
From: Tom Reilly <Tom.Reilly@ghd.com>
Sent: Monday, 15 May 2023 5:15 PM
To: TPC Enquiry
Cc: TasWater Development Mailbox; Peter Hollister (InTouch); David Boyle (InTouch); Jason Taylor (InTouch); Carolyn Milnes
Subject: Draft amendment AM2022.01 and permit PA2022.0024
Attachments: 12590738-LET-Tasmanian Planning Commission and TasWater.pdf; Amended Figure 9 - Proposed lot and zone plan.pdf

Dear Tasmanian Planning Commission,
Please find attached a water supply and sewer drainage assessment to address the Commissions letter of 3 April 2023.
Also attached is an amended Figure 9, which is provided as a reflection of the amendments made to the proposed zone and subdivision plan post hearing.
Please contact me if you have any questions.
Thank you, sincerely
Tom.

Tom Reilly
Planning Technical Leader

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Your ref: Draft amendment AM2022.01 and permit PA2022.0024
Our ref: 12590738

15 May 2023

Robin Nolan
Delegate (Chair)
Tasmanian Planning Commission
Level 3, 144-148 Macquarie Street
Hobart, TAS, 7000

Sent by email to: tpc@planning.tas.gov.au
A copy to: development@taswater.com.au
council@devonport.tas.gov.au

Dear Mr Nolan,

This document has been prepared by GHD engineers to address Tasmanian Planning Commissions TasWater related directions in response to the Draft amendment AM2022.01 and permit PA2022.0024 for 133 Middle Road, Miandetta. The conditions are expressed in section 1 with the addressed conditions summarised in section 6. The full explanation of the addressed conditions can be seen in the corresponding sections later in the document.

GHDs conclusion is that the proposed amendment and subdivision can be appropriately supported by TasWater's existing water and sewer services network and that future subdivision of lots 4, 5, and 6 (which is not proposed as part of this application) could be designed in a regular manner that can be appropriately supported by TasWater's existing water and sewer services network.

Thank you, sincerely,

Tom Reilly
Planning Technical Leader
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1. Purpose of this report

1.1 Information required

The Commission gave direction for the following items to be addressed regarding water and sewer infrastructure:

- a. Required ultimate peak day flow rate in L/s and required residual pressure (kPa) at the connection point
- b. Ultimate peak day usage in L/day
- c. Required fire flow rate in L/s and required residual pressure (kPa) at the connection point
- d. Water model that satisfies TasWater's standards to ensure that the ultimate development (as indicatively shown on the master plan) can be serviced appropriately for domestic and fire purposes given the residential zoning proposal
- e. Calculations of the estimated number of ultimate Equivalent Tenements
- f. Servicing plan for sewer demonstrating ability to service the entirety of the proposed lot 4 by gravity, or confirmation of areas not able to be serviced (preliminary long section, including inverts of existing infrastructure)

The outcome of the assessment has been summarised in section 6, with full explanations addressed in sections below.

1.2 Scope and limitations

This report: has been prepared by GHD on behalf of Devonfield Enterprises Pty Ltd and may only be used and relied by TasWater and the Tasmanian Planning Commission on for the purpose set out in section 1 of this report.

GHD otherwise disclaims responsibility to any person other than the Devonfield Enterprises Pty Ltd arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

1.3 References

The calculations presented throughout this document have used the following reference documents for the calculations:

- WSA 03-2011-3.1 V2.0 Water Supply Code of Australia
- TasWater supplement to WSA 03-2011-3.1 V2.0
- AS/NZS 3500.1-2021 Plumbing and Drainage Part 1: Water Services
- Draft amendment AM2022.01 and permit PA2022.0024 - Amended plan (10 May 2023)
- WSA 02-2014-3.1 Gravity Sewerage Code of Australia
- MRWA WSA 02-2014-3.1 Gravity Sewerage Code of Australia
- TasWater Supplement to WSA 02-2014-3.1
- TasWater Addendum 1 to Supplement to WSA 02-2014-3.1
- DOC040523-04052023160157 (TasWater Fire Hydrant Testing Results for A156233, A156316 and A156176)

2. The site

The site for development is 133 Middle Road, Miandetta. The site proposed to be broken up into seven (7) lots, with details of the proposed lots shown in Table 1.

Table 1 Proposed lot details

Lot	Status	Connection point
Lot 1	Already developed	Buildings connected to water main in Middle Road. No change proposed. Current sewerage discharge assumed to be to Middle Road. Sewer proposed to drain independently to Middle Road.
Lot 2	Already developed	Buildings connected to water main in Middle Road. No change proposed. Sewerage discharge currently to private pump. Sewer proposed to drain from low point by gravity through lots 4, 5 and 7b to nearest available main.
Lot 3	Already developed	Buildings connected to water main in Middle Road. No change proposed. Sewerage discharge currently to private pump. Sewer proposed to drain from low point by gravity through lots 4 and 7b to nearest available main.
Lot 4	An indicative layout has been developed and is shown in Figure 1	Water to be connected from the existing main on Middle Road. Sewage to discharge to the existing network at Asset ID A508216 and Asset ID A508231
Lot 5	An indicative layout has been developed and is shown in Figure 1	Water to be connected from the existing main on Middle Road. Sewage to discharge to the existing network at Asset ID A508216
Lot 6	An indicative layout has been developed and is shown in Figure 2	Site currently connected to water main in Penambul Drive. No change proposed. Sewerage to discharge to the existing network at Asset ID A512137
Lot 7a	No development proposed	No water or sewer connection necessary for land in the open space zone.
Lot 7b	No development proposed	No water or sewer connection necessary for land in the environmental management zone.

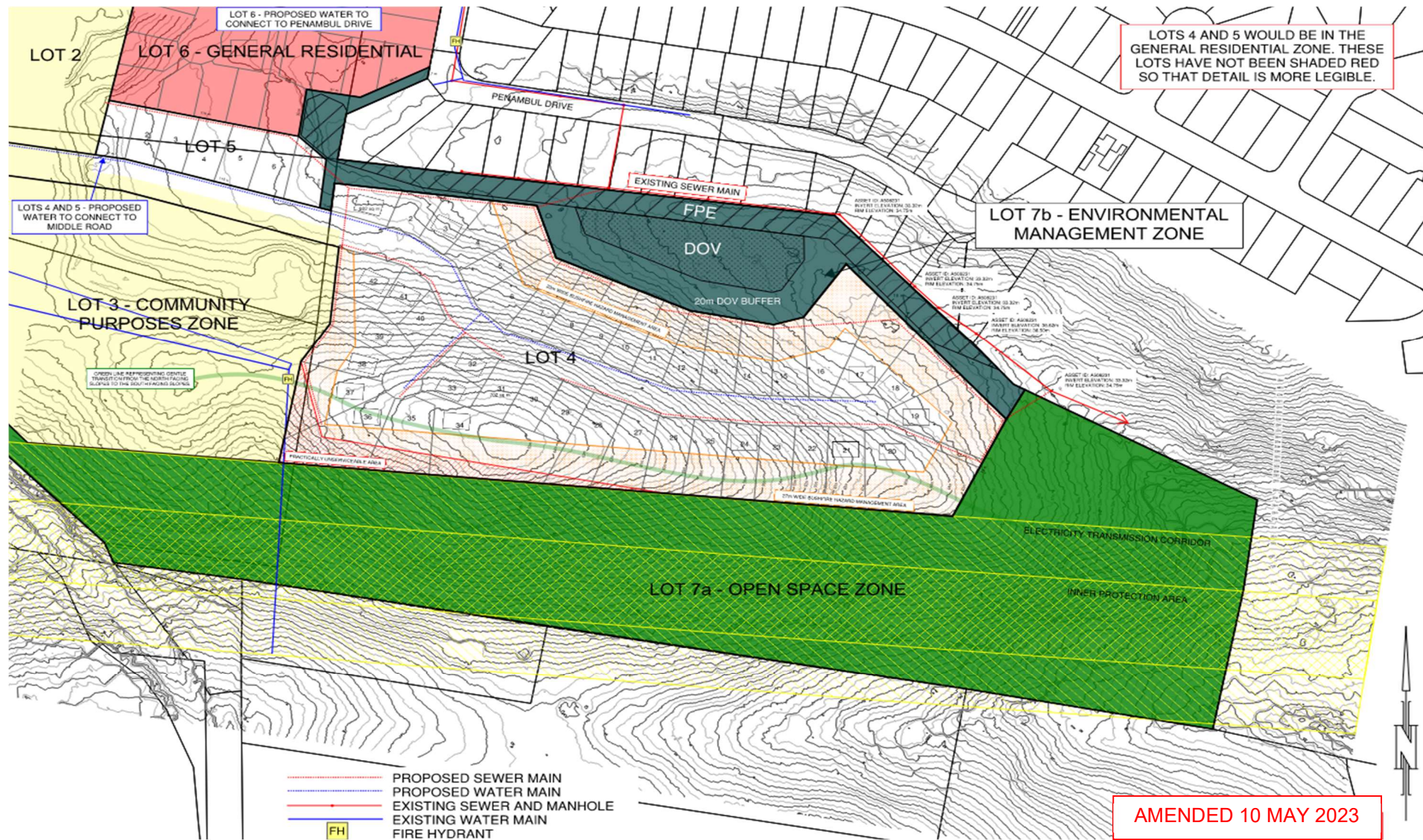


Figure 1 133 Middle Road highlighting lot 4 and lot 5

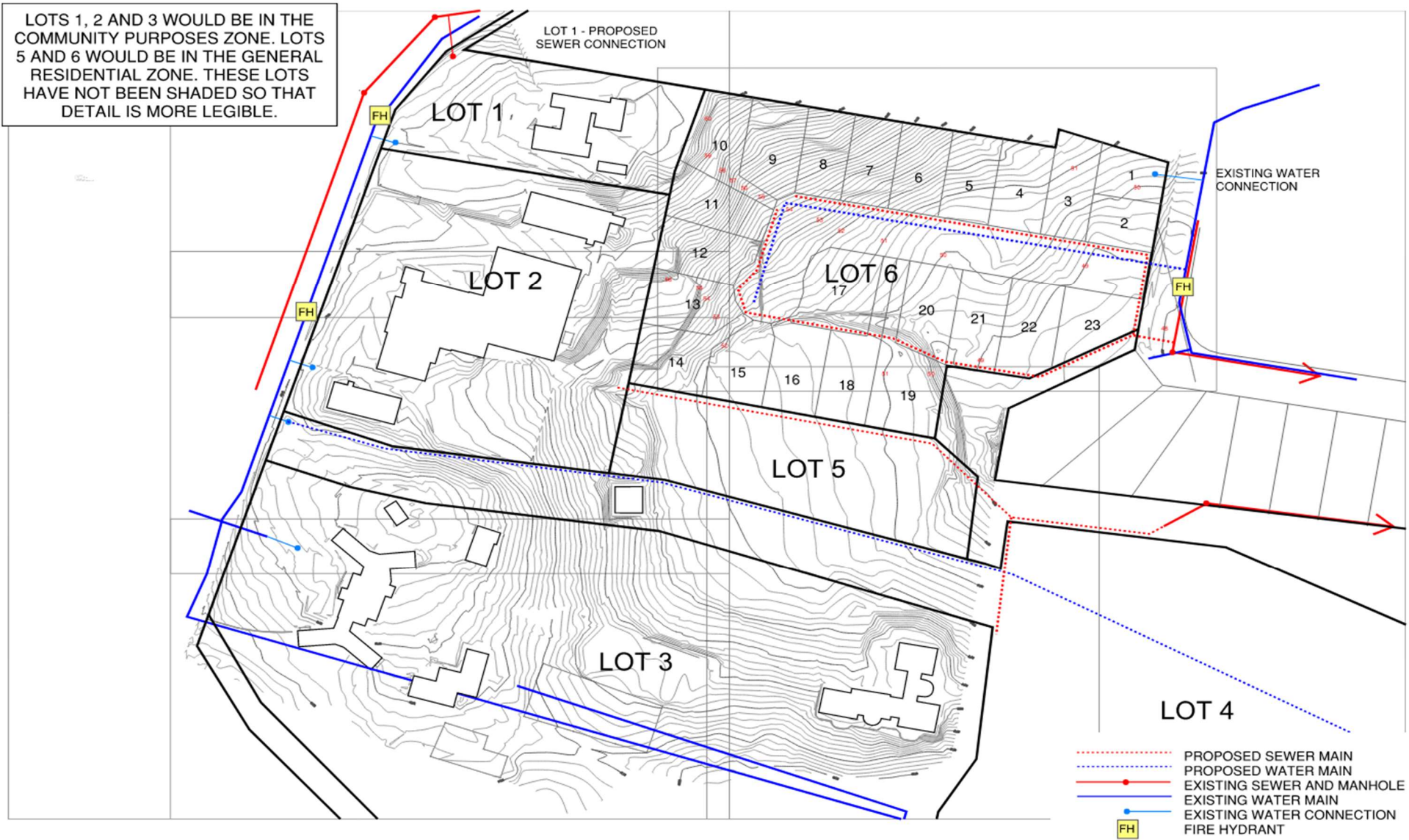


Figure 2 133 Middle Road highlighting lot 1-3, lot 5 and lot 6

3. Water Demand

3.1 Water model

A water model for the water servicing of the proposed lot 4, 5 and 6 have been developed in EPANET v2.2, according to the TasWater supplement modelling guidelines requirements. Lot 4 and 5 were modelled together as they would be supplied by the same main. The initial pressure values for the model were taken from the flow and pressure data provided by TasWater in DOC040523-04052023160157 (TasWater Fire Hydrant Testing Results for A156233, A156316 and A156176) which were within 20 m of the proposed connection points and summarised in Table 2. There were no residual pressure issues identified in the modelled scenarios (peak day, peak day fire flow).

The key inputs and outputs of the models have been included in Appendix A.

Table 2 TasWater supplied flow and pressure data from DOC040523-04052023160157

Parameter	A156233	A156316	A156176	Unit
	Not used as connection point	Used for connection of lot 4 and 5	Used for connection of lot 6	
No flow pressure	400	500	400	kPa
1 st pressure point pressure	350	350	350	kPa
1 st pressure point flow	5.6	13.1	11.6	L/s
2 nd pressure point pressure	200	200	200	kPa
2 nd pressure point flow	11	17.4	23	L/s
Fully open flow	14.7	20	32	L/s

3.2 Water demand based on ETs

The projected water demand was calculated using the indicative site layouts shown in Draft amendment AM2022.01 and permit PA2022.0024 - Amended plan (10 May 2023) drawing are summarised in Table 3. As the connection point would be at Middle Road and supply both lot 4 and 5, they have also been considered together.

The pressure calculations have only been considered for the combined lot 4 and 5, and lot 6 individually. TasWater defines the minimum pressure for Residential Flat Grade ($\leq 18\%$) as 220 kPa (22 m).

Table 3 Summary of water demand calculations

Parameter	Lot 4	Lot 5	Lot 4 & 5	Lot 6	Unit
ET	42	7	49	23	Number
Average day demand	685	685	685	685	L/ET/day
Peak Day / Average Day	2.25	2.25	2.25	2.25	Ratio
Peak Hour / Peak Day	2.0	2.0	2.0	2.0	Ratio
Average Day Demand	28.77	4.80	33.57	15.76	kL/day
Average Day Demand	0.33	0.06	0.39	0.18	L/s
Peak Day Demand	64.73	10.79	75.52	35.45	kL/day
Peak Hour Demand	2.70	0.45	3.15	1.48	kL/h

Parameter	Lot 4	Lot 5	Lot 4 & 5	Lot 6	Unit
Peak Hour Demand (Peak factor = 2.25)	0.75	0.12	0.87	0.41	L/s
Peak Hour Demand (Peak factor = 2.25 * 2)**	1.50	0.25	1.75	0.82	L/s
Peak Simultaneous Demand (PSD)*	4.21	1.41	4.66	2.87	L/s
Required pressure at point of connection*	-	-	280	280	kPa
Required pressure at point of connection*	-	-	28	28	m

*Note: Peak simultaneous demand as read from Table 3.2.3 of AS 3500.1:2021 Plumbing and Drainage Part 1: Water Services, calculations of required pressure are based on the peak simultaneous demand (PSD) flow rate and include for the hydraulic losses and elevation changes between the connection point and the point of use.

**Note: The peak factors stipulated in the TasWater supplement were used, as shown above. The TasWater supplement section 2.3.1 however recommends higher peak hour demand based of peak simultaneous demand for peak hour based on ETs less than 100.

3.3 Fire flow rate and pressure

The required fire flow rate is provided in the TasWater documents as 10.0 L/s at the most disadvantaged hydrant while maintaining the fire hydrant constraints as defined in the Australian Standards and applicable WSA codes.

Table 4 Fire flow requirements

Requirement	At fire hydrant	At connection point for lot 4 and 5	At connection point for lot 6	Units
Required fire flow rate	10.00	11.12	10.20	L/s
Required fire flow pressure	250	325*	330*	kPa
Required fire flow pressure	25	32.5*	33*	m

*Note: Calculations of required pressure are based on the EPANET model values.

4. Sewerage

4.1 Projected sewage flow

The sewage equivalent tenement and design flows have been calculated for each of the lots 4, 5 and 6, separately. They have then been calculated to match the Draft amendment AM2022.01 and permit PA2022.0024 - Amended plan (10 May 2023) drawing connection points for each lot. The full process to calculate these can be found in the reference documents listed above.

The equivalent tenement is 1 ET per lot.

The average dry weather (sanitary) flow (ADWF) is calculated by $ET * \text{loading rate (450 L/ET/day)} * 0.000012$.

The peak dry weather (sanitary) flow (PDWF) is calculated by $d * ET \text{ loading rate (450 L/ET/day)} * 0.000012$.

The d value is found by taking the gross development area (A) of the lots and cross referencing it with figure C1 from the WSA 02-2014-3.1 Gravity Sewerage Code of Australia. The gross development areas (A) and corresponding d values can be seen below in Table 5

Table 5 Areas and correspond d value by lot and connection point

Lot	Area (ha)	Corresponding d value	Connection point	Area (ha)	Corresponding d value
Lot 4	5.4	4.8	Asset ID A508216	3.1	5.6
Lot 5	0.6	9.0	Asset ID A508231	2.9	5.8
Lot 6	1.9	6.4	Asset ID A512137	1.9	6.4

The peak wet weather flow (PWWF or design flow) for sewer has been calculated using the following equation from WSA-02 (Appendix C) and the associated TasWater supplement:

Design Flow = PDWF + GWI + RDI

PDWF is the peak dry weather (sanitary) flow

GWI is the groundwater (non-rainfall dependent) infiltration

RDI is the peak (rainfall dependent) inflow and infiltration (i.e., the “storm allowance”)

The calculated ETs translate into sewage demand as shown below in Table 6 and Table 7.

Table 6 Sewage calculations by lot

Lot	ET	ADWF (L/s)	PDWF (L/s)	GWI (L/s)	RDI (L/s)	Design flow (L/s)
Lot 4	42	0.23	1.09	0.09	2.02	3.20
Lot 5	7	0.04	0.34	0.01	0.33	0.68
Lot 6	23	0.12	0.79	0.03	1.00	1.83

Table 7 Sewage calculation by connection point

Connection Point	ET	ADWF (L/s)	PDWF (L/s)	GWI (L/s)	RDI (L/s)	Design Flow (L/s)
Asset ID A508216 (half lot 4 and all of lot 5)	28	0.15	0.85	0.05	1.33	2.23
Asset ID A508231 (half of lot 4)	21	0.11	0.66	0.05	1.13	1.83
Asset ID A512137 (all of lot 6)	23	0.12	0.79	0.03	1.00	1.83

5. Sewer servicing plan

Below is the concept servicing overviews for lot 4 and 5 together (Figure 3) and lot 6 (Figure 4) of 133 Middle Road.

Based off the undeveloped nature of the land and the surface gradients the pipes will be able to be graded between 2% and 10%. This will meet all minimum grade requirements for pipes, minimum falls through manholes and self-cleansing of the pipe network with peak flows.

Lot 4 and 5 would have two connection points:

- TasWater Asset ID A508216 with an IL = 43.13 mAHD (taken from TasWater GIS)
- TasWater Asset ID A508231. with an IL = 33.32 mAHD (taken from TasWater GIS)

Lot 6 would have one connection point:

- TasWater Asset ID A512137 with an unknown IL (No value is shown on the TasWater GIS)

Preliminary long sections for lot 4 and lot 5 can be found in Appendix B. These preliminary long sections show the viability of gravity sewer to service the proposed lots. They would require survey for more accurate levels and detail design to be completed if they are to be developed.

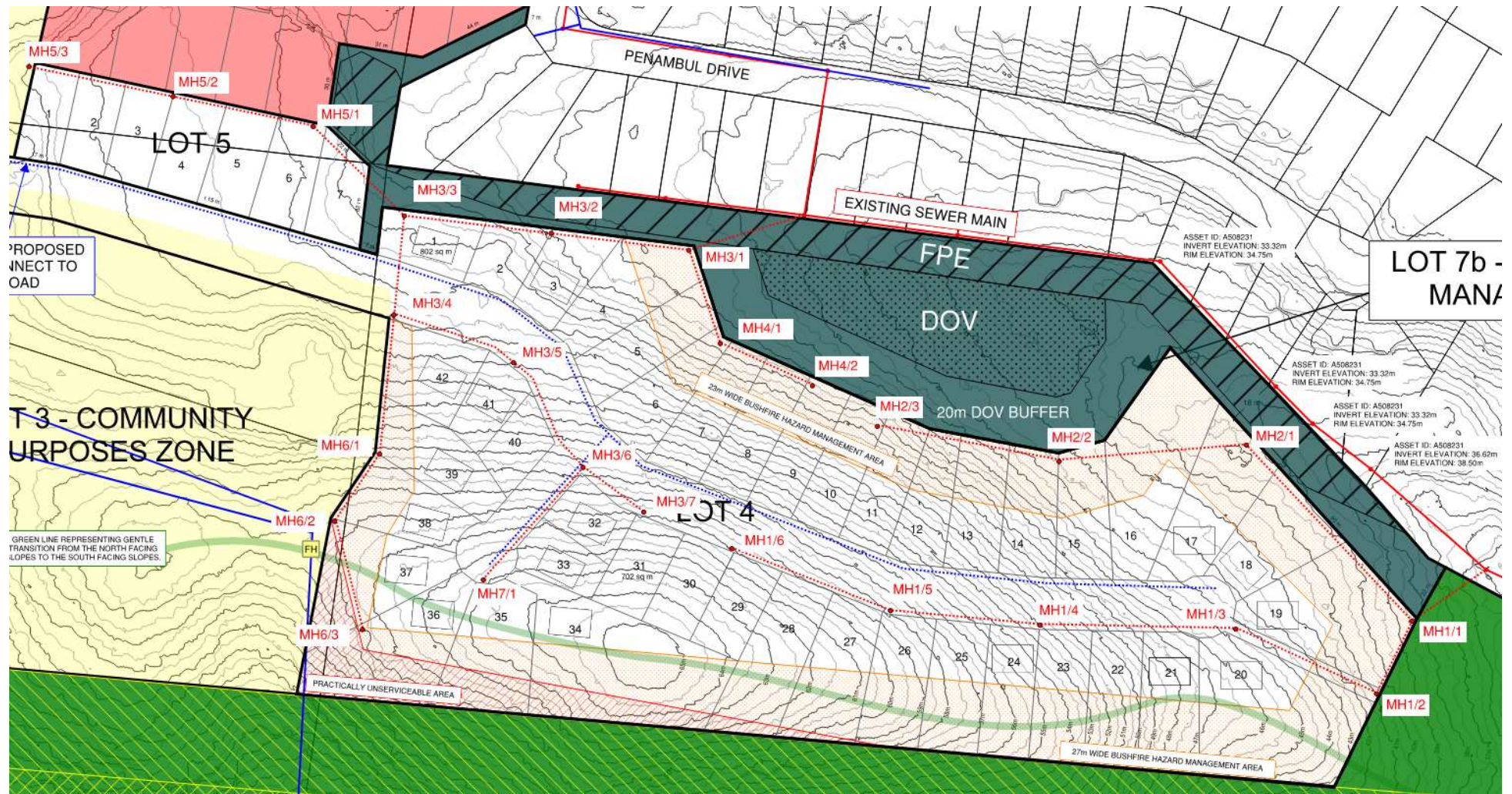


Figure 3 Concept servicing plan for lot 4 and lot 5 of 133 Middle Road

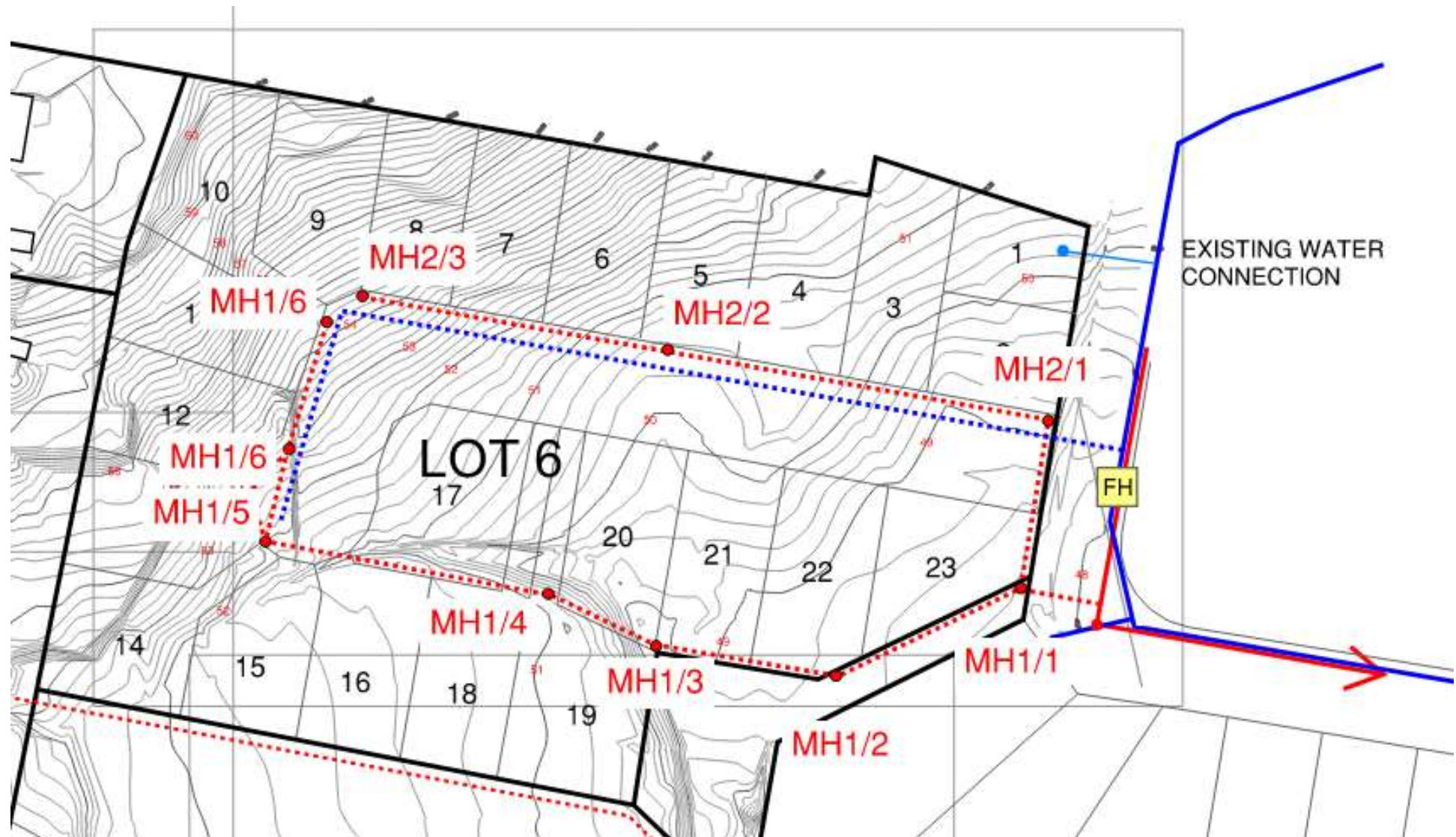


Figure 4 Concept servicing plan for lot 6 of 133 Middle Road

6. Assessment summary

The items to be addressed as expressed in section 1 are addressed as follows:

- a. Required ultimate peak day flow rate in L/s and required residual pressure (kPa) at the connection point

Table 8 Ultimate peak day flow rate and residual pressure at connection point

Requirement	Lot 4 & 5*	Lot 6
Peak day flow rate at connection point	4.66 L/s (PSD)	2.87 L/s (PSD)
Required residential pressure at connection point	280 kPa (28 m)	280 kPa (28 m)

- b. Ultimate peak day usage in L/day

Table 9 Ultimate peak day usage

Requirement	Lot 4 & 5*	Lot 6
Ultimate peak day usage	33.6 kL/day based on 49 ET	15.8 kL/day based on 23 ET

- c. Required fire flow rate in L/s and required residual pressure (kPa) at the connection point

Table 10 Required fire flow rate and pressure

Requirement	Lot 4 & 5*	Lot 6
Required fire flow rate at connection point	11.12 L/s**	10.20 L/s
Required fire flow pressure at connection point	325 kPa (32.5 m)	330 kPa (33 m)

*Note: Lot 4 & 5 have been calculated together as they would be supplied by the same connection point.

**Note: Based off two fire hydrants required to cover service area with small total area that could cause both to be needed at once.

- d. Water model that satisfies TasWater's standards to ensure that the ultimate development (as indicatively shown on the master plan) can be serviced appropriately for domestic and fire purposes given the residential zoning proposal

A hydraulic model has been developed with EPANET v2.2 software which meets all TasWater standard conditions for the indicative masterplan: Draft amendment AM2022.01 and permit PA2022.0024 - Amended plan (10 May 2023). Key inputs and outputs for the models can be found in Appendix A.

- e. Calculations of the estimated number of ultimate Equivalent Tenements

Table 11 Sewage calculation summary

Lot	ET	Design Flow (L/s)	Connection Point	ET	Design Flow (L/s)
Lot 4	42	3.20	A508216 (half lot 4 and lot 5)	28	2.23
Lot 5	7	0.68	A508231 (half lot 4)	21	1.83
Lot 6	23	1.83	A512137 (lot 6)	23	1.83

- f. Servicing plan for sewer demonstrating ability to service the entirety of the proposed lot 4 by gravity, or confirmation of areas not able to be serviced (preliminary long section, including inverts of existing infrastructure)

A servicing plan for sewer has been completed for lot 4, 5 and 6 They can be serviced by gravity sewer to the connection points listed above, while maintaining minimum pipe grades. Long sections for lot 4 and 5 are included in Appendix B. Lot 6 requires a survey to investigate the invert level of the connection point. The connection points have the invert levels:

- Asset ID A508216 IL = 43.13 mAHD (half of lot 4 and all of lot 5) (TasWater GIS)
- Asset ID A508231 IL = 33.32 mAHD (half of lot 4) (TasWater GIS)
- Asset ID A512137 IL = unknown mAHD (all of lot 6) (TasWater GIS)



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Final	0	S Greenwood	C Pieterse	On file	D Rockliff		

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Appendix A

EPANET Water Model

A-1 Model scenarios

The development was modelled using two scenarios.

1. Full Development (49ET), Peak Day.
2. Full Development (49ET), Peak Day, Fire Flow

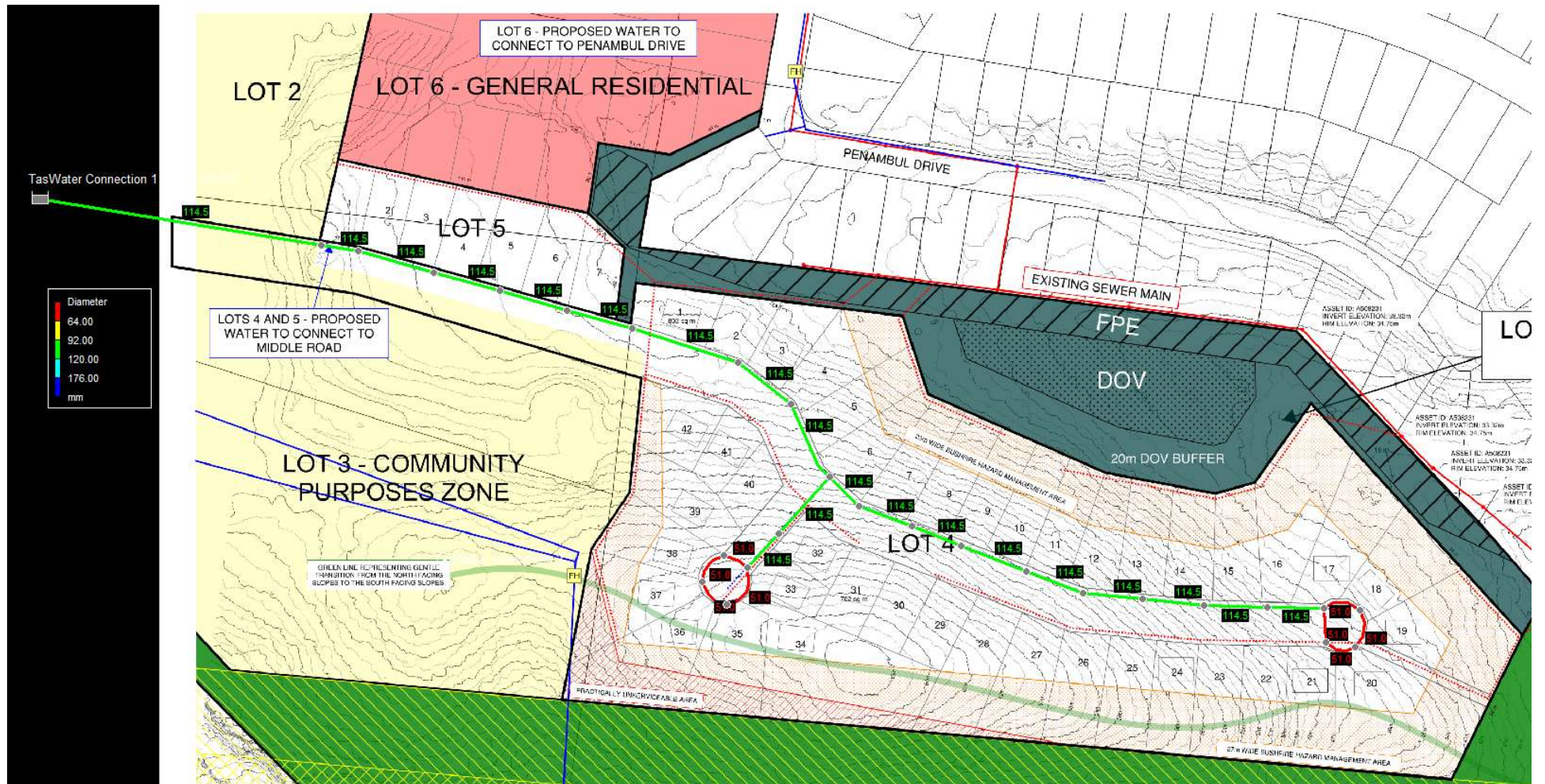


Figure 5 Network layout for lot 4 and 5 hydraulic model showing pipe diameters

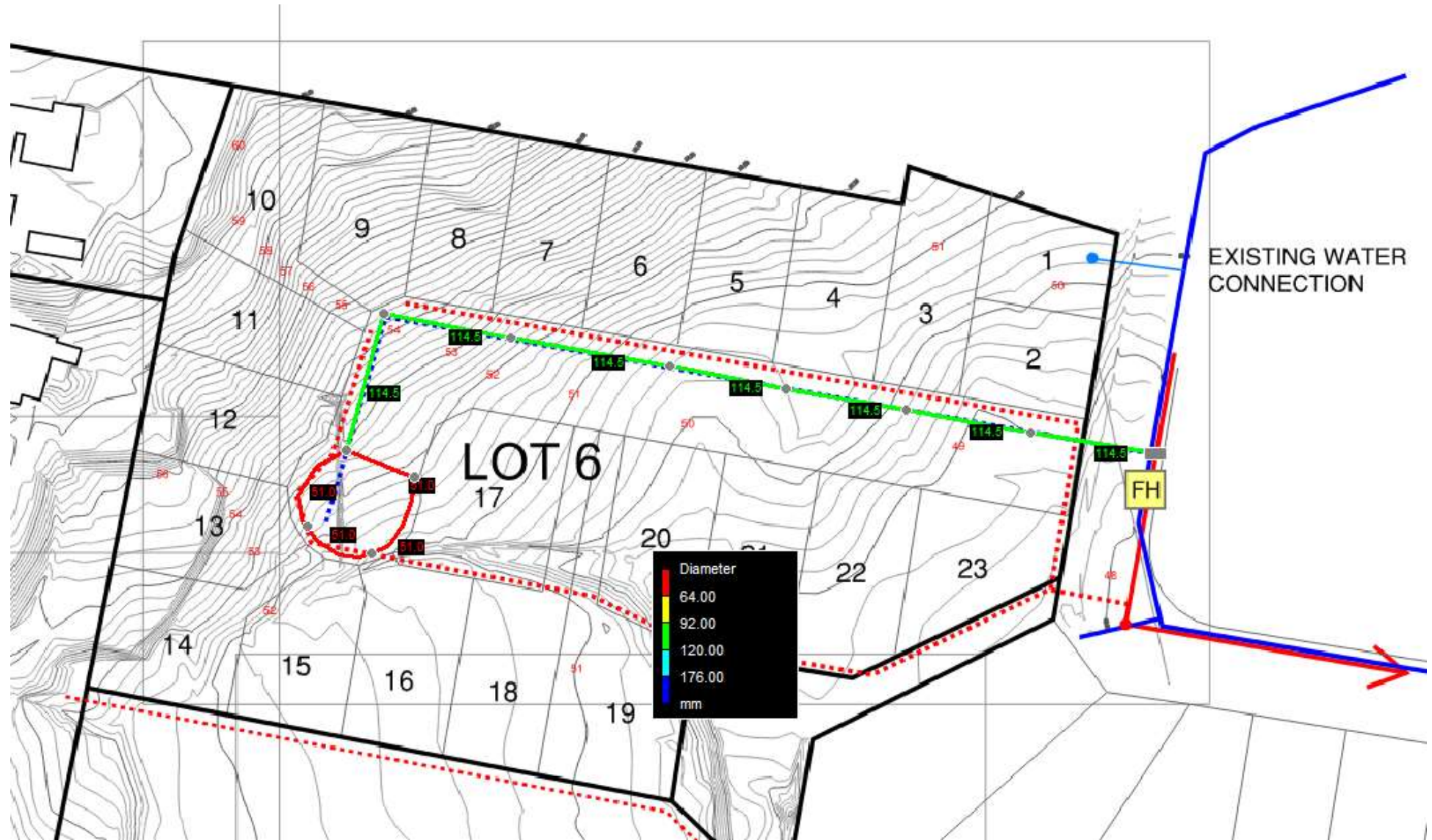


Figure 6 Network layout for lot 6 hydraulic model showing pipe diameters

A-2 Model assumptions and parameters

The models have the following assumption:

- The existing measured pressures provided by TasWater at the surrounding fire hydrants are suitable for determining the extents of the available pressure for the model.

The following boundary condition has been established as per the assumption above:

- Lot 4 and 5 model has a maximum available head at the connection point of 99 m of total head (elevation of connection point has been taken as 59 m as at fire hydrant A156176 with 40 m of pressure from DOC040523-04052023160157).
- Lot 6 model has a maximum available head at the connection point of 99 m of total head (elevation of connection point has been taken as 49 m as at fire hydrant A156176 with 50 m of pressure from DOC040523-04052023160157).

The following model parameters were used, as specified in the TasWater addendum.

Table 12 Modelling input parameters

Parameter	Reference	Value		
Total consumption	TasWater addendum to WSA	250 kL/ET/year		
Modelled ET	Model	49 ET allocated to nodes as per areas shown indicative plan		
Average Day Demand	TasWater addendum to WSA	685 L/ET/D		
Peak Day Demand (general)	TasWater addendum to WSA	1,541 L/ET/D		
Peak Day Demand (general)	TasWater addendum to WSA	0.017836 L/ET/s		
Coincident Peak Hour Demands	TasWater addendum to WSA	As provided in TasWater supplement		
Minimum Pressure at any node (during peak day, peak hour flow)	TasWater addendum to WSA	25 m		
Minimum Peak Day Velocities, typically assessed at 95% of dry summer day morning peak demands. (Taken as 9:00)	WSA03 2011-3.1	50PE	0.25	0.13
		63PE	0.50	0.16
		100	2.0	0.25
		150	8.2	0.41
Maximum Pressure at any node (during peak day, 0:00)	TasWater addendum to WSA	80 m		
Fire flow	TasWater addendum to WSA	10 l/s additional to node demand (equivalent to 561 ET).		

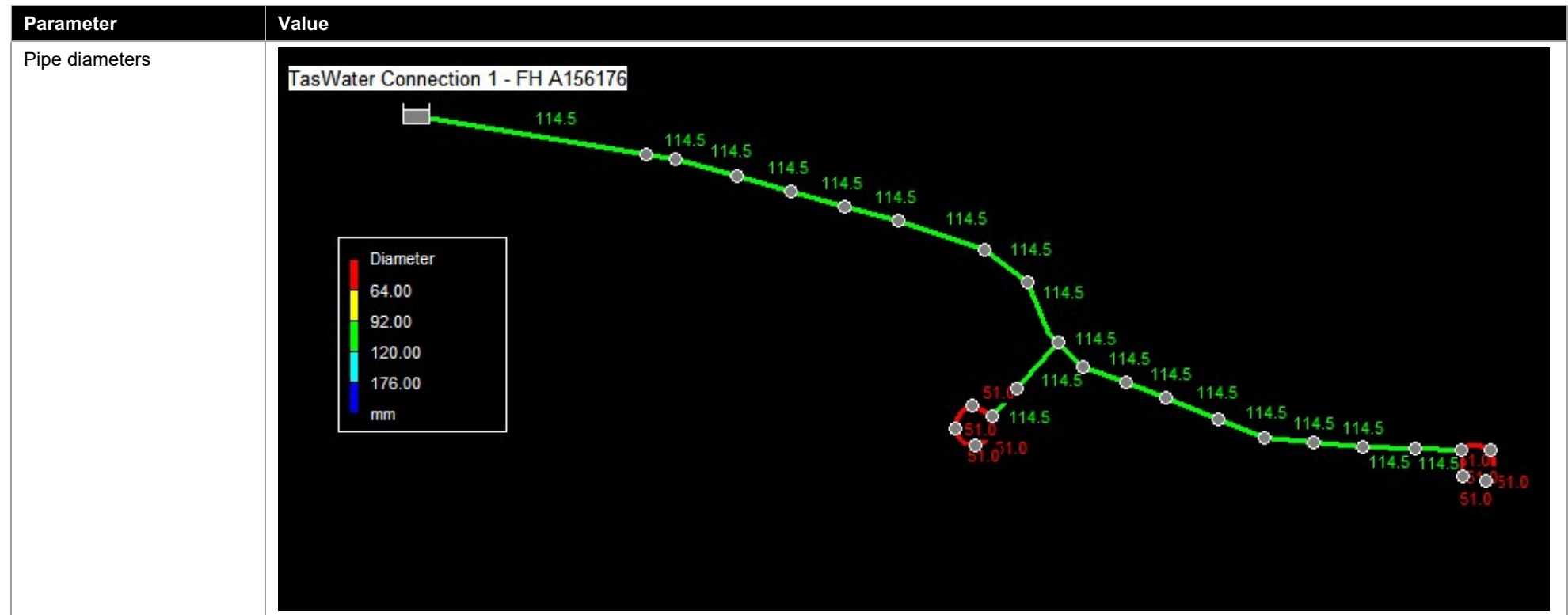
Parameter	Reference	Value
		NOTE: The model has 2 x 10 l/s added in the fire flow scenario to cover the most disadvantaged location and secondary location for minimum hydrant coverage distances.
Minimum Pressure at any point during fire flow demand	TasWater addendum to WSAA	>250 kPa
Maximum water age		Not specified

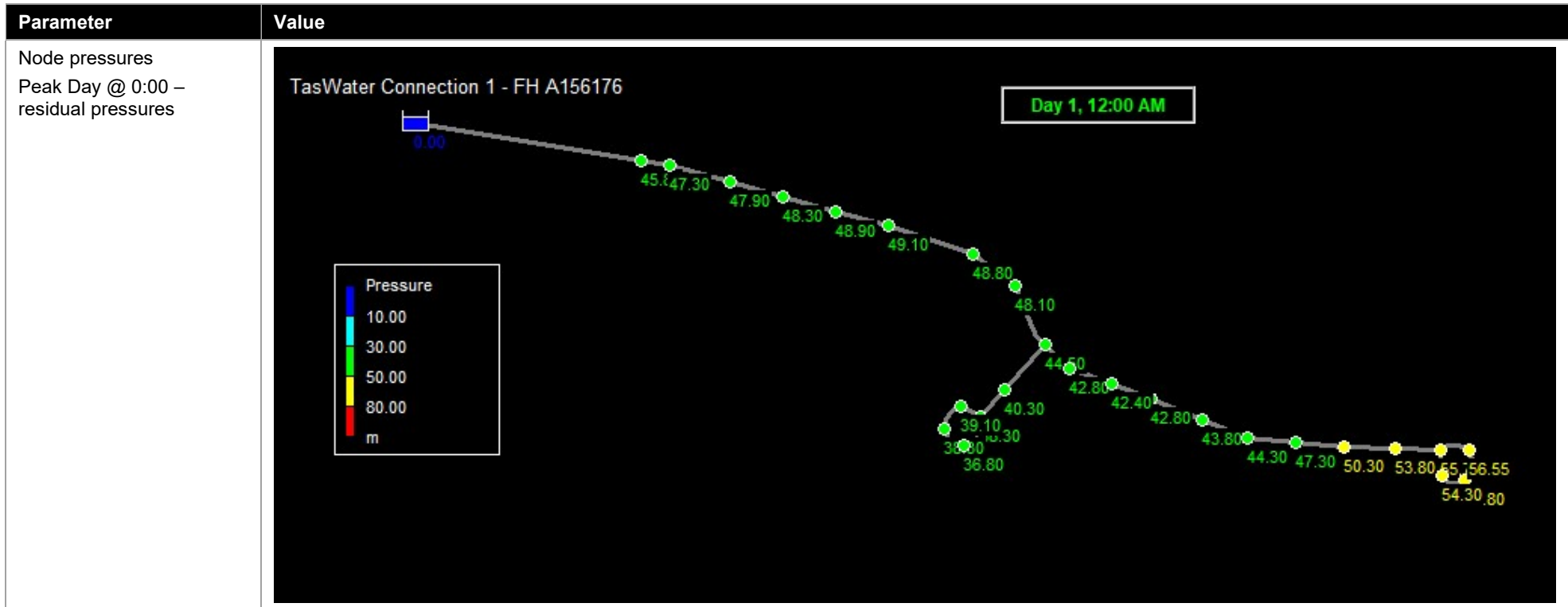
Notes on Model Configuration.

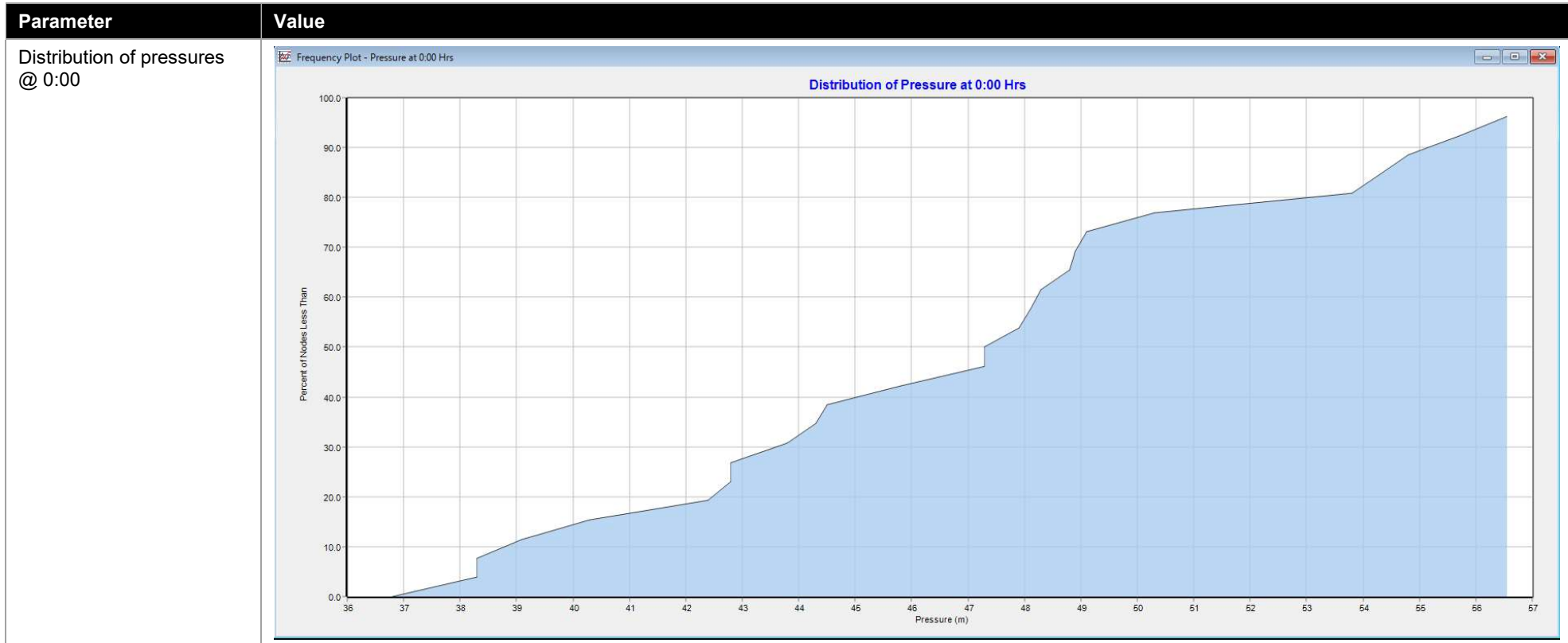
- The pipe size was selected as 114.5 mm ID apart from the cul-de-sac rings that was selected to be 51 mm ID.

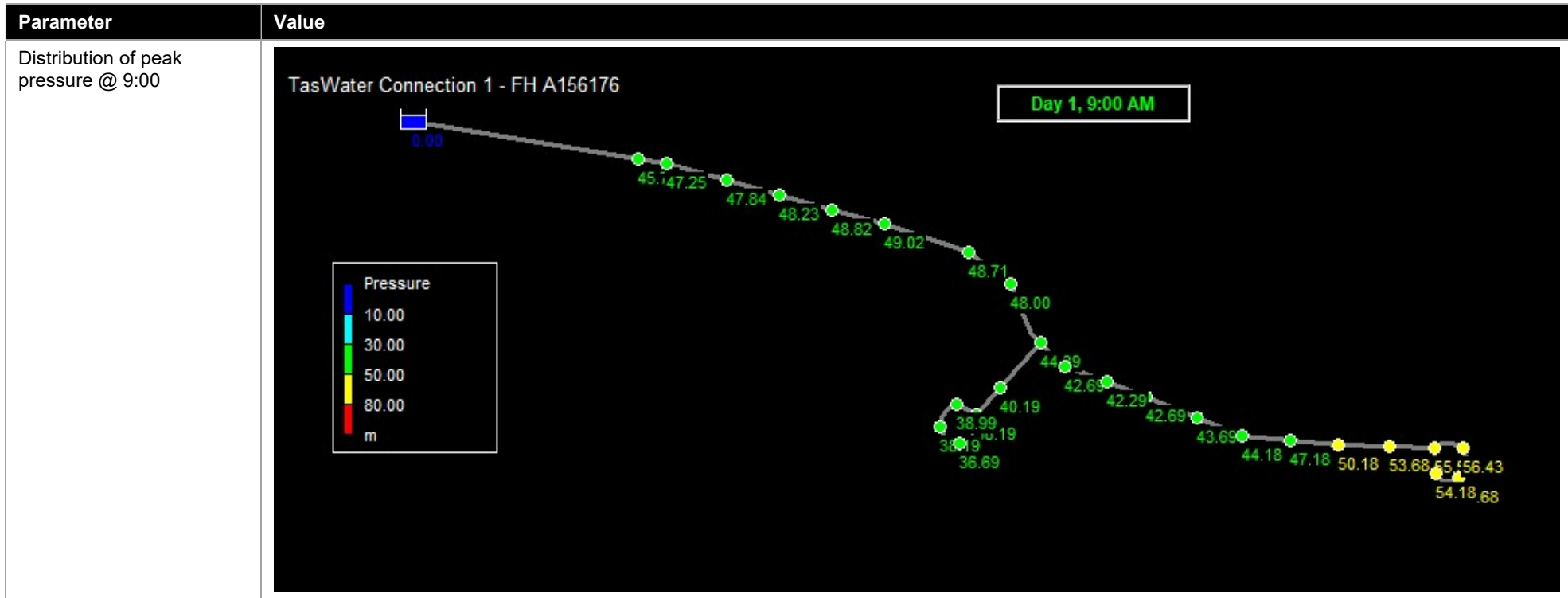
A-3 Model Outputs

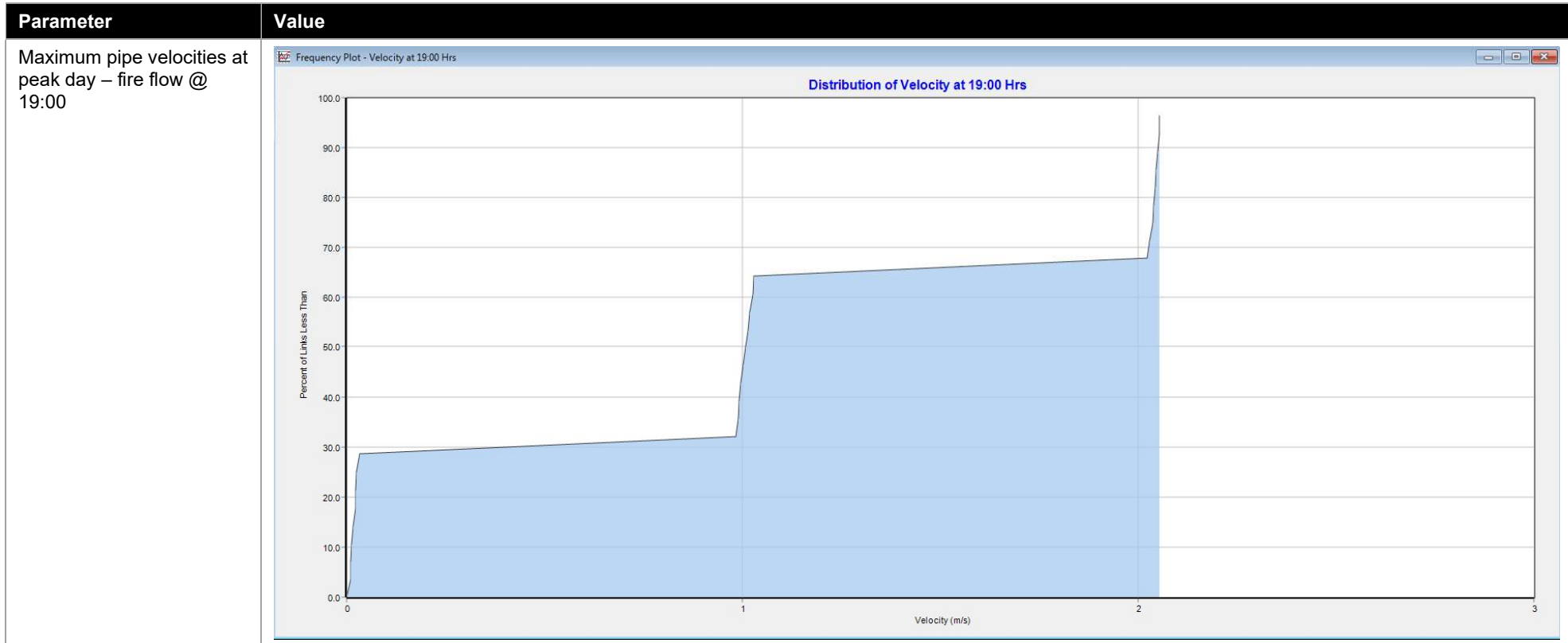
Table A.1 Lot 4 and 5 model outputs

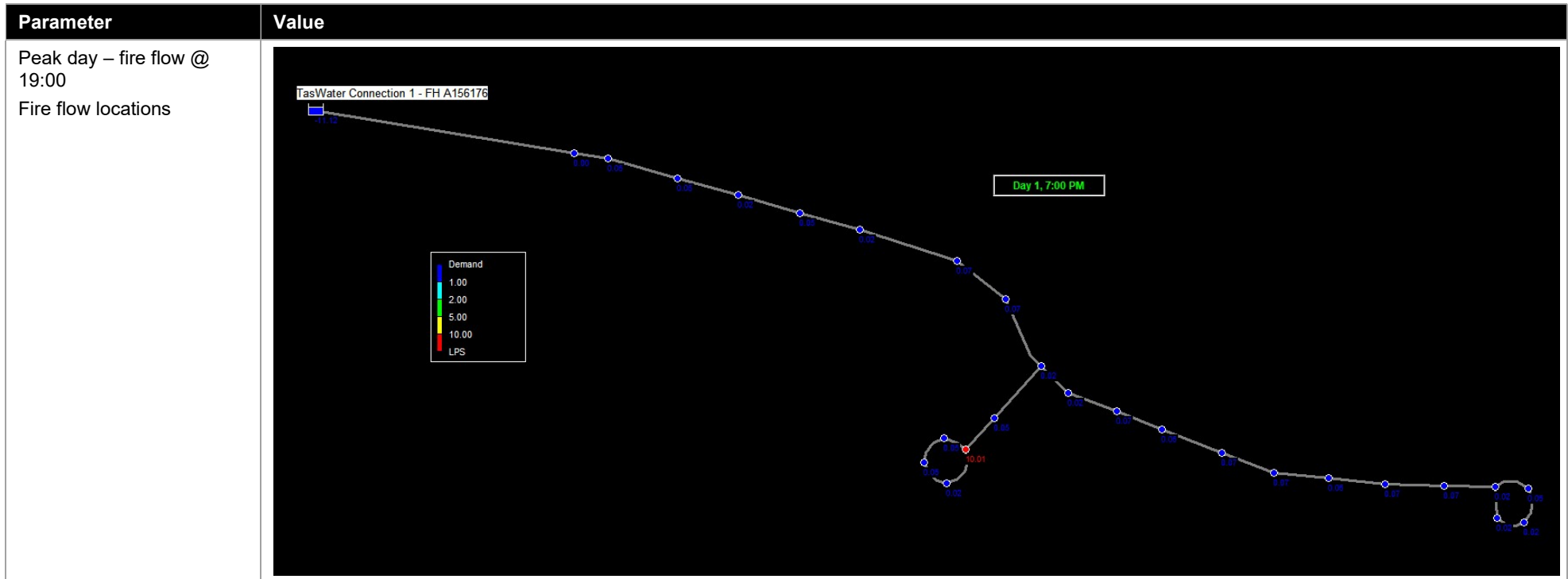


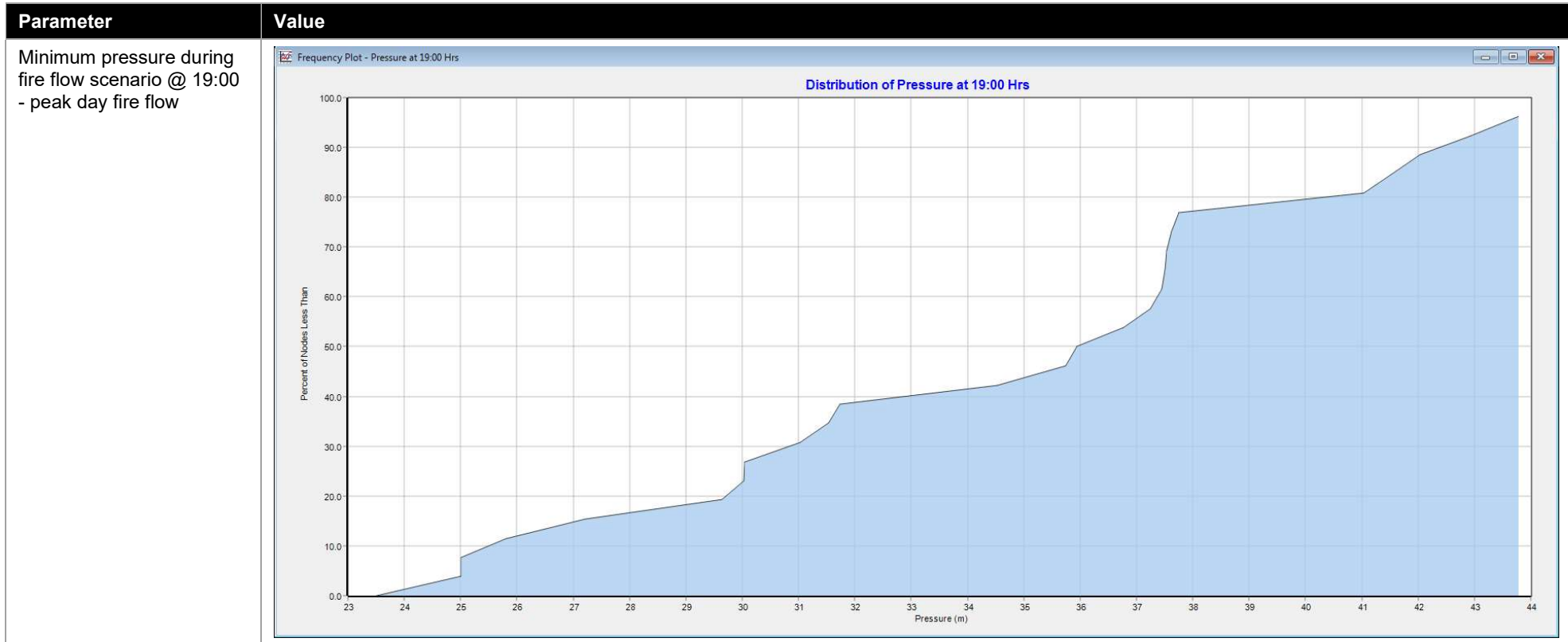


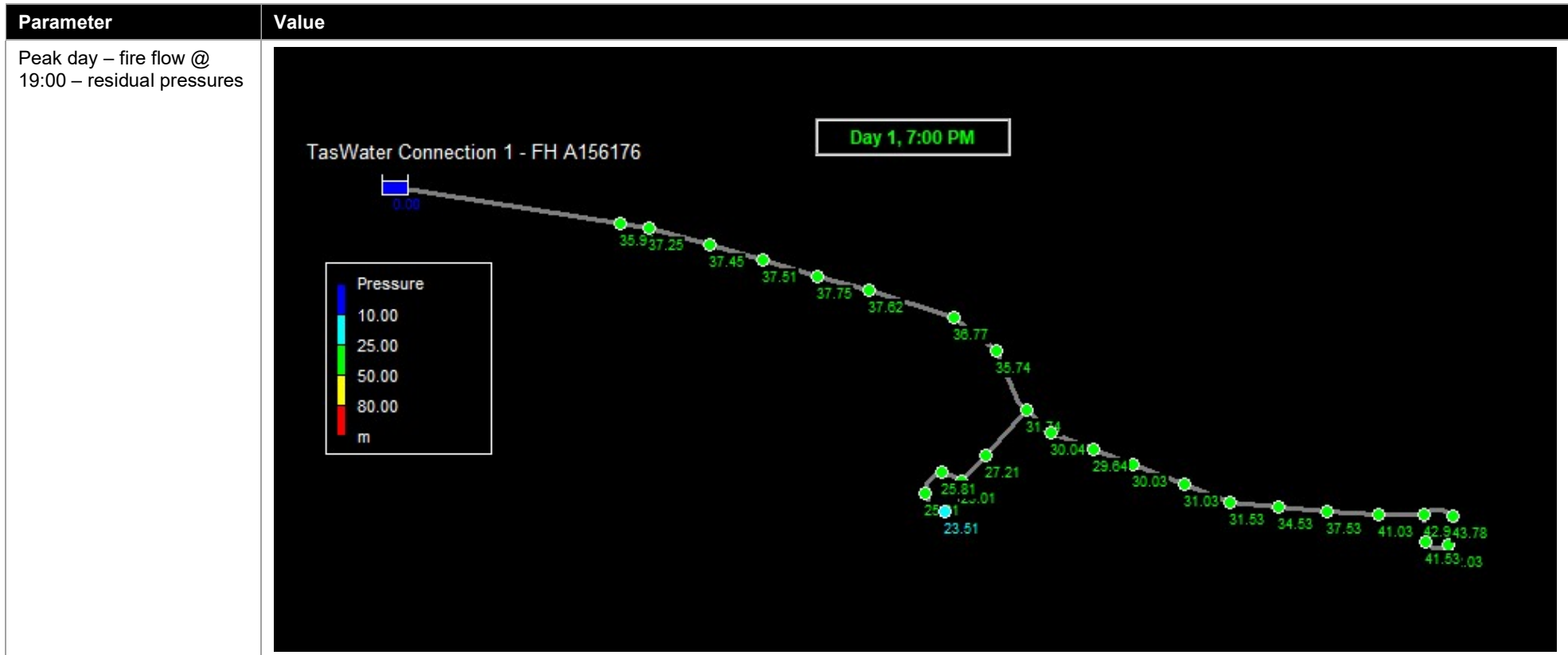


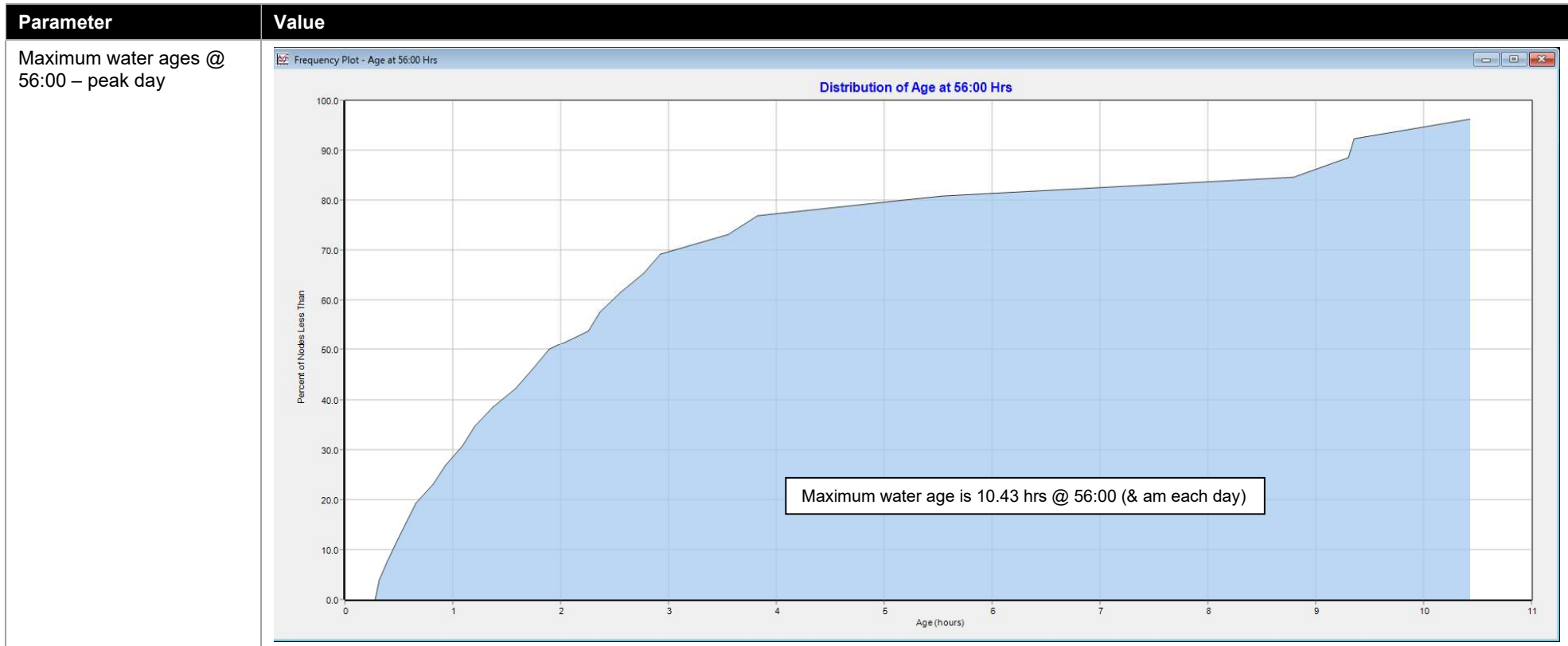


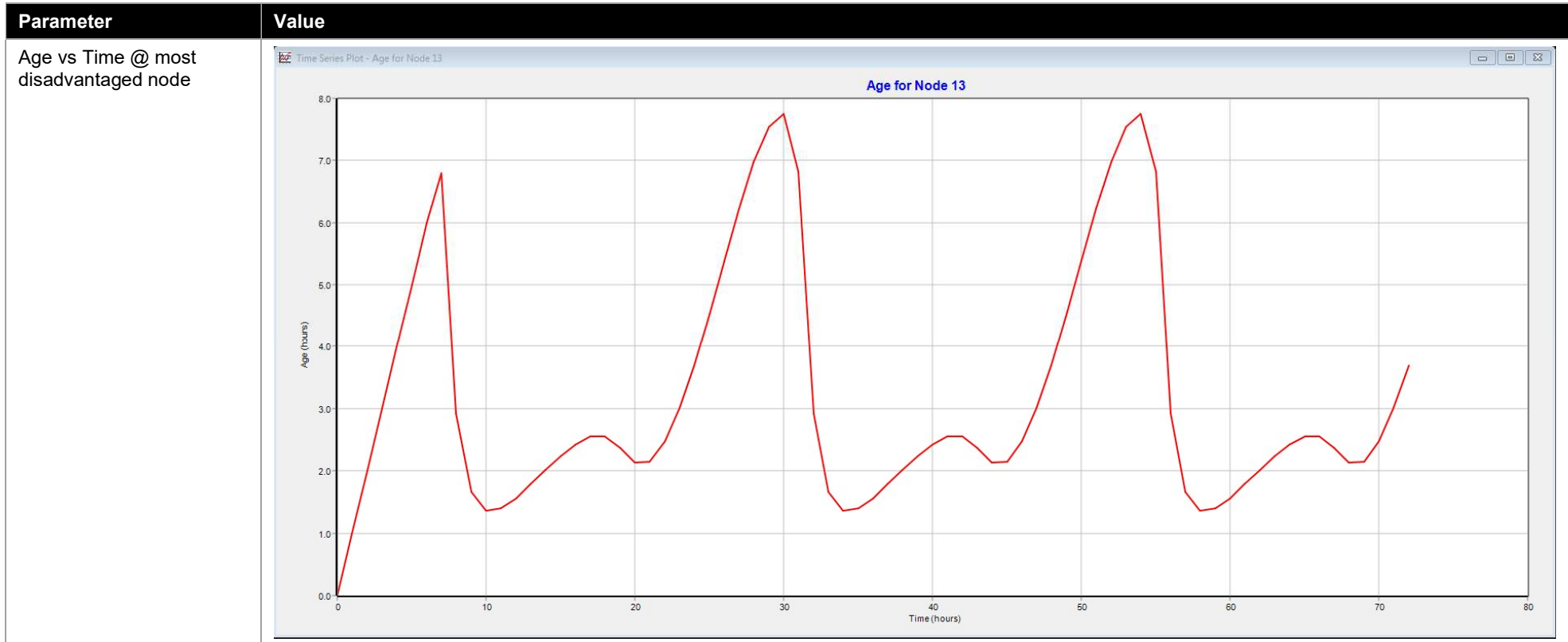












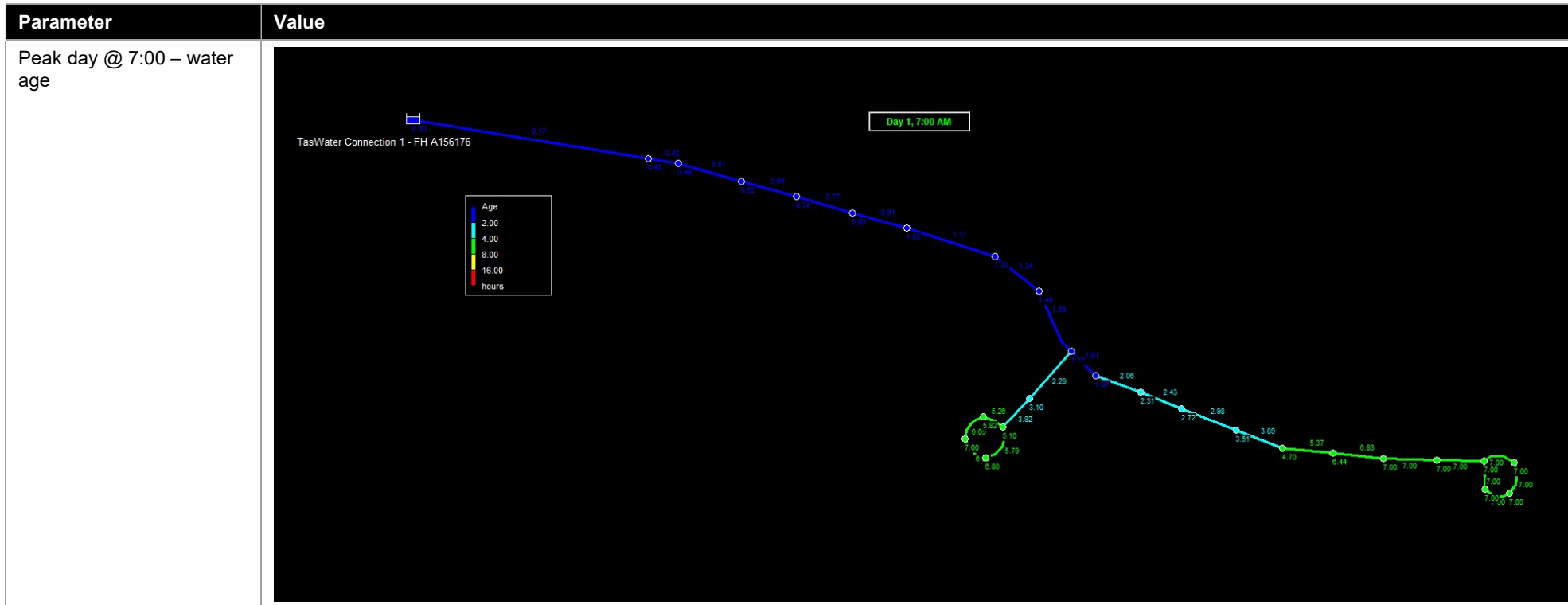
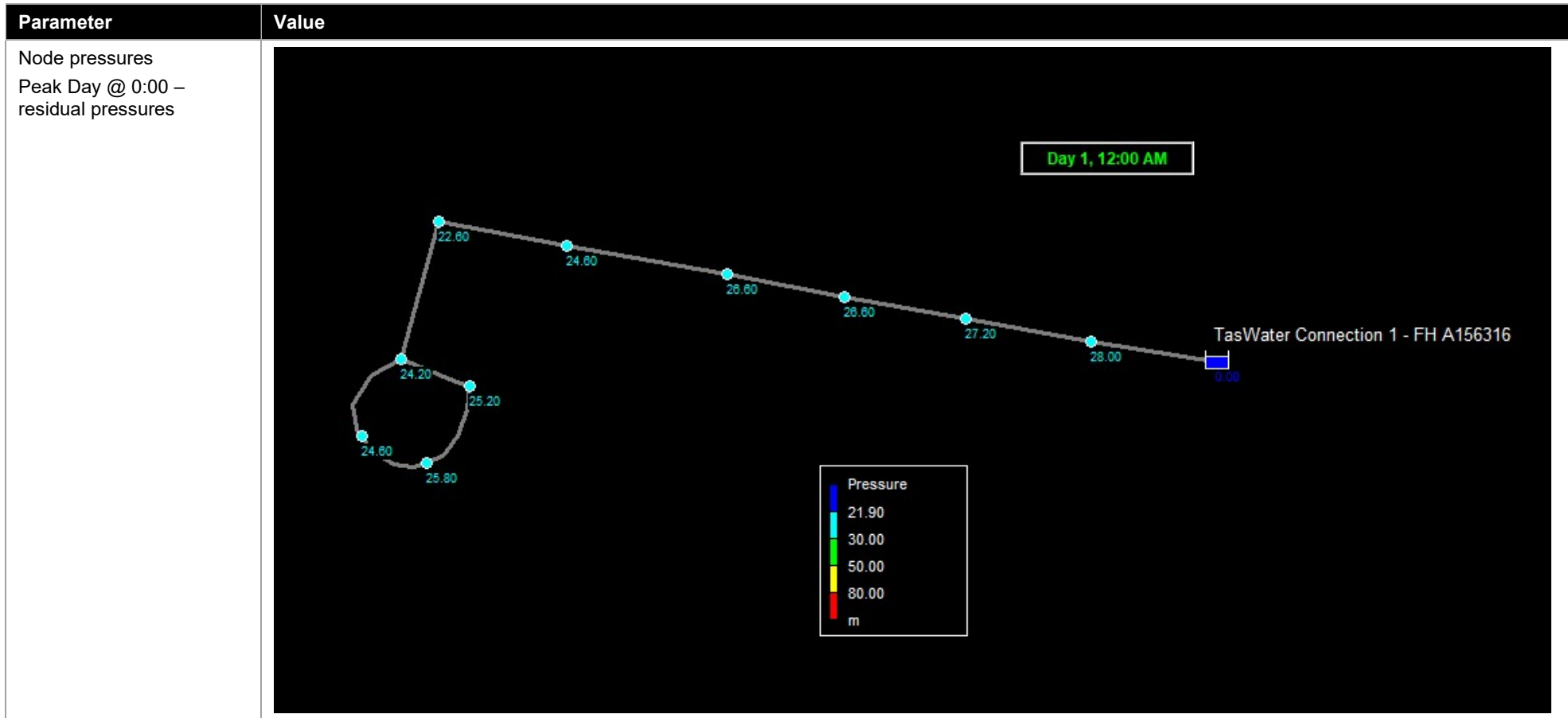
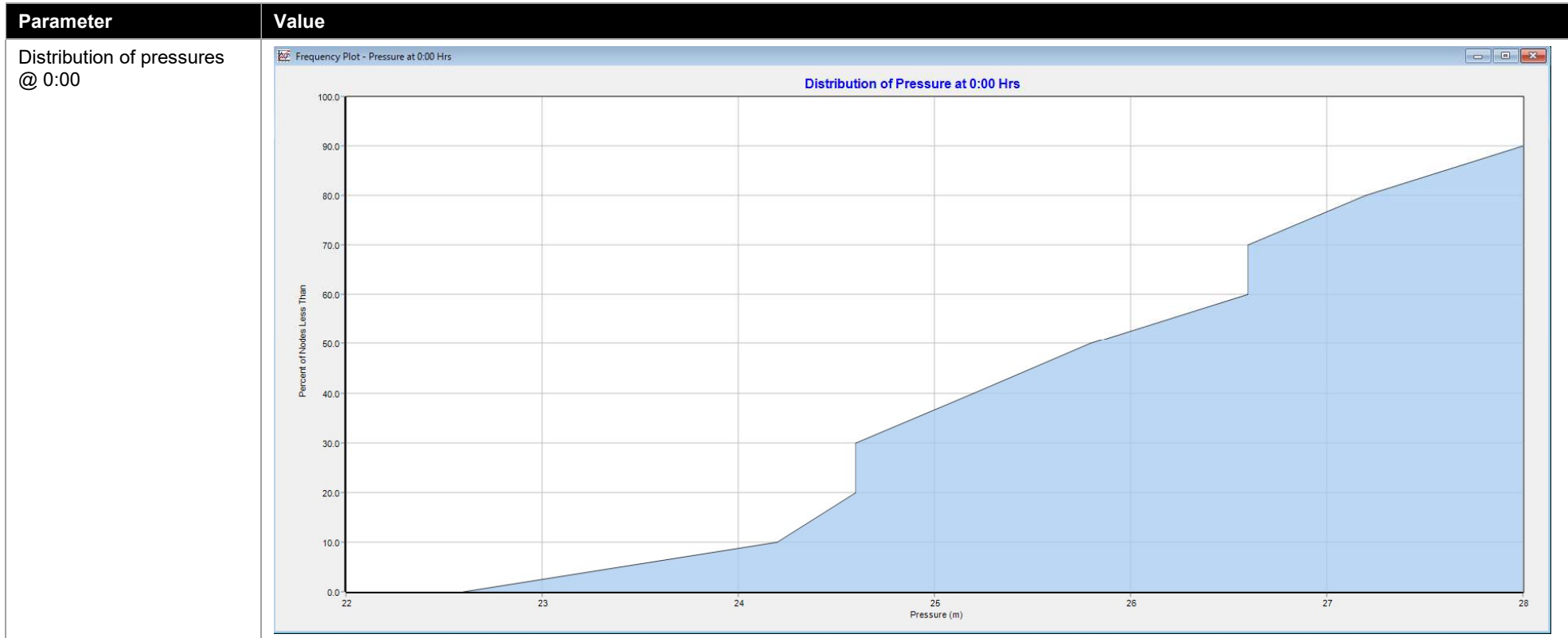
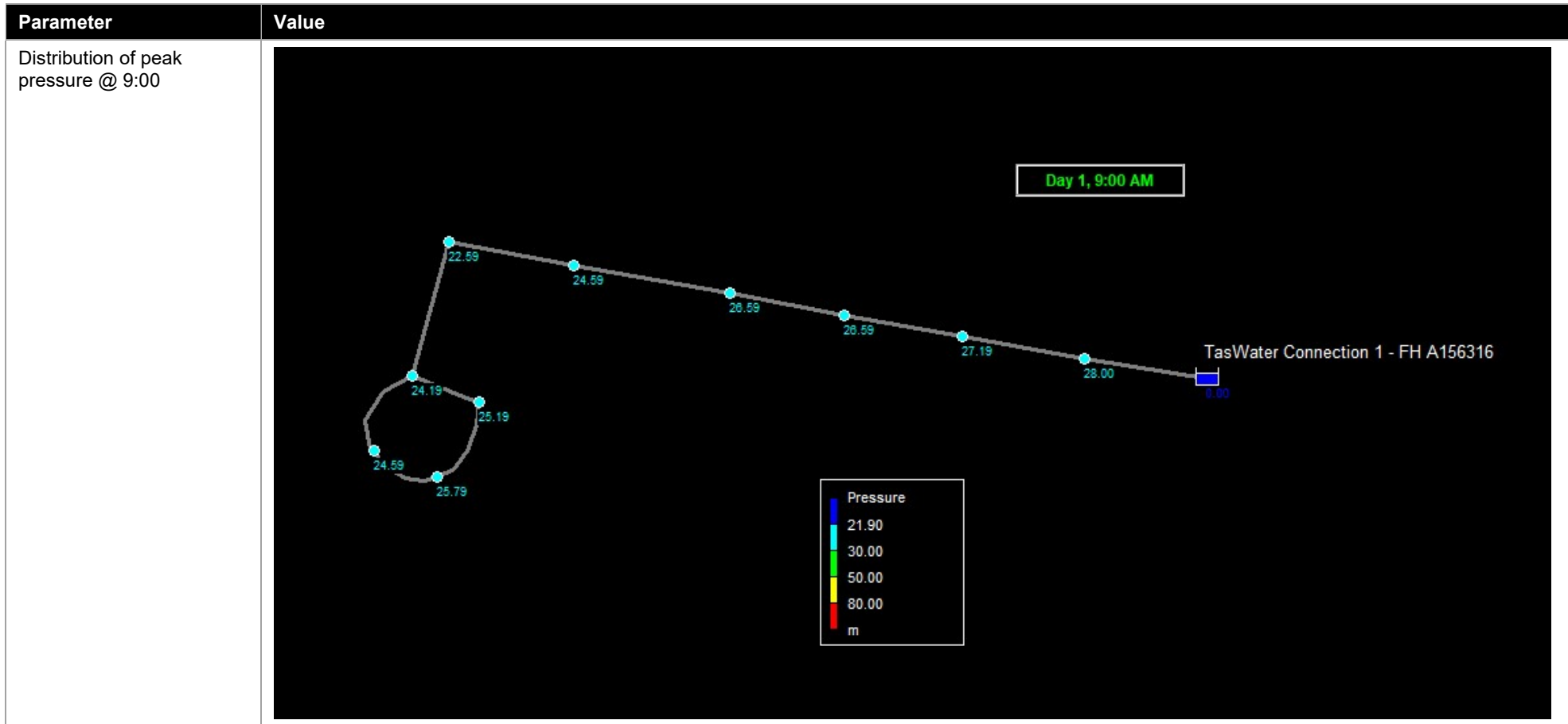


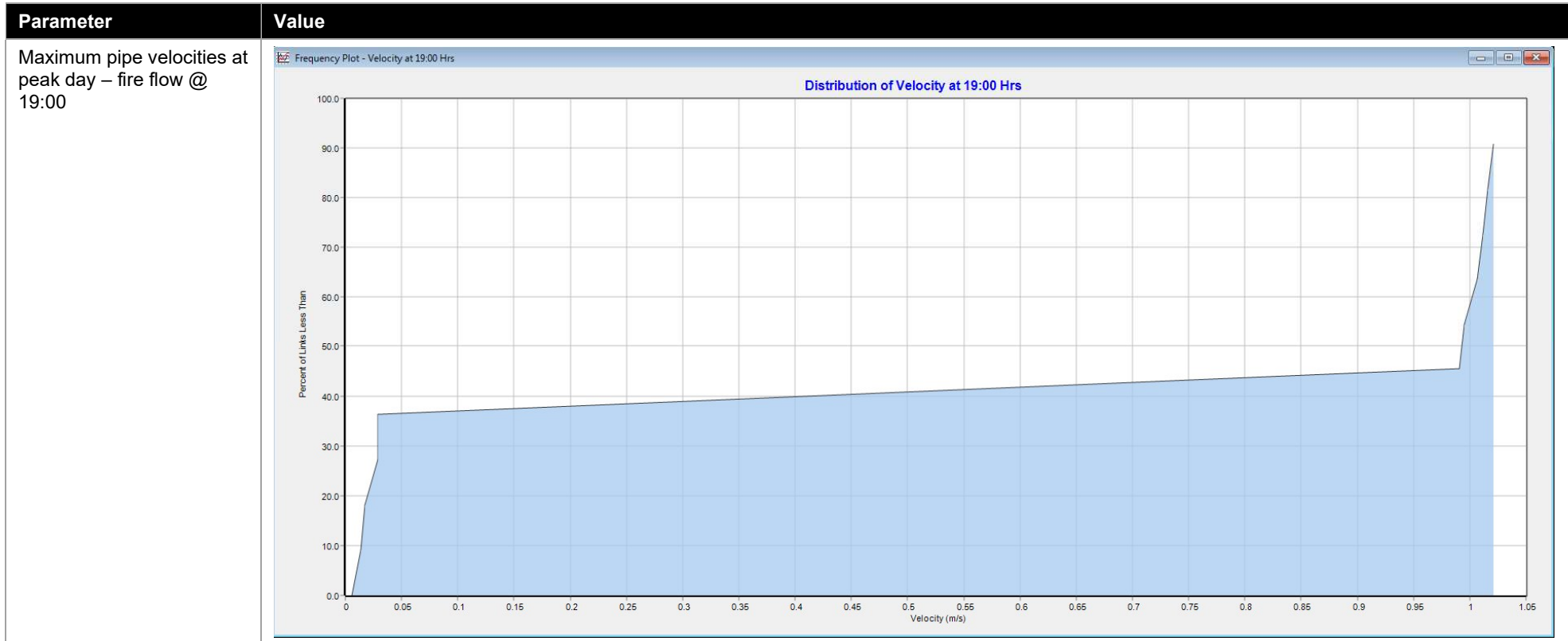
Table A.2 Lot 6 model outputs

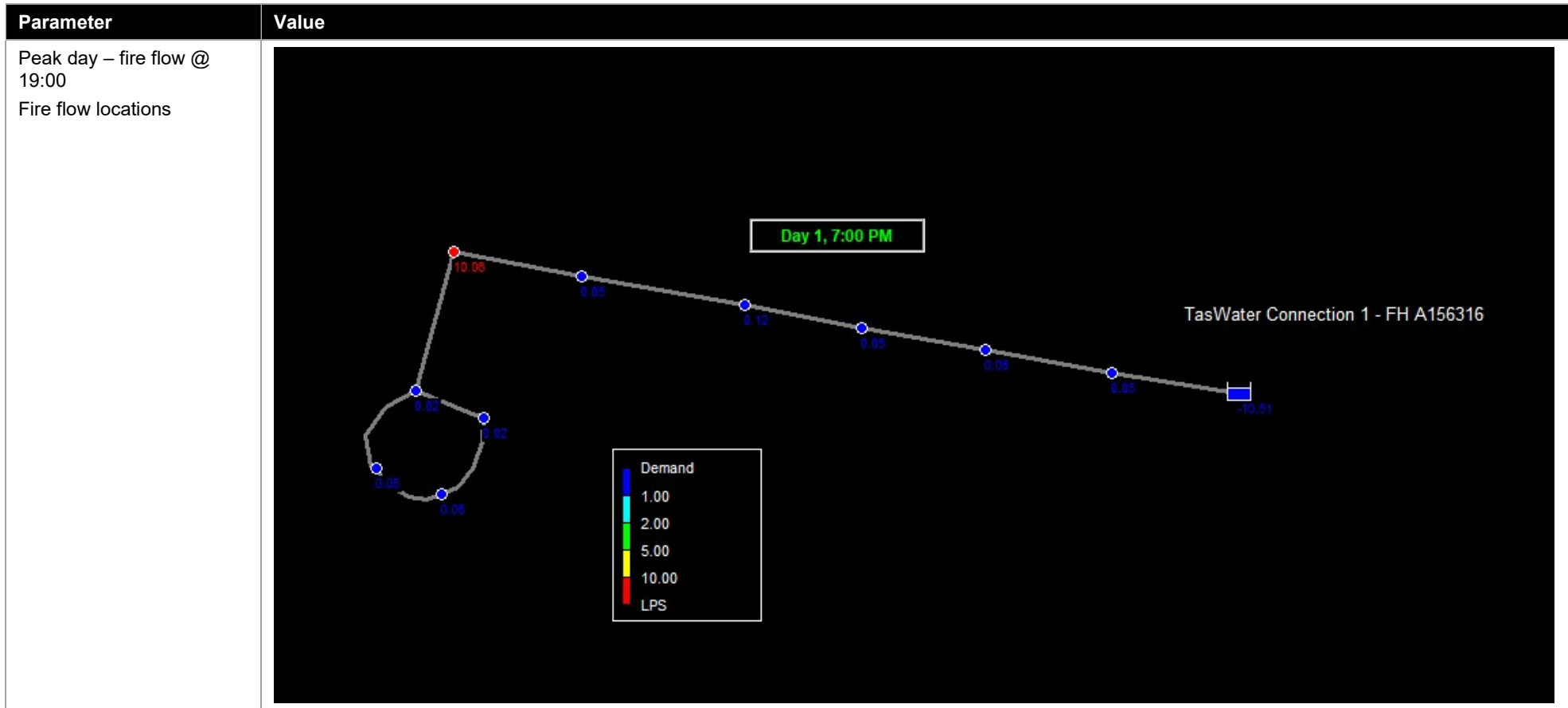
Parameter	Value
Pipe diameters	<p>The diagram illustrates a pipe network with two distinct sections. On the left, a red loop connects five nodes, with each segment labeled '51.0'. On the right, a green line connects seven nodes, with each segment labeled '114.5'. The green line starts from the top node of the red loop and extends to a 'TasWater Connection 1 - FH A156316' node. A legend titled 'Diameter' shows a color scale: red for 64.00, yellow for 92.00, green for 120.00, cyan for 176.00, and blue for mm. The red and green lines correspond to the 51.0 and 114.5 values shown in the diagram.</p>

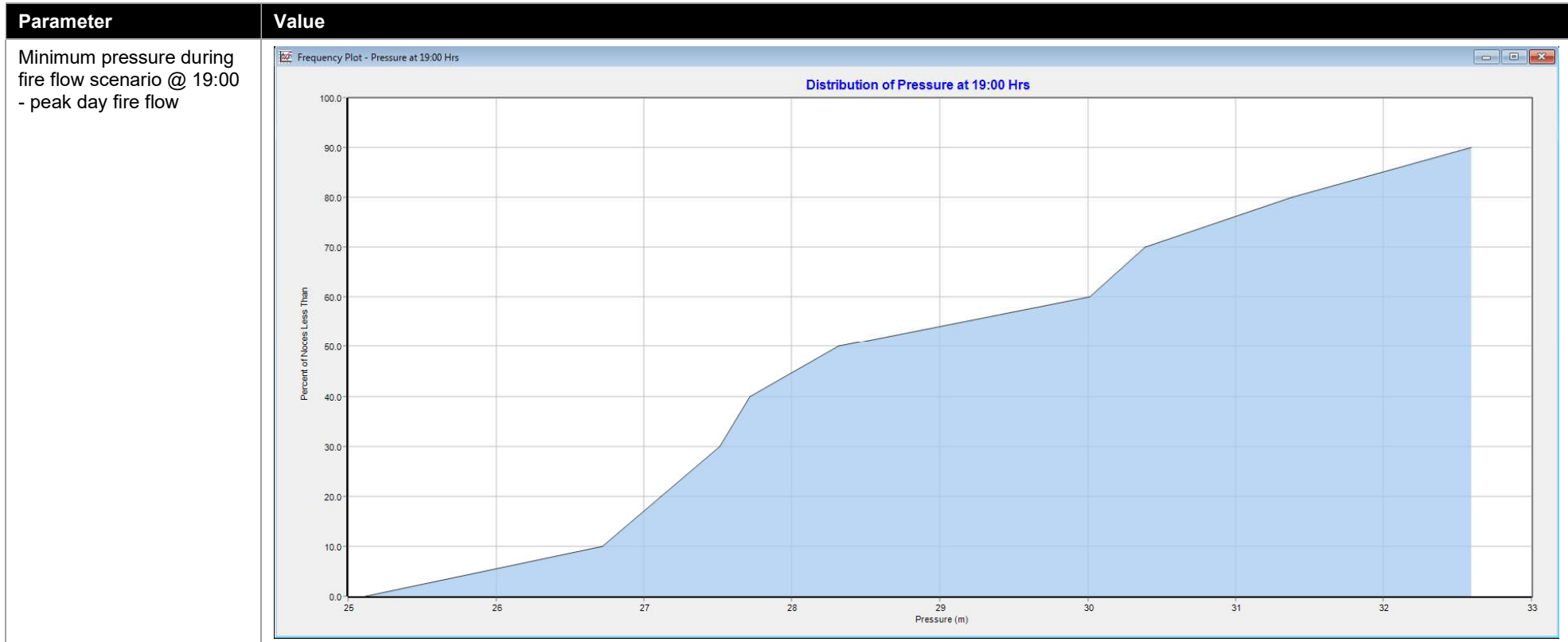


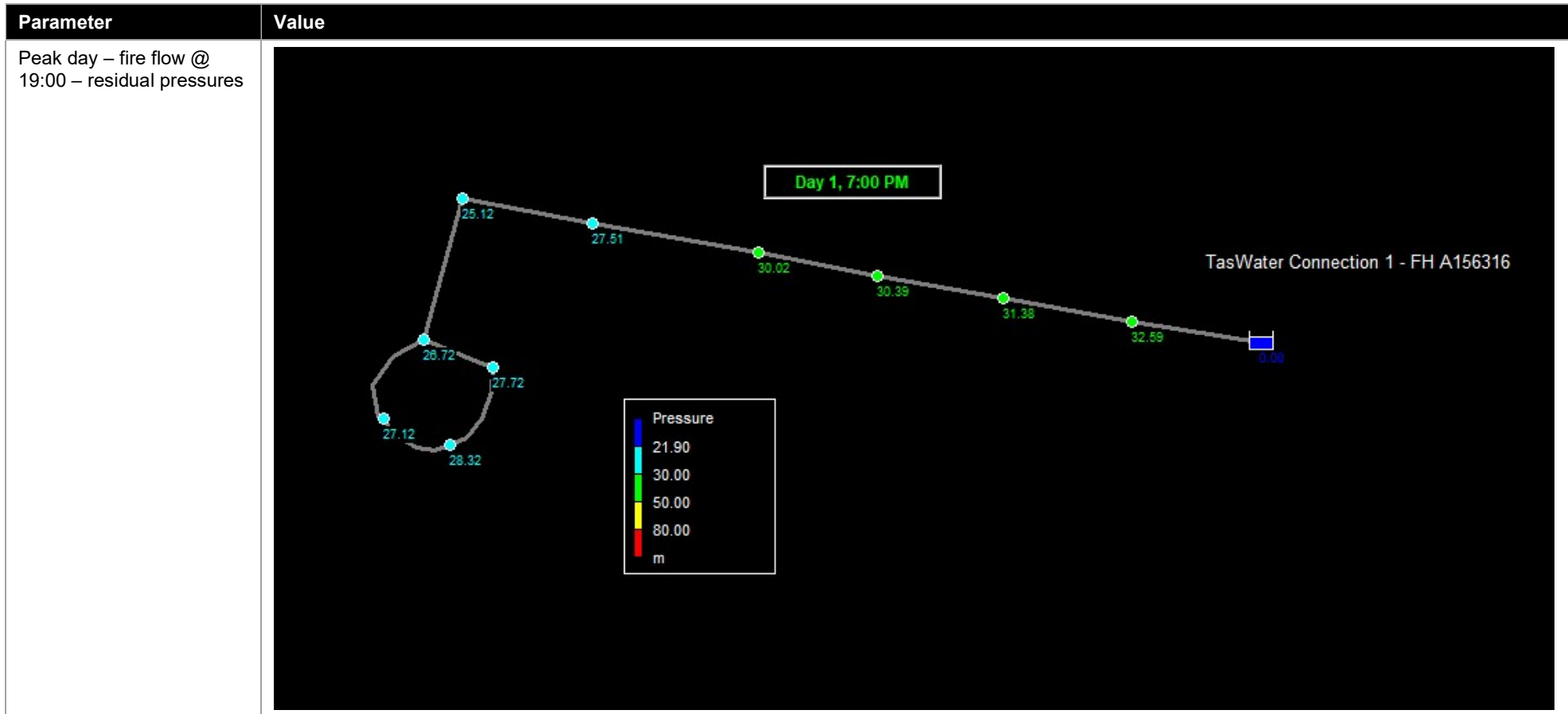


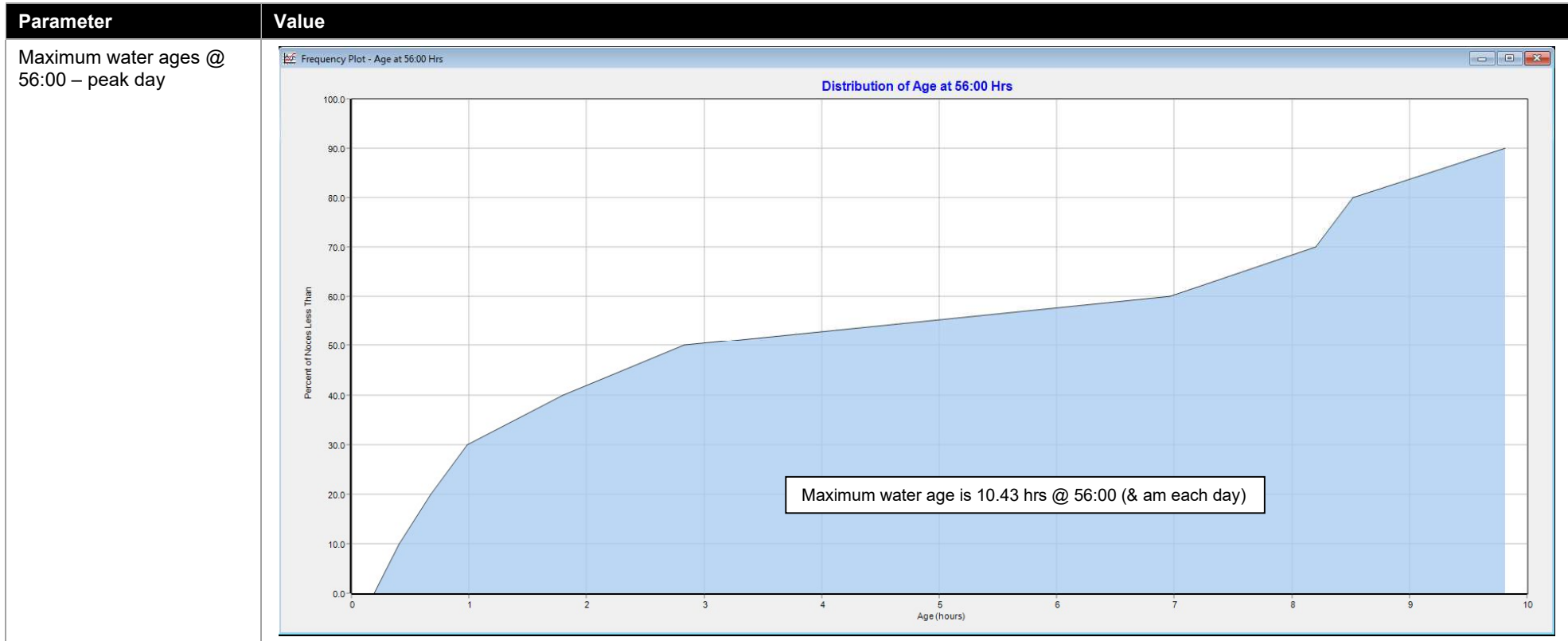


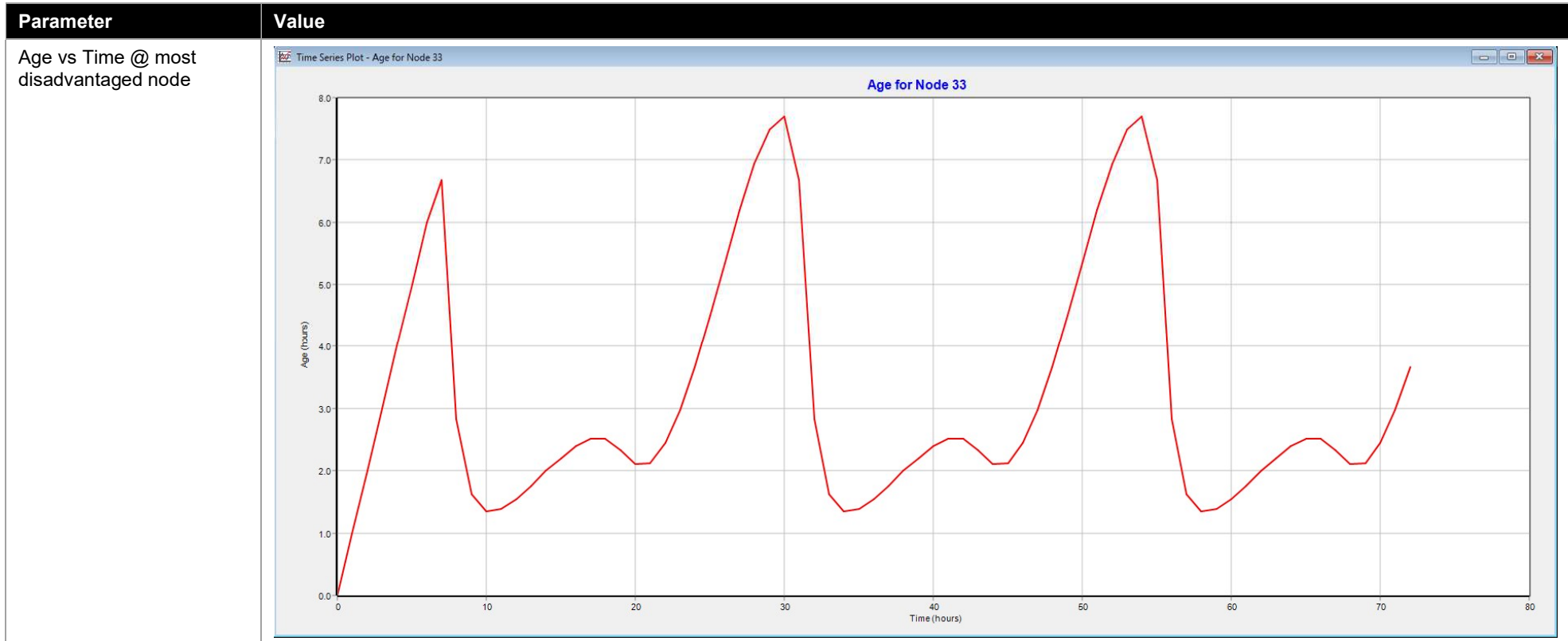


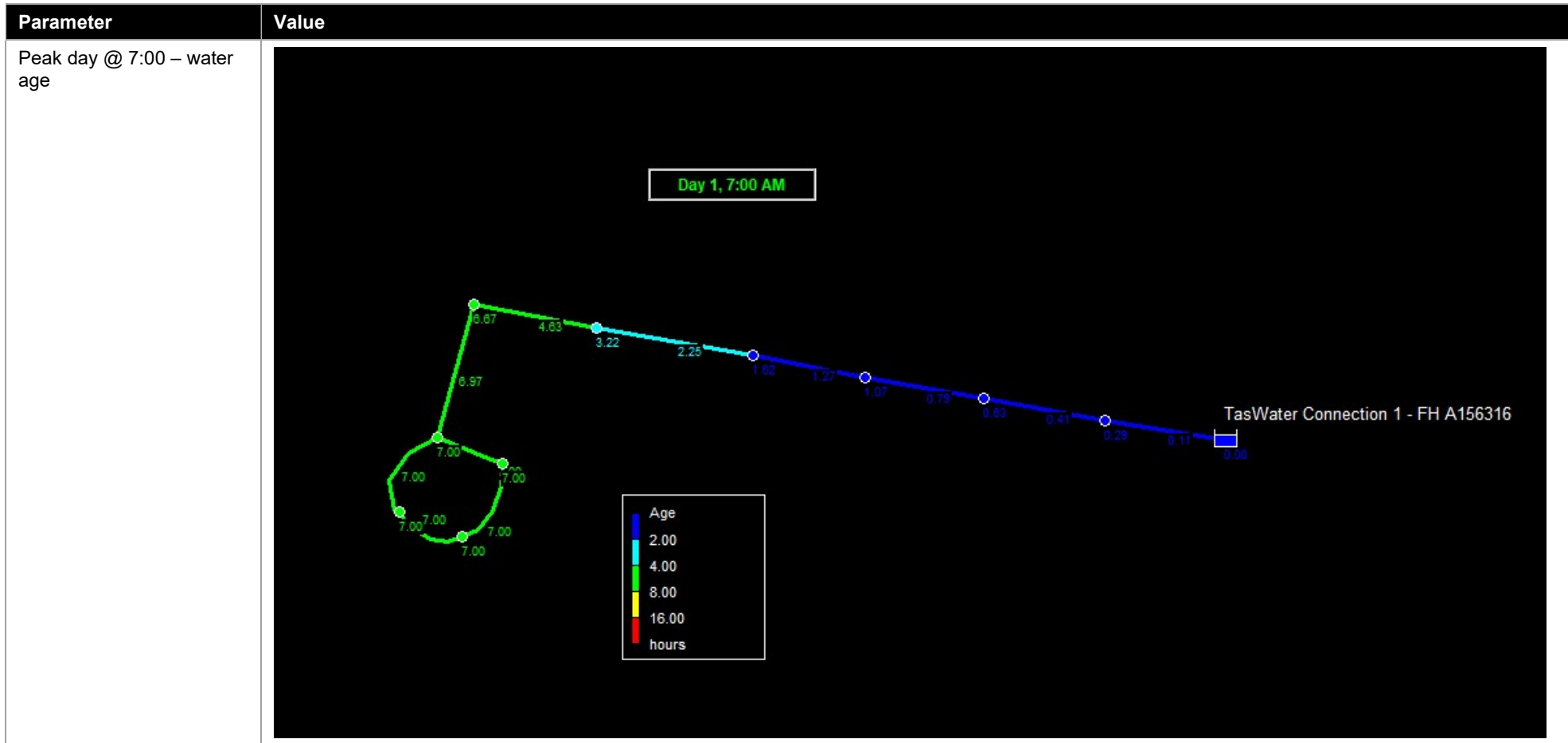












Appendix B

Sewerage long sections

Lot 4 Long Sections

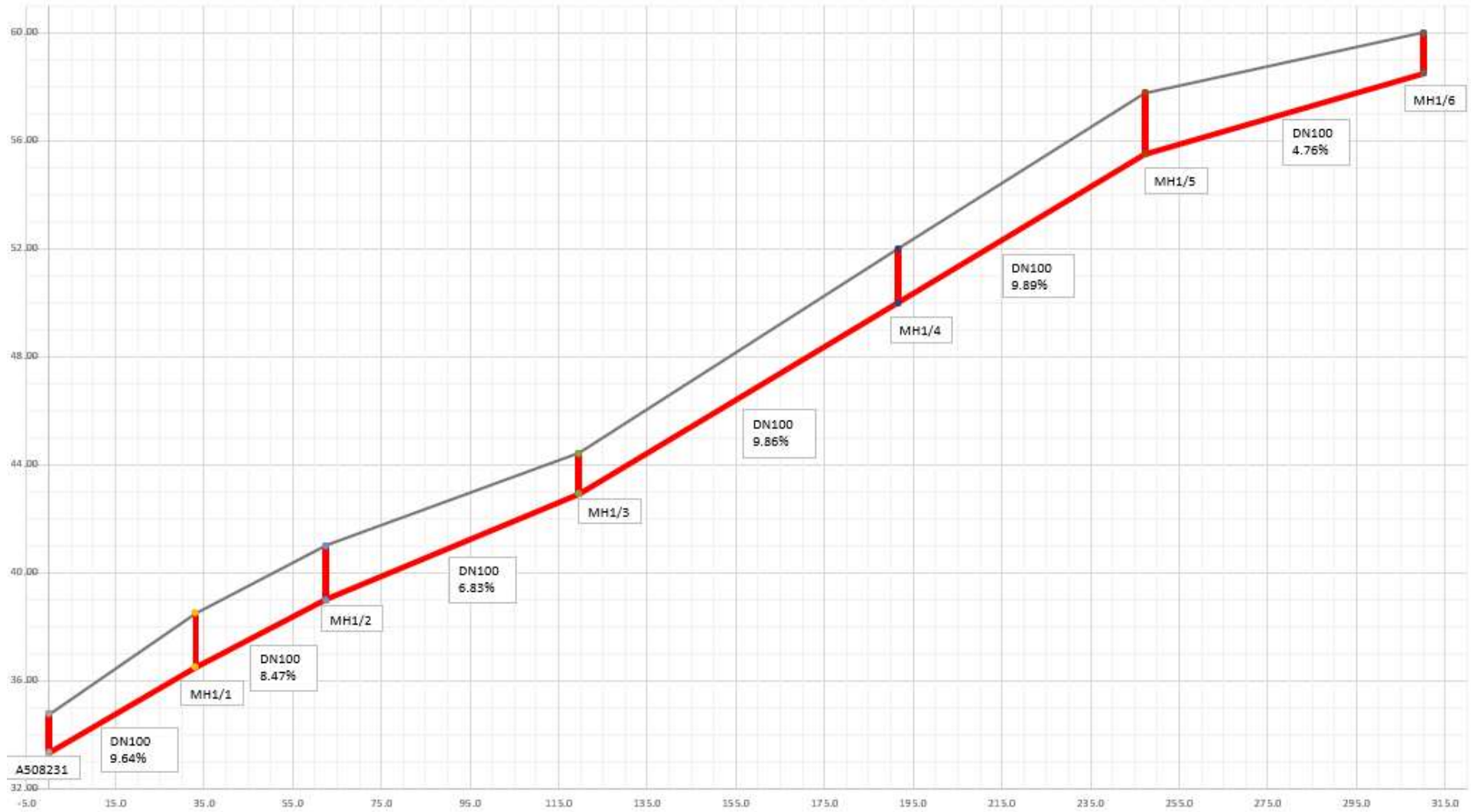


Figure B.1 Lot 4 long section - line 1

Lot 4 Long Sections

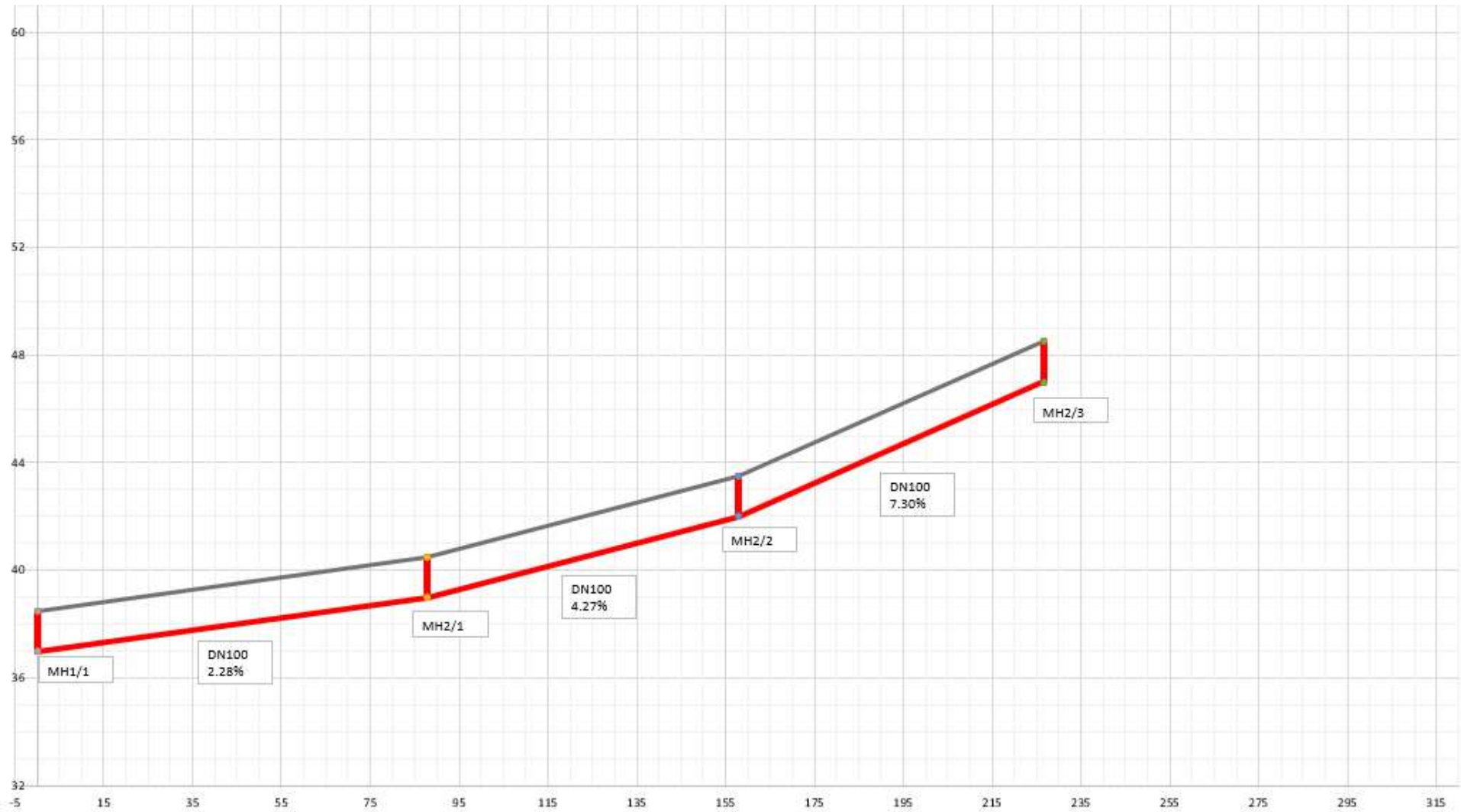


Figure B.2 Lot 4 long section – line 2

Lot 4 Long Sections

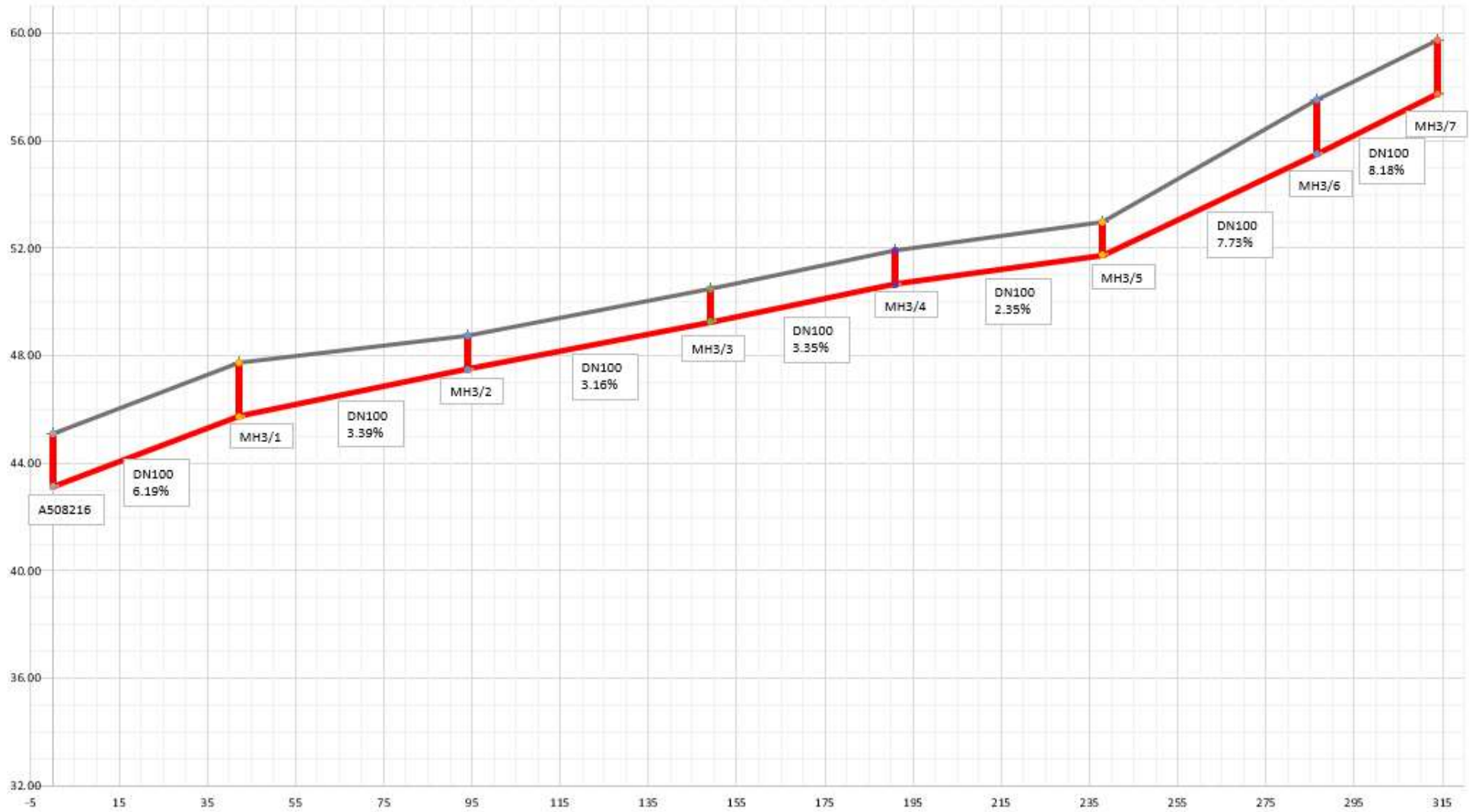


Figure B.3 Lot 4 long section – line 3

Lot 4 Long Sections



Figure B.4 Lot 4 long section – line 4

Lot 5 Long Sections

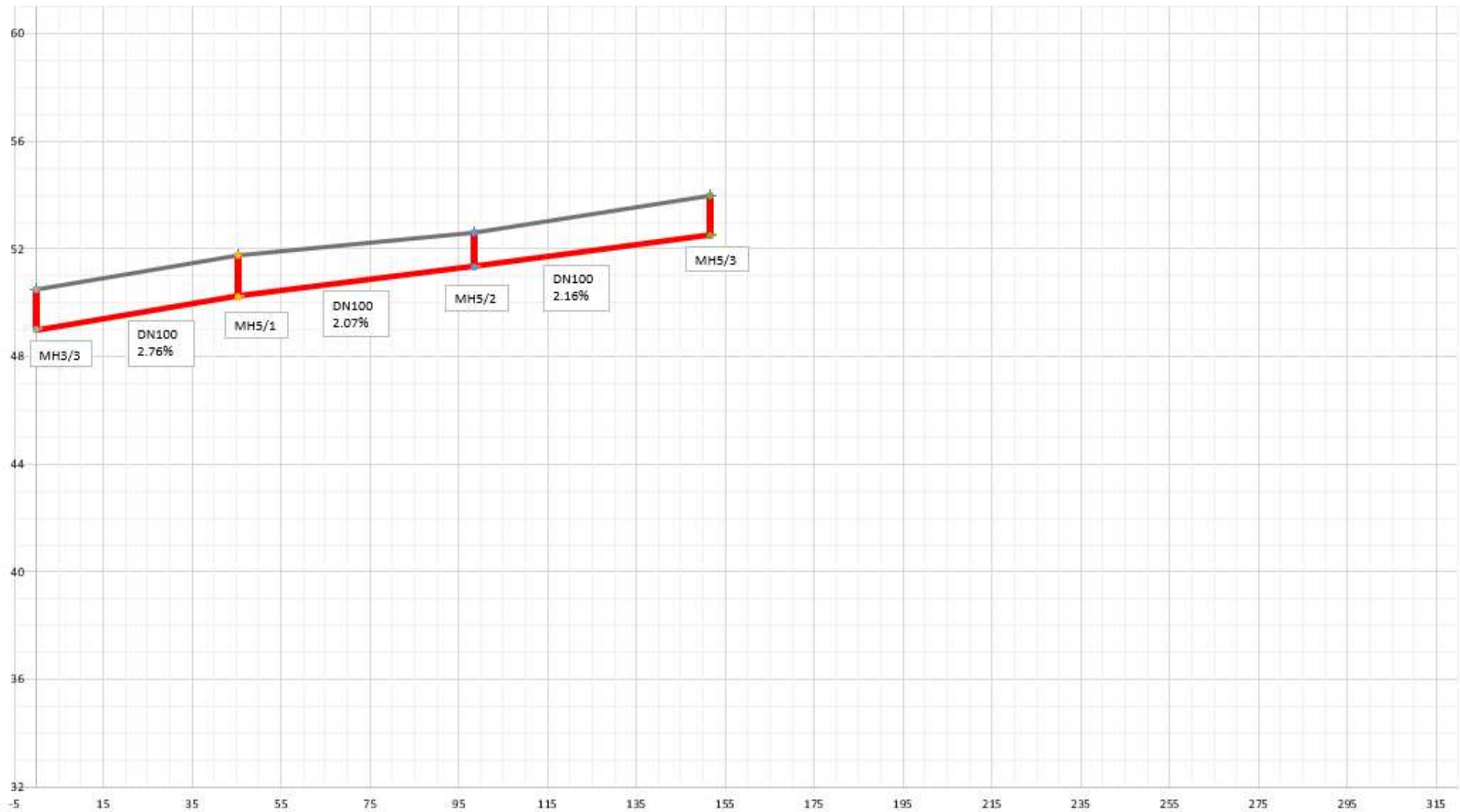


Figure B.5 Lot 5 long section – line 5

Lot 4 Long Sections



Figure B.6 Lot 4 long section – line 6

Lot 4 Long Section

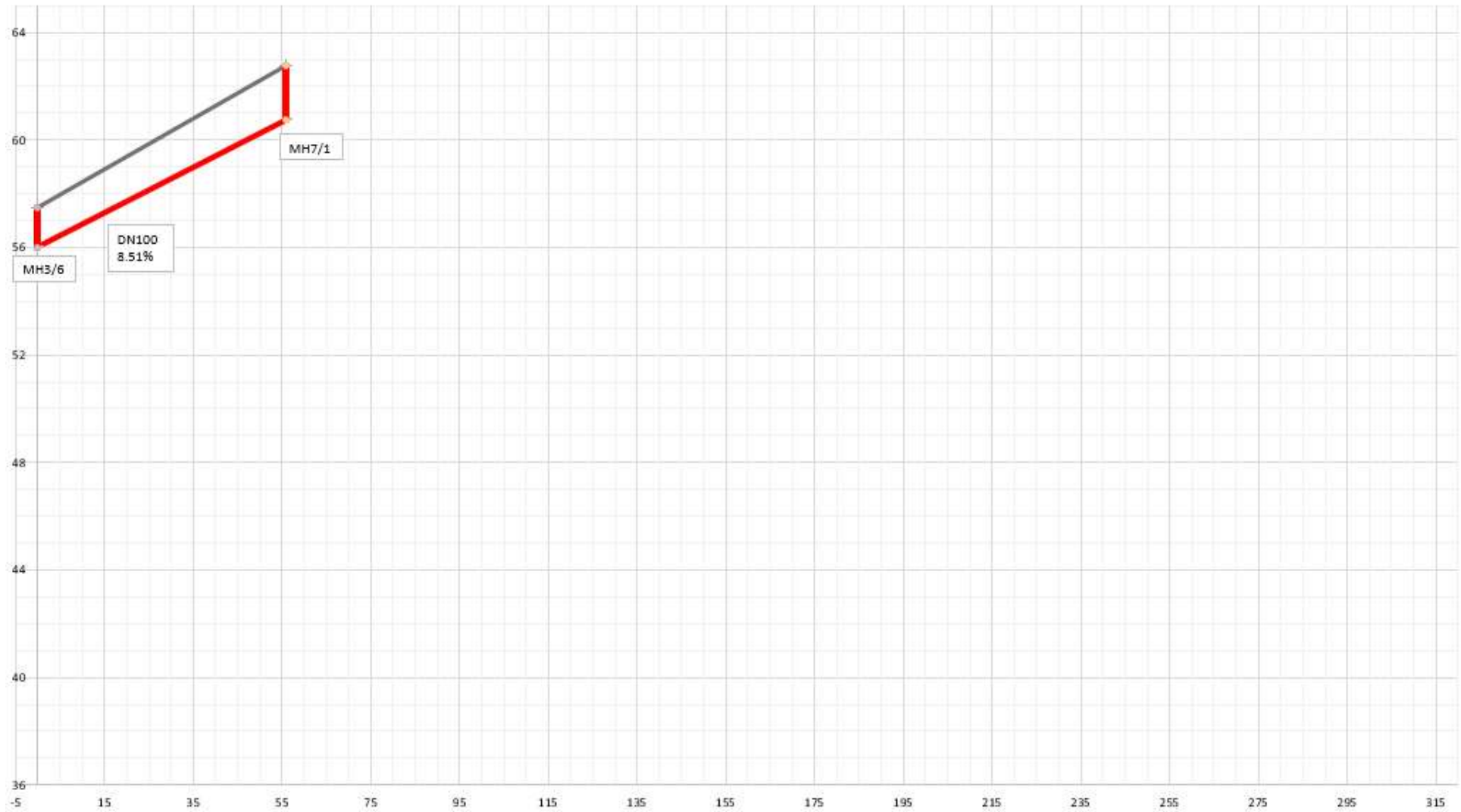
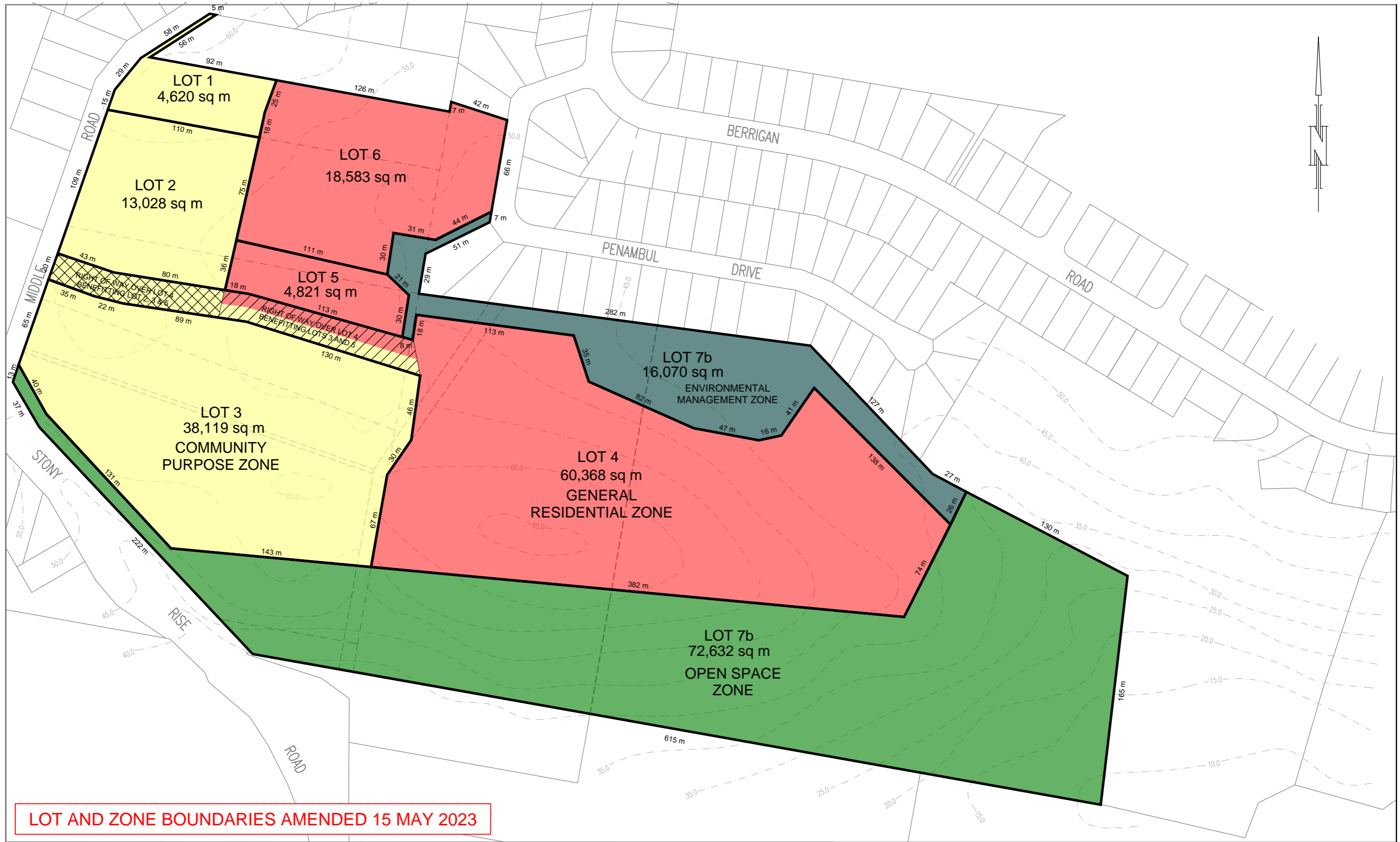


Figure B.7 Lot 4 long section – line 7



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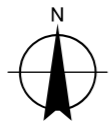
➔ **The Power of Commitment**



LOT AND ZONE BOUNDARIES AMENDED 15 MAY 2023

1:2,500 @ A3

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55



LEGEND

- Surrounding lot boundaries in grey lines
- Proposed lot boundaries in heavy black lines
- Contours in broken grey lines

NOTE

- Drawings based on data provided by Michell Hodgetts & Associates. GHD accepts no responsibility for the accuracy of that data.
- This plan has been prepared to support an application to the Planning Authority and should be used for no other purpose.
- All measurements approximate and are subject to final survey.



Proposed Lots and Proposed Zones

Middle Road, Devonfield PSA & DA

Job Number 12548932
Revision A
Date 06 Oct 2021

Figure 9