industry</td><td>1.2</td><td>1.3</td><td>1.7</td></tr>
<tr><td>Parks / Open space</td><td>1.2</td><td>1.3</td><td>1.7</td></tr>
<tr><td colspan="5">System planning</td></tr>
<tr><td>Bulk supply and reticulation</td><td colspan="4">3 days of MDMM. Reservoirs to have a net positive inflow and capable of continuous operation and not fall below the emergency level.
3 days of MD. Reservoirs should not fall below the emergency level.
5 days of AD. Reservoirs should fill from empty to full.</td></tr>
<tr><td colspan="5">Service pressures</td></tr>
<tr><td rowspan="2">Minimum operating pressure at PH</td><td colspan="4">On demand areas – 22m at the property boundary based on reservoir at minimum operating level (MOL). MOL defined as 15% of storage height or top of emergency storage.</td></tr>
<tr><td colspan="4">Constant flow areas – 10m at the property boundary based on reservoir at minimum operating level (MOL) MOL defined as 15% of storage height or top of emergency storage.</td></tr>
<tr><td>Maximum operating pressure</td><td colspan="4">80 m at the property boundary based on the reservoir at TWL</td></tr>
<tr><td>Target maximum operating pressure</td><td colspan="4">55 m at the property boundary based on the reservoir level at TWL</td></tr>
<tr><td colspan="5">Fire fighting</td></tr>
<tr><td rowspan="2">System pressure</td><td colspan="2">On demand areas</td><td colspan="2">12 m minimum at property boundary</td></tr>
<tr><td colspan="2">Constant flow areas</td><td colspan="2">no fire service provided</td></tr>
<tr><td rowspan="6">Fire flow</td><td colspan="2">Constant flow areas</td><td colspan="2">no fire service provided</td></tr>
<tr><td colspan="2">Rural Residential</td><td colspan="2">7.5 L/s for 2 hrs</td></tr>
<tr><td colspan="2">Rural Commercial / Industrial</td><td colspan="2">15 L/s for 2 hrs</td></tr>
<tr><td colspan="2">Residential</td><td colspan="2">15 L/s for 2 hrs</td></tr>
<tr><td colspan="2">Commercial & Industrial</td><td colspan="2">30 L/s for 4 hrs</td></tr>
<tr><td colspan="2">Special risk / hazard</td><td colspan="2">to be advised by Logan City Council (LCC)</td></tr>
<tr><td>Background demand</td><td colspan="4">2/3 PH (as per DEWS requirements)</td></tr>
<tr><td>Reservoir level</td><td colspan="4">Minimum Operating Level (MOL)</td></tr>
</table>

Water quality	
Drinking water quality	Drinking water to comply with the NHMRC Australian Drinking Water Guidelines
Reservoir storage	
Ground level storage capacity	3 (MD - MDMM) + (Emergency storage) Emergency Storage = 4 hr MDMM demand in zone or 0.5 ML whichever is greater.
Elevated storage capacity Guidance Note: In-line pressure booster pumping without high-level storage shall be considered where satisfactory pressures can be provided by gravity flow during low demand periods or booster failure can be mitigated to an acceptable level (risk assessment required) and where there is no other feasible means of providing adequate pressure.	6 (PH - 1/12 MDMM) + minimum firefighting reserve. *Fire Fighting reserve =* ***> 4800EP:*** • rural residential 0.11 ML • industry 0.54 ML • otherwise 0.22 ML **< 4800 EP:** • rural residential 0.05 ML • industry 0.43 ML • otherwise 0.11 ML
Pumping capacity	
Pump supplying a ground level reservoir	MDMM over 20 hrs
Pump supplying an elevated reservoir	(6PH – operating volume) / (6 x 3600) *Operating volume =* Elevated reservoir capacity - fire fighting reserve
Standby pump capacity	To match duty, except where more than one duty pump or as determined by risk assessment.
Reticulation booster pumps/pumped system	PH + fire flow
Pipeline assessment & design	
Main capacity	Raw water mains & trunk feeding ground level reservoir: MDMM for a gravity supply and MDMM over 20hrs for a pumped supply Trunk Mains feeding elevated reservoir: capacity of pumps: Reticulation Mains: PH + fire flow.
Mains size Guidance Note: New CF areas are not permitted by LCC.	Constant flow areas - where mains terminate in short runs such as cu- de-sacs minimum sizes that may be acceptable are: DN 63 up to 150 m from main DN 80 up to 350 m from main
	On demand areas - minimum reticulation main 100mm in residential areas and 150mm in commercial and industrial areas.

Friction default value

Existing Infrastructure

Colebrook White k values (mm)

Pipe Material	Pipeline Age (years)		
	< 10	10 to 25	> 25
Asbestos Cement	0.15	0.3	0.3
Plastic (UPVC, MDPE, Hobas, etc)	0.06	0.06	0.15
MSCL/DICL	0.3	0.3	0.6
CICL	0.3	0.3	0.6

Future Infrastructure

The design shall be conducted to achieve less than the following head losses:

a) 5 m head/km for ≤DN 150 (CIOD) or ≤DN 180 (ISO).
b) 3 m head/km for ≥DN 200 (CIOD) or ≥DN 250 (ISO).
c) Head loss shall be calculated using computer models or hydraulic formulas.

Maximum velocity	2.5 m/s At peak hour for trunk mains and at peak hour including fire flow for reticulation.

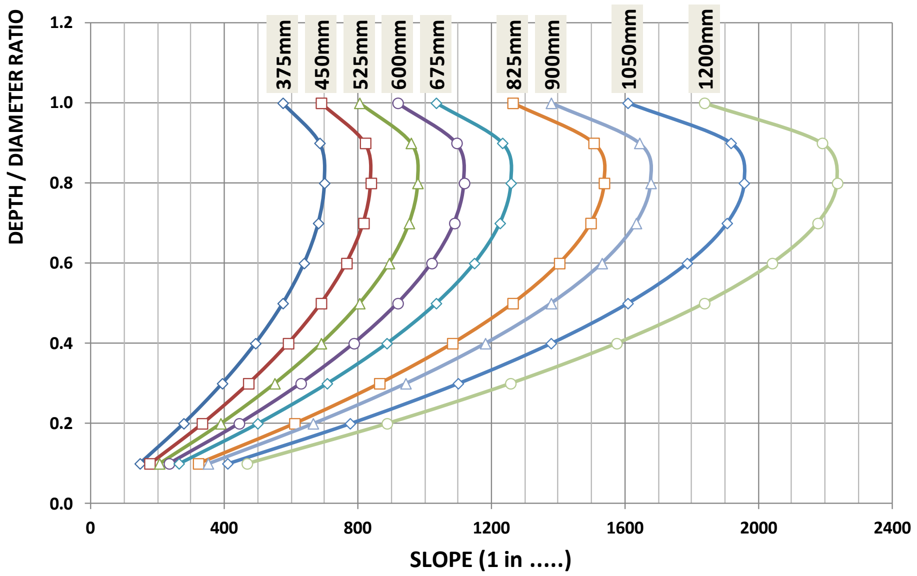
Standpipe and Hydrant Filling Points	
Hydraulic model	**<u>Planning Scenario</u>** All designated and planned standpipes and hydrant filling points are to be modelled at either anticipated flowrates or recorded flows from SCADA or field test (hourly patterns).
	<u>Operational Scenario</u> Operational scenario to be modelled at 15 min time steps to highlight actual likely impacts on network.
<u>Augmentation</u> – In general significant network augmentations would not be considered prudent to support new hydrant filing points. Alternate strategies such as relocation or management of hydrant filing point flows (while maintaining suitable service levels) should be considered to maintain DSS. Suitable service levels should be agreed with Council's Water Business & Customer Management team.	

WASTEWATER NETWORK DSS		
Parameter	**Criteria**	
Sewage load		
ADWF	165 L/EP/day	
PDWF	Use actual flow data; or *d x 165 L/EP/d or;* *d x 0.00191 x EP L/s* *Where:* $d = 0.01(\log A)^4 - 0.19(\log A)^3 + 1.4(\log A)^2 - 4.66\log A + 7.57$ *d = dry weather peaking factor* *A = gross plan area of development catchment, in hectares* *Refer to WSAA Sewerage Code of Australia; Part 1 Planning and Design*	
Overflow Frequency Standard for assessment of existing networks and planning and design of augmentations for existing networks This standard is only to be used by Council and their consultants	Master Planning; • Manholes: Maximum of 1 overflow per year • Sewer designated outlet: Maximum of 2 overflows per year Detailed Planning: • Acceptable network overflow frequency standard to be determined using a risk or effects based approach. The standard is to be determined in consultation with Council.	
PWWF For planning and design of wastewater networks servicing greenfield development This standard is to be used by developers, Council and their consultants	Residential	1000 L/EP/d (6.1xADWF)
	Non-residential	840 L/EP/d (5xADWF)
	High density residential (minimum 3 storey development)	PDWF+0.2 L/s/Ha
	Common Effluent Drainage	660 L/EP/d (4xADWF)
Gravity sewer design		
Flow equation	Colebrook White to be used for all applications – design and modelling	
Pipe roughness general	Colebrook White k = 1.5mm	
Maximum velocity @ PWWF	3 m/s	
Depth of flow @ PWWF - Existing	Up to 1m below MH surface level and no spillage through overflow structures	
Depth of flow @ PWWF - Proposed/ new sewers	75% of pipe depth	
Depth of flow @ PDWF – Existing and new sewers	Maximum 60% of pipe depth	
Minimum shear stress	Minimum grades are to be based on achieving self-cleansing shear stress of 1.6 Pa at 75% of PDWF. Self-cleansing shear stress should be met within 5 years of constructing a pipeline in a greenfield area. The designer must consider the operational implications of not meeting self-cleansing shear over any timeframe.	

<table>
<tr><td>Slime Stripping shear stress</td><td colspan="2">It is desirable where gradients permit to achieve slime stripping. A wall shear of 3.35Pa is required to achieve slime stripping.

Slime stripping shear should be achieved at PWWF. Where gravity mains are constructed in greenfield areas, the operational implications of not meeting slime stripping shear in the early years of growth are to be considered.</td></tr>
<tr><td rowspan="5">Minimum grades for self cleansing</td><td>Diameter (mm)</td><td>Grades (mm, 1 in X)</td></tr>
<tr><td>150</td><td>180 (80 in last section between last manholes or to an end)</td></tr>
<tr><td>225</td><td>300</td></tr>
<tr><td>300</td><td>400</td></tr>
<tr><td>375 - 1200</td><td>Minimum Grades are to be based on achieving Self Cleansing Shear Stress of 1.6 Pa at 75% PDWF, refer formula and figure below.

$$S_{min} = \frac{\tau}{\rho . g . R_p}$$
Where:
S_{min} = Minimum Grade
τ = Self Cleansing Shear Stress = 1.6 Pa
τ = Slime Stripping Shear Stress = 3.85 Pa
ρ = Density of Water = 1000 kg/m³
g = Gravitational constant = 9.8 m²/s
R_p = Hydraulic Radius Partial Full Pipe (m) = Wetted Perimeter / Cross sectional flow area



Note: Depth/Diameter ratio is based on flow conditions at PDWF</td></tr>
</table>

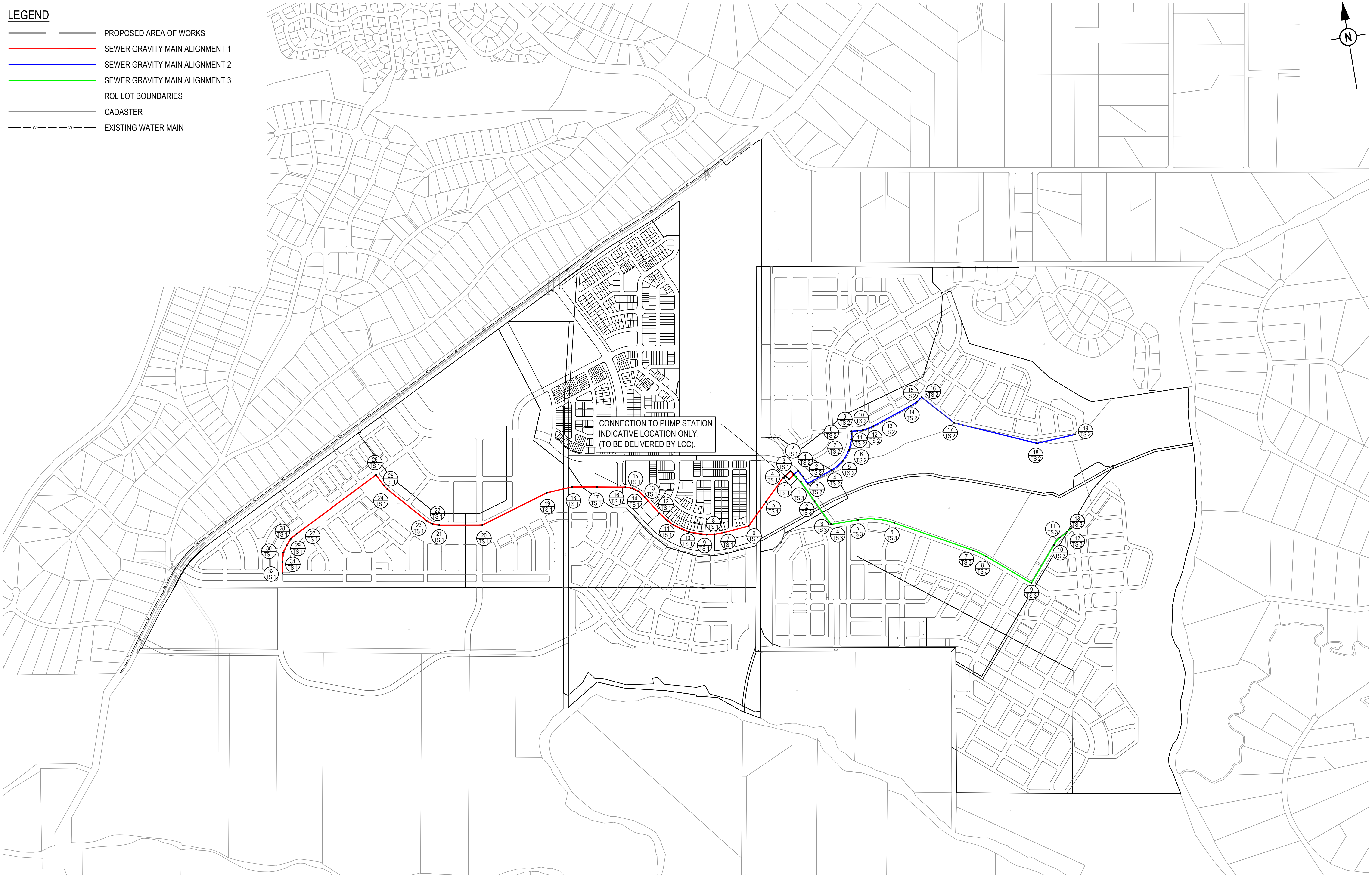
Gravity sewer design	
Flow criticality	If the gradient of a pipeline creates super critical flow conditions consideration must be given to appropriate manhole design to ensure flow disturbances do not occur. Flow criticality is determined by the Froude number: Fr<1.0 sub critical Fr= 1.0 critical Fr>1.0 super critical Where $Fr = \frac{v}{\sqrt{g\,D}}$ v=velocity m/s g=gravity m^2/s D=hydraulic depth (m)
Sewerage pump stations	
Wet well operating requirements	V (kL) = 0.9 x pump rate (L/s) N Where N is the acceptable number of starts per hour Pump Rate (L/s) = capacity of the largest duty pump N = 12 for motors <= 15 kW N = 8 for motors 15kW - 200 kW N = 5 for motors > 200 kW Control levels shall be based on Table 5.1 of WSA04-2005. The minimum depth between duty start and duty off is 100mm and ideally should be 300mm or greater.
Emergency storage	Emergency storage volume requirement to be based on containment of 2 hours of PDWF. Where actual measured flow data is available, then volume should be based on containing 2 hrs measured PDWF provided it takes into account any future growth. Except where otherwise specified to meet the requirements of the overflow risk assessment If there is an overflow pipe - storage in the system is measured between the high level alarm and overflow pipe invert level. If there is no overflow pipe - storage is measured between the high level alarm and 300mm below the lowest upstream manhole or top of wet well.
Pump capacity Guidance Note: As pump stations (PS) are typically categorised as trunk infrastructure this standard shall also apply to pump stations in RIGS networks.	If PWWF <20L/s, then 2 pumps (duty/standby arrangement) shall be provided, with each pump being capable of delivering PWWF. If PWWF >20L/s and <200L/s, then 2 pumps (duty/duty assist arrangement) shall be provided, with each pump being sized such that the two pumps running in parallel are capable of delivering PWWF. The minimum single pump capacity shall be not less than the calculated PDWF, where PDWF is a minimum of 2.5xADWF. If calculated PDWF has a peaking factor <2.5xADWF then 2.5 shall be used. All pump stations with a capacity greater than 200 L/s are to be designed on a case by case basis in consultation with Logan City Council. Pump stations that discharge directly to a WWTP are to be designed to minimise flow variability in wet and dry weather conditions.
NPSH	***Refer Clause 6.4 of WSA04-2005***

Rising mains	
Flow equation	Colebrook White to be used for all applications
Friction mains	For preliminary design a Colebrook White Roughness (k) of 0.6 mm is to be used. For detailed design, roughness shall be based on velocity and pipe roughness at end of pump design life. However, pumps should be able to operate (not necessarily meet design flow) for Colebrook White roughness's between manufacturers specified roughness for new pipes and 0.6 mm
Minimum velocity	Minimum Velocity to be based on: • achieving an absolute minimum self cleansing shear stress of 1.6 Pa at single pump flow • achieving slime stripping shear stress of 3.85 Pa at the greater of PWWF or maximum pump station pumping capacity • If slime stripping shear cannot be met with single pump flow a regular flushing regime is required to prevent slime build up. The wall shear is to be calculated using the following equation: $\tau = \rho . g . (D/4) \times (HL/L)$ Where: τ = Wall Shear Stress (minimum of 1.6 Pa required for self cleansing) HL =Frictional loss over main length of L based on Colebrook White (m) L =Length of main (m) ρ = Density of Water = 1000 kg/m^3 g =Gravitational constant = 9.8 m^2/s D =Internal Diameter of Pipe (m)
Maximum velocity	3.0 m/s proposed systems Manufacturer's specifications for new systems
Max detention time	Maximum time of detention in pressure main and SPS wet well is 6 hours [2 hours in wet well and 4 hours in rising main] (based on daily average flows) to minimise potential for odour / hydrogen sulphide generation. Where high retention times are likely to occur, odour / sulphide control measures will be required to the satisfaction of Logan City Council. ***(Refer WSA 07-2007-1.1 section 3.15)***
Reduced infiltration gravity sewers (RIGS) & NuSewers	
NuSewer	Are not permitted without Logan City Council approval
RIGS Design	Refer to ***SEQ WS&S D&C Code Section 6.7.2 Design Parameters***
Low pressure sewers / vacuum pumps	
Low pressure sewers / vacuum pumps	Are not preferred and will only be allowed subject to approval from Logan City Council.
Private pump stations and rising mains	
Private pump stations and rising mains	Private pump stations and rising mains are permitted for single users only and no connection or sharing will be permitted without approval from Logan City Council.
Common effluent drainage	
Common effluent drainage (CED)	Not permitted without approval from Logan City Council.

Appendix 3. Riverbend sewer trunk pipeline design plans

LEGEND

- PROPOSED AREA OF WORKS
- SEWER GRAVITY MAIN ALIGNMENT 1
- SEWER GRAVITY MAIN ALIGNMENT 2
- SEWER GRAVITY MAIN ALIGNMENT 3
- ROL LOT BOUNDARIES
- CADASTER
- EXISTING WATER MAIN



REV	DATE	DESIGN	DRAWN	REVISION DETAILS
A	10.03.26	LM	BP	ORIGINAL ISSUE

STATUS: ISSUED FOR APPROVAL

[DRAFT ONLY]

FOR AND ON BEHALF OF COLLIERS INTERNATIONAL ENGINEERING & DESIGN PTY LTD

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SCALE: 1:7500 A1, 1:15000 A3 (150 0 150 300)

CLIENT: **CELESTINO**

ASSOCIATED CONSULTANT: PLACE DESIGN GROUP (07) 3852 3922

PROJECT NAME: **RIVERBEND PRECINCT 1**
1294-1352 TEVIOT ROAD, RIVERBEND

DRAWING TITLE: **CONCEPT TRUNK SEWER LAYOUT PLAN**

PROJECT No.	DRAWING No.	REVISION
25-0093	DA-0610	A

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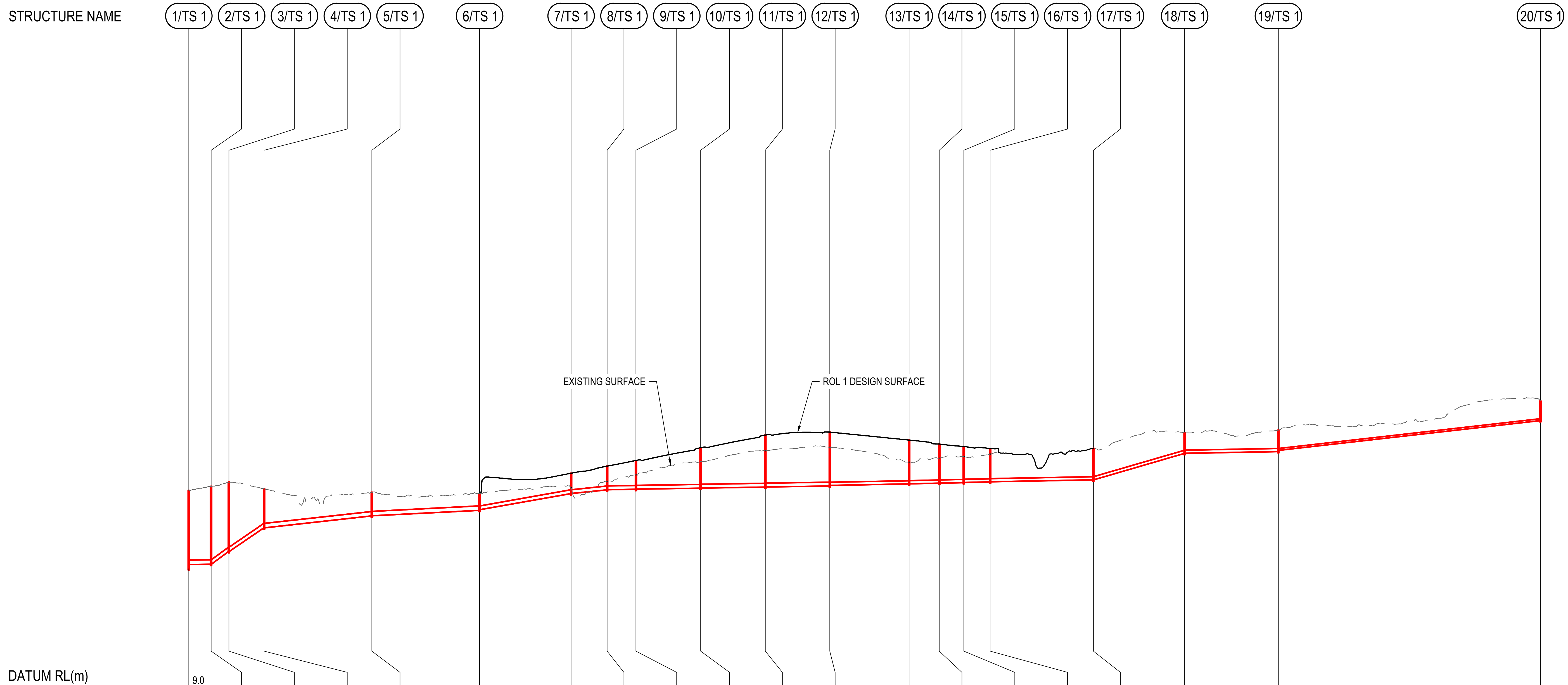

LAND USE / PIPE DIA & TYPE / PIPE GRADE (1 in x)

Pipe	Pipe Dia & Type	Pipe Grade (1 in x)	Length
1/TS 1 – 2/TS 1	uPVC SN6 DN525	1 IN 750	26.437
2/TS 1 – 3/TS 1	uPVC SN6 DN525	1 IN 14.286	21.075
3/TS 1 – 4/TS 1	uPVC SN6 DN525	1 IN 15.036	41.624
4/TS 1 – 5/TS 1	uPVC SN6 DN525	1 IN 90.909	127.481
5/TS 1 – 6/TS 1	uPVC SN6 DN525	1 IN 198	127.481
6/TS 1 – 7/TS 1	uPVC SN6 DN450	1 IN 57.052	108.356
7/TS 1 – 8/TS 1	uPVC SN6 DN450	1 IN 100.000	42.642
8/TS 1 – 9/TS 1	uPVC SN6 DN450	1 IN 700	34.099
9/TS 1 – 10/TS 1	uPVC SN6 DN450	1 IN 700	76.555
10/TS 1 – 11/TS 1	uPVC SN6 DN450	1 IN 700	76.570
11/TS 1 – 12/TS 1	uPVC SN6 DN450	1 IN 700	76.269
12/TS 1 – 13/TS 1	uPVC SN6 DN375	1 IN 550	93.899
13/TS 1 – 14/TS 1	uPVC SN6 DN375	1 IN 550	35.668
14/TS 1 – 15/TS 1	uPVC SN6 DN375	1 IN 550	29.043
15/TS 1 – 16/TS 1	uPVC SN6 DN375	1 IN 550	31.146
16/TS 1 – 17/TS 1	uPVC SN6 DN375	1 IN 550	122.210
17/TS 1 – 18/TS 1	uPVC SN6 DN375	1 IN 34.756	107.974
18/TS 1 – 19/TS 1	uPVC SN6 DN375	1 IN 550	110.919
19/TS 1 – 20/TS 1	uPVC SN6 DN225	1 IN 88.337	310.142

Structure	Junction Invert Level	Depth to Invert	Sewer Invert Level	Design Surface Level	Existing Surface Level	Setout	Running Chainage
1/TS 1		9.240 / 8.756	23.140 / 23.624	32.380	32.380	E496921.340 N6921516.046	0.000
2/TS 1	23.734	9.214 / 9.194	23.659 / 23.679	32.873	32.873	E496943.696 N6921530.158	26.437
3/TS 1		8.228 / 8.208	25.154 / 25.174	33.382	33.382	E496932.446 N6921547.980	47.512
4/TS 1		4.656 / 4.636	27.943 / 27.963	32.598	32.598	E496897.248 N6921525.760	89.137
5/TS 1		2.807 / 2.787	29.365 / 29.385	32.172	32.172	E496807.171 N6921435.552	216.618
6/TS 1		1.972 / 1.897	30.029 / 30.104	32.001	32.078	E496717.093 N6921345.345	344.098
7/TS 1		2.422 / 2.402	32.004 / 32.024	34.426	32.696	E496609.241 N6921334.913	452.454
8/TS 1		2.814 / 2.794	32.450 / 32.470	35.264	33.468	E496566.607 N6921334.062	495.096
9/TS 1		3.415 / 3.395	32.519 / 32.539	35.934	34.228	E496532.751 N6921338.124	529.195
10/TS 1		4.796 / 4.776	32.648 / 32.668	37.444	35.789	E496459.981 N6921361.899	605.750
11/TS 1		6.162 / 6.142	32.777 / 32.797	38.940	37.063	E496396.391 N6921404.552	682.320
12/TS 1		6.373 / 6.298	32.906 / 32.981	39.279	37.496	E496346.907 N6921462.589	758.590
13/TS 1		5.188 / 5.168	33.152 / 33.172	38.340	35.737	E496296.660 N6921541.913	852.489
14/TS 1		4.635 / 4.615	33.237 / 33.257	37.872	36.204	E496275.148 N6921570.364	888.157
15/TS 1		4.280 / 4.260	33.310 / 33.330	37.590	36.376	E496251.658 N6921587.445	917.200
16/TS 1		3.957 / 3.937	33.386 / 33.406	37.344	36.680	E496222.088 N6921597.226	948.346
17/TS 1		3.738 / 3.718	33.629 / 33.649	37.366	37.366	E496101.612 N6921617.737	1070.556
18/TS 1		2.440 / 2.420	36.755 / 36.775	39.195	39.195	E495995.169 N6921635.858	1178.530
19/TS 1		2.537 / 2.387	36.977 / 37.127	39.514	39.514	E495884.496 N6921628.475	1289.450
20/TS 1		2.325	40.638	42.963	42.963	E495588.030 N6921537.391	1599.592

LINE NUMBER: LINE TS 1

REVISION DETAILS | DRAWN | STATUS

ISSUED FOR APPROVAL

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SCALE: 1:2500 / 1:5000 (0 – 50 – 100) A1 / A3; 1:250 / 1:500 (5 – 0 – 5 – 10) A1 / A3

CLIENT: CELESTINO

ASSOCIATED CONSULTANT: PLACE DESIGN GROUP (07) 3852 3922

PROJECT NAME: RIVERBEND PRECINCT 1

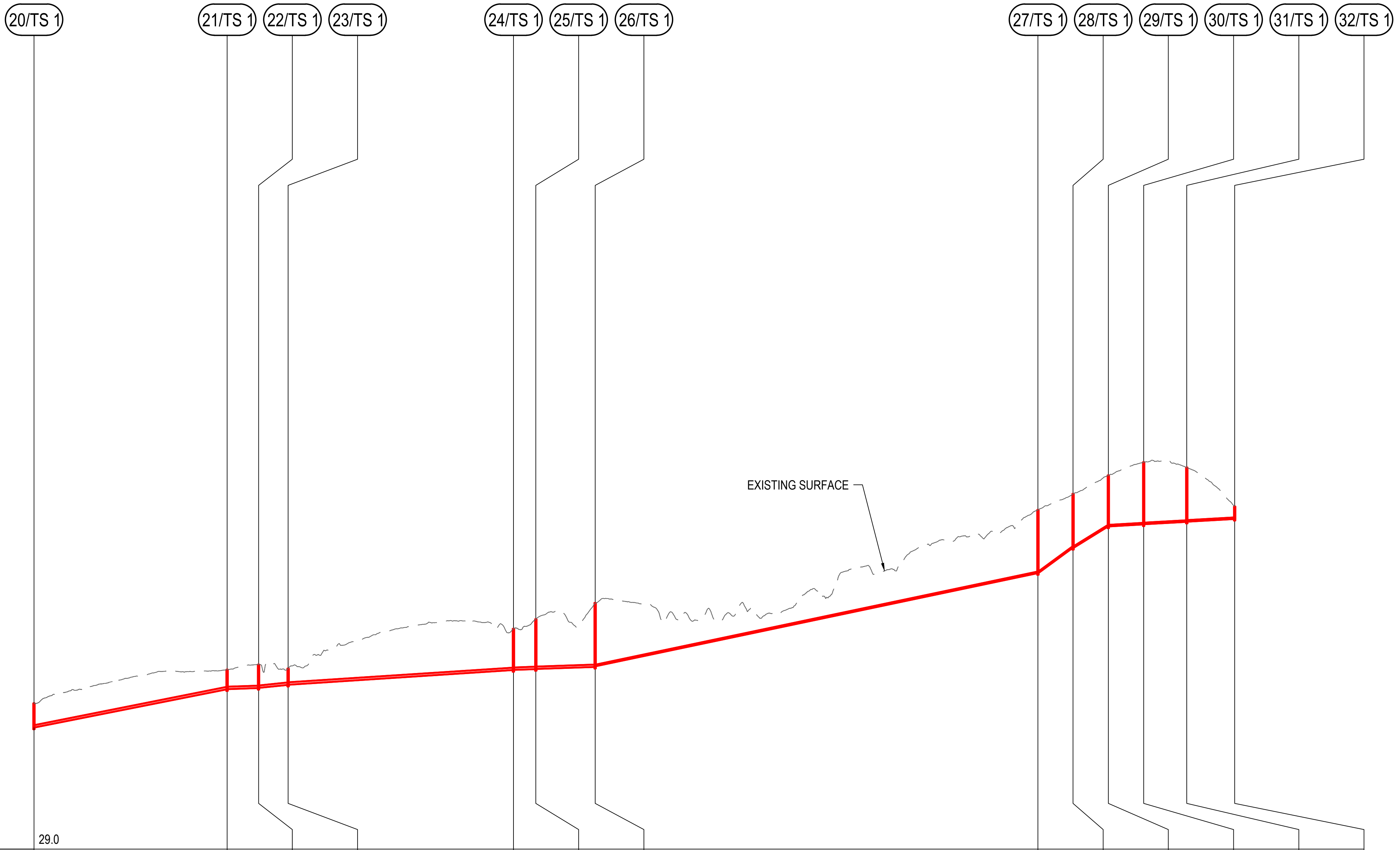
1294-1352 TEVIOT ROAD, RIVERBEND

DRAWING TITLE: CONCEPT TRUNK SEWER MAIN ALIGNMENT 1 LONGITUDINAL SECTION SHEET 1 OF 2

PROJECT No.: 25-0093

DRAWING No.: DA-0611

REVISION: A



LAND USE

PIPE DIA & TYPE	PIPE GRADE (1 in x)
uPVC SN6 DN225	1 IN 50.626
uPVC SN6 DN225	1 IN 300
uPVC SN6 DN225	1 IN 100.000
uPVC SN6 DN225	1 IN 154
uPVC SN6 DN225	1 IN 300
uPVC SN6 DN225	1 IN 300
uPVC SN6 DN150	1 IN 47.647
uPVC SN6 DN150	1 IN 14.031
uPVC SN6 DN150	1 IN 16.667
uPVC SN6 DN150	1 IN 180
uPVC SN6 DN150	1 IN 180
uPVC SN6 DN150	1 IN 180

STRUCTURE NAME	JUNCTION INVERT LEVEL	DEPTH TO INVERT	SEWER INVERT LEVEL	DESIGN SURFACE LEVEL	EXISTING SURFACE LEVEL	SETOUT	RUNNING CHAINAGE	LENGTH TO NEXT
20/TS 1		2.325 / 2.305	40.638 / 40.658	42.963	42.963	E495588.030 N6921537.391	1599.592	185.089
21/TS 1		1.877 / 1.857	44.314 / 44.334	46.191	46.191	E495405.435 N6921567.670	1784.680	30.129
22/TS 1		2.245 / 2.225	44.434 / 44.454	46.679	46.679	E495377.169 N6921578.099	1814.809	28.340
23/TS 1		1.558 / 1.538	44.738 / 44.758	46.296	46.296	E495354.826 N6921595.532	1843.149	215.932
24/TS 1		3.952 / 3.932	46.158 / 46.178	50.110	50.110	E495210.812 N6921756.426	2059.081	21.425
25/TS 1		4.777 / 4.757	46.250 / 46.270	51.027	51.027	E495198.682 N6921774.087	2080.506	56.883
26/TS 1		6.140 / 6.065	46.459 / 46.534	52.599	52.599	E495172.740 N6921824.710	2137.389	424.312
27/TS 1		6.064 / 6.044	55.440 / 55.460	61.504	61.504	E494795.124 N6921631.197	2561.702	33.659
28/TS 1		5.184 / 5.164	57.859 / 57.879	63.043	63.043	E494765.635 N6921614.970	2595.361	33.841
29/TS 1		4.911 / 4.891	59.909 / 59.929	64.820	64.820	E494744.161 N6921588.814	2629.202	33.844
30/TS 1		5.975 / 5.955	60.117 / 60.137	66.092	66.092	E494724.395 N6921561.342	2663.046	41.312
31/TS 1		5.206 / 5.186	60.367 / 60.387	65.572	65.572	E494714.663 N6921521.193	2704.358	45.900
32/TS 1		1.190	60.642	61.832	61.832	E494707.087 N6921475.923	2750.258	

LINE NUMBER: LINE TS 1

REV	DATE	DESIGN	DRAWN	REVISION DETAILS
A	10.03.26	LM	BP	ORIGINAL ISSUE

[DRAFT ONLY]

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SCALE 1:2500 1:5000 50 0 50 100 A1 A3
1:250 1:500 5 0 5 10 A1 A3

CLIENT: CELESTINO

ASSOCIATED CONSULTANT: PLACE DESIGN GROUP (07) 3852 3922

PROJECT NAME: RIVERBEND PRECINCT 1

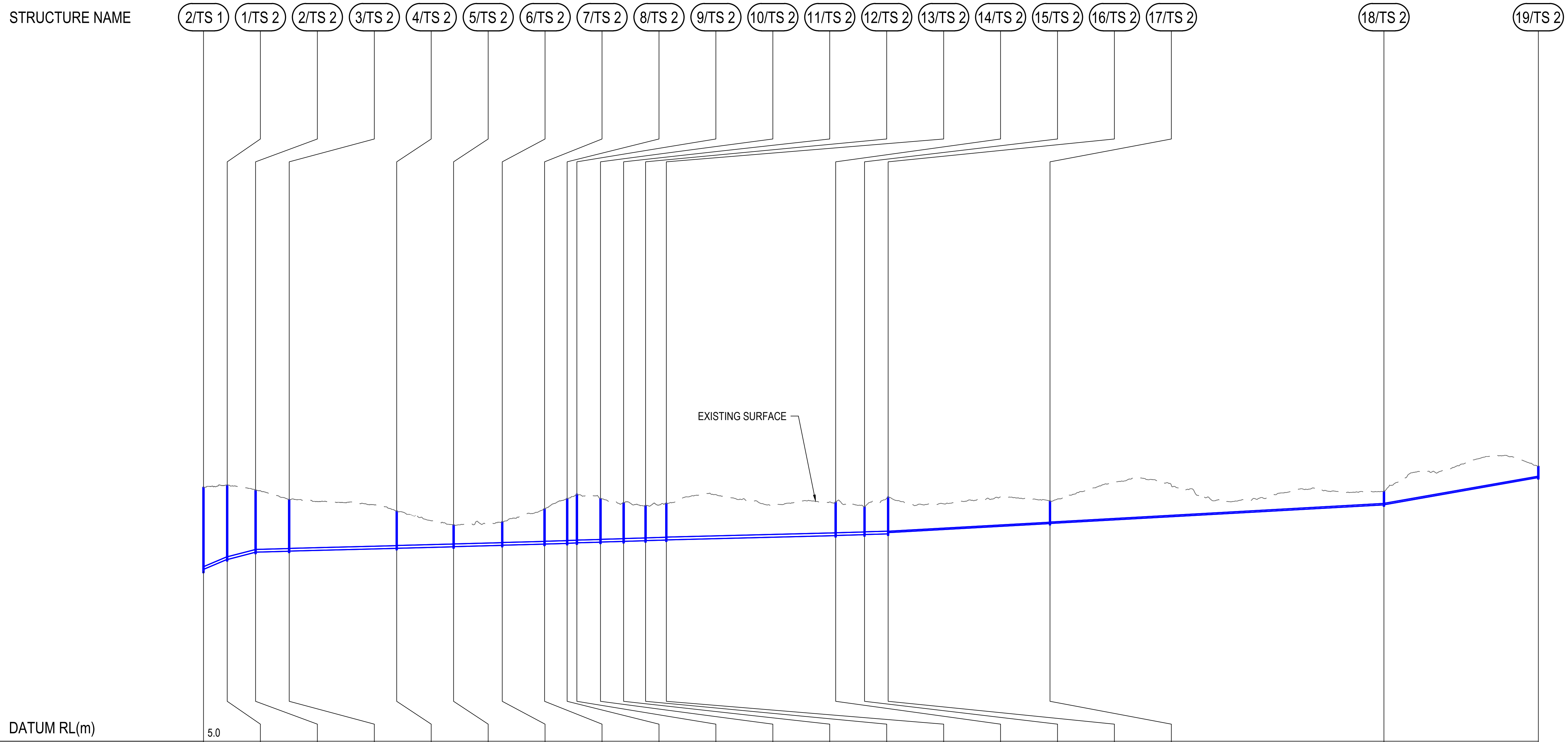
1294-1352 TEVIOT ROAD, RIVERBEND

DRAWING TITLE: CONCEPT TRUNK SEWER MAIN ALIGNMENT 1 LONGITUDINAL SECTION SHEET 2 OF 2

PROJECT No. 25-0093

DRAWING No. DA-0612

REVISION A



LAND USE / PIPE DIA & TYPE / PIPE GRADE (1 in x)

Segment	PIPE DIA & TYPE	PIPE GRADE (1 in x)	Length
2/TS 1 – 1/TS 2	uPVC SN6 DN300	1 IN 24.606	26.006
1/TS 2 – 2/TS 2	uPVC SN6 DN300	1 IN 40.000	31.182
2/TS 2 – 3/TS 2	uPVC SN6 DN300	1 IN 400	36.860
3/TS 2 – 4/TS 2	uPVC SN6 DN300	1 IN 400	118.046
4/TS 2 – 5/TS 2	uPVC SN6 DN300	1 IN 400	62.451
5/TS 2 – 6/TS 2	uPVC SN6 DN300	1 IN 400	53.430
6/TS 2 – 7/TS 2	uPVC SN6 DN300	1 IN 400	46.414
7/TS 2 – 8/TS 2	uPVC SN6 DN300	1 IN 400	24.854
8/TS 2 – 9/TS 2	uPVC SN6 DN300	1 IN 400	10.676
9/TS 2 – 10/TS 2	uPVC SN6 DN300	1 IN 400	25.912
10/TS 2 – 11/TS 2	uPVC SN6 DN300	1 IN 400	25.400
11/TS 2 – 12/TS 2	uPVC SN6 DN300	1 IN 400	24.084
12/TS 2 – 13/TS 2	uPVC SN6 DN300	1 IN 400	22.772
13/TS 2 – 14/TS 2	uPVC SN6 DN300	1 IN 400	185.914
14/TS 2 – 15/TS 2	uPVC SN6 DN300	1 IN 400	31.662
15/TS 2 – 16/TS 2	uPVC SN6 DN300	1 IN 400	25.932
16/TS 2 – 17/TS 2	uPVC SN6 DN150	1 IN 180	177.688
17/TS 2 – 18/TS 2	uPVC SN6 DN150	1 IN 180	366.626
18/TS 2 – 19/TS 2	uPVC SN6 DN150	1 IN 57.086	169.437

STRUCTURE NAME	JUNCTION INVERT LEVEL	DEPTH TO INVERT	SEWER INVERT LEVEL	DESIGN SURFACE LEVEL	EXISTING SURFACE LEVEL	SETOUT	RUNNING CHAINAGE
2/TS 1	23.734	9.214 / 8.989	23.659 / 23.884	32.873	32.873	E496943.696 N6921530.158	0.000
1/TS 2		8.175 / 8.155	24.941 / 24.961	33.116	33.116	E496965.687 N6921544.039	26.006
2/TS 2		6.810 / 6.790	25.740 / 25.760	32.551	32.551	E496981.166 N6921516.970	57.188
3/TS 2		5.681 / 5.661	25.852 / 25.872	31.533	31.533	E496997.049 N6921483.707	94.049
4/TS 2		4.106 / 4.086	26.168 / 26.188	30.273	30.273	E497108.061 N6921523.847	212.095
5/TS 2		2.405 / 2.385	26.344 / 26.364	28.748	28.748	E497161.790 N6921555.680	274.546
6/TS 2		2.601 / 2.581	26.497 / 26.517	29.099	29.099	E497195.697 N6921596.973	327.976
7/TS 2		3.867 / 3.847	26.633 / 26.653	30.500	30.500	E497213.244 N6921639.942	374.390
8/TS 2		4.915 / 4.895	26.715 / 26.735	31.631	31.631	E497217.547 N6921664.421	399.244
9/TS 2		5.357 / 5.337	26.762 / 26.782	32.119	32.119	E497218.608 N6921675.044	409.920
10/TS 2		4.792 / 4.772	26.847 / 26.867	31.638	31.638	E497244.392 N6921672.468	435.833
11/TS 2		4.244 / 4.224	26.930 / 26.950	31.175	31.175	E497269.785 N6921671.871	461.232
12/TS 2		3.851 / 3.831	27.011 / 27.031	30.862	30.862	E497293.682 N6921674.866	485.317
13/TS 2		4.036 / 4.016	27.088 / 27.108	31.124	31.124	E497315.660 N6921680.828	508.089
14/TS 2		3.660 / 3.640	27.572 / 27.592	31.232	31.232	E497491.355 N6921741.616	694.003
15/TS 2		3.053 / 3.033	27.672 / 27.692	30.724	30.724	E497520.161 N6921754.756	725.664
16/TS 2		4.051 / 3.901	27.756 / 27.906	31.807	31.807	E497541.557 N6921769.408	751.597
17/TS 2		2.469 / 2.449	28.894 / 28.914	31.362	31.362	E497661.191 N6921638.027	929.285
18/TS 2		1.479 / 1.459	30.950 / 30.970	32.430	32.430	E497997.804 N6921492.745	1295.911
19/TS 2		1.239	33.938	35.178	35.178	E498166.907 N6921503.368	1465.348

LINE NUMBER: LINE TS 2

[DRAFT ONLY]

ISSUED FOR APPROVAL

Colliers

SCALE: 1:2500 / 1:5000 — 50 0 50 100 (A1 / A3); 1:250 / 1:500 — 5 0 5 10 (A1 / A3)

CLIENT	PROJECT NAME	DRAWING TITLE
CELESTINO	RIVERBEND PRECINCT 1	CONCEPT TRUNK SEWER MAIN ALIGNMENT 2 LONGITUDINAL SECTION
ASSOCIATED CONSULTANT: PLACE DESIGN GROUP (07) 3852 3922	1294-1352 TEVIOT ROAD, RIVERBEND	PROJECT No. 25-0093 / DRAWING No. DA-0620 / REVISION A

LAND USE

PIPE DIA & TYPE / PIPE GRADE (1 in x)

Pipe length (from – to)	PIPE DIA & TYPE	PIPE GRADE (1 in x)	Length
2/TS 1 – 1/ST 3	uPVC SN6 DN450	1 IN 700	42.508
1/ST 3 – 2/ST 3	uPVC SN6 DN450	1 IN 700	102.139
2/ST 3 – 3/ST 3	uPVC SN6 DN450	1 IN 700	119.492
3/ST 3 – 4/ST 3	uPVC SN6 DN450	1 IN 700	5.635
4/ST 3 – 5/ST 3	uPVC SN6 DN450	1 IN 700	114.607
5/ST 3 – 6/ST 3	uPVC SN6 DN300	1 IN 400	157.894
6/ST 3 – 7/ST 3	uPVC SN6 DN300	1 IN 400	358.398
7/ST 3 – 8/ST 3	uPVC SN6 DN300	1 IN 400	63.432
8/ST 3 – 9/ST 3	uPVC SN6 DN300	1 IN 233	224.896
9/ST 3 – 10/ST 3	uPVC SN6 DN300	1 IN 164	190.937
10/ST 3 – 11/ST 3	uPVC SN6 DN225	1 IN 67.189	42.110
11/ST 3 – 12/ST 3	uPVC SN6 DN225	1 IN 300	39.379
12/ST 3 – 13/ST 3	uPVC SN6 DN225	1 IN 300	21.390

STRUCTURE NAME	JUNCTION INVERT LEVEL	DEPTH TO INVERT	SEWER INVERT LEVEL	DESIGN SURFACE LEVEL	EXISTING SURFACE LEVEL	SETOUT	RUNNING CHAINAGE
2/TS 1	23.734	9.214 / 9.139	23.659 / 23.734	32.873	32.873	E496943.696 N6921530.158	0.000
1/ST 3		8.314 / 8.294	23.795 / 23.815	32.108	32.108	E496969.469 N6921496.355	42.508
2/ST 3		5.518 / 5.498	23.961 / 23.981	29.479	29.479	E497014.360 N6921404.610	144.647
3/ST 3		6.869 / 6.849	24.151 / 24.171	31.020	31.020	E497066.082 N6921296.891	264.139
4/ST 3		6.933 / 6.913	24.179 / 24.199	31.112	31.112	E497070.602 N6921294.046	269.774
5/ST 3		6.477 / 6.327	24.363 / 24.513	30.840	30.840	E497185.209 N6921294.240	384.381
6/ST 3		3.288 / 3.268	24.908 / 24.928	28.196	28.196	E497336.634 N6921255.678	542.275
7/ST 3		5.018 / 4.998	25.824 / 25.844	30.842	30.842	E497651.303 N6921084.118	900.674
8/ST 3		3.773 / 3.753	26.002 / 26.022	29.775	29.775	E497703.586 N6921048.388	964.106
9/ST 3		3.773 / 3.753	26.988 / 27.008	30.761	30.761	E497875.616 N6920903.530	1189.002
10/ST 3		2.267 / 2.192	28.175 / 28.250	30.443	30.443	E497998.600 N6921049.584	1379.939
11/ST 3		1.630 / 1.610	28.877 / 28.897	30.507	30.507	E498030.591 N6921076.660	1422.049
12/ST 3		1.516 / 1.496	29.028 / 29.048	30.544	30.544	E498064.492 N6921096.696	1461.428
13/ST 3		1.360	29.120	30.480	30.480	E498082.673 N6921107.965	1482.818

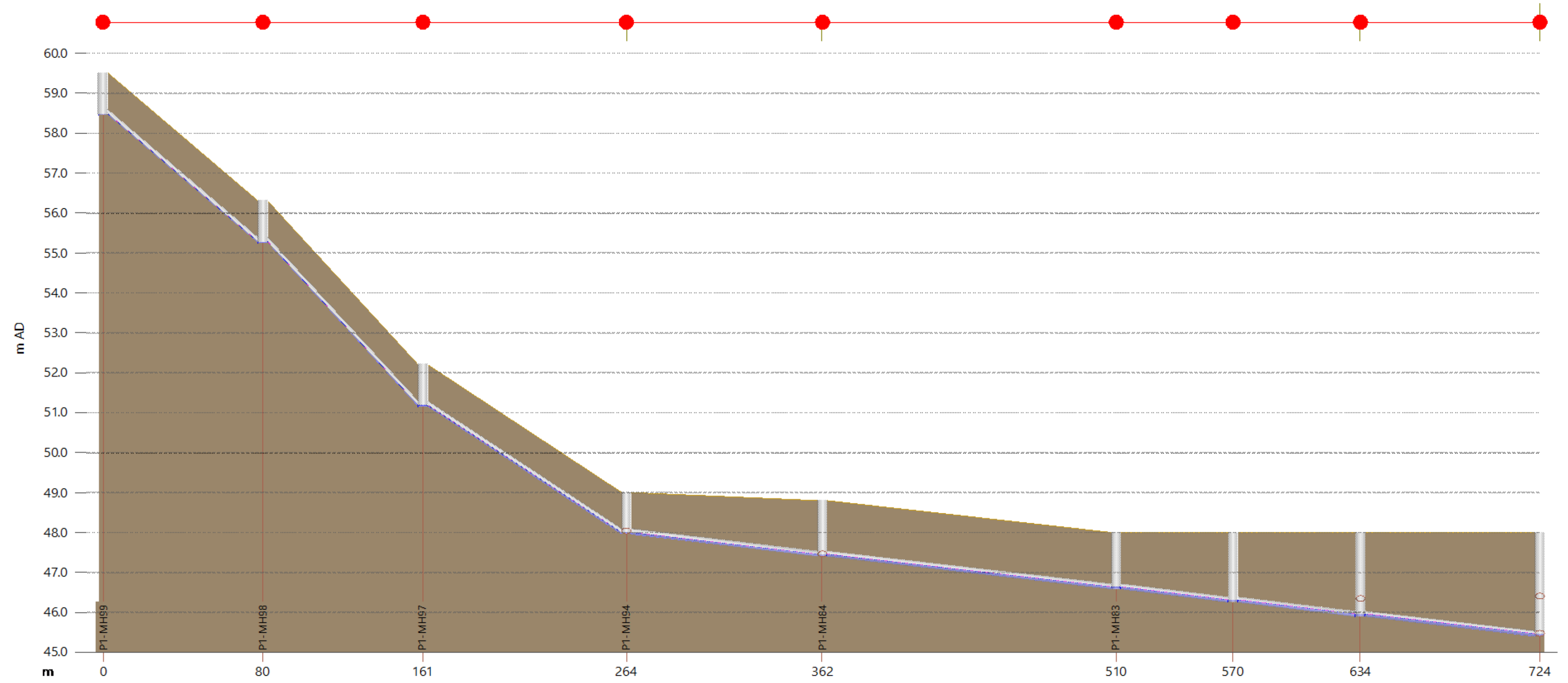
LINE NUMBER: LINE ST 3

REVISION	A — 10.03.26 — LM — MP — ORIGINAL ISSUE
STATUS	ISSUED FOR APPROVAL
	[DRAFT ONLY]
	Colliers
SCALE	1:2500 / 1:5000 HORIZONTAL (A1 / A3); 1:250 / 1:500 VERTICAL (A1 / A3)
CLIENT	CELESTINO
ASSOCIATED CONSULTANT	PLACE DESIGN GROUP (07) 3852 3922
PROJECT NAME	RIVERBEND PRECINCT 1 — 1294-1352 TEVIOT ROAD, RIVERBEND
DRAWING TITLE	CONCEPT TRUNK SEWER MAIN ALIGNMENT 3 LONGITUDINAL SECTION
PROJECT No.	25-0093
DRAWING No.	DA-0621
REVISION	A

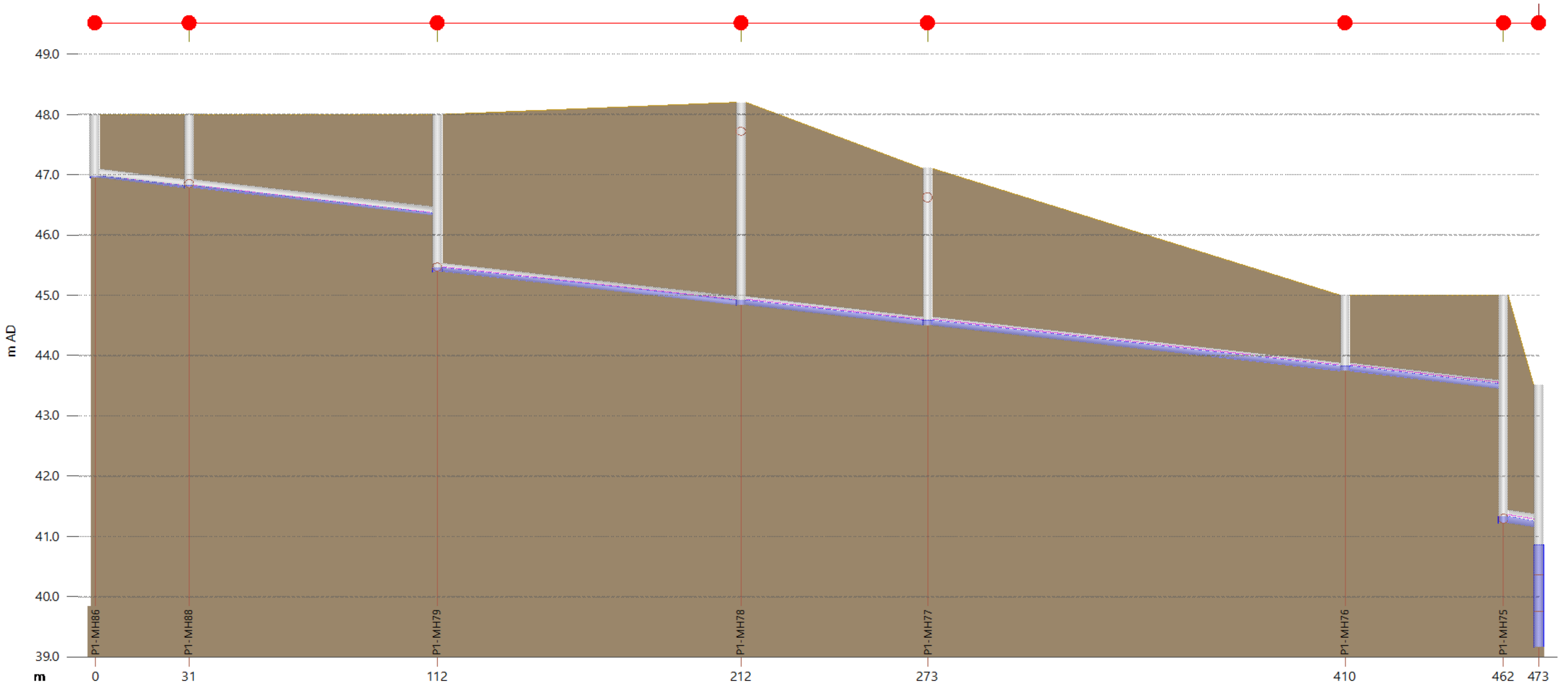
Appendix 4. Sewer network modelling results

Gravity Mains

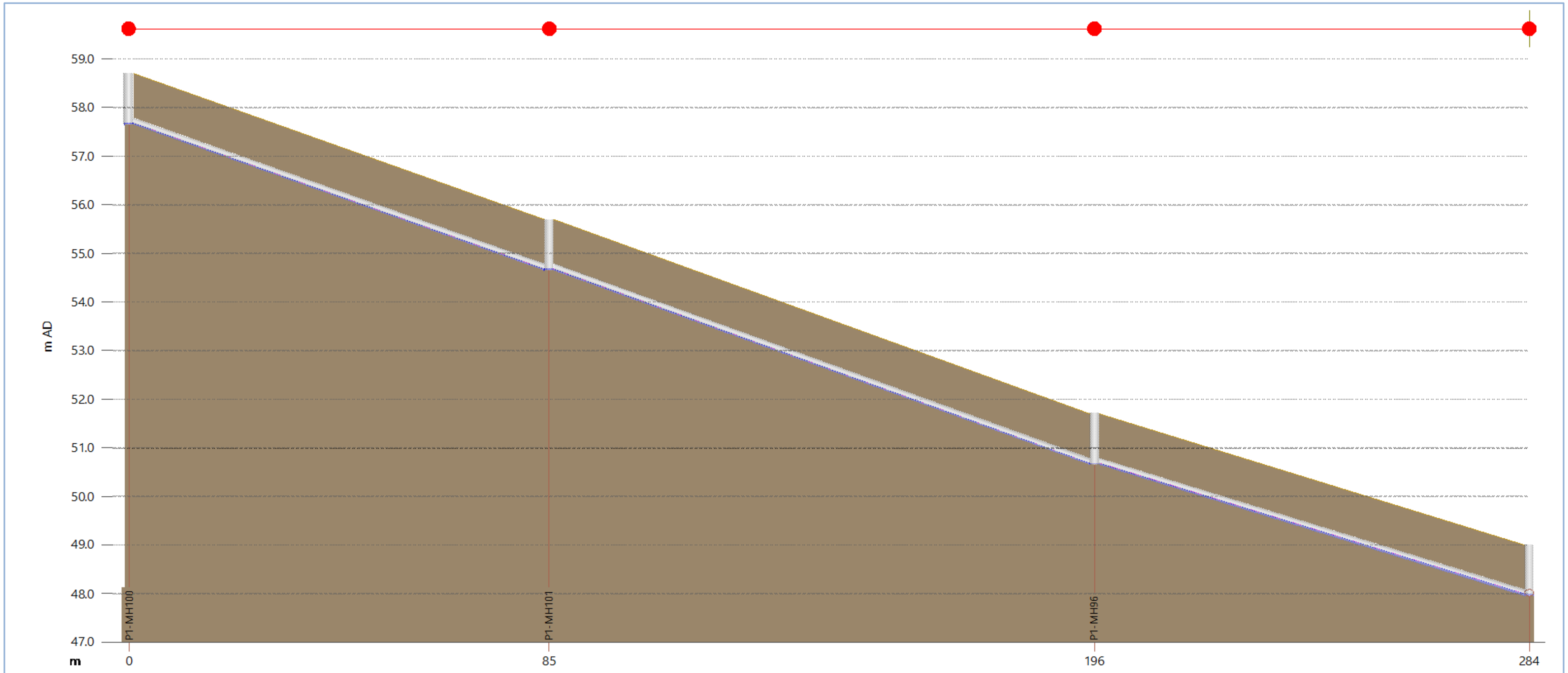
Northern SPS Catchment



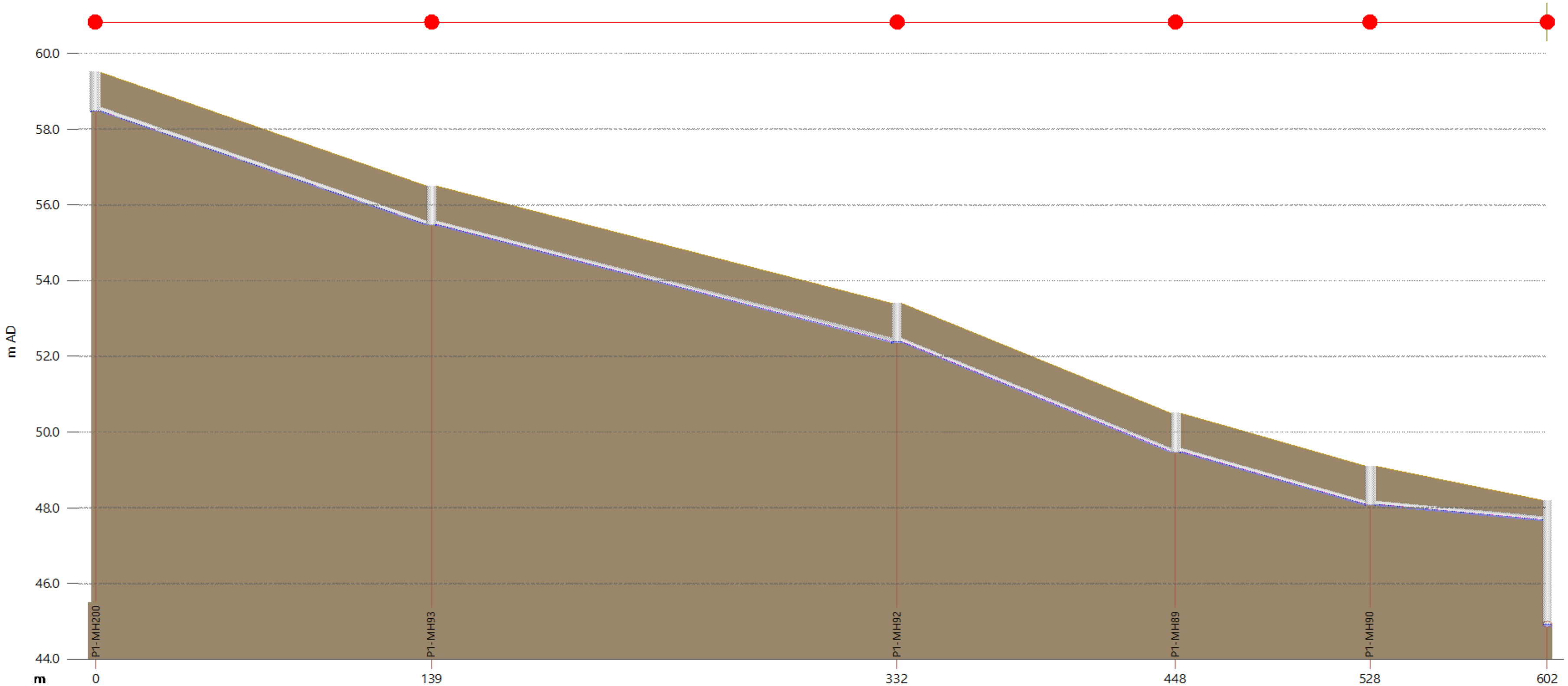
Link	P1-MH99.1	P1-MH98.1	P1-MH97.1	P1-MH94.1	P1-MH84.1	P1-MH83.1	P1-MH82.1	P1-MH80.1	
Node	P1-MH99	P1-MH98	P1-MH97	P1-MH94	P1-MH84	P1-MH83	P1-MH82	P1-MH80	P1-MH79
level (m AD)	58.473	55.273	51.177	47.994	47.450	46.631	46.303	45.951	45.457



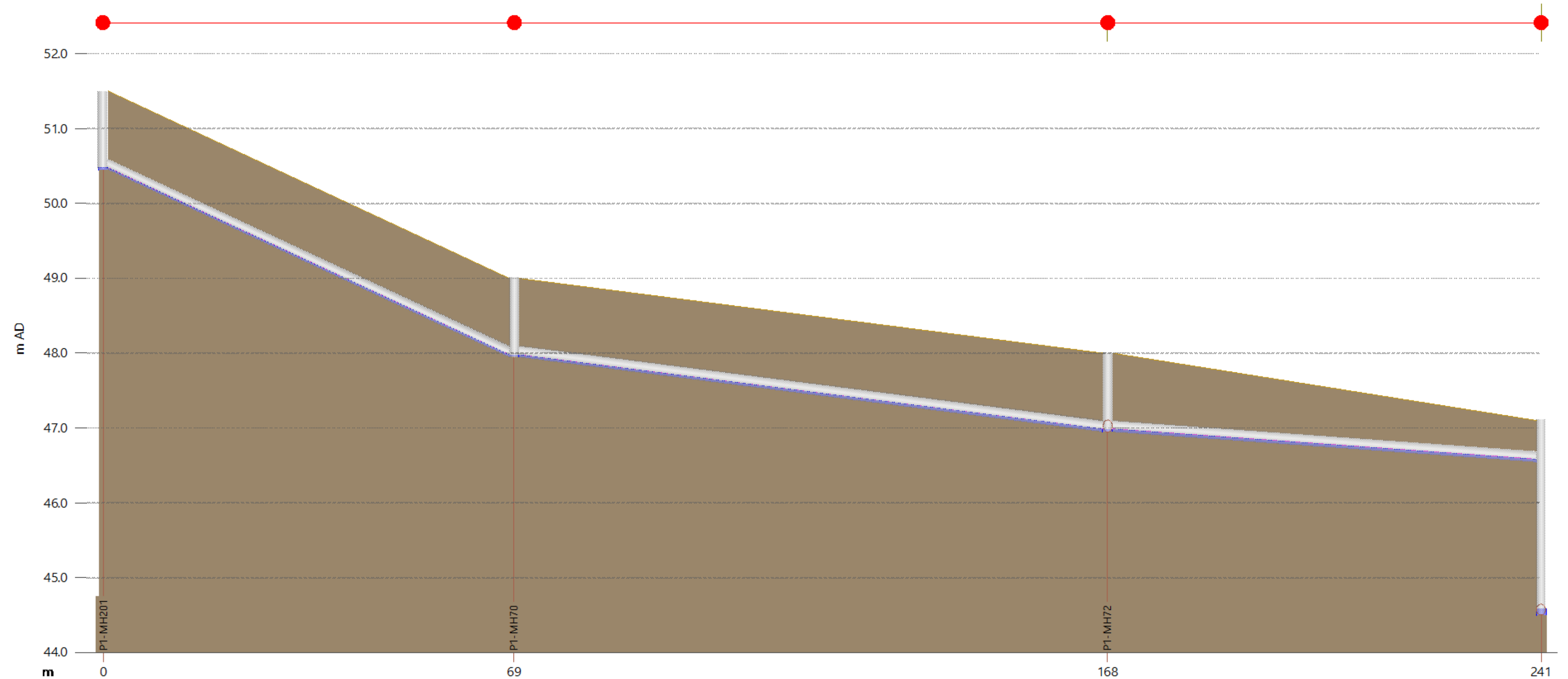
Link		P1-MH86.1	P1-MH88.1	P1-MH79.1	P1-MH78.1	P1-MH77.1	P1-MH76.1	-
Node	-	P1-MH88	P1-MH79	P1-MH78	P1-MH77		P1-MH76	P1-MH75
level (m AD)	-	46.816	45.457	44.917	44.584		43.827	41.335



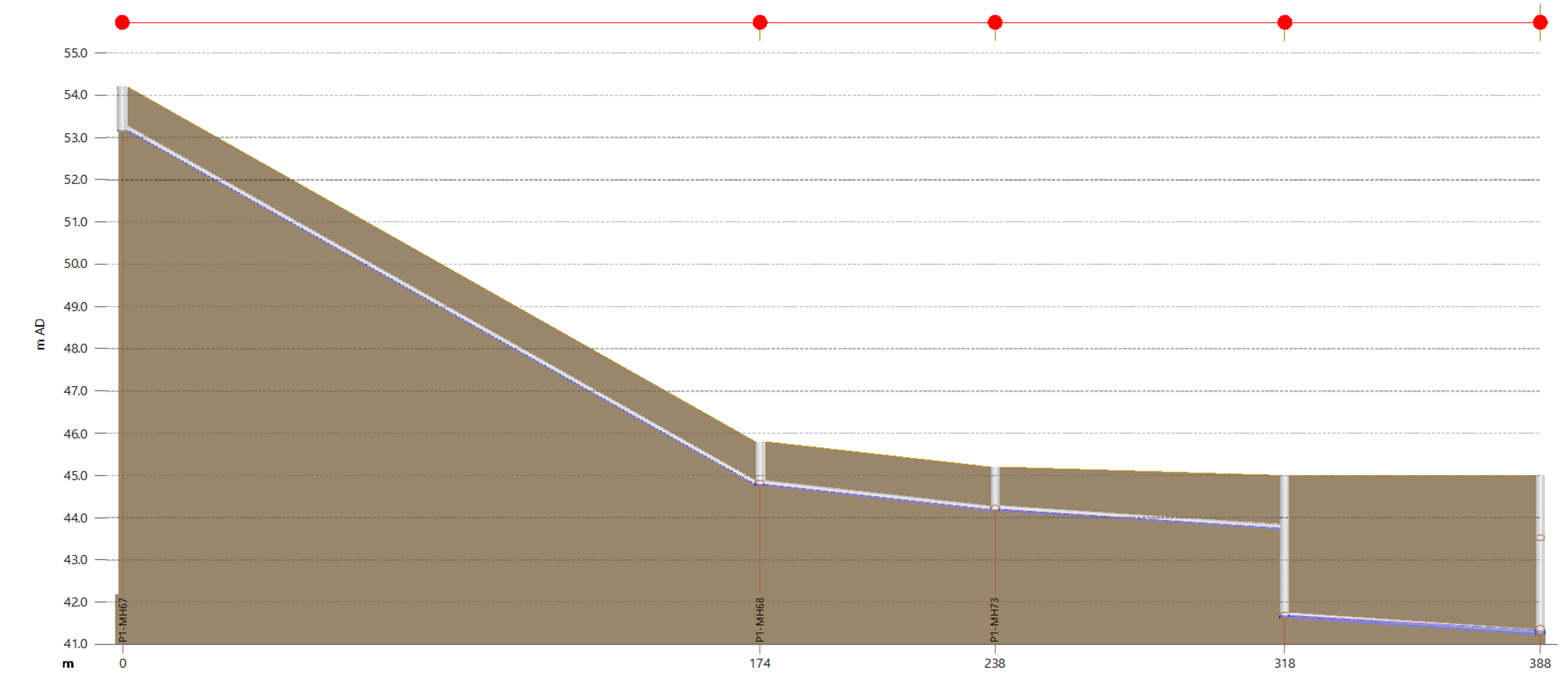
Link	P1-MH100.1	P1-MH101.1	P1-MH96.1	
Node	P1-MH100	P1-MH101	P1-MH96	P1-MH94
level (m AD)	57.673	54.673	50.677	47.994



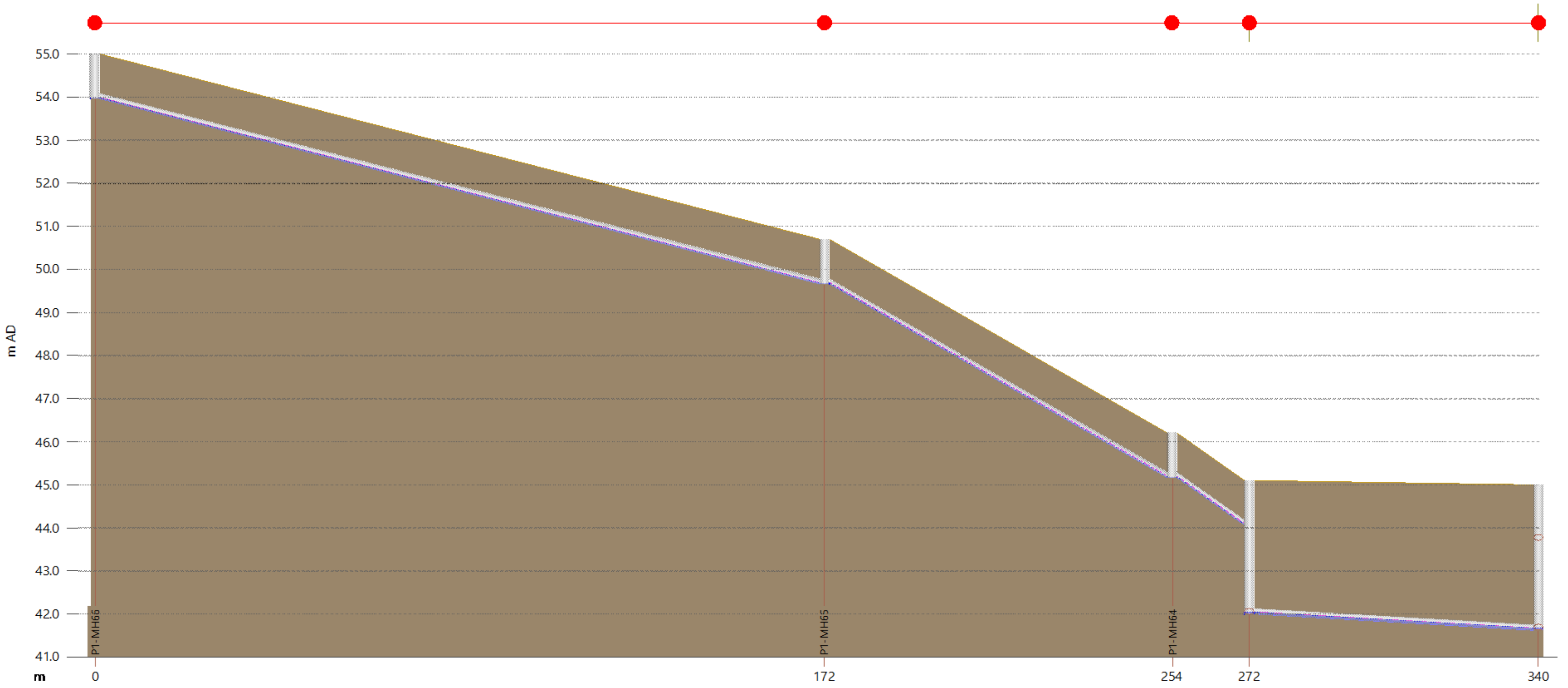
Link	P1-MH200.1	P1-MH93.1	P1-MH92.1	P1-MH89.1	P1-MH90.1	
Node	P1-MH200	P1-MH93	P1-MH92	P1-MH89	P1-MH90	P1-MH78
level (m AD)	58.474	55.479	52.380	49.482	48.089	44.917



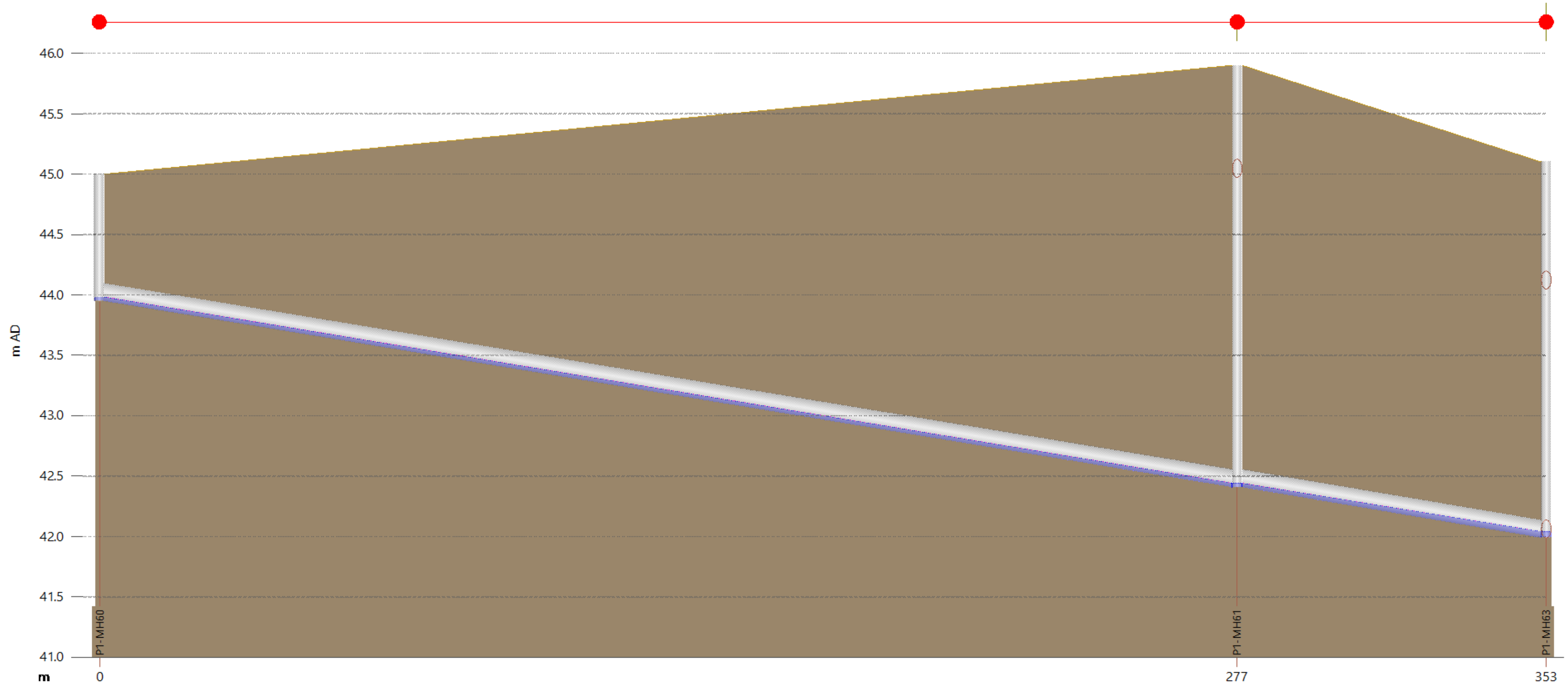
Link	P1-MH201.1	P1-MH70.1	P1-MH72.1	
Node	P1-MH201	P1-MH70	P1-MH72	P1-MH77
level (m AD)	50.473	47.976	46.984	44.584



Link	P1-MH67.1	P1-MH68.1	P1-MH73.1	P1-MH74.1	
Node	P1-MH67	P1-MH68	P1-MH73	P1-MH74	P1-MH75
level (m AD)	53.173	44.781	44.189	41.671	41.335

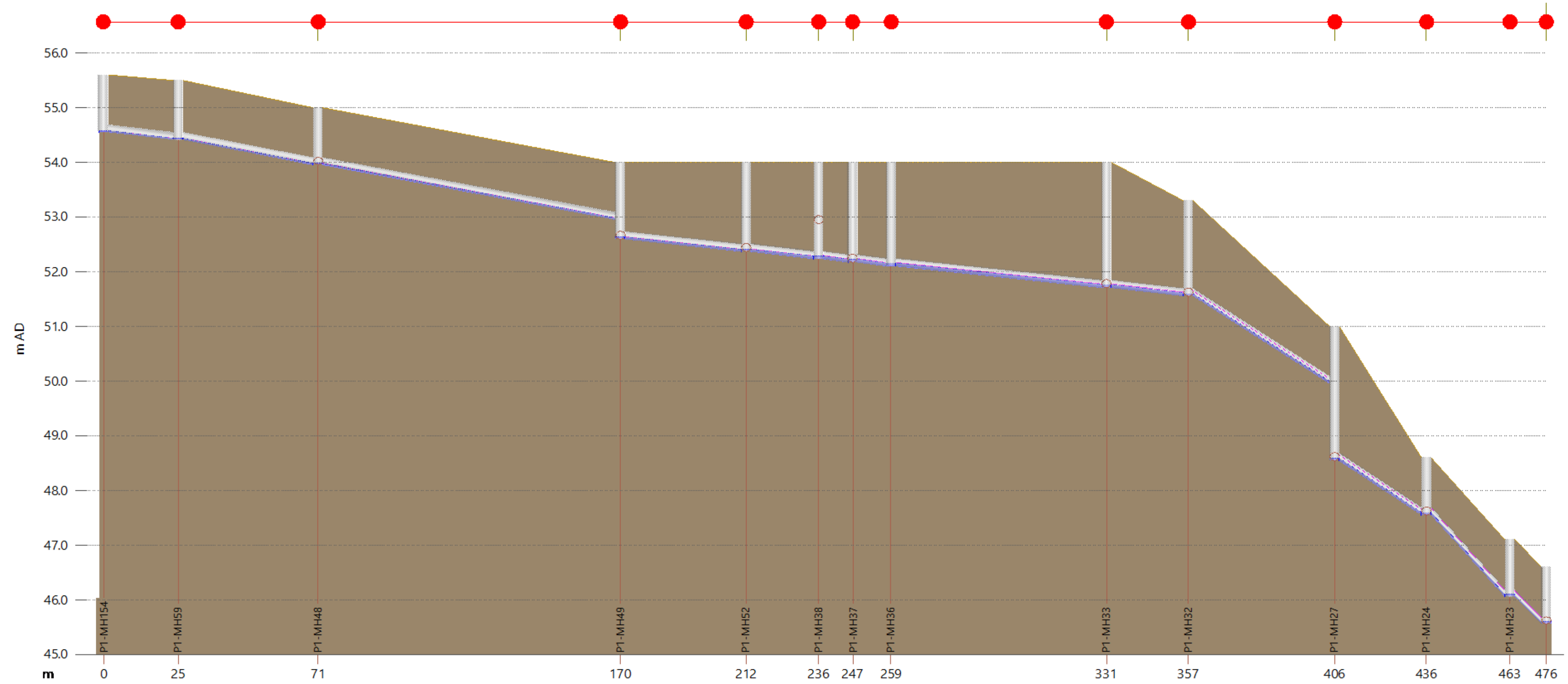


Link	P1-MH66.1		P1-MH65.1	P1-MH64.1	P1-MH63.1
Node	P1-MH66	P1-MH65	P1-MH64	P1-MH63	P1-MH74
level (m AD)	53.980	49.679	45.179	42.039	41.671

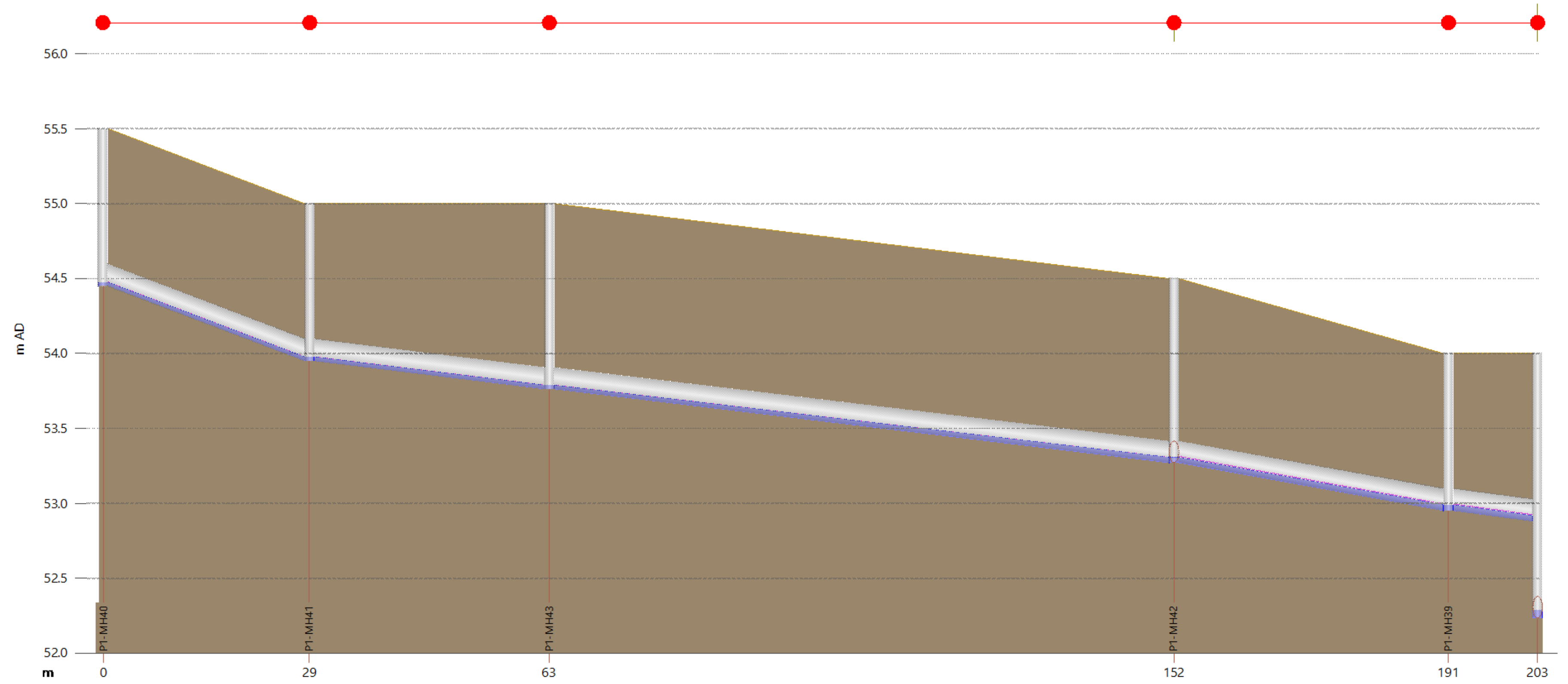


Link	P1-MH60.1		P1-MH61.1
Node	P1-MH60	P1-MH61	P1-MH63
level (m AD)	43.980	42.439	42.039

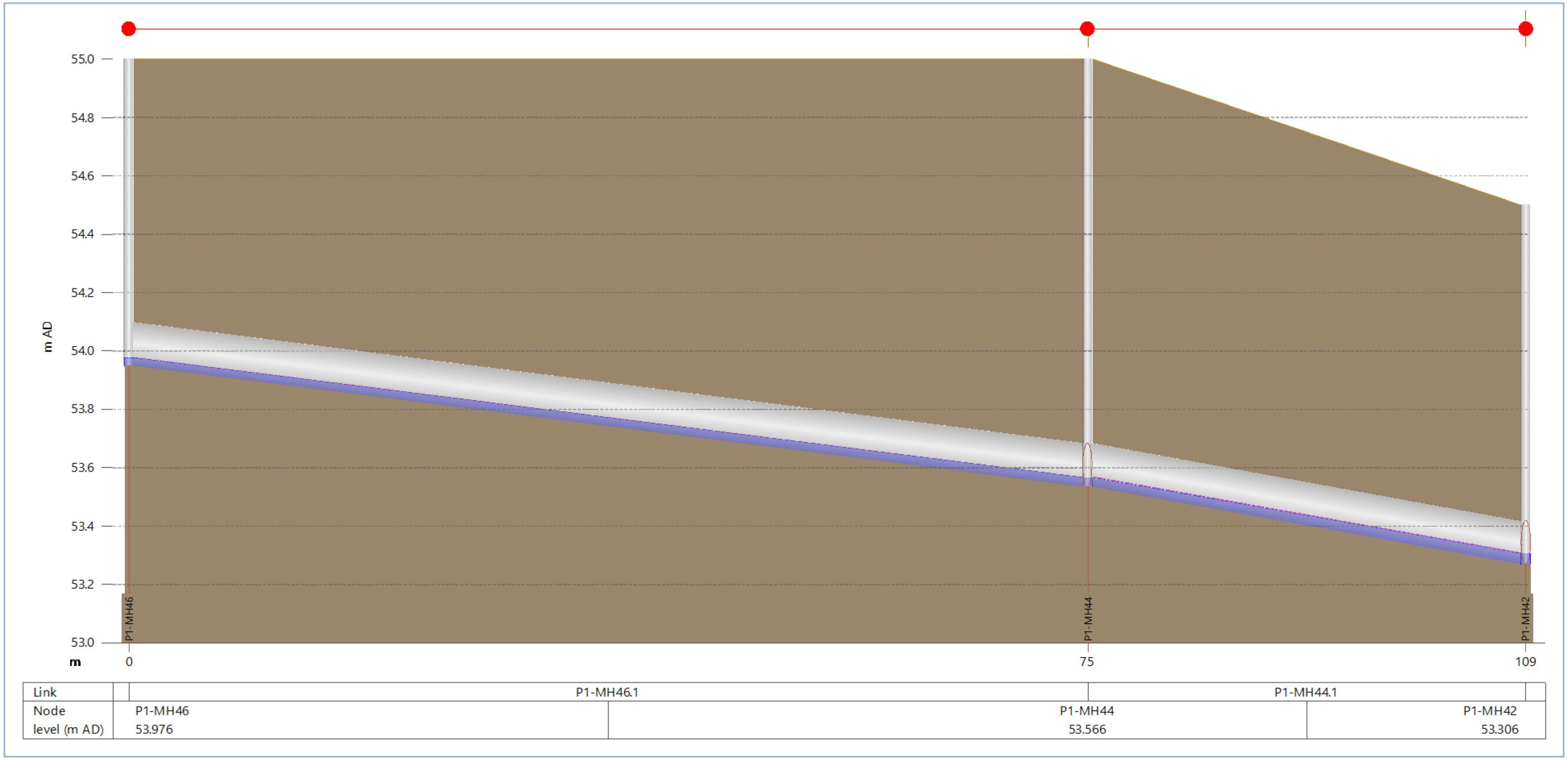
Central SPS Catchment

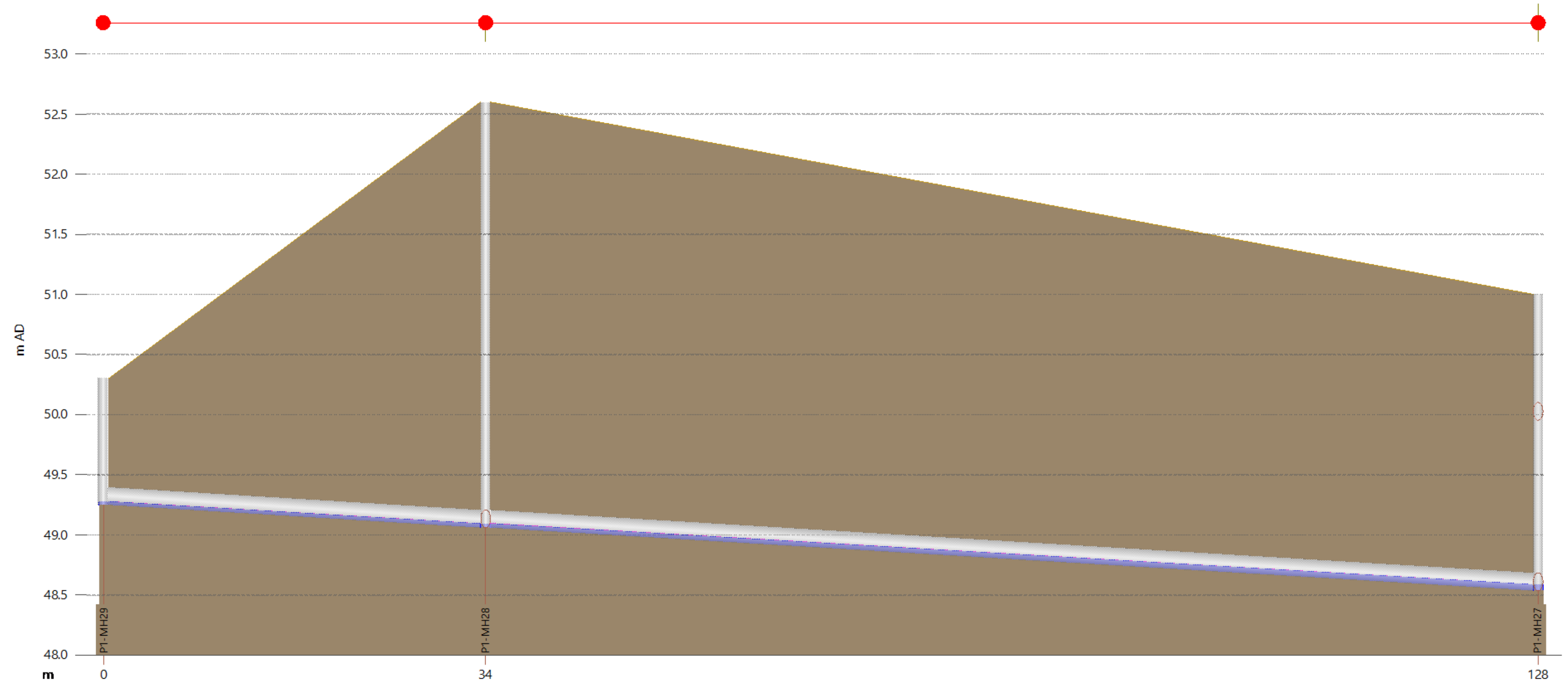


Link	-	P1-MH59.1	P1-MH48.1	P1-MH49.1	P1-MH52.1	-	-	P1-MH36.1	P1-MH33.1	P1-MH32.1	P1-MH27.1	P1-MH24.1	-
Node	-	P1-MH59	P1-MH48	P1-MH49	P1-MH52	-	-	P1-MH36	P1-MH33	P1-MH32	P1-MH27	P1-MH24	-
level (m AD)	-	54.439	53.981	52.633	52.405	52.286	-	52.156	51.764	51.598	48.587	47.595	46.097

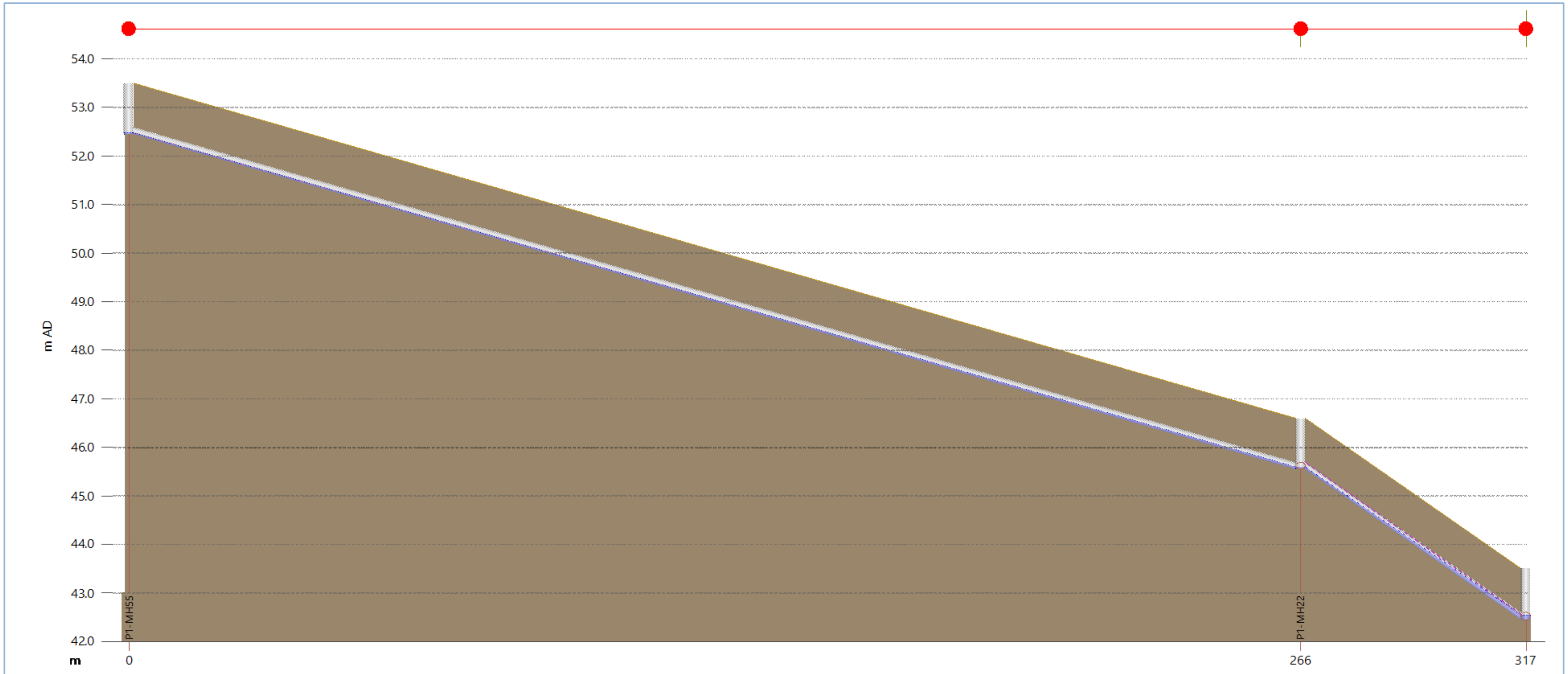


Link	P1-MH40.1	P1-MH41.1	P1-MH43.1	P1-MH42.1	P1-MH39.1	
Node	P1-MH40	P1-MH41	P1-MH43	P1-MH42	P1-MH39	-
level (m AD)	54.474	53.976	53.787	53.306	52.990	-

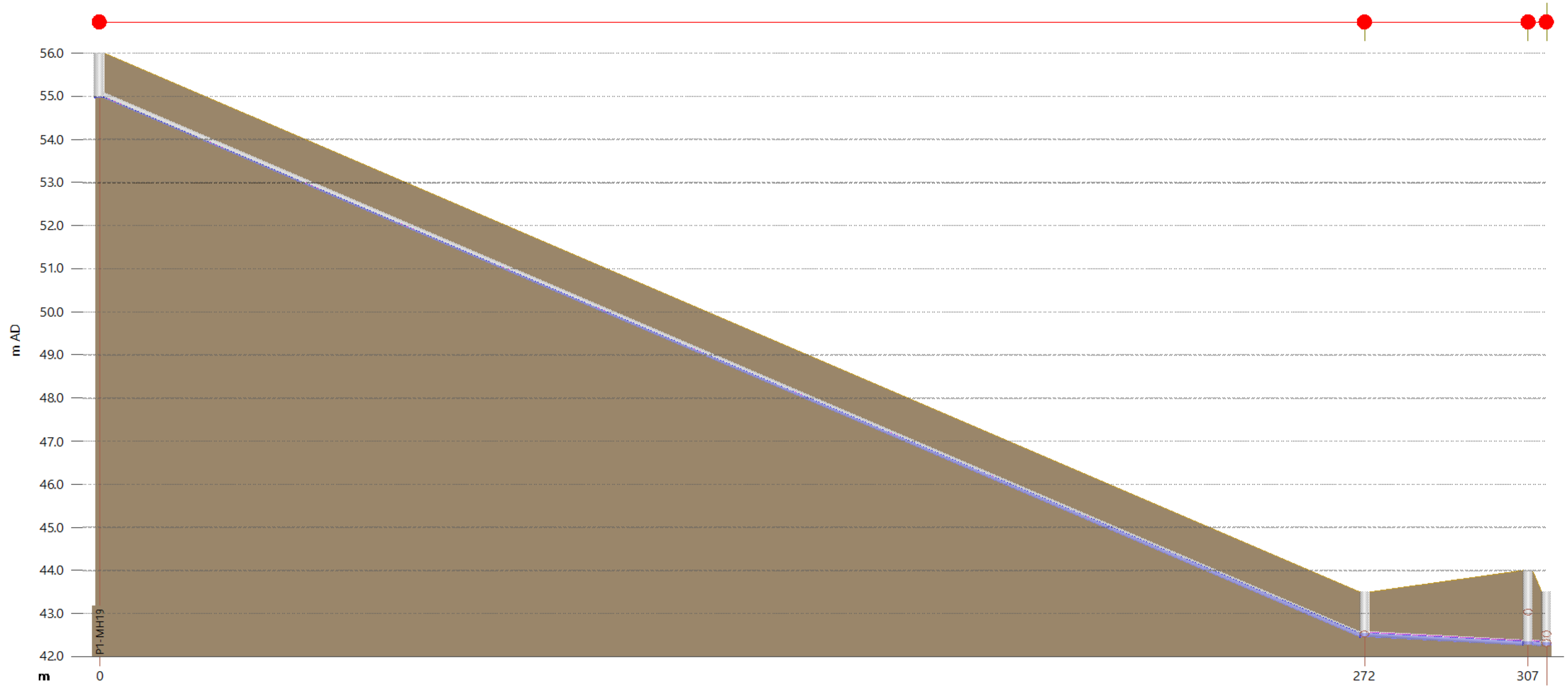

55.0
54.8
54.6
54.4
54.2
54.0
53.8
53.6
53.4
53.2
53.0
m AD
m
0
75
109
P1-MH46
P1-MH44
P1-MH42
Link
P1-MH46.1
P1-MH44.1
Node
P1-MH46
P1-MH44
P1-MH42
level (m AD)
53.976
53.566
53.306



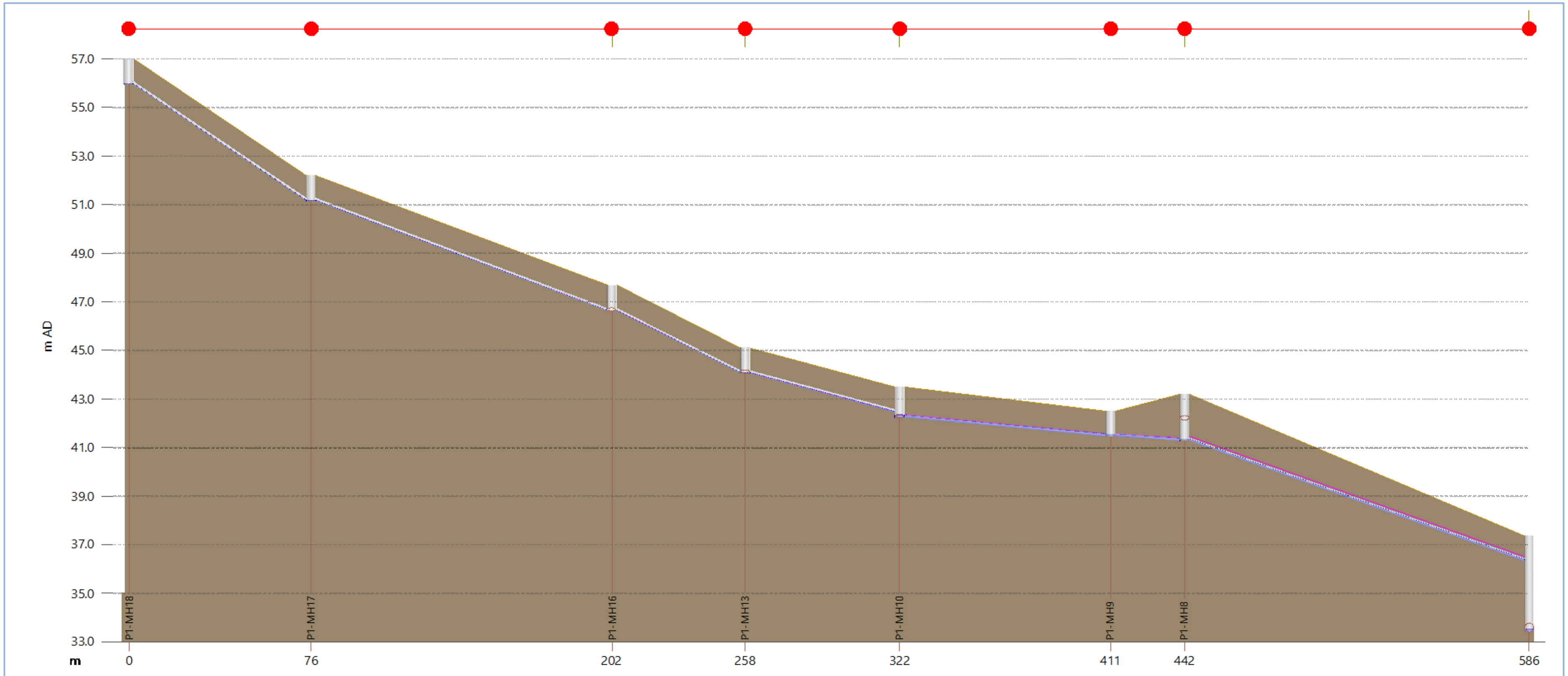
Link	P1-MH29.1		P1-MH28.1
Node level (m AD)	P1-MH29 49.276	P1-MH28 49.093	P1-MH27 48.587



Link	P1-MH55.1		P1-MH22.1
Node	P1-MH55	P1-MH22	P1-MH20
level (m AD)	52.473	45.596	42.541

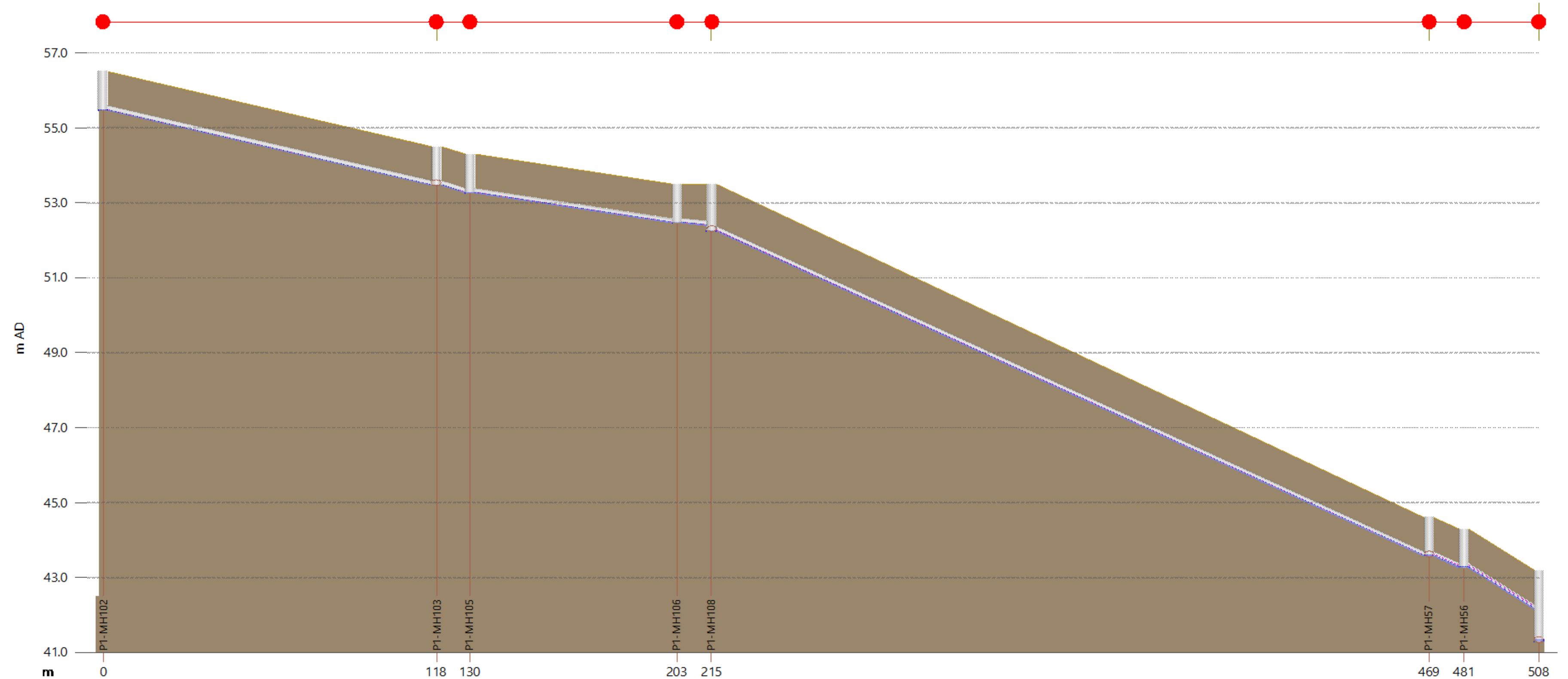


Link	P1-MH19.1	P1-MH20.1	-
Node	P1-MH19	P1-MH20	P1-MH11
level (m AD)	54.972	42.541	42.353



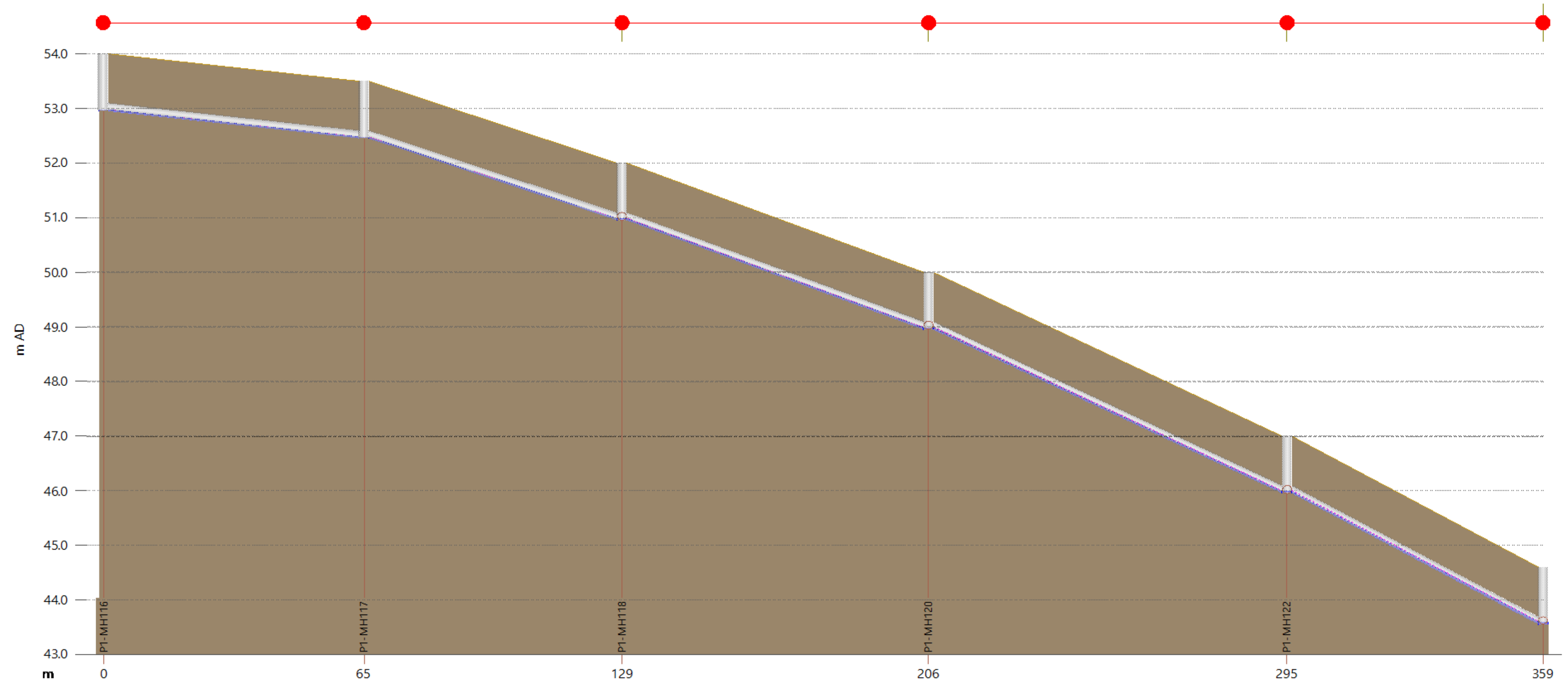
Link	P1-MH18.1	P1-MH17.1	P1-MH16.1	P1-MH13.1	P1-MH10.1	P1-MH9.1	P1-MH8.1	
Node	P1-MH18	P1-MH17	P1-MH16	P1-MH13	P1-MH10	P1-MH9	P1-MH8	P1-MH7
level (m AD)	55.972	51.175	46.649	44.081	42.329	41.554	41.355	33.517

H2ONE



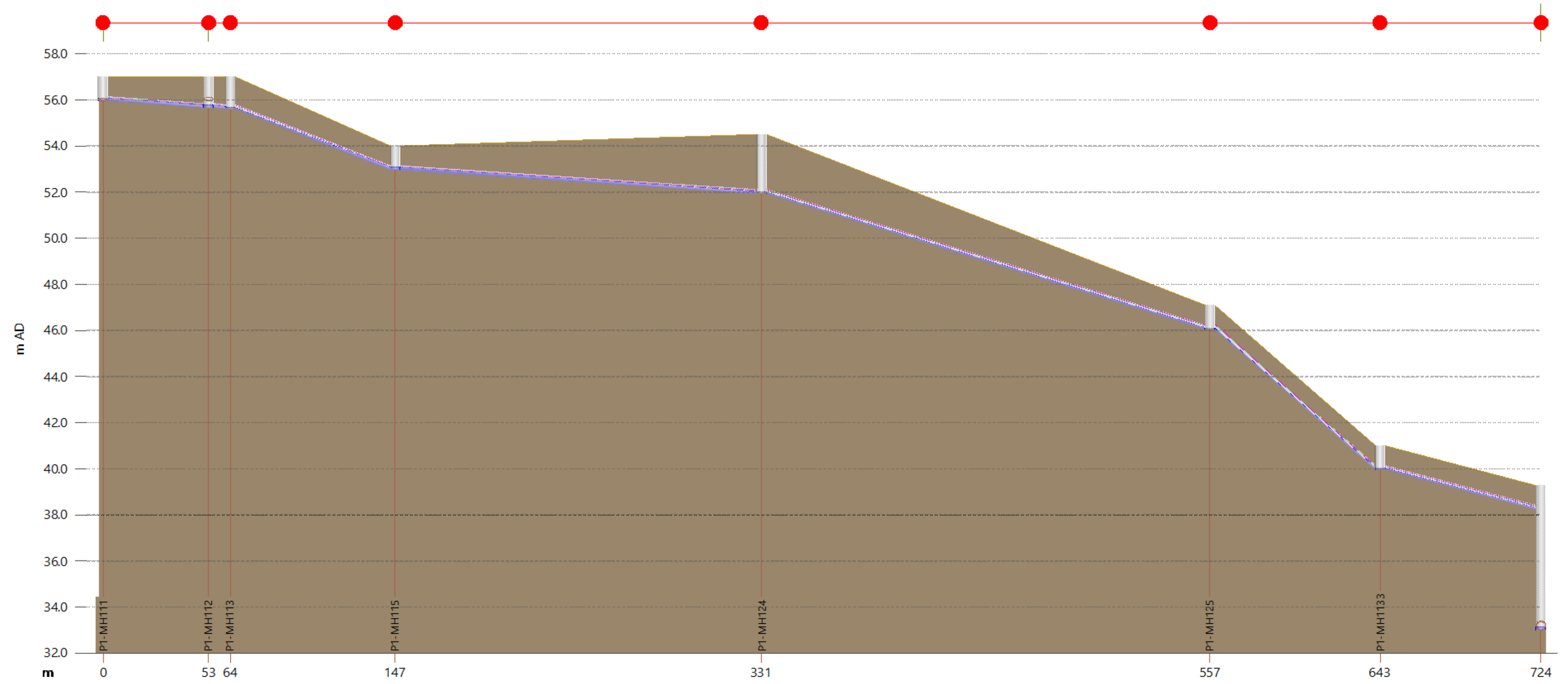
Link	P1-MH102.1	-	P1-MH105.1	-	P1-MH108.1	-	P1-MH56.1

Node	P1-MH102	P1-MH103	P1-MH105	P1-MH106	P1-MH108		P1-MH57	-	-
level (m AD)	55.474	53.477	53.279	52.482	52.263		43.595	43.290	-

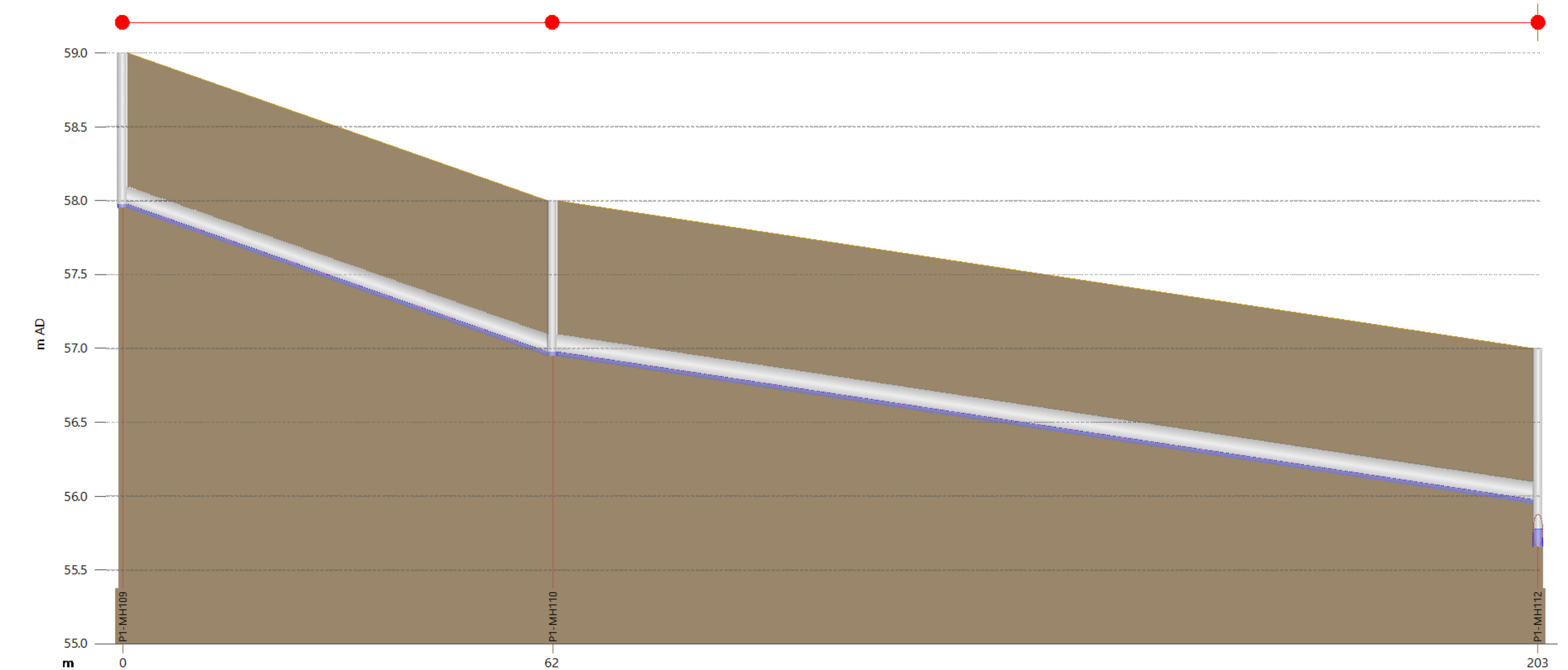


Link	P1-MH116.1	P1-MH117.1	P1-MH118.1	P1-MH120.1	P1-MH122.1

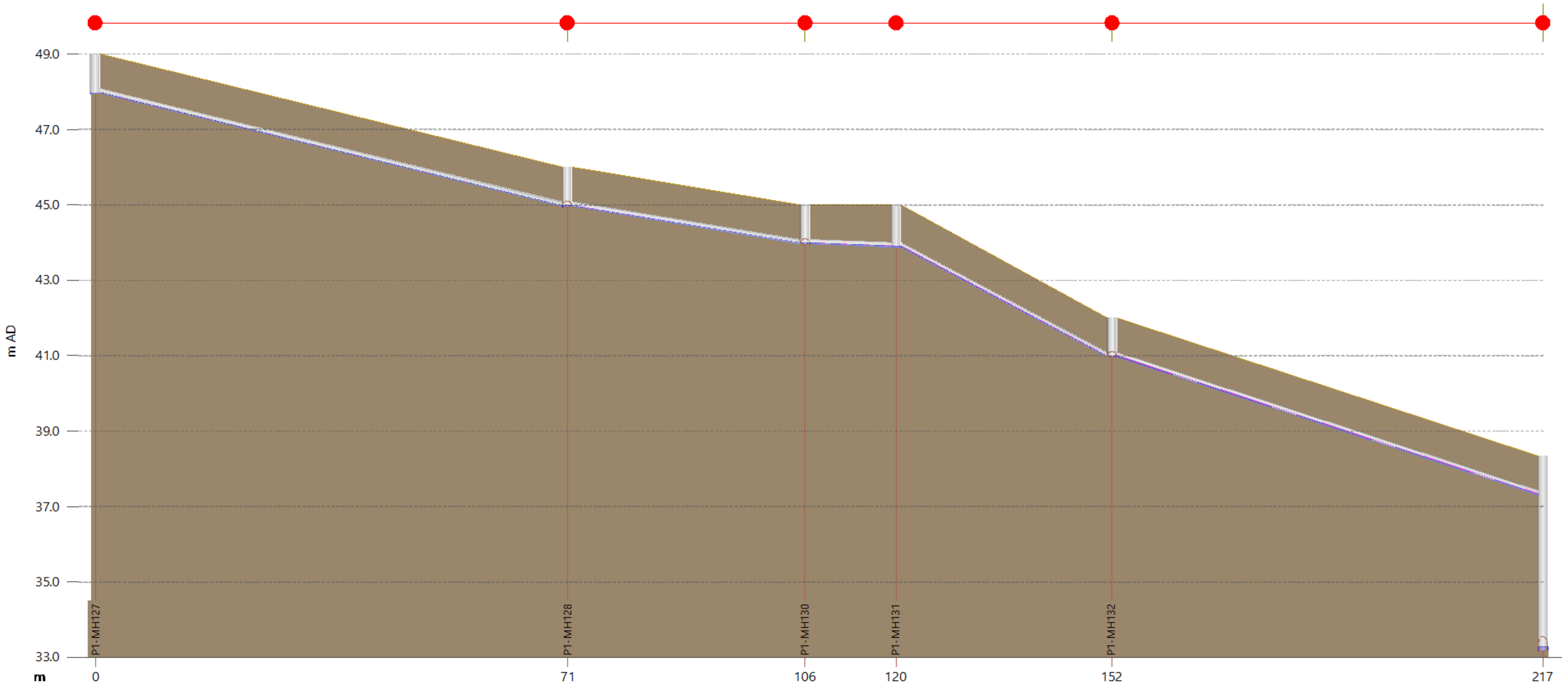
Node level (m AD)	P1-MH116 52.976	P1-MH117 52.473	P1-MH118 50.978	P1-MH120 48.982	P1-MH122 45.983	P1-MH57 43.595



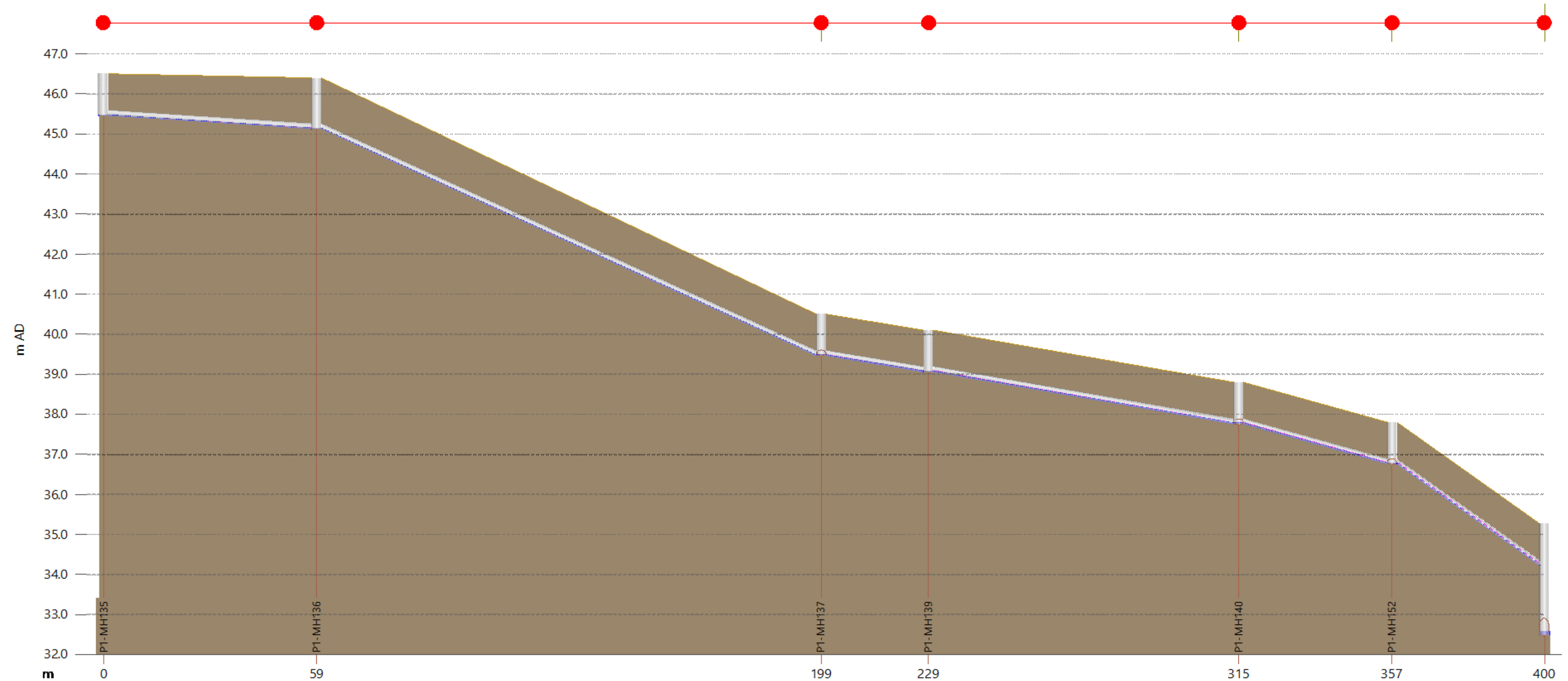
Link	Node	level (m AD)
	-	-
P1-MH111.1	-	55.775
-	P1-MH113	55.665
P1-MH113.1	P1-MH115	53.081
P1-MH115.1	P1-MH124	52.001
P1-MH124.1	P1-MH125	46.109
P1-MH125.1	P1-MH1133	40.031
P1-MH1133.1	P1-MH5	33.127



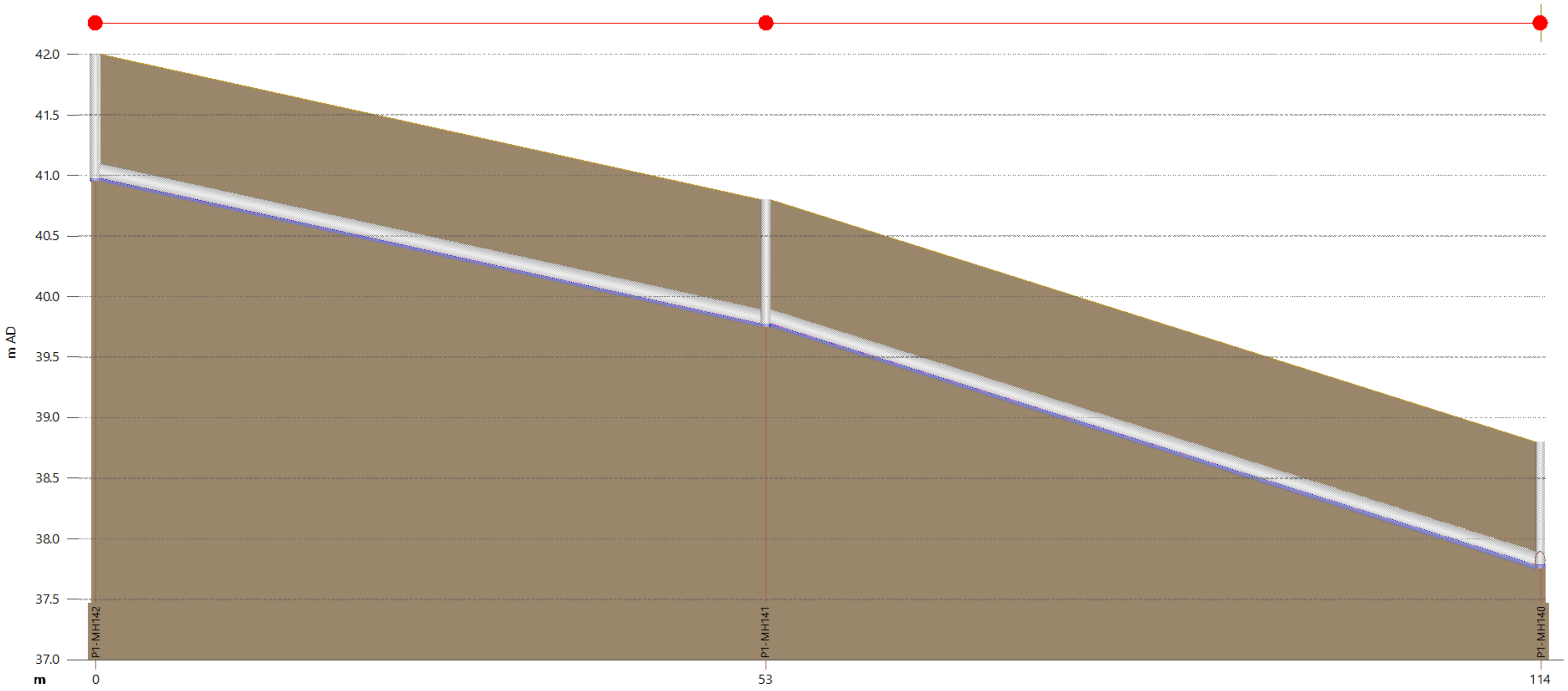
Link	P1-MH109.1		P1-MH110.1
Node	P1-MH109	P1-MH110	P1-MH112
level (m AD)	57.974	56.976	55.775



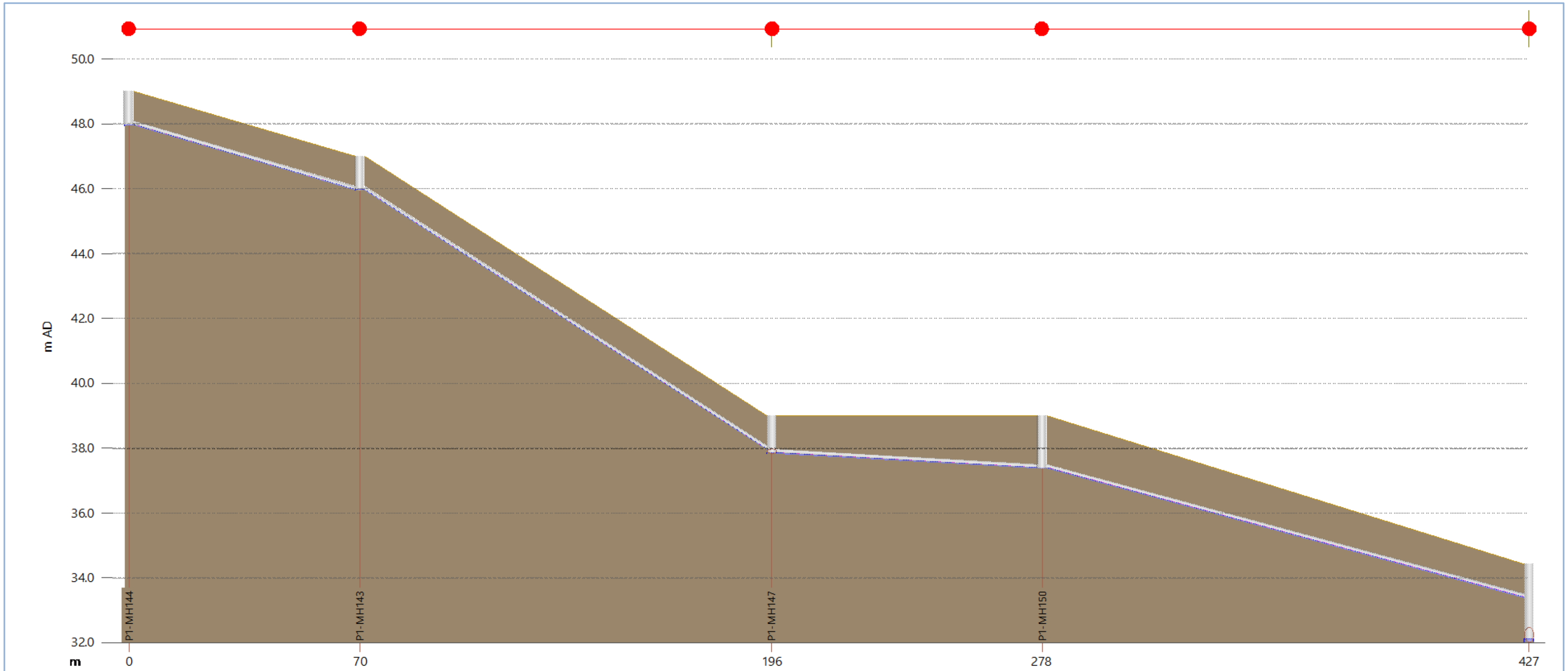
Link	P1-MH127.1		P1-MH128.1	P1-MH130.1	P1-MH131.1	P1-MH132.1
Node	P1-MH127	P1-MH128	P1-MH130	P1-MH131	P1-MH132	P1-MH6
level (m AD)	47.973	44.976	43.990	43.896	40.979	33.274



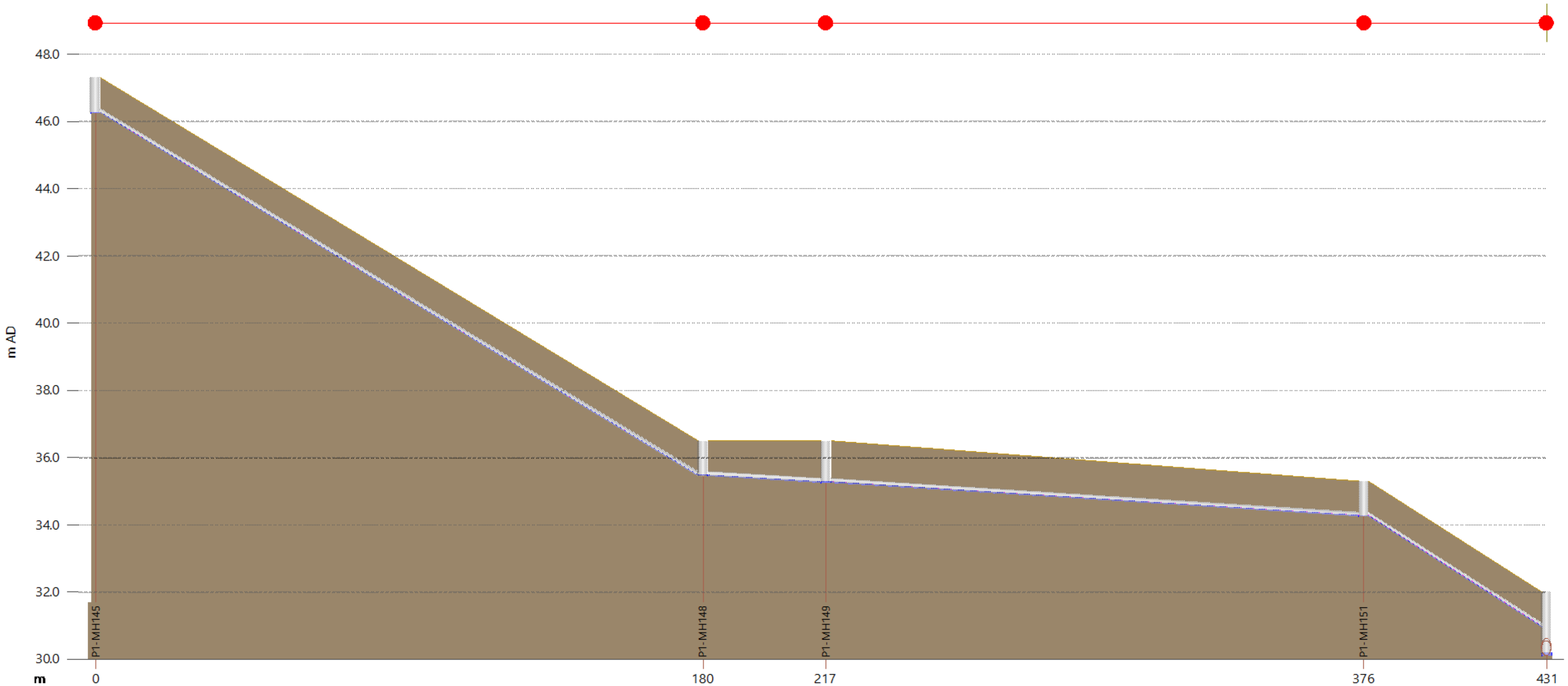
Link	P1-MH135.1	P1-MH136.1	P1-MH137.1	P1-MH139.1	P1-MH140.1	P1-MH152.1	
Node	P1-MH135	P1-MH136	P1-MH137	P1-MH139	P1-MH140	P1-MH152	P1-MH4
level (m AD)	45.476	45.145	39.481	39.081	37.784	36.781	32.583



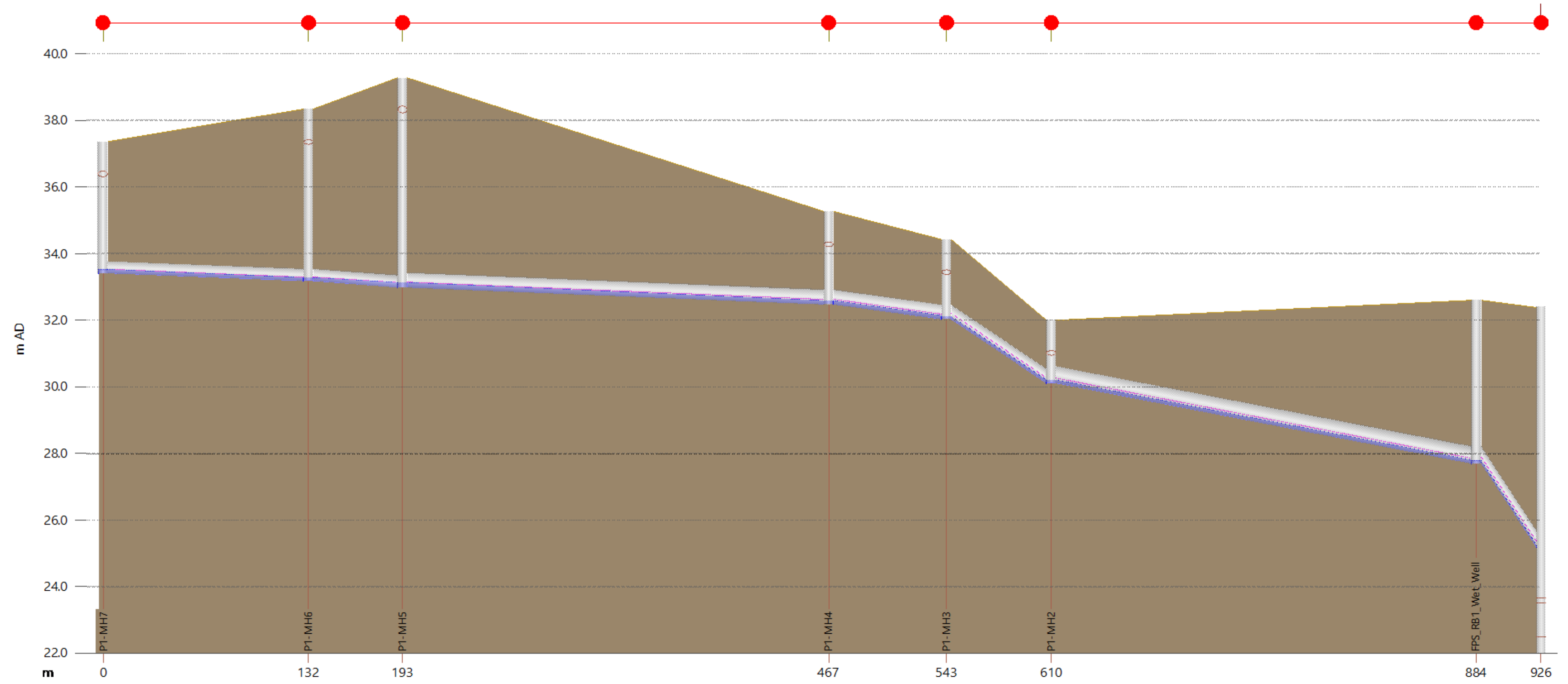
Link	P1-MH142.1	P1-MH141.1	
Node	P1-MH142	P1-MH141	P1-MH140
level (m AD)	40.973	39.773	37.784



Link	P1-MH144.1	P1-MH143.1	P1-MH147.1	P1-MH150.1	
Node	P1-MH144	P1-MH143	P1-MH147	P1-MH150	P1-MH3
level (m AD)	47.973	45.972	37.858	37.396	32.112

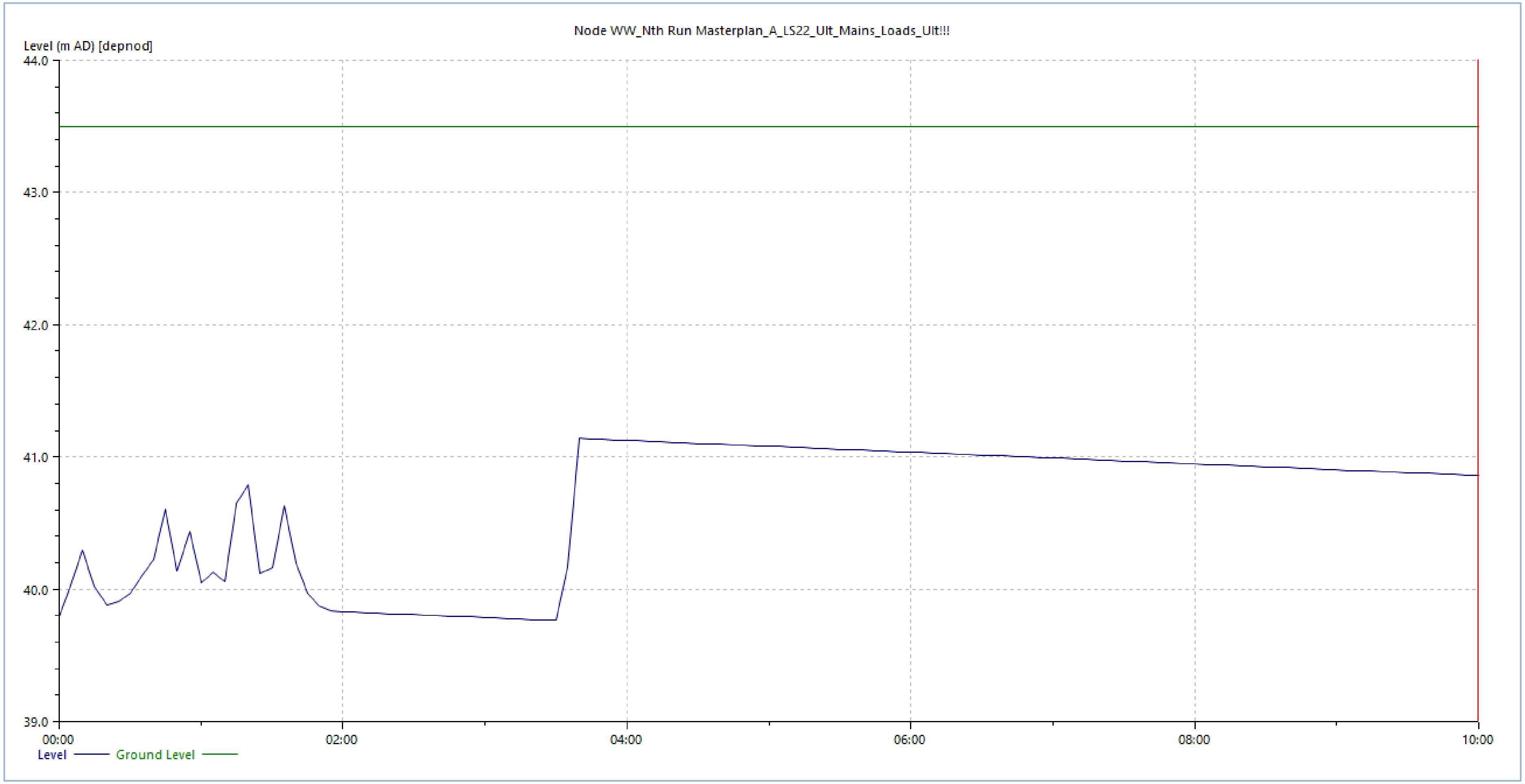


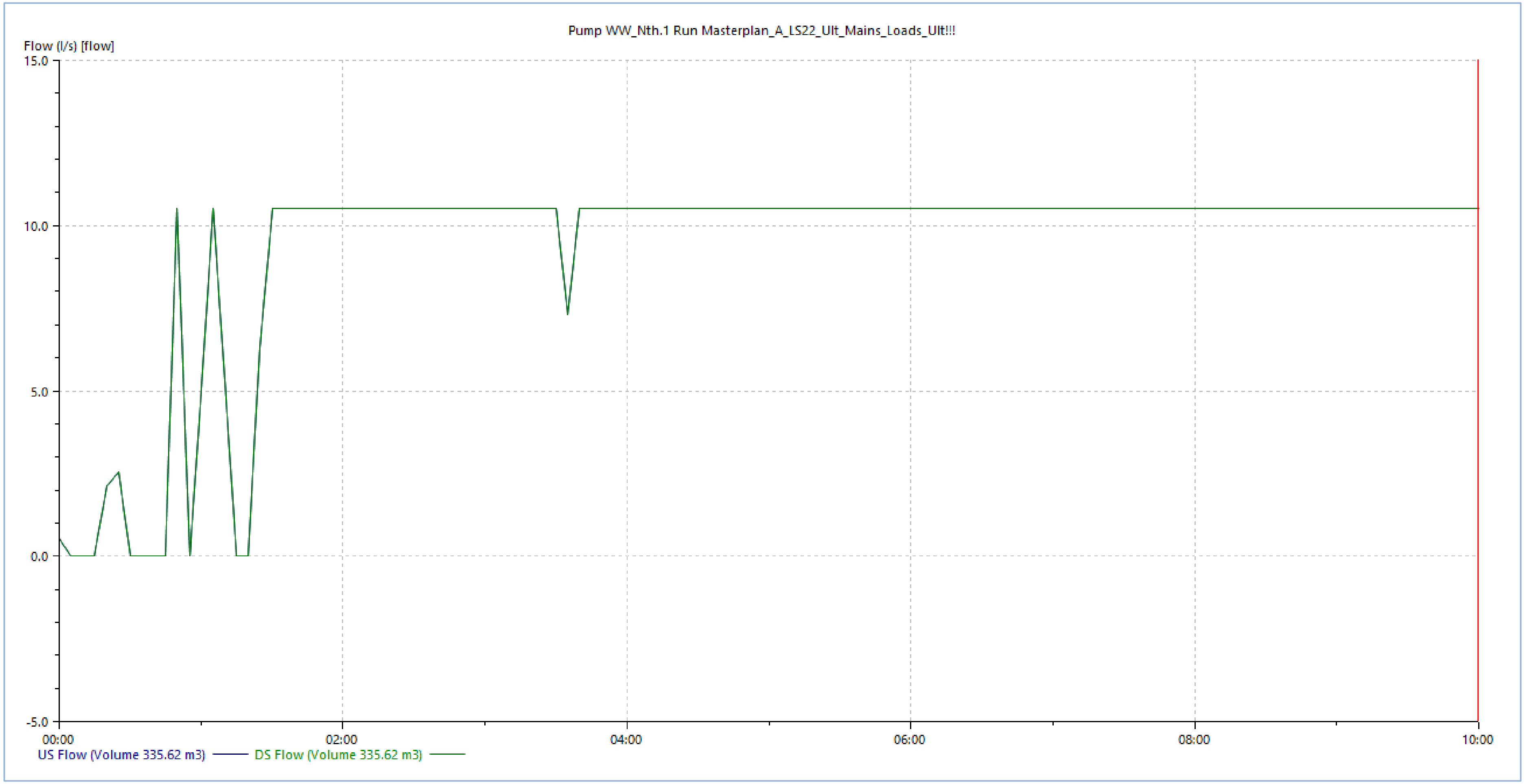
Link	P1-MH145.1		P1-MH148.1	P1-MH149.1		P1-MH151.1
Node	P1-MH145	P1-MH148	P1-MH149		P1-MH151	P1-MH2
level (m AD)	46.272	35.476	35.278		34.276	30.205

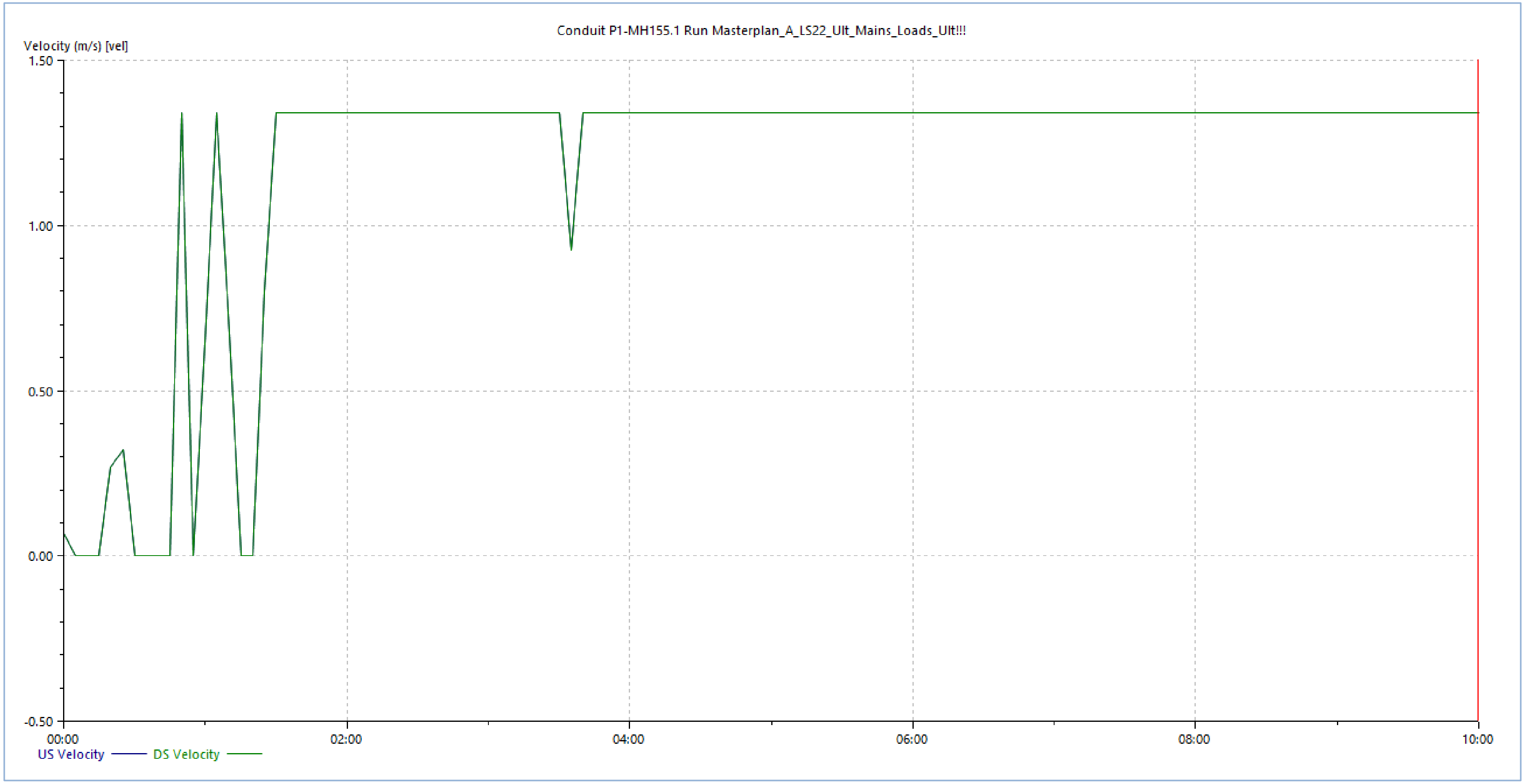


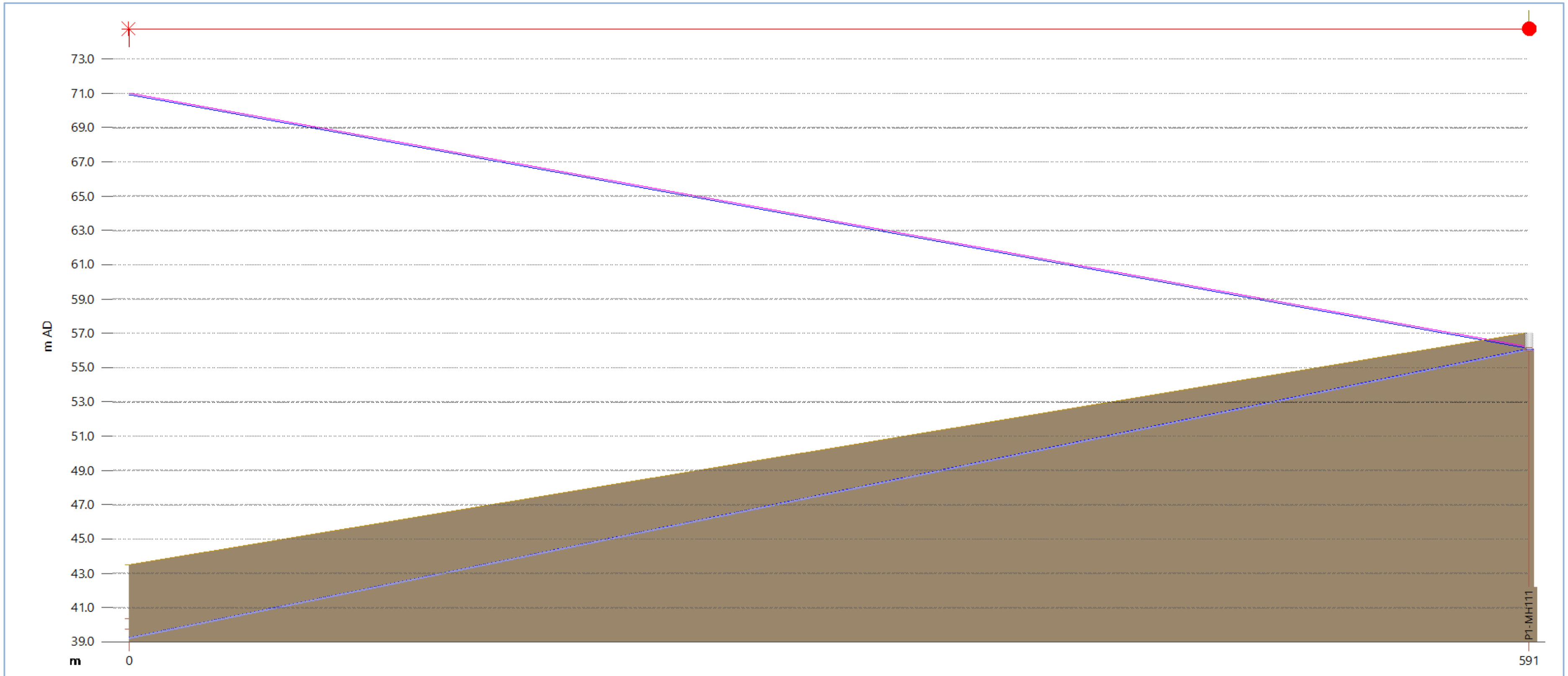
Link	P1-MH7.1	P1-MH6.1	P1-MH5.1	P1-MH4.1	P1-MH3.1	P1-MH2.2	-	
Node	P1-MH7	P1-MH6	P1-MH5	P1-MH4	P1-MH3	P1-MH2	FPS_RB1_Wet_Well	-
level (m AD)	33.517	33.274	33.127	32.583	32.112	30.205	27.773	-

Northern SPS and DN100 Rising Main




Pump WW_Nth.1 Run Masterplan_A_LS22_Ult_Mains_Loads_Ult!!!
Flow (l/s) [flow]
15.0
10.0
5.0
0.0
-5.0
00:00
02:00
04:00
06:00
08:00
10:00
US Flow (Volume 335.62 m3)
DS Flow (Volume 335.62 m3)


Conduit P1-MH155.1 Run Masterplan_A_LS22_Ult_Mains_Loads_Ult!!!
Velocity (m/s) [vel]
1.50
1.00
0.50
0.00
-0.50
00:00
02:00
04:00
06:00
08:00
10:00
US Velocity
DS Velocity



Link	P1-MH155.1	
Node	P1-MH155	P1-MH111
level (m AD)	71.090	56.068

Manhole ID's

P1-MH79
P1-MH87
P1-MH86
P1-MH78
P1-MH82
P1-MH83
P1-MH77
P1-MH80
P1-MH90
P1-MH81
P1-MH76
P1-MH71
P1-MH84
P1-MH75
P1-MH89
P1-MH73
P1-MH74
P1-MH69
P1-MH94
P1-MH68
P1-MH201
P1-MH60
P1-MH92
P1-MH63
P1-MH96
P1-MH67
P1-MH61
P1-MH97
P1-MH65
P1-MH66
P1-MH101
P1-MH98
P1-MH93
P1-MH100
P1-MH99
P1-MH200
P1-MH50
P1-MH102
P1-MH49
P1-MH109
P1-MH47
P1-MH45
P1-MH51
P1-MH104
P1-MH103
P1-MH59
P1-MH44
P1-MH54
P1-MH110
P1-MH112

P1-MH100
P1-MH99
P1-MH200
P1-MH50
P1-MH102
P1-MH49
P1-MH109
P1-MH47
P1-MH51
P1-MH48
P1-MH45
P1-MH103
P1-MH104
P1-MH52
P1-MH105
P1-MH59
P1-MH44
P1-MH54
P1-MH110
P1-MH112
P1-MH37
P1-MH41
P1-MH114
P1-MH42
P1-MH55
P1-MH106
P1-MH43
P1-MH107
P1-MH34
P1-MH115
P1-MH117
P1-MH33
P1-MH18
P1-MH116
P1-MH30
P1-MH32
P1-MH118
P1-MH28
P1-MH27
P1-MH17
P1-MH119
P1-MH29
P1-MH26
P1-MH24
P1-MH15
P1-MH22
P1-MH120
P1-MH121
P1-MH58
P1-MH20
P1-MH14
P1-MH21
P1-MH12
P1-MH56
P1-MH10
P1-MH122
P1-MH8
P1-MH123


P1-MH129
P1-MH128
P1-MH127
P1-MH130
P1-MH125
P1-MH131
P1-MH7
P1-MH135
P1-MH136
P1-MH132
P1-MH134
P1-MH6
P1-MH1133
P1-MH138
P1-MH5
P1-MH137
P1-MH139
P1-MH153
P1-MH144
P1-MH145
P1-MH143
P1-MH142
P1-MH141
P1-MH140
P1-MH152
P1-MH4
P1-MH146
P1-MH147
P1-MH148
P1-MH149
P1-MH150
P1-MH151
P1-MH3
P1-MH2
FPS_RB1_We
WW

Appendix 5. Water supply network modelling results

Precinct 1 - Nodes

Develop. Stage	Node ID	Peak Demand (l/s)	FF Min Pressure (m)	SF Min Pressure (m)	Surface RL (m)
Stage 1A and 1B	P1-100	0.141	59.22	51.60	43.00
	P1-69	0.141	52.37	45.60	49.00
	P1-70	0.141	53.67	46.10	48.50
	P1-71	0.141	51.08	44.60	50.00
	P1-72	0.141	52.33	45.60	49.00
	P1-74	0.141	53.43	46.60	48.00
	P1-75	0.141	53.42	46.60	48.00
	P1-76	0.141	53.04	46.10	48.50
	P1-77	0.141	51.15	46.10	48.50
	P1-78	0.141	54.43	46.60	48.00
	P1-79	0.141	53.70	46.60	48.00
	P1-80	0.376	53.07	46.60	48.00
Stage 1-2	P1-61	0.141	59.10	48.57	46.00
	P1-62	0.141	53.99	46.07	48.50
	P1-64	0.141	51.42	49.57	45.00
	P1-65	0.141	56.04	49.57	45.00
	P1-66	0.141	56.27	46.57	48.00
	P1-67	0.141	53.37	46.57	48.00
	P1-68	0.141	53.44	48.07	46.50
	P1-69	0.141	55.22	45.57	49.00
	P1-70	0.141	52.65	46.07	48.50
	P1-71	0.141	53.52	44.57	50.00
	P1-72	0.141	51.08	45.57	49.00
	P1-74	0.141	52.27	46.57	48.00
	P1-75	0.141	53.27	46.57	48.00
	P1-76	0.141	53.30	46.07	48.50
	P1-77	0.141	52.92	46.07	48.50
	P1-78	0.141	51.03	46.57	48.00
	P1-79	0.141	54.31	46.57	48.00
	P1-80	0.376	53.58	46.57	48.00
	P1-100	0.141	52.95	51.57	43.00
Stages 1-3	P1-57	0.141	45.29	40.05	54.50
	P1-59	0.141	49.94	45.55	49.00
	P1-60	0.141	50.97	45.55	49.00
	P1-61	0.141	54.82	48.55	46.00
	P1-62	0.141	52.38	46.05	48.50
	P1-63	0.141	48.35	42.05	52.50
	P1-64	0.141	56.17	49.55	45.00
	P1-65	0.141	56.23	49.55	45.00
	P1-66	0.141	53.40	46.55	48.00
	P1-67	0.141	53.43	46.55	48.00
	P1-68	0.141	55.15	48.05	46.50
	P1-69	0.141	52.50	45.55	49.00
	P1-70	0.141	53.40	46.05	48.50
	P1-71	0.141	51.36	44.55	50.00
	P1-72	0.141	52.27	45.55	49.00
	P1-73	0.141	51.95	45.55	49.00
	P1-74	0.141	53.19	46.55	48.00
	P1-75	0.141	53.14	46.55	48.00
	P1-76	0.141	52.79	46.05	48.50
	P1-77	0.141	50.84	46.05	48.50
	P1-78	0.141	54.18	46.55	48.00
	P1-79	0.141	53.43	46.55	48.00
	P1-80	0.376	52.83	46.55	48.00

	P1-82	0.141	46.05	40.55	54.00
	P1-85	0.141	40.12	40.05	54.50
	P1-100	0.141	56.00	51.55	43.00
Stage 1-4	P1-53	0.141	58.86	35.02	59.50
	P1-54	0.141	41.61	35.52	59.00
	P1-55	0.141	42.13	37.52	57.00
	P1-56	0.446	44.15	38.52	56.00
	P1-57	0.141	45.25	40.02	54.50
	P1-58	0.141	46.48	44.52	50.00
	P1-59	0.141	51.20	45.52	49.00
	P1-60	0.141	50.23	45.52	49.00
	P1-61	0.141	51.20	48.52	46.00
	P1-62	0.141	54.83	46.02	48.50
	P1-63	0.141	52.42	42.02	52.50
	P1-64	0.141	48.51	49.52	45.00
	P1-65	0.141	56.10	49.52	45.00
	P1-66	0.141	56.36	46.52	48.00
	P1-67	0.141	53.30	46.52	48.00
	P1-68	0.141	53.32	48.02	46.50
	P1-69	0.141	55.07	45.52	49.00
	P1-70	0.141	52.37	46.02	48.50
	P1-71	0.141	53.29	44.52	50.00
	P1-72	0.141	51.26	45.52	49.00
	P1-73	0.141	52.39	45.52	49.00
	P1-74	0.141	52.26	46.52	48.00
	P1-75	0.141	53.06	46.52	48.00
	P1-76	0.141	53.05	46.02	48.50
	P1-77	0.141	52.67	46.02	48.50
	P1-78	0.141	50.77	46.52	48.00
	P1-79	0.141	54.06	46.52	48.00
	P1-80	0.376	53.33	46.52	48.00
	P1-82	0.141	52.71	40.52	54.00
	P1-85	0.141	47.05	40.02	54.50
	P1-100	0.141	45.31	51.52	43.00
Stage 1-9	Node2_6726	0.141	55.44	51.77	42.50
	Node2_6727	0.141	57.88	54.27	40.00
	Node2_6728	0.141	62.63	58.77	35.50
	Node2_6729	0.141	64.16	60.27	34.00
	Node2_6730	0.141	63.14	59.27	35.00
	Node2_6731	0.141	62.32	58.27	36.00
	Node2_6732	0.141	59.98	56.27	38.00
	Node2_6733	0.141	53.24	49.27	45.00
	Node2_6734	0.141	53.67	49.77	44.50
	Node2_6735	0.141	49.12	45.27	49.00
	Node2_6737	0.141	58.71	55.27	39.00
	Node2_6738	0.141	58.81	55.27	39.00
	Node2_6739	0.141	56.42	52.77	41.50
	Node2_6740	0.141	59.91	56.27	38.00
	Node2_6742	0.141	60.18	56.27	38.00
	Node2_6743	0.141	60.07	56.27	38.00
	Node2_6749	0.141	59.90	56.27	38.00
	P1-2	0.000	64.06	60.27	34.00
	P1-1	0.141	62.26	58.27	36.00
	P1-3	0.141	59.96	55.77	38.50
	P1-4	0.141	50.34	46.27	48.00
	P1-5	0.141	49.67	45.27	49.00
	P1-6	0.141	49.10	45.27	49.00
	P1-7	0.141	47.00	42.27	52.00
	P1-27	0.141	44.88	38.78	55.50

	P1-30	0.141	45.76	39.28	55.00
	P1-31	0.141	46.01	39.28	55.00
	P1-39	0.141	44.52	39.27	55.00
	P1-40	0.141	44.66	39.27	55.00
	P1-41	0.141	46.88	41.27	53.00
	P1-42	0.141	47.58	42.27	52.00
	P1-43	0.141	49.44	44.27	50.00
	P1-44	0.141	52.04	46.77	47.50
	P1-45	0.141	45.21	39.28	55.00
	P1-46	0.141	45.98	40.28	54.00
	P1-47	0.141	46.04	40.28	54.00
	P1-48	0.141	43.42	37.28	57.00
	P1-49	0.141	43.58	37.28	57.00
	P1-50	0.141	46.75	41.28	53.00
	P1-51	0.141	44.11	37.78	56.50
	P1-52	0.141	44.41	39.28	55.00
	P1-53	0.141	41.53	34.79	59.50
	P1-54	0.141	42.13	35.29	59.00
	P1-55	0.141	44.22	37.29	57.00
	P1-56	0.446	45.15	38.29	56.00
	P1-57	0.141	46.23	39.80	54.50
	P1-58	0.141	51.01	44.30	50.00
	P1-59	0.141	49.97	45.30	49.00
	P1-60	0.141	51.00	45.30	49.00
	P1-61	0.141	54.57	48.30	46.00
	P1-62	0.141	52.10	45.80	48.50
	P1-63	0.141	48.21	41.80	52.50
	P1-64	0.141	55.83	49.30	45.00
	P1-65	0.141	56.12	49.30	45.00
	P1-66	0.141	52.96	46.31	48.00
	P1-67	0.141	53.01	46.31	48.00
	P1-68	0.141	54.75	47.81	46.50
	P1-69	0.141	52.00	45.31	49.00
	P1-70	0.141	52.87	45.82	48.50
	P1-71	0.141	50.97	44.30	50.00
	P1-72	0.141	52.13	45.30	49.00
	P1-73	0.141	52.09	45.30	49.00
	P1-74	0.141	52.53	46.32	48.00
	P1-75	0.141	52.51	46.32	48.00
	P1-76	0.141	52.13	45.83	48.50
	P1-77	0.141	50.26	45.83	48.50
	P1-78	0.141	53.53	46.33	48.00
	P1-79	0.141	52.81	46.32	48.00
	P1-80	0.376	52.22	46.32	48.00
	P1-81	0.141	48.74	44.27	50.00
	P1-82	0.141	46.93	40.29	54.00
	P1-84	0.000	54.49	47.28	47.00
	P1-85	0.141	45.17	39.79	54.50
	P1-88	0.141	49.33	45.27	49.00
	P1-93	0.141	54.41	49.27	45.00
	P1-94	0.576	45.44	39.28	55.00
	P1-95	0.141	45.56	39.28	55.00
	P1-97	0.141	45.36	40.28	54.00
	P1-99	0.141	47.96	40.78	53.50
	P1-100	0.141	58.38	51.32	43.00
	P1-200	0.000	47.98	40.78	53.50
Stages 1-11 (Ultimate)	Node2_4889	0.000	66.45	60.13	34.00
	Node2_4918	0.000	56.84	50.13	44.00
	Node2_6591	0.000	62.84	56.13	38.00

Node2_6726	0.141	56.82	51.61	42.50
Node2_6727	0.141	59.38	54.11	40.00
Node2_6728	0.141	64.22	58.61	35.50
Node2_6729	0.141	65.67	60.11	34.00
Node2_6730	0.141	64.60	59.11	35.00
Node2_6731	0.141	63.67	58.11	36.00
Node2_6732	0.141	61.34	56.11	38.00
Node2_6733	0.141	54.61	49.11	45.00
Node2_6734	0.141	55.08	49.61	44.50
Node2_6735	0.141	50.75	45.11	49.00
Node2_6736	0.141	55.96	50.11	44.00
Node2_6737	0.141	60.88	55.11	39.00
Node2_6738	0.141	60.86	55.11	39.00
Node2_6739	0.141	58.05	52.61	41.50
Node2_6740	0.141	61.73	56.11	38.00
Node2_6741	0.141	50.93	45.11	49.00
Node2_6742	0.141	61.44	56.11	38.00
Node2_6743	0.141	61.42	56.11	38.00
Node2_6749	0.141	61.42	56.11	38.00
Node2_6812	0.000	62.81	56.13	38.00
P1-2	0.000	65.38	60.11	34.00
P1-1	0.141	63.67	58.11	36.00
P1-3	0.141	61.22	55.61	38.50
P1-4	0.141	51.61	46.11	48.00
P1-5	0.141	50.85	45.11	49.00
P1-6	0.141	50.73	45.11	49.00
P1-7	0.141	48.03	42.11	52.00
P1-9	0.000	57.84	51.13	43.00
P1-10	0.000	57.74	51.12	43.00
P1-11	0.141	57.72	51.12	43.00
P1-12	0.141	55.91	49.61	44.50
P1-13	0.141	56.65	50.12	44.00
P1-14	0.141	55.72	49.61	44.50
P1-15	0.141	54.03	48.11	46.00
P1-16	0.141	49.50	43.61	50.50
P1-17	0.141	51.58	45.12	49.00
P1-18	0.141	48.69	43.11	51.00
P1-19	0.141	45.65	40.11	54.00
P1-20	0.141	45.70	40.11	54.00
P1-21	0.141	44.83	39.11	55.00
P1-22	0.141	43.51	37.61	56.50
P1-23	0.141	43.04	37.11	57.00
P1-24	0.141	43.95	38.11	56.00
P1-25	0.141	44.94	39.11	55.00
P1-26	0.141	44.89	39.11	55.00
P1-27	0.141	44.53	38.61	55.50
P1-28	0.141	45.9	40.11	54.00
P1-29	0.141	44.89	39.11	55.00
P1-30	0.141	45.04	39.11	55.00
P1-31	0.141	45.07	39.11	55.00
P1-32	0.141	44.96	39.11	55.00
P1-33	0.141	45.95	40.11	54.00
P1-34	0.141	45.92	40.11	54.00
P1-35	0.141	46.09	40.11	54.00
P1-36	0.141	45.58	39.61	54.50
P1-37	0.141	54.27	48.11	46.00
P1-38	0.000	48.68	42.13	52.00
P1-39	0.141	45.12	39.11	55.00
P1-40	0.141	45.09	39.11	55.00

	P1-41	0.141	47.03	41.11	53.00
	P1-42	0.141	47.65	42.11	52.00
	P1-43	0.141	49.76	44.11	50.00
	P1-44	0.141	52.67	46.61	47.50
	P1-45	0.141	44.98	39.11	55.00
	P1-46	0.141	45.78	40.11	54.00
	P1-47	0.141	45.81	40.11	54.00
	P1-48	0.141	42.94	37.11	57.00
	P1-49	0.141	42.93	37.10	57.00
	P1-50	0.141	46.75	41.11	53.00
	P1-51	0.141	43.23	37.60	56.50
	P1-52	0.141	44.37	39.11	55.00
	P1-53	0.141	40.26	34.60	59.50
	P1-54	0.141	40.75	35.10	59.00
	P1-55	0.141	42.81	37.10	57.00
	P1-56	0.446	43.53	38.10	56.00
	P1-57	0.141	44.43	39.60	54.50
	P1-58	0.141	49.19	44.10	50.00
	P1-59	0.141	48.08	45.10	49.00
	P1-60	0.141	49.08	45.10	49.00
	P1-61	0.141	52.68	48.10	46.00
	P1-62	0.141	50.21	45.60	48.50
	P1-63	0.141	46.36	41.60	52.50
	P1-64	0.141	53.88	49.10	45.00
	P1-65	0.141	54.14	49.10	45.00
	P1-66	0.141	50.95	46.10	48.00
	P1-67	0.141	50.98	46.10	48.00
	P1-68	0.141	52.60	47.60	46.50
	P1-69	0.141	49.92	45.10	49.00
	P1-70	0.141	50.59	45.60	48.50
	P1-71	0.141	49.01	44.10	50.00
	P1-72	0.141	50.31	45.10	49.00
	P1-73	0.141	50.38	45.10	49.00
	P1-74	0.141	50.04	46.10	48.00
	P1-75	0.141	50.06	46.10	48.00
	P1-76	0.141	49.64	45.60	48.50
	P1-77	0.141	47.75	45.60	48.50
	P1-78	0.141	51.00	46.10	48.00
	P1-79	0.141	50.30	46.10	48.00
	P1-80	0.376	49.75	46.10	48.00
	P1-81	0.141	48.98	44.11	50.00
	P1-82	0.141	45.48	40.10	54.00
	P1-84	0.000	53.87	47.13	47.00
	P1-85	0.141	43.70	39.60	54.50
	P1-86	0.000	58.35	51.63	42.50
	P1-87	0.000	66.57	60.13	34.00
	P1-88	0.141	50.76	45.11	49.00
	P1-89	0.141	52.94	47.11	47.00
	P1-90	0.637	61.52	55.61	38.50
	P1-91	0.000	57.84	51.13	43.00
	P1-92	0.141	55.93	49.61	44.50
	P1-93	0.141	55.25	49.11	45.00
	P1-94	0.576	44.91	39.11	55.00
	P1-95	0.141	44.99	39.11	55.00
	P1-97	0.141	45.99	40.11	54.00
	P1-98	0.141	46.11	40.11	54.00
	P1-99	0.141	46.55	40.61	53.50
	P1-100	0.141	55.96	51.10	43.00
	P1-200	0.000	47.36	40.63	53.50

Note: Each stage will be constructed separately, however certain stages were modelled concurrently where they represented the worst-case hydraulic scenario relative to the preceding stages (e.g. higher cumulative flows through the same pipework).

Precinct 1 - Pipes

Develop. Stage	Pipe ID	Diam. (mm)	SF PH Flow (L/s)	SF PH Velocity (m/s)	SF PH Headloss (m/km)
Stage 1A and 1B	P1-71.P1-69.1	100.0	0.14	0.02	0.01
	P1-69.P1-70.1	100.0	0.28	0.04	0.03
	P1-71.P1-72.1	100.0	0.00	0.00	0.00
	P1-72.P1-100.1	150.0	0.14	0.01	0.00
	P1-74.P1-75.1	100.0	0.07	0.01	0.00
	P1-76.P1-75.1	100.0	0.21	0.03	0.01
	P1-76.P1-78.1	100.0	0.49	0.06	0.07
	P1-76.P1-77.1	100.0	0.14	0.02	0.01
	P1-74.P1-79.1	100.0	0.08	0.01	0.00
	P1-79.P1-80.1	100.0	0.38	0.05	0.05
	P1-79.P1-100.1	100.0	0.59	0.08	0.10
	P1-78.P1-70.1	150.0	0.42	0.02	0.01
	P1-100.P1-78.1	150.0	0.88	0.05	0.03
	MPR-N1669.P1-78.1	150.0	1.93	0.11	0.12
Stage 1 - 2	P1-64.P1-65.1	100.0	0.22	0.03	0.02
	P1-65.P1-68.1	150.0	0.36	0.02	0.01
	P1-64.P1-66.1	100.0	0.06	0.01	0.00
	P1-66.P1-67.1	100.0	0.35	0.04	0.04
	P1-67.P1-69.1	100.0	0.23	0.03	0.02
	P1-71.P1-69.1	100.0	0.04	0.01	0.00
	P1-69.P1-70.1	100.0	0.33	0.04	0.04
	P1-67.P1-68.1	100.0	0.26	0.03	0.02
	P1-61.P1-64.1	100.0	0.14	0.02	0.01
	P1-61.P1-62.1	100.0	0.00	0.00	0.00
	P1-62.P1-66.1	100.0	0.14	0.02	0.01
	P1-71.P1-72.1	100.0	0.18	0.02	0.01
	P1-72.P1-100.1	150.0	0.32	0.02	0.00
	P1-74.P1-75.1	100.0	0.08	0.01	0.00
	P1-76.P1-75.1	100.0	0.23	0.03	0.02
	P1-76.P1-78.1	100.0	0.51	0.06	0.08
	P1-76.P1-77.1	100.0	0.14	0.02	0.01
	P1-74.P1-79.1	100.0	0.06	0.01	0.00
	P1-79.P1-80.1	100.0	0.38	0.05	0.05
	P1-79.P1-100.1	100.0	0.57	0.07	0.09
	P1-78.P1-70.1	150.0	1.23	0.07	0.05
	P1-70.P1-68.1	150.0	0.76	0.04	0.02
	P1-100.P1-78.1	150.0	1.04	0.06	0.04
	MPR-N1669.P1-78.1	150.0	2.91	0.16	0.27
Stages 1-3	P1-82.P1-73.1	150.0	0.14	0.01	0.00
	P1-73.P1-72.1	150.0	0.42	0.02	0.01
	P1-64.P1-65.1	100.0	0.35	0.04	0.04
	P1-65.P1-68.1	150.0	0.49	0.03	0.01
	P1-64.P1-66.1	100.0	0.09	0.01	0.00
	P1-66.P1-67.1	100.0	0.48	0.06	0.07
	P1-67.P1-69.1	100.0	0.20	0.03	0.01
	P1-71.P1-69.1	100.0	0.26	0.03	0.02
	P1-69.P1-70.1	100.0	0.61	0.08	0.10
	P1-67.P1-68.1	100.0	0.42	0.05	0.06
	P1-61.P1-64.1	100.0	0.30	0.04	0.03
	P1-57.P1-60.1	100.0	0.05	0.01	0.00
	P1-60.P1-59.1	100.0	0.14	0.02	0.01
	P1-60.P1-61.1	100.0	0.23	0.03	0.02
	P1-61.P1-62.1	100.0	0.08	0.01	0.00

	P1-63.P1-62.1	100.0	0.04	0.00	0.00
	P1-62.P1-66.1	100.0	0.25	0.03	0.02
	P1-57.P1-63.1	100.0	0.19	0.02	0.01
	P1-63.P1-71.1	100.0	0.29	0.04	0.03
	P1-71.P1-72.1	100.0	0.17	0.02	0.01
	P1-72.P1-100.1	150.0	0.74	0.04	0.02
	P1-74.P1-75.1	100.0	0.13	0.02	0.01
	P1-76.P1-75.1	100.0	0.27	0.03	0.03
	P1-76.P1-78.1	100.0	0.56	0.07	0.09
	P1-76.P1-77.1	100.0	0.14	0.02	0.01
	P1-74.P1-79.1	100.0	0.01	0.00	0.00
	P1-79.P1-80.1	100.0	0.38	0.05	0.05
	P1-79.P1-100.1	100.0	0.53	0.07	0.08
	P1-78.P1-70.1	150.0	1.80	0.10	0.10
	P1-70.P1-68.1	150.0	1.05	0.06	0.04
	P1-100.P1-78.1	150.0	1.40	0.08	0.07
	P1-85.P1-73.1	100.0	0.14	0.02	0.01
	MPR-N1669.P1-78.1	150.0	3.90	0.22	0.46
Stages 1 - 4	P1-55.P1-54.1	150.0	0.13	0.01	0.00
	P1-54.P1-53.1	150.0	0.21	0.01	0.00
	P1-55.P1-56.1	150.0	0.01	0.00	0.00
	P1-53.P1-82.1	150.0	0.35	0.02	0.01
	P1-82.P1-73.1	150.0	0.49	0.03	0.01
	P1-54.P1-85.1	100.0	0.06	0.01	0.00
	P1-73.P1-72.1	150.0	0.83	0.05	0.03
	P1-56.P1-57.1	100.0	0.04	0.01	0.00
	P1-56.P1-58.1	150.0	0.42	0.02	0.01
	P1-58.P1-65.1	150.0	0.56	0.03	0.01
	P1-64.P1-65.1	100.0	0.20	0.03	0.01
	P1-65.P1-68.1	150.0	0.90	0.05	0.03
	P1-64.P1-66.1	100.0	0.21	0.03	0.02
	P1-66.P1-67.1	100.0	0.65	0.08	0.12
	P1-67.P1-69.1	100.0	0.29	0.04	0.03
	P1-71.P1-69.1	100.0	0.36	0.05	0.04
	P1-69.P1-70.1	100.0	0.79	0.10	0.17
	P1-67.P1-68.1	100.0	0.50	0.06	0.07
	P1-61.P1-64.1	100.0	0.27	0.03	0.02
	P1-57.P1-60.1	100.0	0.04	0.00	0.00
	P1-60.P1-59.1	100.0	0.14	0.02	0.01
	P1-60.P1-61.1	100.0	0.25	0.03	0.02
	P1-61.P1-62.1	100.0	0.12	0.01	0.01
	P1-63.P1-62.1	100.0	0.03	0.00	0.00
	P1-62.P1-66.1	100.0	0.29	0.04	0.03
	P1-57.P1-63.1	100.0	0.22	0.03	0.02
	P1-63.P1-71.1	100.0	0.32	0.04	0.04
	P1-71.P1-72.1	100.0	0.10	0.01	0.01
	P1-72.P1-100.1	150.0	1.08	0.06	0.04
	P1-74.P1-75.1	100.0	0.18	0.02	0.01
	P1-76.P1-75.1	100.0	0.32	0.04	0.03
	P1-76.P1-78.1	100.0	0.60	0.08	0.10
	P1-76.P1-77.1	100.0	0.14	0.02	0.01
	P1-74.P1-79.1	100.0	0.04	0.00	0.00
	P1-79.P1-80.1	100.0	0.38	0.05	0.05
	P1-79.P1-100.1	100.0	0.48	0.06	0.07
	P1-78.P1-70.1	150.0	2.47	0.14	0.18
	P1-70.P1-68.1	150.0	1.54	0.09	0.08
	P1-100.P1-78.1	150.0	1.70	0.10	0.09
	P1-85.P1-73.1	100.0	0.20	0.03	0.01
	MPR-N1669.P1-78.1	150.0	4.91	0.28	0.71

Stages 1-9	MP-P03639 (Node2_6726.Node2_6732.1)	100.0	0.02	0.00	0.00
	MP-P03646 (Node2_6728.Node2_6729.1)	150.0	0.29	0.02	0.00
	MP-P03643 (Node2_6729.Node2_6730.1)	150.0	0.33	0.02	0.00
	MP-P03644 (Node2_6730.Node2_6731.1)	150.0	0.47	0.03	0.01
	MP-P03645 (Node2_6732.Node2_6729.1)	100.0	0.10	0.01	0.00
	MP-P03637 (Node2_6733.Node2_6726.1)	100.0	0.25	0.03	0.02
	MP-P03641 (Node2_6742.Node2_6743.1)	100.0	0.25	0.03	0.02
	MP-P03642 (Node2_6743.Node2_6731.1)	100.0	0.15	0.02	0.01
	P1-1.P1-2.1	150.0	0.00	0.00	0.00
	P1-1.Node2_6731.1	150.0	0.76	0.04	0.02
	P1-3.P1-1.1	150.0	0.90	0.05	0.03
	P1-3.Node2_6742.1	100.0	0.25	0.03	0.02
	P1-5.P1-3.1	150.0	1.29	0.07	0.06
	P1-5.P1-4.1	100.0	0.78	0.10	0.16
	Node2_6742.P1-4.1	100.0	0.15	0.02	0.01
	P1-4.Node2_6733.1	100.0	0.49	0.06	0.07
	Node2_6743.Node2_6732.1	100.0	0.26	0.03	0.02
	Node2_6733.Node2_6734.1	100.0	0.10	0.01	0.00
	Node2_6734.Node2_6735.1	100.0	0.27	0.03	0.02
	Node2_6734.Node2_6727.1	100.0	0.22	0.03	0.02
	Node2_6726.Node2_6749.1	100.0	0.13	0.02	0.01
	Node2_6727.Node2_6749.1	100.0	0.08	0.01	0.00
	Node2_6749.Node2_6728.1	100.0	0.07	0.01	0.00
	Node2_6728.Node2_6740.1	150.0	0.22	0.01	0.00
	Node2_6740.Node2_6738.1	150.0	0.08	0.00	0.00
	Node2_6737.Node2_6738.1	150.0	0.14	0.01	0.00
	P1-6.Node2_6735.1	100.0	0.48	0.06	0.07
	Node2_6738.Node2_6739.1	100.0	0.20	0.03	0.01
	Node2_6739.Node2_6727.1	100.0	0.00	0.00	0.00
	Node2_6739.P1-6.1	100.0	0.34	0.04	0.04
	P1-7.P1-5.1	150.0	2.21	0.13	0.15
	Node2_6735.P1-88.1	100.0	0.89	0.11	0.20
	P1-27.P1-95.1	150.0	0.14	0.01	0.00
	P1-30.P1-31.1	150.0	1.00	0.06	0.04
	P1-31.P1-99.1	150.0	1.14	0.06	0.05
	P1-7.P1-39.1	150.0	3.39	0.19	0.35
	P1-39.P1-44.1	150.0	1.03	0.06	0.04
	P1-39.P1-40.1	150.0	2.50	0.14	0.18
	P1-40.P1-43.1	100.0	0.09	0.01	0.00
	P1-40.P1-41.1	150.0	2.55	0.14	0.19
	P1-41.P1-42.1	100.0	0.06	0.01	0.00
	P1-44.P1-43.1	100.0	0.57	0.07	0.09
	P1-44.P1-93.1	150.0	0.60	0.03	0.01
	P1-81.P1-50.1	100.0	0.88	0.11	0.20
	P1-46.P1-47.1	100.0	0.67	0.09	0.12
	P1-47.P1-50.1	100.0	0.22	0.03	0.02
	P1-45.P1-46.1	100.0	0.48	0.06	0.07
	P1-42.P1-46.1	100.0	1.01	0.13	0.25
	P1-43.P1-42.1	100.0	0.81	0.10	0.17
	P1-41.P1-45.1	150.0	2.63	0.15	0.20
	P1-45.P1-48.1	150.0	3.25	0.18	0.29
	P1-47.P1-48.1	100.0	1.03	0.13	0.26
	P1-48.P1-49.1	150.0	4.42	0.25	0.50

	P1-50.P1-97.1	100.0	0.80	0.10	0.17
	P1-52.P1-51.1	100.0	1.08	0.14	0.29
	P1-49.P1-51.1	100.0	1.08	0.14	0.28
	P1-51.P1-55.1	100.0	2.30	0.29	1.10
	P1-55.P1-54.1	150.0	1.40	0.08	0.06
	P1-54.P1-53.1	150.0	0.27	0.02	0.00
	P1-49.P1-53.1	150.0	3.48	0.20	0.33
	P1-55.P1-56.1	150.0	5.53	0.31	0.75
	P1-53.P1-82.1	150.0	3.90	0.22	0.40
	P1-82.P1-73.1	150.0	4.04	0.23	0.43
	P1-54.P1-85.1	100.0	1.27	0.16	0.38
	P1-73.P1-72.1	150.0	5.59	0.32	0.77
	P1-56.P1-57.1	100.0	2.30	0.29	1.10
	P1-56.P1-58.1	150.0	3.67	0.21	0.36
	P1-58.P1-65.1	150.0	3.81	0.22	0.38
	P1-64.P1-65.1	100.0	0.01	0.00	0.00
	P1-65.P1-68.1	150.0	3.95	0.22	0.41
	P1-64.P1-66.1	100.0	1.08	0.14	0.29
	P1-66.P1-67.1	100.0	2.53	0.32	1.31
	P1-67.P1-69.1	100.0	0.92	0.12	0.22
	P1-71.P1-69.1	100.0	1.94	0.25	0.81
	P1-69.P1-70.1	100.0	3.00	0.38	1.79
	P1-67.P1-68.1	100.0	1.75	0.22	0.67
	P1-61.P1-64.1	100.0	0.93	0.12	0.22
	P1-57.P1-60.1	100.0	0.93	0.12	0.22
	P1-60.P1-59.1	100.0	0.14	0.02	0.01
	P1-60.P1-61.1	100.0	1.22	0.15	0.35
	P1-61.P1-62.1	100.0	0.42	0.05	0.06
	P1-63.P1-62.1	100.0	0.74	0.09	0.15
	P1-62.P1-66.1	100.0	1.31	0.17	0.40
	P1-57.P1-63.1	100.0	1.51	0.19	0.52
	P1-63.P1-71.1	100.0	0.91	0.12	0.21
	P1-71.P1-72.1	100.0	0.89	0.11	0.20
	P1-72.P1-100.1	150.0	4.84	0.27	0.59
	P1-74.P1-75.1	100.0	0.79	0.10	0.16
	P1-76.P1-75.1	100.0	0.93	0.12	0.22
	P1-76.P1-78.1	100.0	1.21	0.15	0.35
	P1-76.P1-77.1	100.0	0.14	0.02	0.01
	P1-74.P1-79.1	100.0	0.65	0.08	0.12
	P1-79.P1-80.1	100.0	0.38	0.05	0.05
	P1-79.P1-100.1	100.0	0.13	0.02	0.01
	P1-78.P1-70.1	150.0	8.98	0.51	1.82
	P1-70.P1-68.1	150.0	5.83	0.33	0.83
Stages 1-11 (Ultimate)	MP-P03434 (Node2_4918.Node2_4914.1)	300.0	9.99	0.14	0.08
	MP-P03445 (Node2_4918.P1-91.1)	300.0	0.00	0.00	0.00
	MP-P04187 (P1-91.P1-38.1)	250.0	0.00	0.00	0.00
	MP-P03764 (Node2_6591.P1-86.1)	375.0	0.00	0.00	0.00
	MP-P03639 (Node2_6726.Node2_6732.1)	100.0	0.08	0.01	0.00
	MP-P03646 (Node2_6728.Node2_6729.1)	150.0	0.53	0.03	0.01
	MP-P03643 (Node2_6729.Node2_6730.1)	150.0	0.30	0.02	0.00
	MP-P03644 (Node2_6730.Node2_6731.1)	150.0	0.16	0.01	0.00
	MP-P03645 (Node2_6732.Node2_6729.1)	100.0	0.08	0.01	0.00
	MP-P03637 (Node2_6733.Node2_6726.1)	100.0	0.10	0.01	0.00

MP-P03641 (Node2_6742.Node2_6743.1)	100.0	0.04	0.01	0.00
MP-P03642 (Node2_6743.Node2_6731.1)	100.0	0.08	0.01	0.00
P1-86.P1-87.1	250.0	0.00	0.00	0.00
P1-1.P1-2.1	150.0	0.00	0.00	0.00
P1-1.Node2_6731.1	150.0	0.06	0.00	0.00
P1-3.P1-1.1	150.0	0.20	0.01	0.00
P1-3.Node2_6742.1	100.0	0.10	0.01	0.01
P1-5.P1-3.1	150.0	0.44	0.03	0.01
P1-5.P1-4.1	100.0	0.23	0.03	0.02
Node2_6742.P1-4.1	100.0	0.08	0.01	0.00
P1-4.Node2_6733.1	100.0	0.01	0.00	0.00
Node2_6743.Node2_6732.1	100.0	0.02	0.00	0.00
Node2_6741.P1-7.1	150.0	0.72	0.04	0.02
Node2_6733.Node2_6734.1	100.0	0.24	0.03	0.02
Node2_6734.Node2_6735.1	100.0	0.33	0.04	0.04
Node2_6734.Node2_6727.1	100.0	0.05	0.01	0.00
Node2_6726.Node2_6749.1	100.0	0.11	0.01	0.00
Node2_6727.Node2_6749.1	100.0	0.11	0.01	0.01
Node2_6749.Node2_6728.1	100.0	0.15	0.02	0.01
Node2_6728.Node2_6740.1	150.0	0.81	0.05	0.03
Node2_6740.Node2_6738.1	150.0	0.95	0.05	0.03
Node2_6737.Node2_6738.1	150.0	1.57	0.09	0.08
Node2_6736.P1-90.1	150.0	1.91	0.11	0.11
Node2_6736.P1-6.1	100.0	0.46	0.06	0.06
P1-6.Node2_6735.1	100.0	0.36	0.05	0.04
Node2_6738.Node2_6739.1	100.0	0.48	0.06	0.07
Node2_6739.Node2_6727.1	100.0	0.30	0.04	0.03
Node2_6739.P1-6.1	100.0	0.04	0.00	0.00
Node2_6736.P1-89.1	150.0	1.31	0.07	0.06
P1-7.P1-5.1	150.0	0.82	0.05	0.03
Node2_6735.P1-88.1	100.0	0.11	0.01	0.01
MP-P03764 (P1-9.P1-200.1)	375.0	6.72	0.06	0.01
P1-10.P1-11.1	250.0	16.71	0.34	0.55
P1-11.P1-13.1	250.0	0.28	0.01	0.00
P1-13.P1-17.1	250.0	0.14	0.00	0.00
P1-16.P1-22.2	150.0	1.74	0.10	0.10
P1-22.P1-23.1	150.0	2.20	0.12	0.14
P1-23.P1-24.1	100.0	0.61	0.08	0.11
P1-24.P1-25.1	100.0	0.06	0.01	0.00
P1-25.P1-21.1	100.0	0.64	0.08	0.11
P1-23.P1-27.1	150.0	1.44	0.08	0.07
P1-27.P1-26.1	100.0	0.11	0.01	0.00
P1-24.P1-26.1	100.0	0.53	0.07	0.08
P1-26.P1-29.1	100.0	0.28	0.04	0.03
P1-25.P1-28.1	100.0	0.44	0.06	0.06
P1-28.P1-29.1	100.0	0.28	0.04	0.03
P1-29.P1-30.1	100.0	0.42	0.05	0.05
P1-27.P1-95.1	150.0	1.41	0.08	0.07
P1-30.P1-31.1	150.0	0.97	0.05	0.03
P1-32.P1-31.1	100.0	0.19	0.02	0.01
P1-31.P1-99.1	150.0	1.02	0.06	0.04
P1-32.P1-36.1	100.0	0.22	0.03	0.02
P1-32.P1-33.1	100.0	0.55	0.07	0.09
P1-28.P1-34.1	100.0	0.02	0.00	0.00
P1-34.P1-33.1	100.0	0.45	0.06	0.06
P1-33.P1-35.1	100.0	0.24	0.03	0.02
P1-35.P1-98.1	150.0	2.43	0.14	0.17

P1-35.P1-37.1	150.0	2.82	0.16	0.22
P1-12.P1-14.1	150.0	3.59	0.20	0.34
P1-14.P1-16.1	150.0	2.48	0.14	0.18
P1-14.P1-15.1	100.0	0.97	0.12	0.24
P1-37.P1-15.1	100.0	0.95	0.12	0.23
P1-15.P1-19.1	100.0	0.79	0.10	0.16
P1-18.P1-19.1	100.0	0.11	0.01	0.01
P1-19.P1-21.1	100.0	0.76	0.10	0.15
P1-15.P1-18.1	100.0	0.99	0.13	0.25
P1-16.P1-22.1	100.0	0.59	0.08	0.10
P1-18.P1-20.1	100.0	0.74	0.09	0.15
P1-20.P1-21.1	100.0	0.02	0.00	0.00
P1-20.P1-34.1	100.0	0.58	0.07	0.10
P1-11.P1-92.1	150.0	12.02	0.68	3.13
P1-12.P1-37.1	150.0	3.91	0.22	0.40
MP-P04187 (P1-38.Node2_4889.1)	250.0	0.00	0.00	0.00
P1-7.P1-39.1	150.0	0.18	0.01	0.00
P1-39.P1-44.1	150.0	1.93	0.11	0.11
P1-39.P1-40.1	150.0	1.60	0.09	0.08
P1-40.P1-43.1	100.0	0.26	0.03	0.02
P1-40.P1-41.1	150.0	1.72	0.10	0.09
P1-41.P1-42.1	100.0	0.03	0.00	0.00
P1-44.P1-43.1	100.0	1.08	0.14	0.29
P1-44.P1-93.1	150.0	3.15	0.18	0.27
P1-81.P1-50.1	100.0	0.81	0.10	0.17
P1-46.P1-47.1	100.0	0.12	0.02	0.01
P1-47.P1-50.1	100.0	0.63	0.08	0.11
P1-45.P1-46.1	100.0	0.31	0.04	0.03
P1-42.P1-46.1	100.0	0.57	0.07	0.09
P1-43.P1-42.1	100.0	0.68	0.09	0.13
P1-41.P1-45.1	150.0	1.55	0.09	0.08
P1-45.P1-48.1	150.0	1.72	0.10	0.09
P1-47.P1-48.1	100.0	0.61	0.08	0.11
P1-48.P1-49.1	150.0	2.19	0.12	0.14
P1-50.P1-97.1	100.0	0.04	0.00	0.00
P1-52.P1-51.1	100.0	0.70	0.09	0.13
P1-49.P1-51.1	100.0	0.48	0.06	0.07
P1-51.P1-55.1	100.0	1.03	0.13	0.26
P1-55.P1-54.1	150.0	0.70	0.04	0.02
P1-54.P1-53.1	150.0	0.03	0.00	0.00
P1-49.P1-53.1	150.0	1.57	0.09	0.08
P1-55.P1-56.1	150.0	2.50	0.14	0.18
P1-53.P1-82.1	150.0	1.46	0.08	0.07
P1-82.P1-73.1	150.0	1.32	0.07	0.06
P1-54.P1-85.1	100.0	0.53	0.07	0.08
P1-73.P1-72.1	150.0	1.57	0.09	0.08
P1-56.P1-57.1	100.0	0.87	0.11	0.19
P1-56.P1-58.1	150.0	1.18	0.07	0.05
P1-58.P1-65.1	150.0	1.04	0.06	0.04
P1-64.P1-65.1	100.0	0.33	0.04	0.04
P1-65.P1-68.1	150.0	0.57	0.03	0.01
P1-64.P1-66.1	100.0	0.15	0.02	0.01
P1-66.P1-67.1	100.0	0.16	0.02	0.01
P1-67.P1-69.1	100.0	0.01	0.00	0.00
P1-71.P1-69.1	100.0	0.39	0.05	0.05
P1-69.P1-70.1	100.0	0.24	0.03	0.02
P1-67.P1-68.1	100.0	0.03	0.00	0.00
P1-61.P1-64.1	100.0	0.04	0.00	0.00

	P1-57.P1-60.1	100.0	0.37	0.05	0.05
	P1-60.P1-59.1	100.0	0.14	0.02	0.01
	P1-60.P1-61.1	100.0	0.09	0.01	0.00
	P1-61.P1-62.1	100.0	0.01	0.00	0.00
	P1-63.P1-62.1	100.0	0.30	0.04	0.03
	P1-62.P1-66.1	100.0	0.15	0.02	0.01
	P1-57.P1-63.1	100.0	0.35	0.04	0.04
	P1-63.P1-71.1	100.0	0.09	0.01	0.00
	P1-71.P1-72.1	100.0	0.62	0.08	0.11
	P1-72.P1-100.1	150.0	0.81	0.05	0.02
	P1-74.P1-75.1	100.0	0.00	0.00	0.00
	P1-76.P1-75.1	100.0	0.15	0.02	0.01
	P1-76.P1-78.1	100.0	0.43	0.05	0.06
	P1-76.P1-77.1	100.0	0.14	0.02	0.01
	P1-74.P1-79.1	100.0	0.14	0.02	0.01
	P1-79.P1-80.1	100.0	0.38	0.05	0.05
	P1-79.P1-100.1	100.0	0.65	0.08	0.12
	P1-78.P1-70.1	150.0	0.56	0.03	0.01
	P1-70.P1-68.1	150.0	0.46	0.03	0.01
	P1-9.Node2_4918.1	250.0	9.99	0.20	0.21
	MP-P03764 (P1-84.Node2_6842.1)	375.0	6.72	0.06	0.01
	MP-P03764 (P1-86.P1-9.1)	375.0	0.00	0.00	0.00
	P1-88.P1-7.1	100.0	0.05	0.01	0.00
	P1-89.Node2_6741.1	150.0	0.86	0.05	0.03
	P1-88.P1-89.1	100.0	0.30	0.04	0.03
	P1-90.Node2_6737.1	150.0	1.71	0.10	0.09
	P1-90.P1-11.1	150.0	4.26	0.24	0.54
	MP-P03445 (P1-91.Node2_6812.1)	300.0	0.00	0.00	0.00
	P1-92.P1-12.1	150.0	7.64	0.43	1.36
	P1-93.P1-81.1	100.0	0.95	0.12	0.23
	P1-92.P1-93.1	150.0	4.24	0.24	0.54
	P1-95.P1-30.1	150.0	0.70	0.04	0.02
	P1-95.P1-94.1	150.0	0.58	0.03	0.01
	P1-97.P1-52.1	100.0	0.84	0.11	0.18
	P1-98.P1-36.1	150.0	1.35	0.08	0.06
	P1-98.P1-97.1	150.0	0.94	0.05	0.03
	P1-99.P1-36.1	150.0	1.43	0.08	0.07
	P1-99.P1-55.1	150.0	2.31	0.13	0.17
	P1-100.P1-78.1	150.0	0.01	0.00	0.00
	P1-85.P1-73.1	100.0	0.39	0.05	0.05
	MPR-N1669.P1-78.1	150.0	0.00	0.00	0.00
	MP-P03764 (P1-200.P1-84.1)	375.0	6.72	0.06	0.01
	P1-200.P1-99.1	150.0	0.00	0.00	0.00

Note: Each stage will be constructed separately, however certain stages were modelled concurrently where they represented the worst-case hydraulic scenario relative to the preceding stages (e.g. higher cumulative flows through the same pipework).

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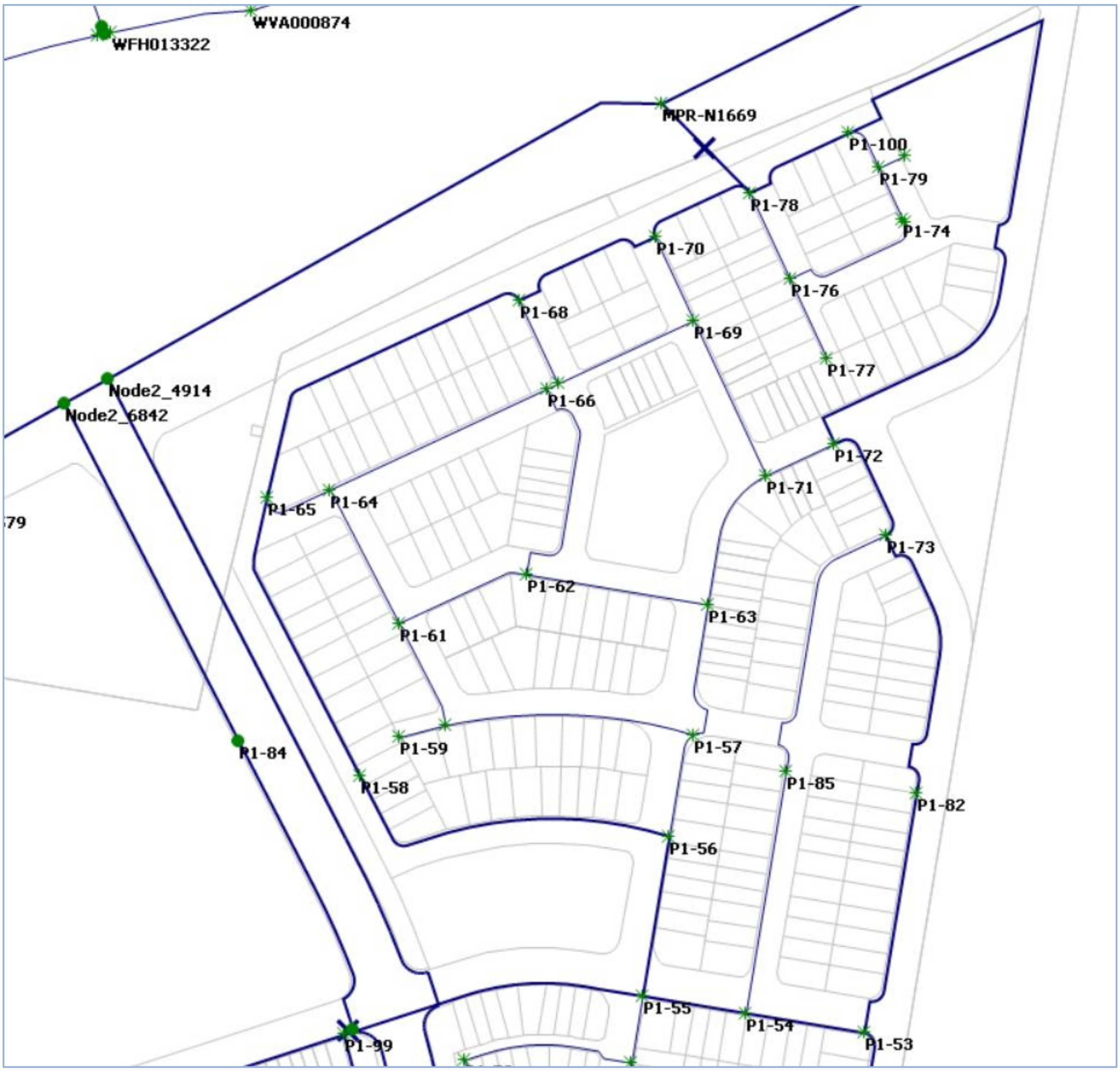
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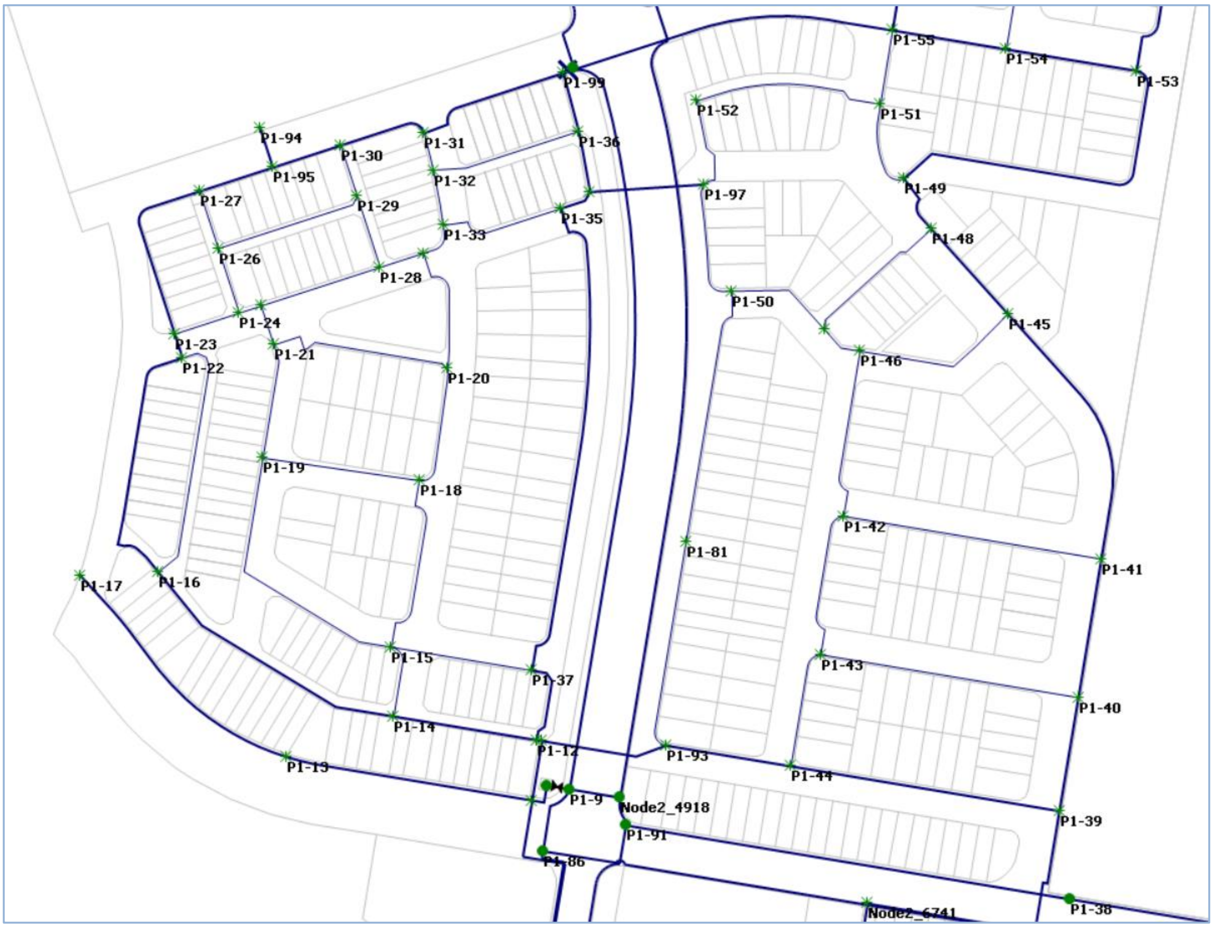
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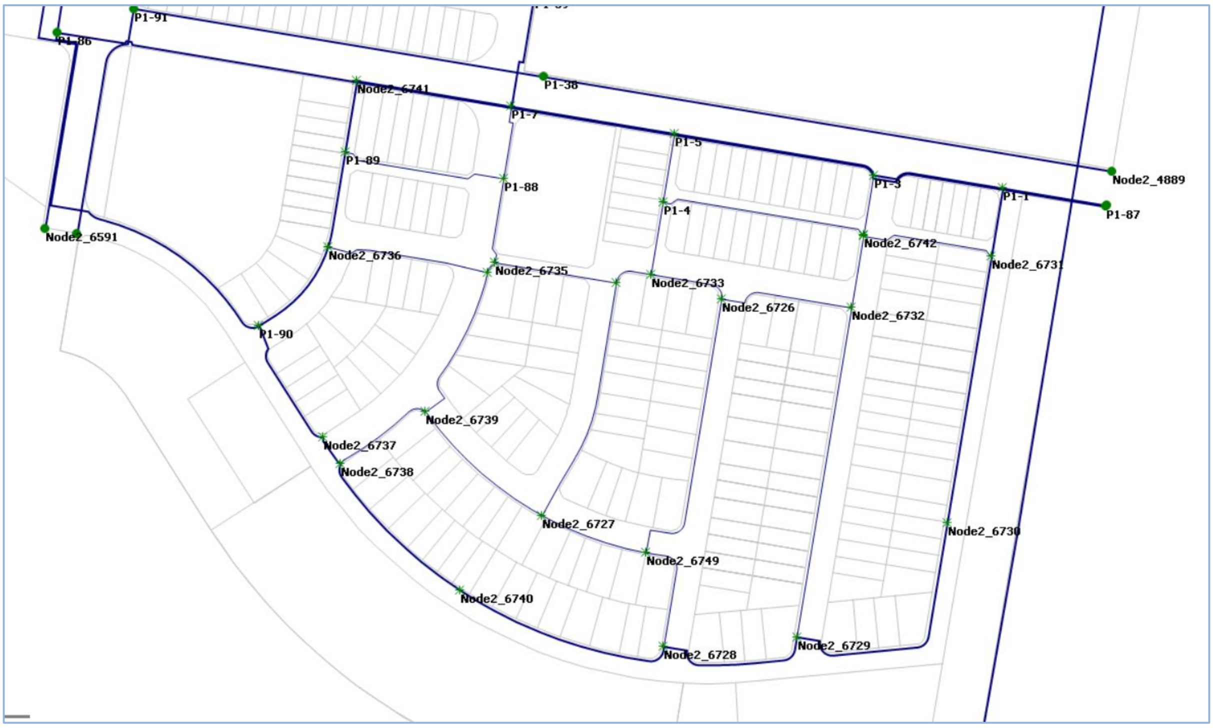
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