APPENDIX F

Engineering Report prepared by Premise

brazier motti

North Shore Commercial Town Centre Engineering Report

Oreana Property

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Premise

PART OF THE Amey GROUP

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1. INTRODUCTION

Premise has been commissioned by Oreana Property to prepare this Engineering Report in support of a Development Application for the proposed North Shore Commercial Town Centre – Stage 1. The proposed development (Stage 1) includes earthworks, sewer and water reticulation, drainage, road networks, stormwater quality, and electrical and telecommunications works.

2. PROPOSED DEVELOPMENT

The existing site is located at 33 Main Street Burdell (Lot 869 on SP361255), a 10ha lot of undeveloped land towards the southern end of the North Shore Development as shown in Figure 1 below. The site is bound by Main Street to the North, Nexus Drive to the West, Market Street to the East, and vacant land to the South.

Figure 1 - Site Location

Stage 1 of the proposed development is located south of the existing North Shore Marketplace and includes retail space, carparking, associated internal roads and the extension of Nexus Drive from the existing roundabout on Market Street to the roundabout on Main Street. The architectural layout prepared by Buchan Architects, illustrating the proposed North Shore Commercial Town Centre are attached in Appendix A.

3. TRAFFIC AND ROADWAYS

A Traffic Impact Assessment for the proposed development has been completed by SLR Consulting Australia Pty Ltd, this has informed the road alignment and determined the road hierarchies and widths which have been adopted for this Engineering Report. Refer to the Nexus Drive Road cross section in Figure 2.

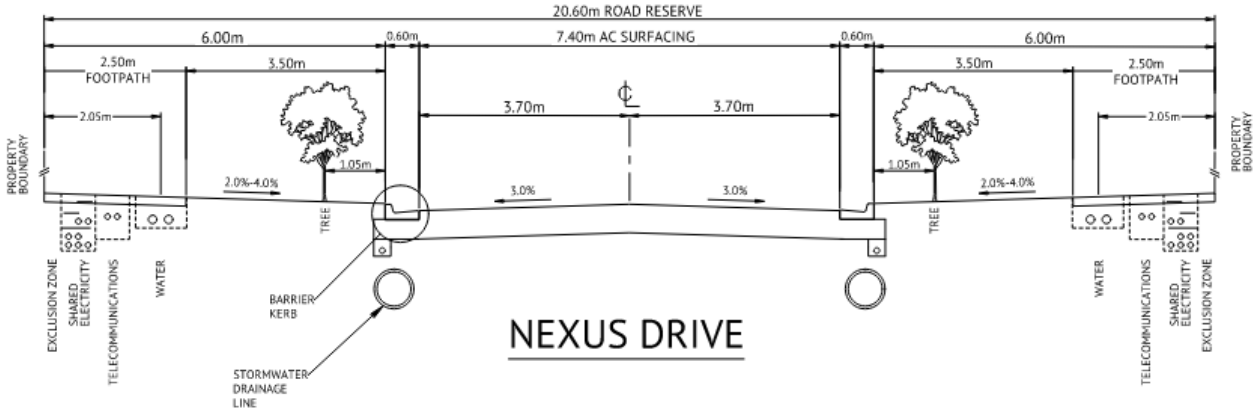


Figure 2 - Nexus Drive Cross Section

4. EARTHWORKS

4.1 Existing Ground Conditions

The Stage 1 development site is predominantly flat, with minimal variation in existing surface levels, which range from approximately 7.0 m to 8.0 m AHD. Aerial imagery indicates the site has been cleared, with a temporary drainage feature traversing the site.

4.2 Required Earthworks

The site will be shaped to ensure positive drainage towards roadways or drainage reserves. Grading will be in accordance with Council requirements for non-residential allotments. The subject site will be filled to a 100-year flood immunity standard in accordance with Schedule 6.4 Development manual planning scheme policy of the Townsville City Plan and State Government requirements. All allotment earthworks shall be carried out to Level 1 testing and inspection by a NATA registered geotechnical inspection and testing authority.

5. SOIL EROSION AND SEDIMENT CONTROL

Prior to commencement of construction, an ESCP will be prepared and implemented to minimise the impacts on stormwater quality. The plan will address site and catchment specific erosion control measures, generally adhering to the following control measures.

5.1 Pre-Construction

Before construction the following measures will be established and maintained for any to be disturbed.

- Stockpile areas to be designated to minimise impacts on site runoff.
- Provision of shakedown pit for any entry/exit points to the site; and

- Toolbox talk to inform any regular site personnel.

5.2 During Construction

During construction the following measures will be established and maintained for any to be disturbed.

- Construction related activities will be contained within the subject site where possible to minimise areas of disturbance.
- Topsoil retention for site rehabilitation.
- Regular inspection of sediment control measures; and
- Dynamic response to any changing site conditions.

5.3 Post-Construction

Following construction any disturbed areas will be stabilised through revegetation which is to be maintained until established.

6. STORMWATER DRAINAGE

Stormwater drainage shall be designed and constructed in accordance with the Townsville City Plan – Planning Scheme Policy – Schedule 6.4.4.4 Stormwater Drainage Design and associated reference documents.

The development will be shaped to ensure positive drainage towards roadways or drainage reserves (ultimately east) as per Council requirements. The preliminary layout of the drainage strategy is shown in Figure 3.

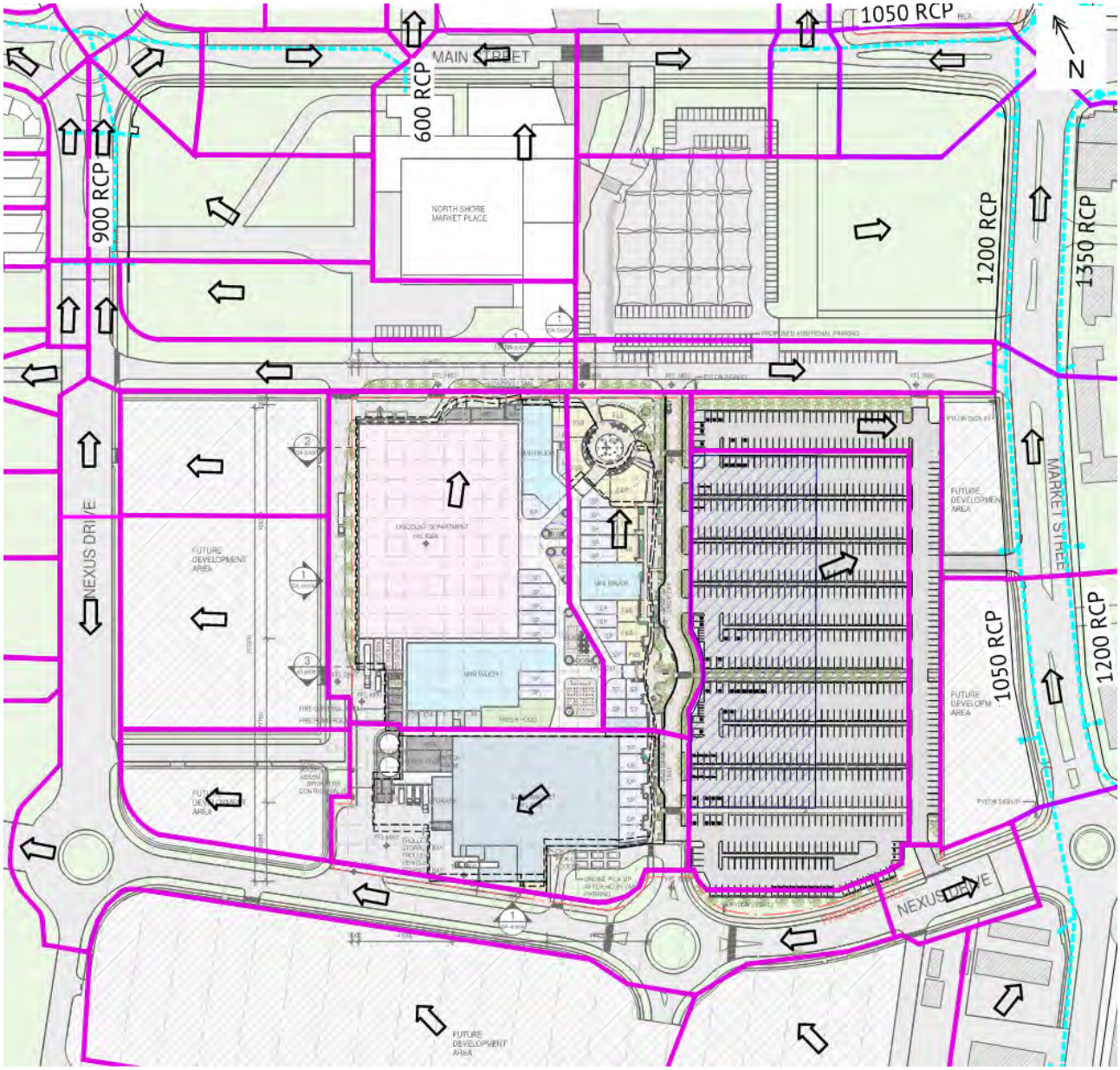


Figure 3 – Preliminary Stormwater Intent

6.1 Minor and Major Stormwater System

Minor system (Q5 – 18% AEP) stormwater flows within the commercial allotments will be collected and discharged to councils underground stormwater at designated collection points. Flows falling within the Nexus Drive Road Reserve will be conveyed by kerb and channel, inverts, and kerb inlet pits and underground stormwater drainage pipes to the roads stormwater system before being discharged to the major drainage system as per Council standards.

Major system (Q100 – 1% AEP) stormwater flows, surplus to the minor system capacity, shall be transported via the roadway systems to the main drainage paths, and discharged as per normal Council requirements.

6.2 Hydraulics

A Hydraulic Impact Assessment (HIA) has been completed for the site as a separate report for the North Shore Town Centre. The proposed Carpark generally falls east to Market Street with the Shopping Centre and balance land grading to the existing open drain to the west via the proposed Nexus Drive Road Reserve

7. STORMWATER QUALITY DURING CONSTRUCTION

7.1 Stormwater Quality Treatment (Construction Phase)

During the construction phase various pollutants are generated which can find their way into the stormwater runoff. These pollutants can affect the quality of the stormwater runoff and hence pollute both the site and the downstream receiving environment. Table 1 below outlines the major sources of pollutants.

Table 1 – Typical Construction Phase Pollutants

Construction Phase Pollutants
Litter from construction packaging, paper, food packaging, off cuts, etc.
Sediment from erosion of exposed soils and stockpiles.
Hydrocarbons - from fuel and oil spills, leaks from construction equipment.
Toxic Materials - cement slurry, solvents, cleaning agents, wash waters.
pH altering substances - cement slurry, wash waters.

Erosion and sediment control measures used during the construction phase of the development will be designed and installed in accordance with International Erosion Control Association (Australasia) - "Best Practice Erosion & Sediment Control – for building and construction sites" November 2008 as well as the TCC Development Guidelines for Erosion and Sediment Control.

8. STORMWATER QUALITY DESIGN

8.1 State Planning Policy Compliance

The latest SPP (2017) Stormwater Management Design Objectives (SMDOs) have been adopted for the operational phases of the development and is detailed in Table 2 below.

Table 2 – Stormwater Quality Objectives

Pollutant	Reductions in Mean Annual Load from unmitigated development (%)
Suspended Solids	80
Total Phosphorus	65
Total Nitrogen	40
Gross Pollutants	90

8.2 Stormwater Quality Modelling

Stormwater Pollutant modelling for the development has been generated using the modelling program 'Model for Urban Stormwater Improvement Conceptualisation' (MUSIC), version 6.3.0, adhering to the prescribed Water by Design MUSIC modelling guidelines Version 3.0, 2018 (WBDMG).

The following data was used as input for the MUSIC model:

- Long term rainfall data was obtained from the Townsville AERO pluviometer (gauge number 032040) at a six (6) minute data interval for a representative period from 1990-1999;
- Monthly aerial potential evapotranspiration data from the Townsville Aero pluviometer;
- The Values for typical Impervious Fractions used have been conservatively calculated from areas on the design plans, and/or adopted from Table SC6.4.9.2 - Design AEPs and fraction Impervious for Land Use Zones in line with TCC City Plan - Stormwater Quantity section.
- Pollutant export parameters have been adopted from Table 3.8 and 3.9 in the Healthy Land and Water (2018) MUSIC Modelling Guidelines Version 3.0, 2018, and Mackay MUSIC Guidelines Version 1.1 (2008) Table 8 and 9, for a land use type of commercial. Insitu Soil properties matching Mackay Lowlands has been adopted in lieu of more specific information.

Details of Catchment assumptions are provided in the following sections of this report. Full detail design of treatment trains will comply with TCC City plan SC6.4.8 and SC6.4.10 where applicable.

8.3 Overall Strategy

The stormwater quality treatment for this development is made up of two (2) parts. The shaded blue area in Figure 4 represents "Nexus Drive Catchments". The Orange and pink shaded areas in Figure 4 represents "Internal Site Catchments". Both parts have common treatment device parameters and as such have been presented together in this report. Table 3 shows the allocation of devices used for each catchment as part of the overall treatment train.

Figure 4 – Break up of Catchments

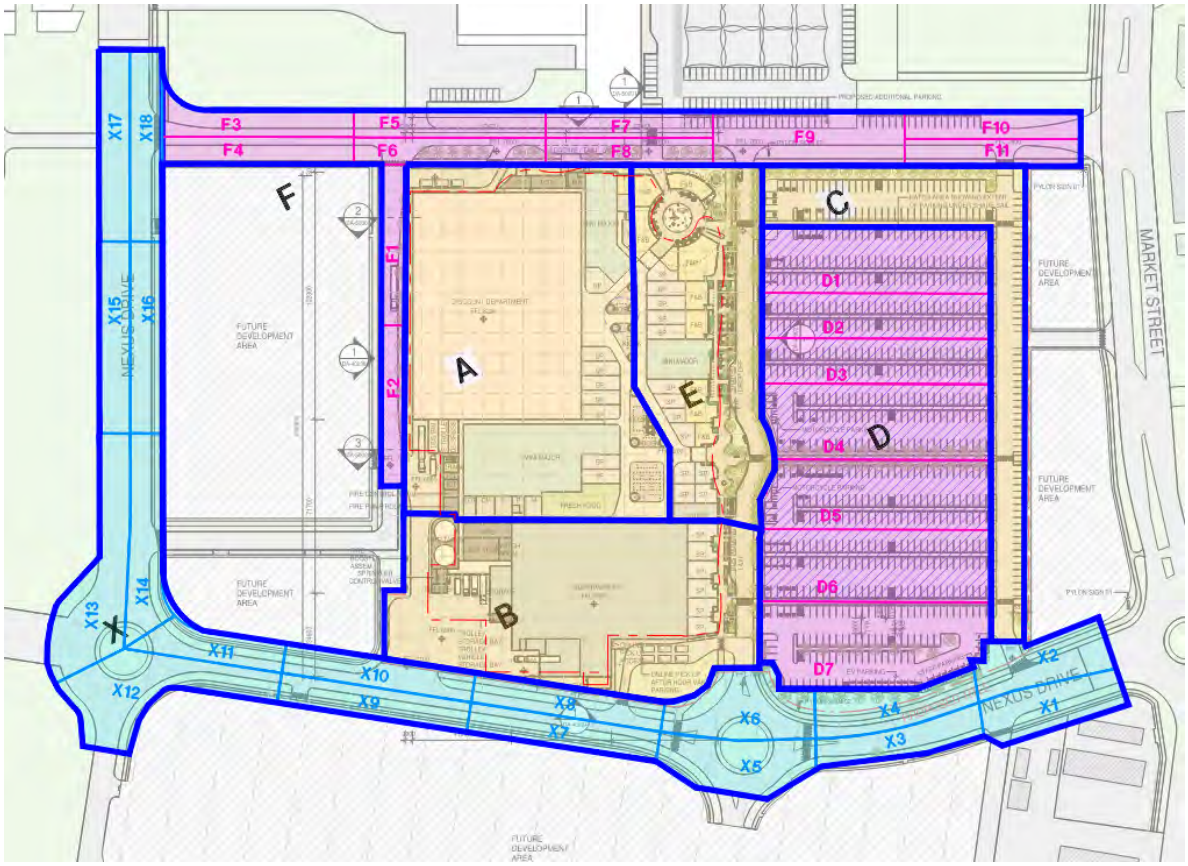


Table 3 –Catchment Treatment Device Strategies

Catchment	Treatment Device Types
A	Proprietary Products
B	Proprietary Products
C	Proprietary Products
D	Swale (Internal) + Bio Basins (Type A) *= [Treatment trains T1 – T9]*
E	Proprietary Products
F	Proprietary Products OR Bio Basins (Type B) *= [Treatment trains T20-T26]*
X	Bio Basins (Type B) *= [Treatment trains T20-T26]*

Details of the modelled catchment split parameters are presented in Table 4.

Table 4 - MUSIC Model Catchment Parameters

Catchment ID	Land Use	Node Type	Total Area (ha)	Fraction Impervious
A	Roof-Commercial	Urban	1.348	100%
	Sealed Road - Commercial	Urban	0.036	95%
	Ground - Commercial	Urban	0.088	95%
E	Roof-Commercial	Urban	0.388	100%
	Sealed Road - Commercial	Urban	0.103	95%
	Ground - Commercial	Urban	0.253	95%
F1 - F2	Ground - Commercial	Urban	0.132	95%
B	Roof-Commercial	Urban	0.626	100%
	Sealed Road - Commercial	Urban	0.298	95%
	Ground - Commercial	Urban	0.010	95%
C	Sealed Road - Commercial	Urban	0.410	95%
	Ground - Commercial	Urban	0.114	95%
F3 - F11	Lumped - Commercial	Urban	0.873	95%
D (D1 - D7)	Sealed Road - Commercial	Urban	1.806	95%
X (X1 - X18)	Lumped - Commercial	Urban	2.075	75%

8.4 Treatment Devices

This section provides a summary of the proposed treatment devices for the stormwater quality management of the 'Internal Site' and 'Nexus Drive' catchments.

8.4.1 PROPRIETARY PRODUCTS

Proprietary Products modelled for the proposed site includes two systems from Ocean Protect. Further information on the products is available from https://oceanprotect.com.au/.

- A primary treatment is modelled using 'OceanGuards'. These are a gully pit insert / basket designed to capture pollution that runs into stormwater drains. *'The filtration bag, filtration cage and flow diverter work together to maximise the flow treated and pollutants captured.' (Ocean Protect, 2026).*
- Secondary treatment is modelled using 'Jellyfish' devices of various capacities and filter cartridge arrangements. They are installed offline with high flow bypasses. 'Jellyfish' *"use gravity, flow rotation and up-flow membrane filtration to provide stormwater treatment in a compact underground system". (Ocean Protect, 2026).*

8.4.2 VEGETATED SWALES

Swales with typical cross-sectional dimensions as shown in Figure 5 are proposed for the Sub-Catchments D1 – D7. The Figure shows flush kerb; wheel stops and pavement subsoil drainage. It is proposed that these swales are located upstream of the bioretention basin/pods in the treatment train, with two (2) or more treatment trains running the length of the parking aisle. The swales run perpendicular to vehicle parking bays in place of a traditional separation median as shown in Figure 7. The length of swale required for effective treatment varies depending on the catchment size.

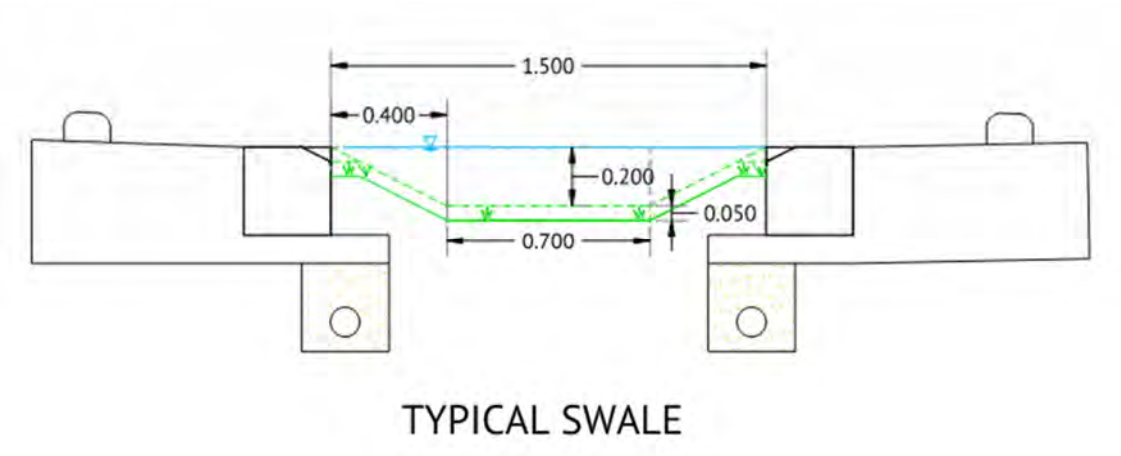


Figure 5 – Dimensions of Typical Swale Cross Section Used

8.4.3 BIO-RETENTION BASINS/PODS

Two typical arrangements for end of line bio retention treatments are proposed for this site (Sub-Catchments of D), and for the adjacent Nexus Drive Catchments (Sub – Catchments of X). Both have a typical Extended Detention Depth of 0.2m. Both proposed bio retention basins have field inlets pits to bypass the flows surplus to the 3 month events.

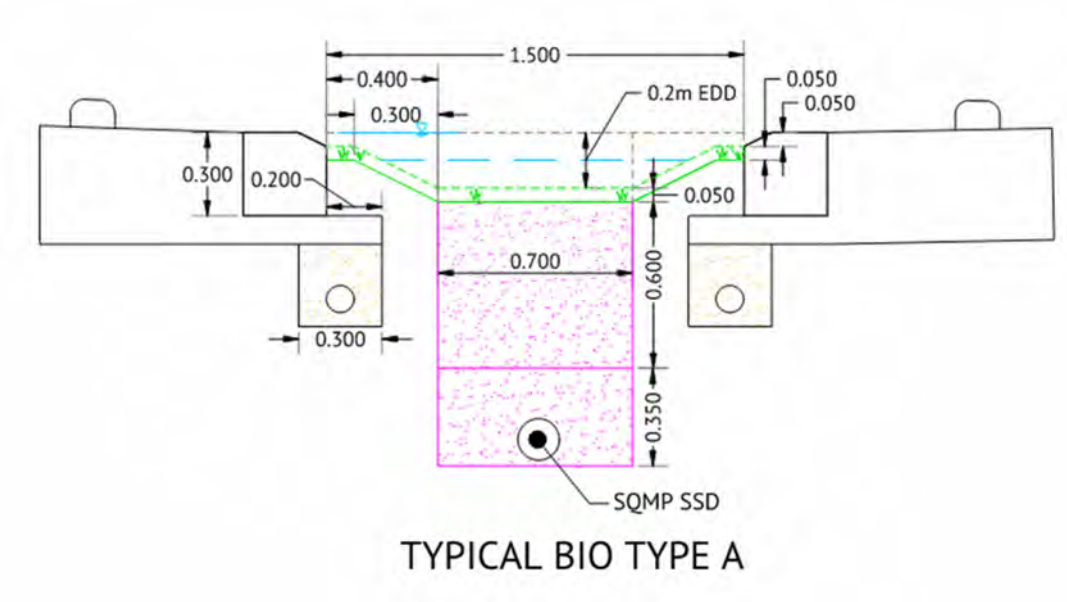


Figure 6 –Typical Bio - Type A Cross Sectional Dimensions

Figure 6 shows the typical cross-sectional dimensions of the bio retention basin (Type A) proposed in sub-catchments D1 -D7. These are the proposed end of line treatments and are on the same alignment as the swales. The proposed arrangement is shown in Figure 7.

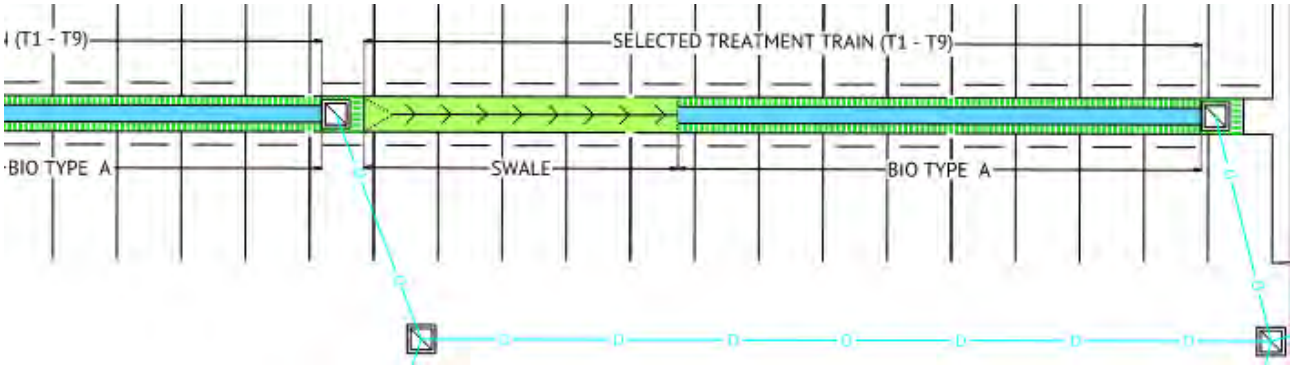


Figure 7 –Typical Arrangement of Proposed Carpark Treatment Trains

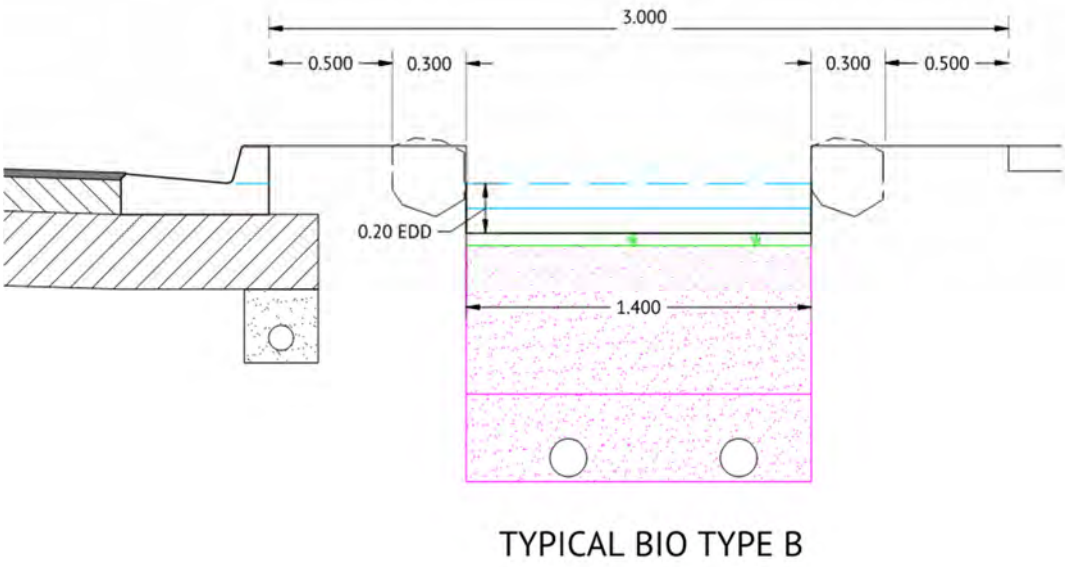


Figure 8 – Typical Bio - Type B Cross Sectional Dimensions (Nexus Drive)

Figure 8 shows the typical cross-sectional dimensions of the bio retention basins proposed in sub-catchments X1-X18. These bio basins receive road flows from kerb chutes and are not preceded by swales.

The Length of the bio retention basins (both Type A and Type B) vary depending on the pit catchment size which will be determined at detailed design stage. As such, rather than allocate specific lengths to each sub catchment at this preliminary stage, a series of treatment trains (named T1- T26) were modelled to treat different sub catchment sizes all of which meet the required pollutant reduction targets and would fit in the allocated space. At detailed design stage the most appropriate train will be selected for each sub catchment.

8.5 Catchments A, B, C, E and Sub-Catchments F1, F2

Split portions of adjacent catchments (which have the same discharge points) have been combined to most efficiently treat pollutants. Table 5, Table 6 and Table 7 show the contributing catchments to each modelled treatment train.

Table 5 – Treatment Trains for Catchments A, E and Part F

Catchment ID	Split	Total Area (ha)	Treatments	
A + E	ROOFs	1.736	-	JELLYFISH JF – 3300 16-3 (460)
A + E	ROADs	0.139	7 x OCEANGUARDS	
A + E	GROUNDs	0.341		
F1+F2 (GROUND)	LUMPED commercial	0.132	2 x OCEAN GUARDS	

Table 6 – Treatment Trains for Catchment B

Catchment ID	Split	Total Area (ha)	Treatments	
B	ROOFs	0.626	-	JELLYFISH JF – 2300 7-2 (460)
B	ROADs	0.298	6 x OCEANGUARDS	
B	GROUNDs	0.010		

Table 7 – Treatment Trains for Catchment C

Catchment ID	Split	Total Area (ha)	Treatments	
C	ROADs	0.410	6 x OCEANGUARDS	JELLYFISH JF – 1500 5-1 (460)
C	GROUNDs	0.114		

A snapshot of the MUSIC model layout is below (Figure 9) And also Appendix C.

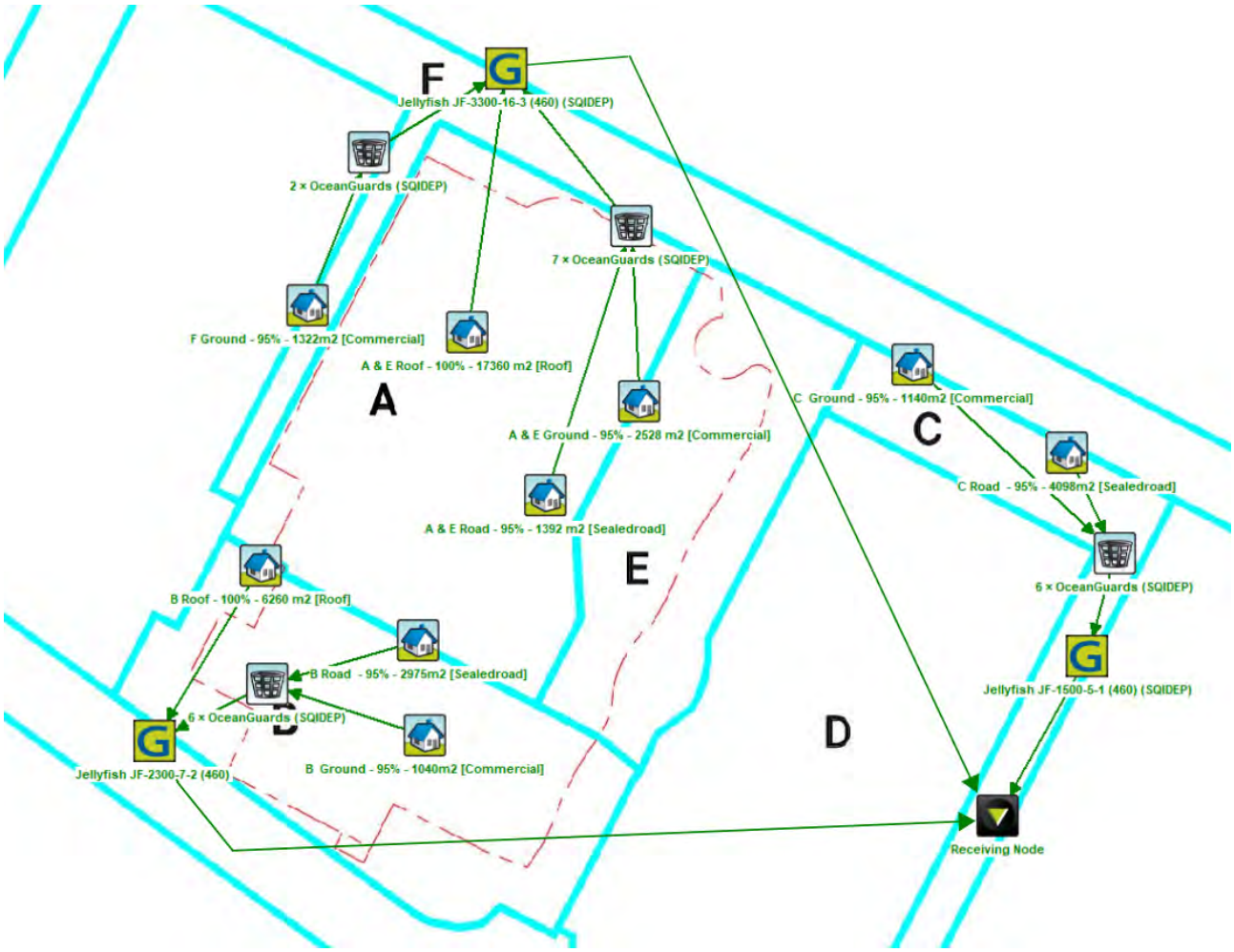


Figure 9 – Music Model Layout for Catchments A, B, C, E and Sub-Catchments F1, F2

8.5.1 TREATMENT NODE PARAMETERS

Proprietary products modelled for the proposed site includes two systems from OceanProtect. Relevant parameters are shown in Table 8.

Table 8 – Proprietary Product Device Parameters

Component	High flow Bypass (m3/s)	Refer Manufacturers Specification
Jellyfish JF-2300-7-2 (460)	0.0400	This Treatment Node is in accordance with reductions from SQIDEP Verification Certificate
Jellyfish JF-1500-5-1 (460)	0.0275	
Jellyfish JF-3300-16-3 (460)	0.0875	
OceanGuards	0.0200	

The treatment flow rate per cartridge is:

- 1370mm - 460mm Head - Hi-Flow 5L/s per cart and Drain Down 2.5L/s per cart.
- 686mm - 460mm Head - Hi-Flow 2.5L/s per cart and Drain Down 1.30L/s per cart.
- Further information on the products is available from https://oceanprotect.com.au/.

8.5.2 TREATMENT TRAIN EFFECTIVENESS

Table 9 summarises the MUSIC results by showing a comparison of the mean pollutant loads for the treatment strategy. Overall pollutant loads have been reported at the downstream extent of the model (the Receiving Node).

The results demonstrate the effectiveness of the proposed treatment train in the MUSIC Model (for Catchments A, B, C, E and Sub-Catchments F1, F2) in achieving the set Stormwater Management Design Objectives (SMDOs) for pollutant reduction targets. Table 9 demonstrates that proposed Treatment train for Catchments A, B, C, E and Sub-Catchments F1, F2 has been adequately sized and meets pollutant reduction targets.

Table 9 – Treatment Train Effectiveness – Receiving Node

Pollutant	Sources (kg/yr)	Residual Load (kg/yr)	Reduction (%)	Target Reduction (%)
Suspended Solids (TSS)	4980.0	884	**82.2**	80
Total Phosphorus (TP)	12.7	4.2	**67**	65
Total Nitrogen (TN)	117	70.1	**40**	40
Gross Pollutants (GP)	676	48.4	**92.8**	90

8.6 Sub-Catchments D1- D7

Table 10 provides the overall catchment parameters for Catchment D.

Table 10 - MUSIC Model Catchment Parameters

Catchment ID	Land Use	Node Type	Total Area (ha)	Fraction Impervious	Treatment Train	
D	Sealed Road - Commercial	Urban	1.806	95%	SWALE	BIO BASIN -TYPE A

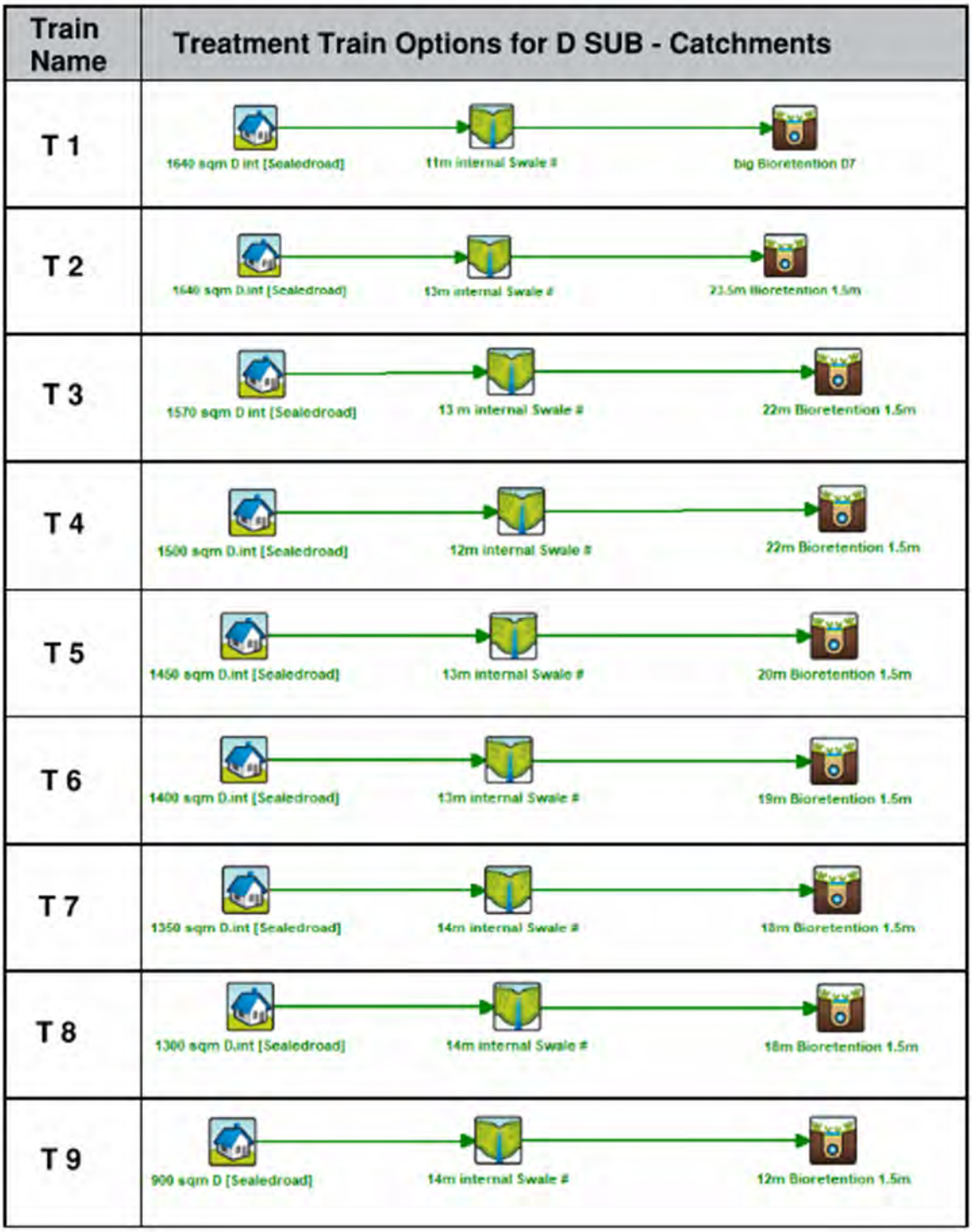
Table 11 displays the components that make up each viable treatment train (that has been modelled) as an option for the treatment of sub-catchments D1 – D7. The option ultimately selected will reflect the pit catchment size, and final layout parameters (such as grading), which will be determined at detailed design stage.

Table 11 – Treatment Train Components (T1-T9)

Treatment Train Name	Effective treatment for Sub-Catchment areas (sqm)	Length TYPICAL INTERNAL SWALE (m)	Length BIO (TYPE A - width 0.7m) (m^2)
T1	1640	11.0	Custom shape
T2	1640	13.0	23.5
T3	1570	13.0	22.0
T4	1500	12.0	22.0
T5	1450	13.0	20.0
T6	1400	13.0	19.0
T7	1350	14.0	12.0
T8	1300	14.0	12.0
T9	900	14.0	12.0

Figure 7 shows the context of the above treatment train options. A snapshot of the MUSIC model layout for Treatment train options T1 – T9 is provided in Figure 10 and also Appendix C.

Figure 10 – MUSIC Model Layout for Treatment Trains T1 – T9



8.6.1 TREATMENT NODE PARAMETERS

Relevant treatment node parameters for the Swale and Basin Components are shown in Table 12 and Table 13 respectively.

Table 12 – Treatment Device Parameters – Typical Internal Swale

Properties	Parameter name	Typical INTERNAL SWALE
Inlet Properties	Low Flow Bypass (m^3/s)	0
Storage Properties	Length (m)	*varies*
	Bed Slope (%)	0.4
	Base width (m)	0.7
	Top Width (m)	1.5
	Depth (m)	0.2
	vegetation height (m)	0.25
	Exfiltration rate (mm/hr)	0

Table 13 – Treatment Device Parameters – Bioretention Basins

	Parameter	Bio Basins TYPE A and B
Inlet Properties	Low Flow Bypass (m^3/s)	0
	High Flow Bypass (m^3/s)	100
Storage Properties	Surface Area (m^2)	*varies*
	Extended detention depth (m)	0.2
Filter And Media Properties	Filter treatment area (m^2)	*varies*
	Unlined filter media perimeter (m)	*varies*
	Saturated hydraulic conductivity (mm/hr)	200
	Filter depth (m)	0.6
	TN content of filter media (%)	800
	Orthophosphate content of filter media (mg/kg)	30
Lining	Is the base lined?	No
Vegetation	Vegetated with effective nutrient removal plants	Yes
Infiltration Properties	Exfiltration rate (mm/hr)	0

Outlet Properties	Overflow weir width (m)	1.2
	Underdrain present?	Yes
	Submerged zone with carbon present?	Yes
	Depth of submerged zone (m)	0.35
-	Confirmation that K and C* remain default	Yes

Assuming each Sub-Catchment D1 – D7 will have 2 pit catchments, Table 14 presents suitable Treatment train combinations.

Table 14 - MUSIC Model Sub-Catchment Parameters and Treatment Trains

Sub-Catchment ID	Land Use	Node Type	Total Area (ha)	Fraction Impervious	Suitable Treatment Train COMBINATION
D1	Sealed Road - Commercial	Urban	**0.264**	95%	**T7 + T8**
D2	Sealed Road - Commercial	Urban	**0.180**	95%	**T9 + T9**
D3	Sealed Road - Commercial	Urban	**0.180**	95%	**T9 + T9**
D4	Sealed Road - Commercial	Urban	**0.297**	95%	**T3 + T6**
D5	Sealed Road - Commercial	Urban	**0.274**	95%	**T6+ T7**
D6	Sealed Road - Commercial	Urban	**0.291**	95%	**T2 + T8**
D7	Sealed Road - Commercial	Urban	**0.320**	95%	**T3 + T1**

For example, a suitable treatment train combination for Catchment D1 is T7 plus T8.

> T7 effectively treats a catchment area of 0.135ha and

> T8 effectively treats a catchment area of 0.130 ha.

Therefore, the combination effectively treats 0.135 + 0.130 = **0.265ha > D1 catchment.**

8.6.2 TREATMENT TRAIN EFFECTIVENESS

Table 15 presents the effectiveness of the MUSIC Model Treatment Trains T1- T9 in achieving the set Stormwater Management Design Objectives (SMDOs) for pollutant reduction for sub-catchments D1-D7.

Table 15 – Treatment Train Effectiveness T1 -T9

Treatment Train Name	TSS (% reduct.)	TP (% reduct.)	TN (% reduct.)	GP (% reduct.)
T1	96.0	84.2	67.8	100.0
T2	84.1	70.0	40.5	100.0
T3	84.9	70.5	40.3	100.0
T4	84.5	70.8	40.9	100.0
T5	84.2	70.0	40.1	100.0
T6	84.1	70.8	39.8	100.0
T7	84.1	71.0	39.7	100.0
T8	85.2	70.4	40.5	100.0
T9	87.4	73.4	40.4	100.0

All of the above proposed treatment train options in the MUSIC Model achieve the set Stormwater Management Design Objectives (SMDOs) for pollutant reduction targets.

8.7 Sub- Catchments X1-X18 and F3-F11

Table 16 shows the overall catchment parameters for catchments X and part of F.

Table 17 displays the components that make up each viable treatment train that has been modelled as an option for the treatment of sub catchments X1 – X18 and F3 -F11. The option ultimately selected will reflect the pit catchment size, and final layout parameters (such as grading) which will be determined at detailed design stage.

Table 16 - MUSIC Model Catchment Parameters

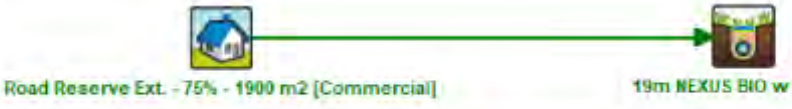
Catchment ID	Land Use	Node Type	Total Area (ha)	Fraction Impervious	Treatment Train
F3 - F11	Lumped - Commercial	Urban	0.873	95%	BIO BASIN -TYPE B
X (X1 - X18)	Lumped - Commercial	Urban	2.075	75%	BIO BASIN -TYPE B

Table 17 – Treatment Train T20- T26 Components

Treatment Train Name	Sub-Catchment areas (sqm)	Length BIO (TYPE B - width 1.4m) (m^2)
T20	800	11.0
T21	1000	12.0
T22	1100	13.0
T23	1200	14.0
T24	1500	17.0
T25	1900	21.0
T26	1900	19.0* (with increased EDD)

A snapshot of the MUSIC model layout for treatment train options T20 – T26 is provided in Figure 11 and also Appendix C.

Figure 11 – MUSIC Model Layout for Treatment Trains T20 – T26

Train Name	Treatment Train Options for X and F SUB - Catchments
T 20	
T 21	
T 22	
T 23	
T 24	
T 25	
T 26	

8.7.1 TREATMENT NODE PARAMETERS

Relevant treatment node parameters for Basin Type B are shown in Table 13.

Assuming each Sub-Catchment X1 – X18 and F3- F11 will have one (1) pit catchments, Table 18 and Table 19 presents suitable treatment train options.

Table 18 – MUSIC Model 'F' Sub-Catchment Parameters

Sub-Catchment ID	Land Use	Node Type	Total Area (ha)	Fraction Impervious	Suitable Treatment Train COMBINATION
F3	Lumped - Commercial	Urban	**0.099**	75%	**T 21**
F4	Lumped - Commercial	Urban	**0.090**	75%	**T 21**
F5	Lumped - Commercial	Urban	**0.090**	75%	**T 21**
F6	Lumped - Commercial	Urban	**0.090**	75%	**T 21**
F7	Lumped - Commercial	Urban	**0.079**	75%	**T 20**
F8	Lumped - Commercial	Urban	**0.079**	75%	**T 20**
F9	Lumped - Commercial	Urban	**0.180**	75%	**T 25**
F10	Lumped - Commercial	Urban	**0.083**	75%	**T 21**
F11	Lumped - Commercial	Urban	**0.083**	75%	**T 21**

Table 19 – MUSIC Model 'X' Sub-Catchment Parameters

Sub-Catchment ID	Land Use	Node Type	Total Area (ha)	Fraction Impervious	Suitable Treatment Train
X1	Lumped - Commercial	Urban	0.111	75%	**T 21**
X2	Lumped - Commercial	Urban	0.111	75%	**T 21**
X3	Lumped - Commercial	Urban	0.087	75%	**T 20**
X4	Lumped - Commercial	Urban	0.087	75%	**T 20**
X5	Lumped - Commercial	Urban	0.132	75%	**T 24**
X6	Lumped - Commercial	Urban	0.151	75%	**T 24**
X7	Lumped - Commercial	Urban	0.100	75%	**T 21**
X8	Lumped - Commercial	Urban	0.100	75%	**T 21**
X9	Lumped - Commercial	Urban	0.100	75%	**T 21**
X10	Lumped - Commercial	Urban	0.100	75%	**T 21**
X11	Lumped - Commercial	Urban	0.077	75%	**T 20**
X12	Lumped - Commercial	Urban	0.185	75%	**T 25 /T 26**
X13	Lumped - Commercial	Urban	0.188	75%	**T 25 /T 26**
X14	Lumped - Commercial	Urban	0.123	75%	**T 23**
X15	Lumped - Commercial	Urban	0.103	75%	**T 21**
X16	Lumped - Commercial	Urban	0.109	75%	**T 22**
X17	Lumped - Commercial	Urban	0.103	75%	**T 21**
X18	Lumped - Commercial	Urban	0.109	75%	**T 22**

8.7.2 TREATMENT TRAIN EFFECTIVENESS

Table 20 compiles the effectiveness of the MUSIC Model Treatment Trains T20- T26 in achieving the set Stormwater Management Design Objectives (SMDOs) for pollutant reduction for Sub- Catchments X1-X18 and F3-F11.

Table 20 – Treatment Train Effectiveness T20 -T26

Treatment Train Name	TSS (% reduct.)	TP (% reduct.)	TN (% reduct.)	GP (% reduct.)
T20	83.2	68.4	56.4	100.0
T21	80.8	66.9	53.3	100.0
T22	80.6	66.8	52.7	100.0
T23	80.2	66.8	53.2	100.0
T24	80.0	65.3	52.4	100.0
T25	79.0	65.4	51.7	100.0
T26	79.8	65.0	53.5	100.0

All the above proposed treatment train options in the MUSIC Model achieves the set Stormwater Management Design Objectives (SMDOs) for pollutant reduction targets.

8.8 Summary

All proposed treatment solutions have been adequately sized to ensure that all mitigated catchments satisfy meet or exceed the Stormwater Management Design Objectives (SMDOs) for pollutant reduction targets.

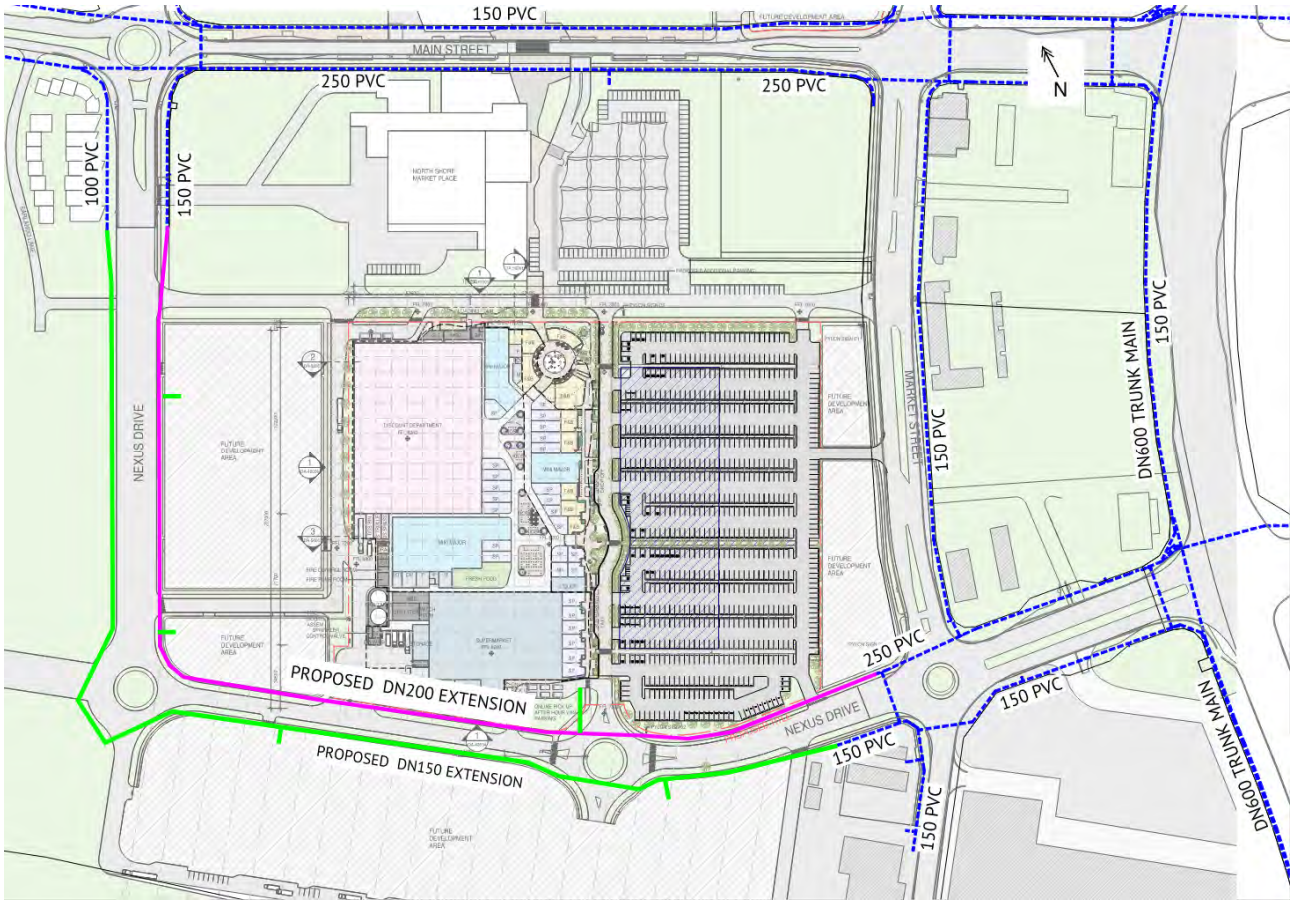
9. WATER RETICULATION

9.1 Reticulation Mains

The North Shore Commercial Town Centre will be provided with a reticulated water supply via underground uPVC mains connecting to an extension of Council's existing water mains. A DN200 water main extension along the northern and eastern side of the Nexus Drive extension, and a DN150 water main on the southern and western side of the Nexus Drive extension will provide the required peak hour water pressures and commercial flows. The existing and proposed water mains are shown in Figure 12 below.

Each asement or Lot within the proposed development shall be serviced via water mains of DN200 uPVC. DN150 uPVC water mains will generally be on a 1.8m alignment from the property boundary. Valves and hydrants shall be provided in accordance with Section 6.4.11.3 of the Townsville City Plan.

Figure 12 - Water Mains - Existing and Proposed



9.2 Water Infrastructure Assessment

Existing water infrastructure services in the vicinity of the proposed development site are shown in Figure 12 above. As shown, there is a DN250 water main which runs parallel to Main Street and a DN250 water main on

the southern branch of Nexus Drive. These existing mains will provide the connection to the proposed DN200 water main extension along Nexus Drive. Both existing DN250 water mains connect to the DN600 trunk main on North Shore Boulevard. The existing DN100 water main on the northern branch of Nexus Drive and the existing DN150 water main on the southern brank of Nexus Drive will provide the connection to the proposed DN150 water main extension along Nexus Drive.

9.3 Water Demand

Water demands have been calculated in accordance with Townsville City Council planning scheme and associated CTM code. The water demands were calculated based parameters from the CTM code for each Equivalent Person (EP). The EP was determined based on a population assessment for the proposed North Shore Town Centre development expansion along with the proposed nearby residential developments. Based on the population assessment of 1069 EP and demand parameters, the peak hour demand is 37.4 L/s, in addition to a commercial fire flow of 30 L/s.

The population assessment and water demand assessment are outlined in Sections 2 and 3 of the *North Shore Town Centre Water Supply Planning Report* in Appendix B.

9.4 Water Network Analysis

Water modelling for the development has been performed using the WaterGEMS network model. This model includes the existing water infrastructure along with the existing water demands for all the Bushland Beach, Northshore, Sanctum and Mt Low areas that are located on the northern side of the Bruce Hwy. It has been updated to include the additional commercial and residential demands and proposed water main extensions as outlined in Section 9.1 above.

The water network modelling demonstrated the existing water network in the North Shore development area and the proposed DN200 and DN150 water mains along the Nexus Drive extension are sufficiently sized to service the proposed North Shore Town Centre development. The existing DN250 water main along Main Street is also sufficiently sized to service the additional commercial developments along Main Street along with the proposed 310 lot residential lifestyle community development to the west of the town centre.

The water network analysis is detailed in the *North Shore Town Centre Water Supply Planning Report* in Appendix B.

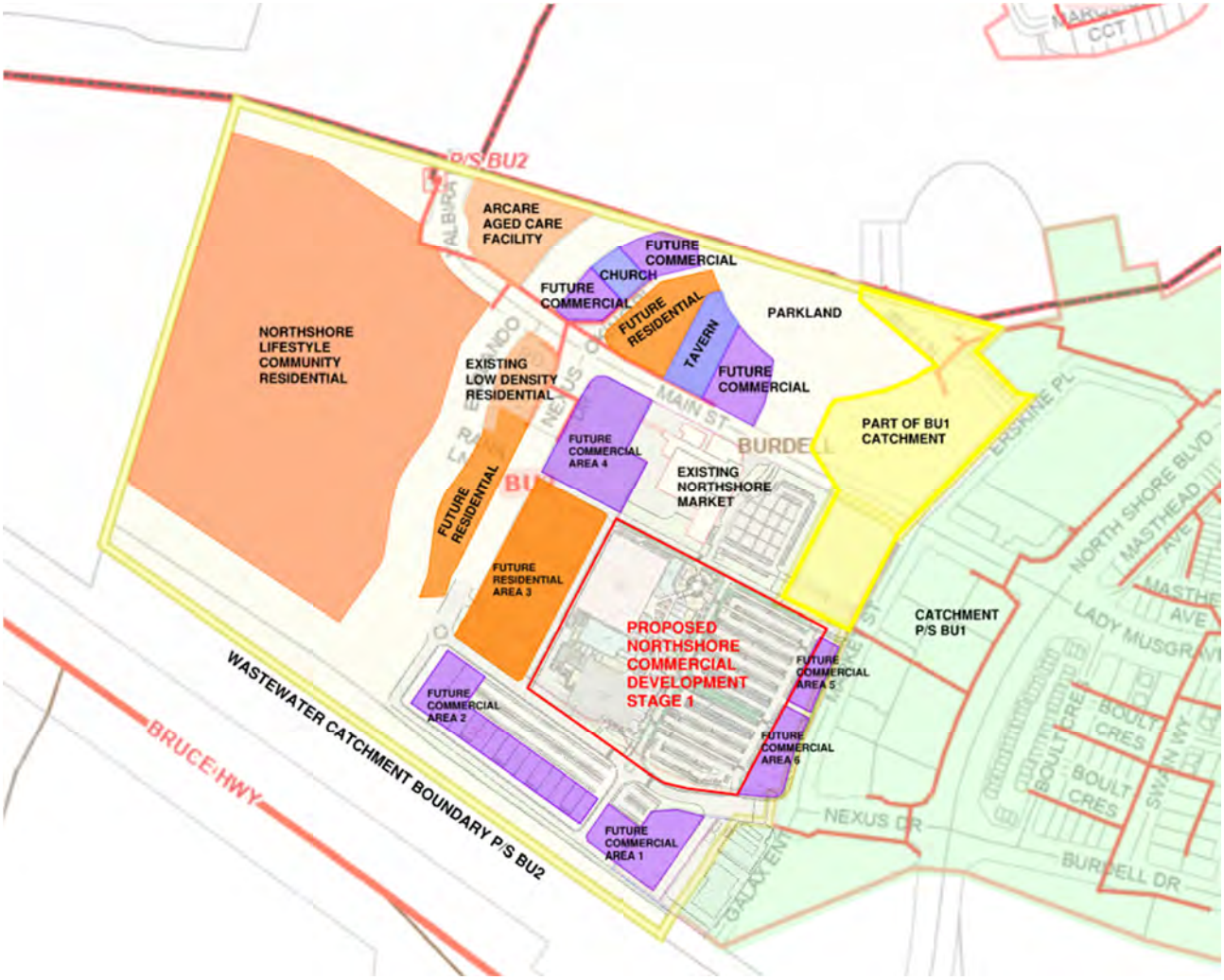
10. SEWERAGE

The North Shore Commercial Town Centre will be provided with sewerage reticulation via gravity reticulation sewers connecting to Council's existing sewerage mains. The proposed connection to the existing trunk gravity main is on the eastern side of Nexus Drive at sewer manhole 9/BU2.

10.1 Sewer Catchment Analysis

The proposed development will be serviced by Sewer Pump Station P/S BU2 which is located on the western side of Yalbira Drive, to the northeast of the development. P/S BU2 (formerly identified as Sewerage Pump Station ML03) was designed by UDP Consulting Engineers (the precursor to Premise) in June 2008 to service the western half of the North Shore town centre. The pump station was designed to service an Equivalent Population (EP) of 3,532 EP.

Figure 13 - Development sites within the P/S BU2 Wastewater Catchment Boundary



Since the design of Sewer Pump Station P/S BU2, residential and commercial developments have been constructed, and more information on proposed developments has become available. Therefore, a sewer catchment capacity analysis has been undertaken, identifying demands in terms of an EP for all current and proposed residential and commercial areas as identified in Figure 13. This capacity analysis indicates that all existing and future residential and commercial developments can be adequately serviced by P/S BU2. The areas, EPs and assumptions / references are detailed in Table 21 below.

Table 21 - Sewer Capacity Assessment - Existing and Future Demands

Demand Location	Population (EP)	Information Source
Residential Development Demand		
Arcare	306	90 private rooms, based on an EP of 3.4 EP/available bed as per WSA 02-2014-3.1 Table B1

Demand Location	Population (EP)	Information Source
Existing residential Earlando Drive	34	12 lots, based on an EP of 2.8 persons per lot
Future residential Earlando Drive	228	1.9 ha at 120 EP/ha as referenced in COT022/R01 SPS ML03 Design Report section 2.1
Future Northshore Lifestyle Community	496	demand modelled on 310 lots at 1.6 EP per lot
Area 3 West of proposed commercial development	149	demand modelled on 83 lots at 1.8 EP per lot (medium density)
Commercial Development Demand		
Existing North Shore Market	196	GFA and demand for Retail of 2.74EP/100m^{2}GFA as per TCC LGIP Projections and demands 2019
Tavern	64	
Church (Lot 876 on SP273625)	9	GFA and demand for Services of 1.88EP/100m^{2}GFA as per TCC LGIP Projections and demands 2019
Proposed Commercial Development Stage 1 Oreana	478	GFA and demand for Retail of 2.74EP/100m^{2}GFA as per TCC LGIP Projections and demands 2019
Area 1 south of proposed commercial development	176	
Area 2 south of proposed commercial development	265	
Lot 877 on SP273625	55	Sewer demand 184 EP/Ha from Table SC3.1.6a TCC
North of Church	69	
Undeveloped area east of Tavern	107	
Area 4 west of Northshore Market	208	
Area 5 East of proposed commercial development	38	
Area 6 East of proposed commercial development	68	
Total Commercial Demand	**1734**	
Total Residential Demand	**1213**	
Total Demand	**2947**	
Expected demand for catchment P/S BU2	3532	COT022/R01 SPS ML03 Design Report section 2.1
Available capacity	*585*	

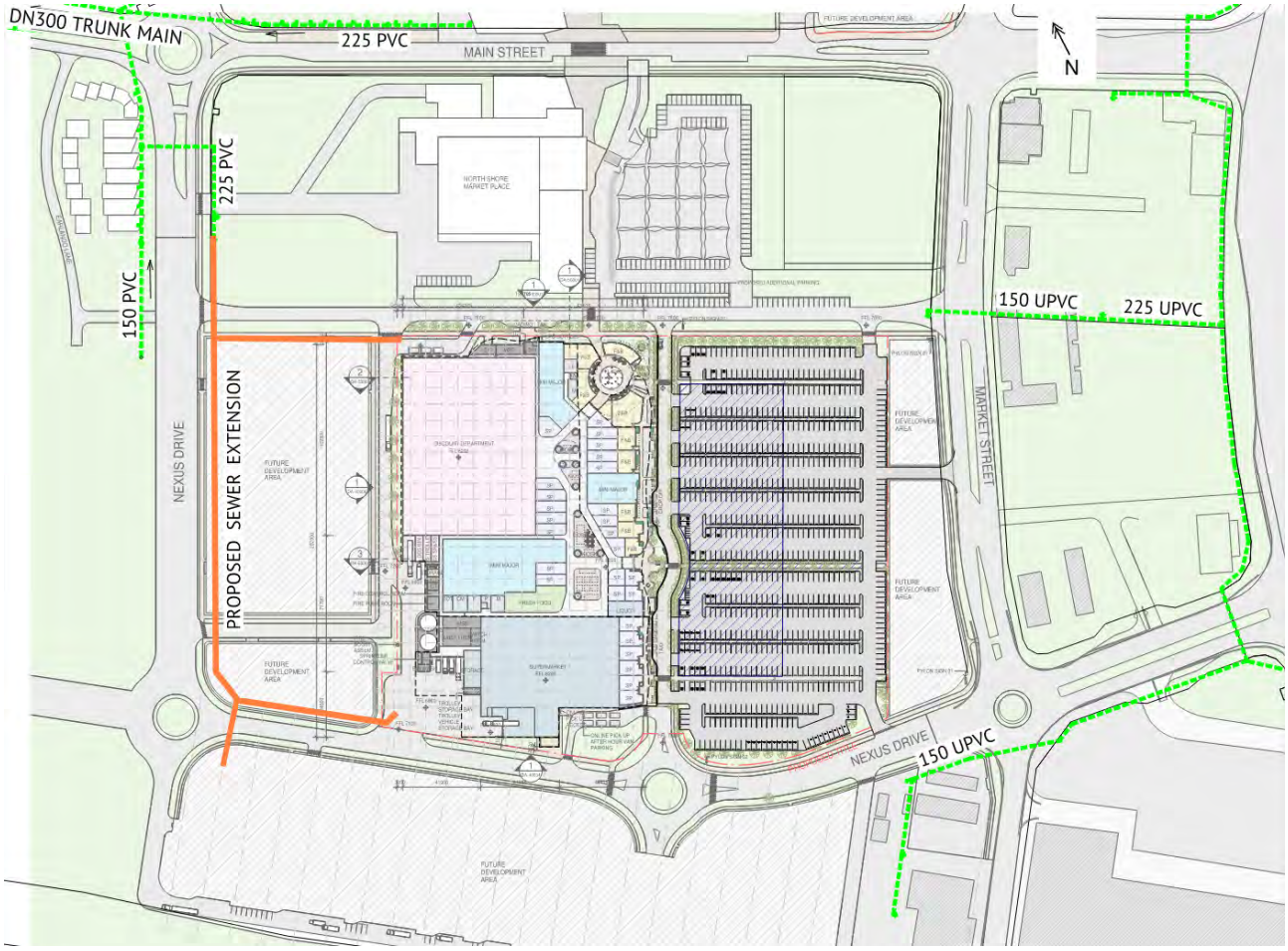
10.2 Sewerage Design Criteria

The proposed gravity sewer line will direct flows north to the existing DN300 trunk main via the existing DN225 reticulation sewer on Nexus Drive as shown in Figure 14 below.

The sewerage network shall be designed and constructed in accordance with the Townsville City Plan – Planning Scheme Policy and Water Systems Australia Specification WSA-03.

The location and sizing of the internal sewerage infrastructure will be verified as part of the detailed design of the development planning approvals.

Figure 14 - Sewer Mains - Existing and Proposed



11. PATHS AND PEDESTRIANS

Footpaths are provided on both sides of Market Street, Main Street and the north and southern branch of Nexus Drive. A network of shared paths provides pedestrian and cycle access from these footpaths to the nearby North Shore Tavern and from there, through to the greenspace along Saunders Creek. The shared path through Saunders Creek provides pedestrian connectivity to community facilities in the greater North Shore development, including the North Shore dog park and numerous other parks.

To assist in pedestrian circulation through the development, it is proposed to construct a new concrete pathway network. The pedestrian pathway network for the development is shown in the architectural layouts in Appendix A and will be fully considered as part of detailed design.

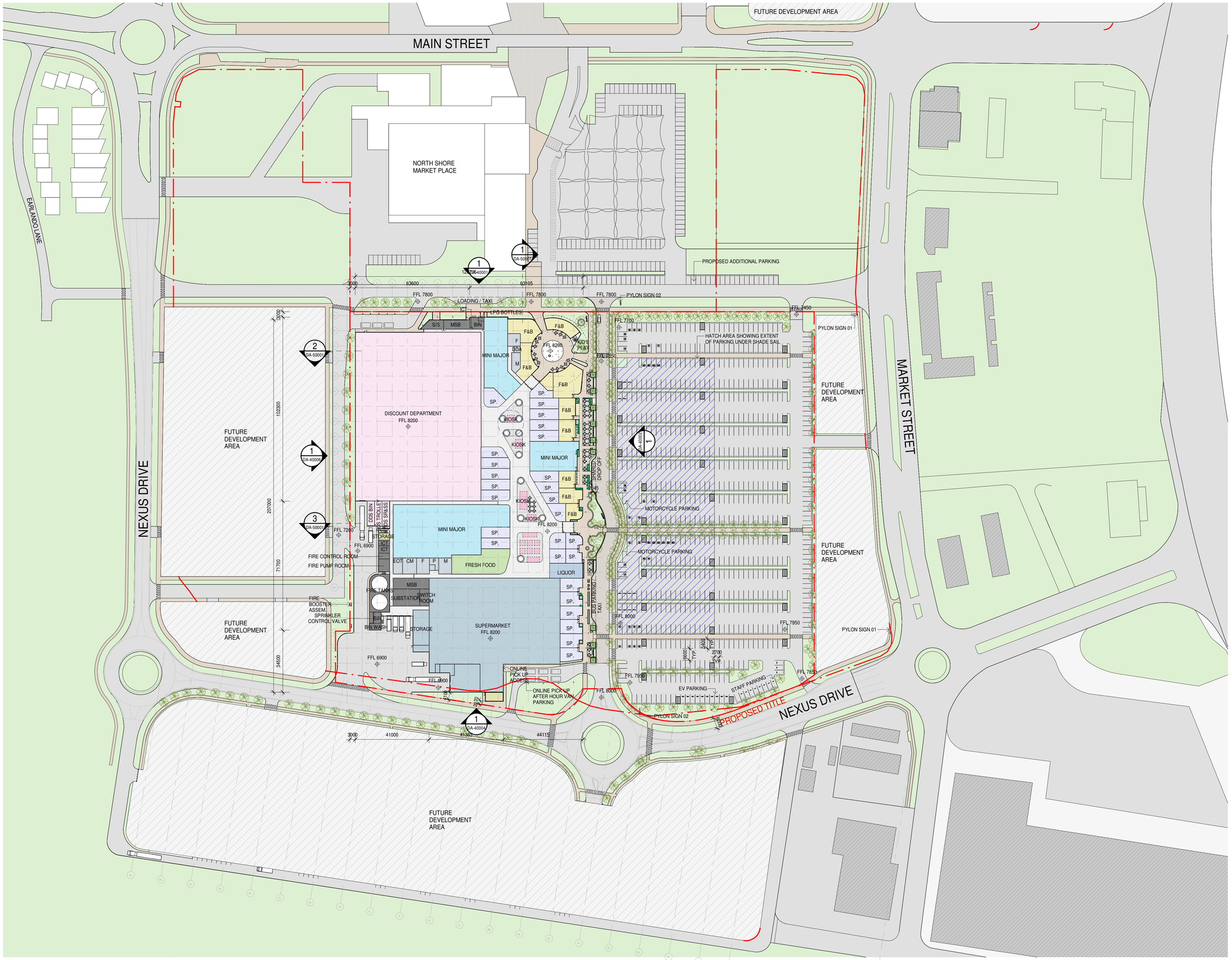
12. ELECTRICITY AND COMMUNICATIONS

Negotiations shall be undertaken with utility service providers for the supply of electricity and telecommunications to the development.

Preliminary discussions indicate that the supply of power and telecommunications to the proposed development is possible

APPENDIX A

DEVELOPMENT SITE PLAN



GFA: 22196m²
SITE COVERAGE: 56498m²

AREA SCHEDULE - GLA	
AREA TYPE	GLA
DISCOUNT DEPARTMENT	6724 m²
FRESH FOOD	385 m²
KIOSK	191 m²
LIQUOR	153 m²
MINI MAJOR	2666 m²
SPECIALTY	2338 m²
SPECIALTY - F&B	1290 m²
SUPERMARKET	4207 m²
TOTAL	17954 m²

PARKING NUMBER	
Description	Count
ACCESSIBLE PARKING	16
ELECTRIC	10
MOTORCYCLE PARKING	10
PARKING WITH PRAMS	12
SENIOR PARKING	10
SHORT TERM PARKING	12
STAFF PARKING	11
STANDARD PARKING	657
TOTAL	738

Rev.	Date	Description	Iss.	Appr.
A	06/02/2026	TOWN PLANNING APPLICATION	LY	

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ereana

Project
NORTH SHORE CENTRAL

Project Number
250030

Status

Date Plotted 18/02/26 12:43:27 PM

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0 10 20 40 60M

Drawing Title
SITE PLAN

Drawing Number
NTS-BUC-DR-A-DA-20001

Revision
A

BUCHAN

Melbourne Studio
+ 61 3 9329 1077 / **buchan.au**

APPENDIX B

WATER SUPPLY PLANNING REPORT

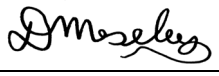
NORTH SHORE TOWN CENTRE

WATER SUPPLY PLANNING REPORT

Date: 23 January 2026 (Rev 2)

TABLE OF CONTENTS

APPENDICES

REPORT AUTHORISATION				
Revision	**Revision Date**	**Details**	**Prepared by**	**Signature**
1	21/01/2026	Initial Report	Desmond Moseley	
2	23/01/2026	Updated Report (Adjusted EP's)	Desmond Moseley	

1 INTRODUCTION

The North Shore residential development area on the northern side of the Bruce Highway in Burdell commenced development in around 2007. The initial development stages between the Bruce Highway and Saunders Creek included residential lots on the eastern side of North Shore Boulevard and some initial commercial sites within the Town Centre area on the western side. The North Shore Town Centre commercial area has slowly expanded over the past 20 years with the extent of the existing developed area illustrated on the extract from Council's GIS below.

Figure 1.1 – North Shore Town Centre

The Town Centre commercial area is to be further developed with this to include a number of new commercial sites on the extension of Nexus Drive along with a proposed residential lifestyle village community to the west of Earlando Lane in Burdell.

A separate water assessment and report "North Shore town centre – Water Supply Planning Report (DPM Water – Oct 2025)" was undertaken for the proposed 310 house town centre site that is proposed on the western side of the North Shore Town Centre area. The WaterGEMS modelling for the LLC site will be expanded to now include the proposed town centre development expansion.

The general layout of the North Shore Town Centre development is provided on Figure 1.2 below (with a larger version provided in Appendix A). The water modelling has illustrated:

- The existing water mains in the North Shore Town Centre area are adequately sized to allow for the servicing of the remaining areas of the town centre.

- A DN200 water main extension along the “inside” of Nexus Rd extension and a DN150 water main on the “outside” of the Nexus Rd extension will provide the required peak hour water pressures and 30 l/s commercial fire flows.

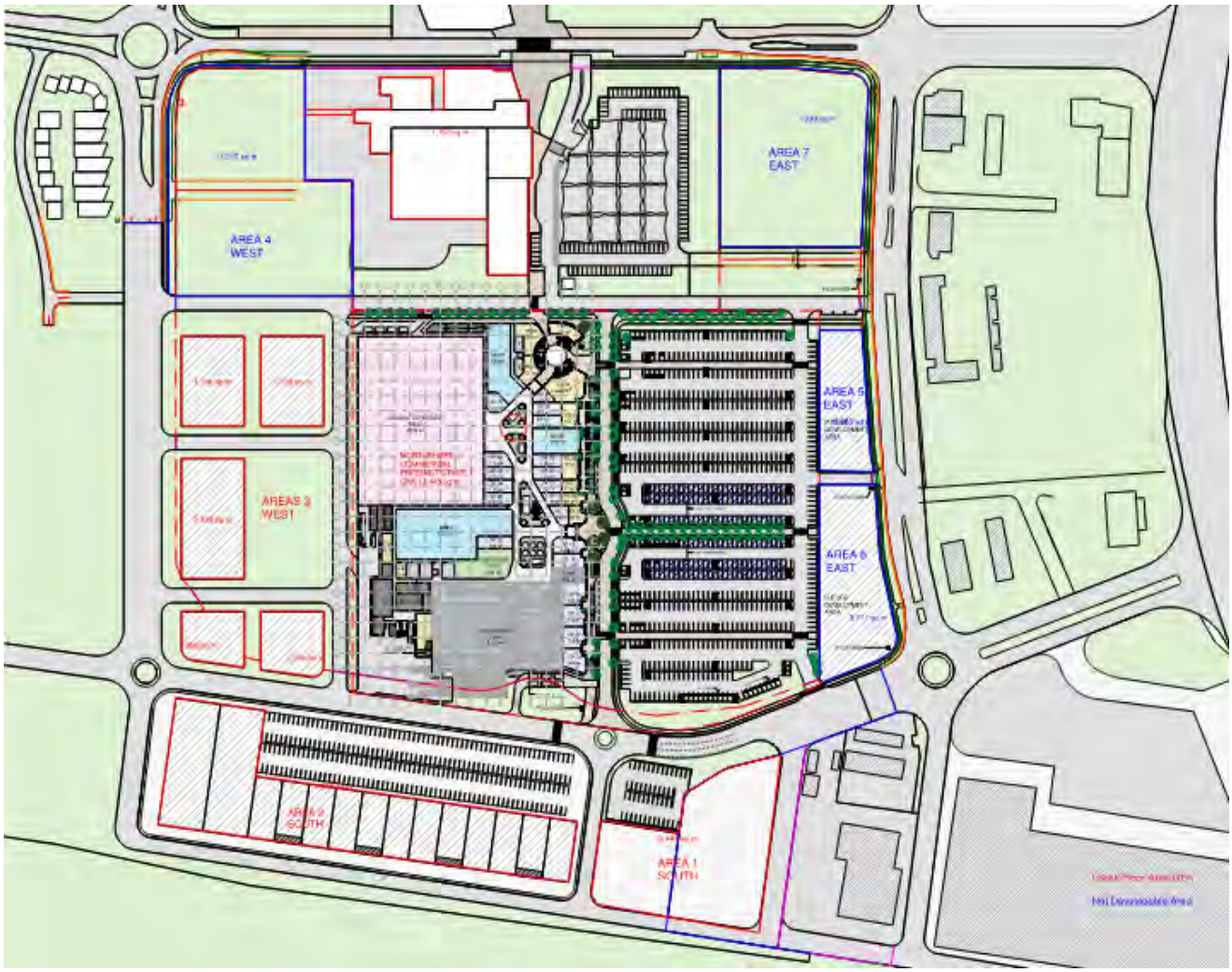


Figure 1.2 – North Shore Town Centre Layout Plan

The following sections of this report provide a summary of the water network capacity assessment for the North Shore Town Centre and proposed residential lifestyle community.

2 POPULATION ASSESSMENT

The following table provides the population assessment for the proposed North Shore Town Centre development expansion along with the proposed residential lifestyle community (separate application).

The following is noted in relation to the equivalent population assessment:

- The North Shore Town Centre is zoned “Emerging Communities” in the Townsville Planning Scheme. The planning scheme “Table SC3.1.6a - Planned demand generation rate for a trunk infrastructure network” provides the water loading rate for this zoning as 145.1 EP/ha.
- The site areas for the various commercial sites in the town centre are provided in Table 2.1 below with Figure 2.1 illustrating the location of the various commercial sites.
- The adopted equivalent population per lot for the lifestyle village will be 1.6 EP/lot. This loading rate is due to the proposed site use which will be a retirement lifestyle village with one and two bedroom houses.

Table 2.1 –Population Assessment

Development Area	Number/Area	Rate	EP
Existing North Shore Market	2.29 ha	145.1 EP/ha	332.3 EP
Proposed Commercial Development Stage 1 Oreana	5.768 ha	145.1 EP/ha	836.9 EP
Area 1 - South of proposed Commercial development	0.732 ha	145.1 EP/ha	106.2 EP
Area 2 - South of proposed Commercial development	1.912 ha	145.1 EP/ha	277.4 EP
Area 3 - West of proposed Commercial development	83 lot Medium Density Lots	1.8 EP/lot	149.4 EP
Area 4 - West of Northshore Market	1.125 ha	145.1 EP/ha	163.2 EP
Area 5 - East of proposed commercial development	0.207 ha	145.1 EP/ha	30.0 EP
Area 6 - East of proposed commercial development	0.372 ha	145.1 EP/ha	53.9 EP
Area 7 - East of proposed commercial development	0.794 ha	145.1 EP/ha	115.2 EP
North Shore Lifestyle Community	310 lots	1.6 EP/lot	496.0 EP

The above equivalent population has been used in the water assessment.

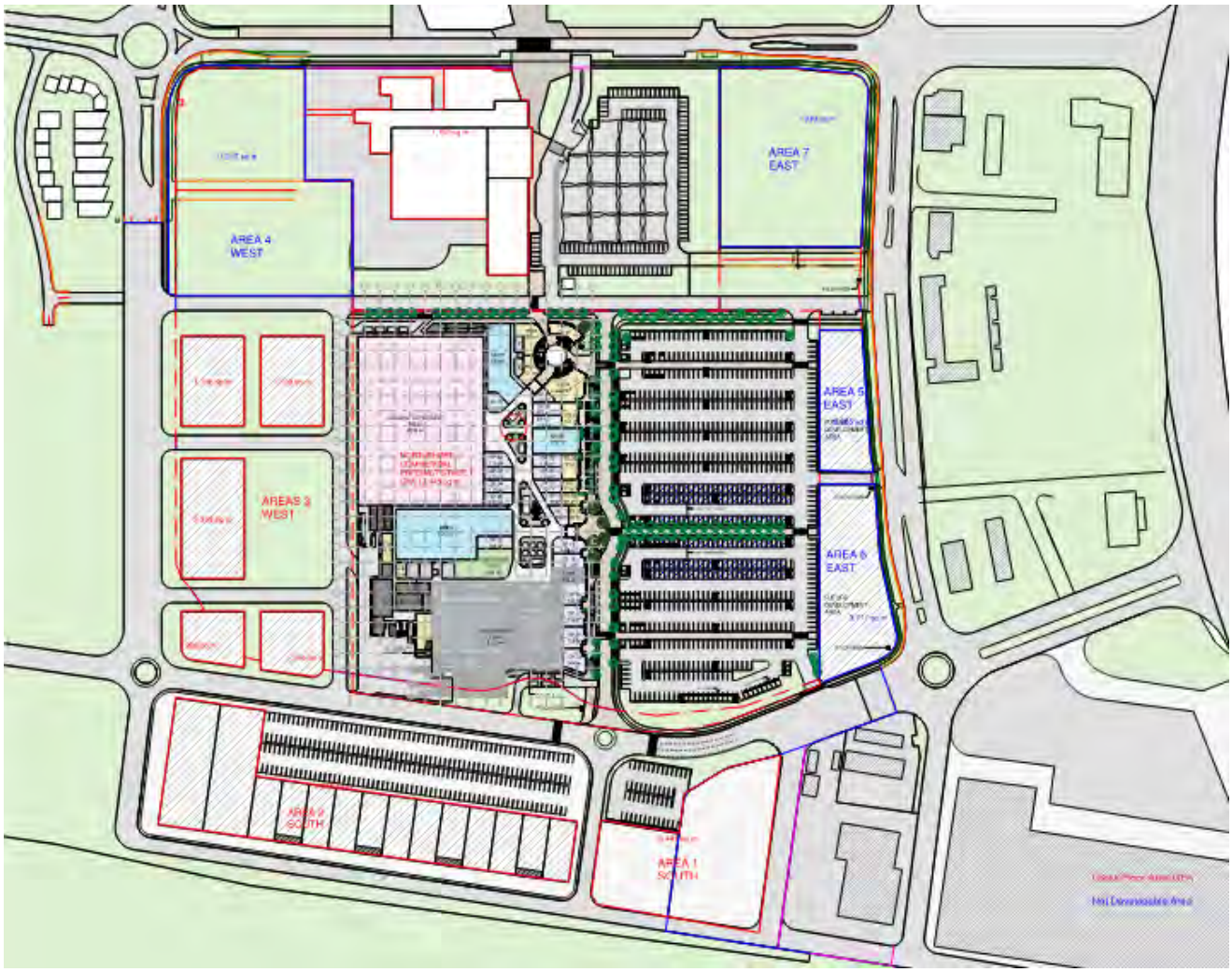


Figure 2.1 – North Shore Town Centre Site Locations & Areas

3 WATER SUPPLY PLANNING

3.1 Water Demand

Water demands have been calculated in accordance with Townsville City Council planning scheme and associated CTM Code. The following Table 3.1 provides the residential water demand parameters from the CTM Code for each equivalent person (EP).

Table 3.1 - Water Supply Unit Demand Parameters

Parameter	Unit Demand	Peaking Factor
Average Day (AD)	600 L/day/EP	
Mean Day Max Month (MDMM)	900 L/day/EP	1.5 AD
Peak Day (PD)	1125 L/day/EP	1.25 MDMM
Peak Hour (PH)	0.0333 L/s/EP	2.56 PD

The peak hour water demand for the proposed 310 lot residential lifestyle village that will be located to the west of the town centre will be 496 EP x 0.033 = 16.37 l/s.

The peak hour water demand for the proposed 83 medium density residential lots located in “Area 3 - West of proposed Commercial development” will be 149.4 EP x 0.033 = 4.98 l/s.

The CTM Code also have diurnal water demand patterns that are applied to the various water uses. As the North Shore Town Centre development is commercial, the commercial demand diurnal pattern will be applied. The commercial demand diurnal pattern (refer to Figure 3.1 below) has a peaking factor of 1.5, instead of the 2.56 peaking factor provided in the above table for residential water demands.

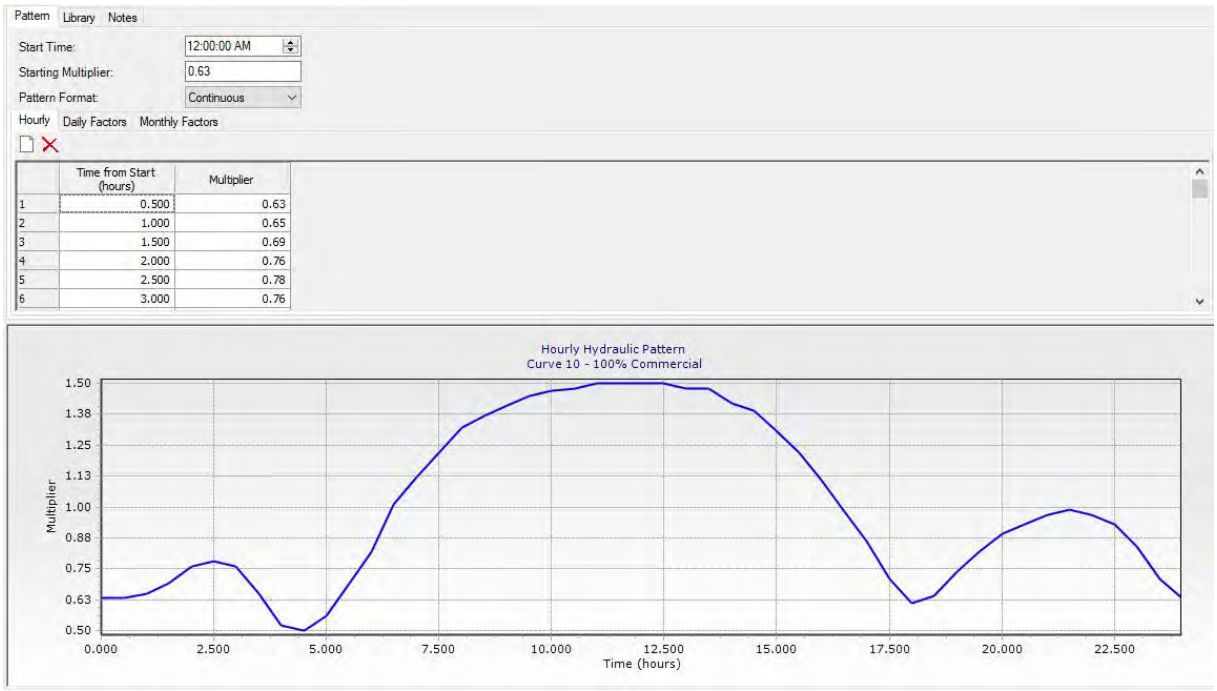


Figure 3.1 – Commercial Diurnal Demand Pattern

Based on the total North Shore Town Centre commercial development expansion, the additional equivalent population is 1,069.4 EP. This additional equivalent population gives a peak water demand as follows:

= 1,915.1 EP x 1125 L/day/EP x 1.5 (commercial peaking factor)

= 1,915.1 x (1125 / (24*3600)) x 1.5

= 37.4 l/s

In addition to the above, as the majority of the development area is commercial a 30 l/s fire flow is required in accordance with Council's design standards. The water network modelling results for the proposed North Shore Town Centre development and the proposed residential lifestyle village that will be located to the west of the town centre, is detailed in the following report sections.

3.2 Water Supply Assessment

The water network modelling for the development has been performed using the WaterGEMS network model. The WaterGEMS network model includes the existing water infrastructure along with the existing water demands for all of the Bushland Beach, Northshore, Sanctum and Mt Low areas that are located on the northern side of the Bruce Hwy.

The WaterGEMS network model has been updated to include:

- The additional commercial water demands on the existing water mains on Main Street.
- The proposed water mains on the extension of Nexus Drive along with the additional commercial development water demands on these proposed water mains. The proposed water mains involve:
    - A DN200 water main extension along the "inside" of Nexus Rd extension (northern and eastern side).
    - A DN150 water main on the "outside" of the Nexus Rd extension (southern and western side).
    - It is noted that minimum DN150 water mains are generally required in the North Shore Town Centre area to ensure the future commercial developments are able to be serviced with the peak hour demands along with the 30 l/s commercial fire flow requirements.
- The additional residential water demands for the proposed residential lifestyle community of 310 lots on the west of the town centre area and on the south western side of Main St in Burdell.

The existing trunk water infrastructure that services this development area consists of:

- The Mt Spec Pipeline. These dual DN600 MSCL and DN485 MSCL bulk water pipelines run along the southern/western side of the Bruce Hwy. These bulk water pipelines can be supplied water from either the 3 x 22.5 ML Mt Louisa reservoirs or from the Northern Water Treatment Plant via the 10 ML Mt Kulburn reservoir.
- There is a DN600 trunk water main connection off the Mt Spec pipelines opposite the North Shore Boulevard intersection. This offtake includes a PRV to lower the water pressures into the reticulation network. The normal pressure setting for the PRV is 64m HGL (being 52m pressure based on a ground elevation of 12m).

- The DN600 trunk water main crosses under the Bruce Hwy and continues along the western side of North Shore Boulevard.
- A DN250 PVC water main connects to the DN600 trunk water main on Nexis St and a DN250 PVC water main connects to the DN600 trunk water main on Main St. Both these connections direct water into the reticulation network in North Shore. It is noted that both these offtakes include PRV's but they are not currently in use.
- The DN250 PVC main continues to the west along Main St and to the frontage of the town centre development site.

The following Figure 3.1 from the WaterGEMS model illustrates the existing water infrastructure along with the proposed new water mains to service the North Shore Town Centre development area. The figure also illustrates the preliminary private internal development water layout for the proposed 310 lot residential lifestyle community to the west of the town centre.

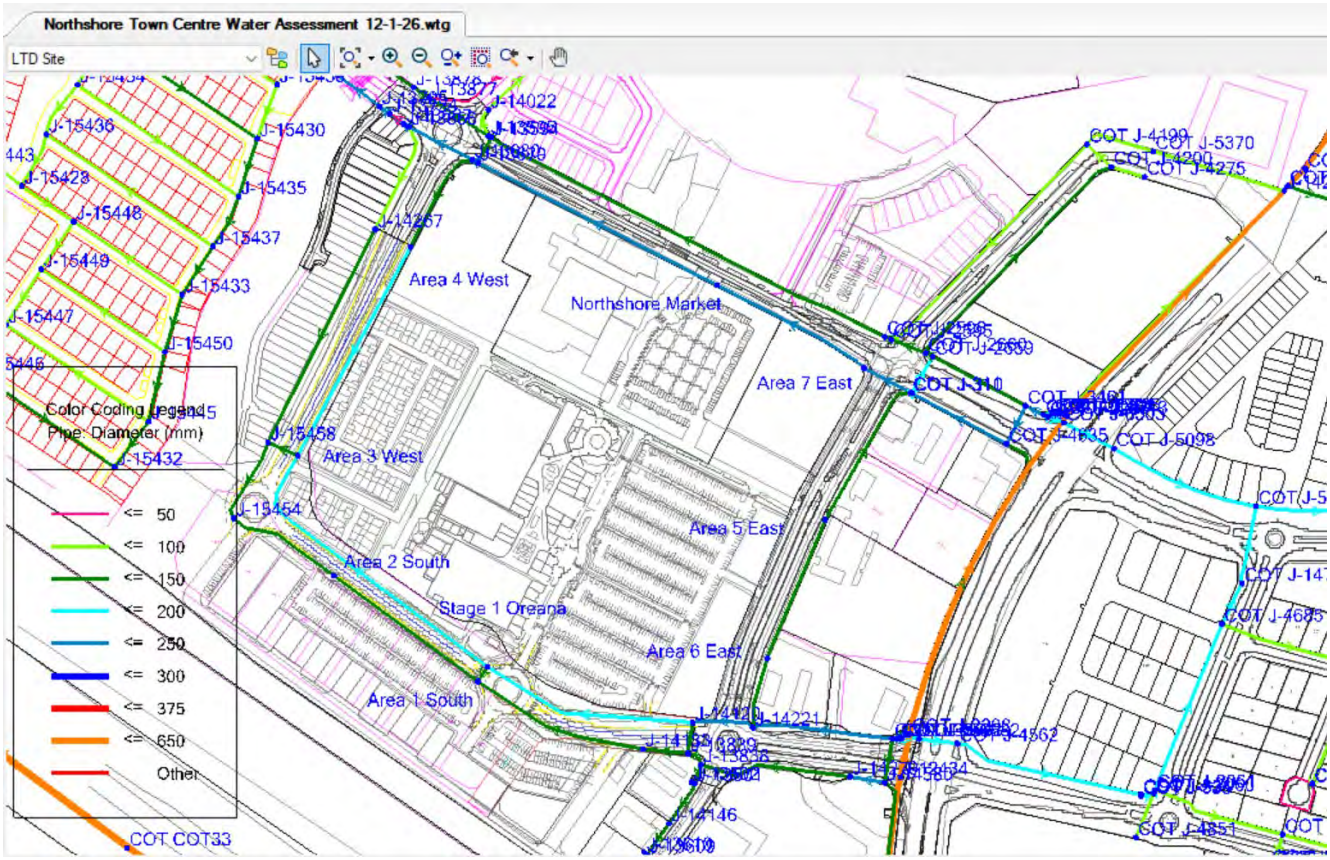


Figure 3.1 – Residential Town Centre WaterGEMS Model

With the inclusion of the proposed water mains and commercial demands along the Nexus Drive extension and the water demands for the proposed residential lifestyle community to the west of the town centre area, the water network performance is summarised below:

- The existing DN600 trunk water main along North Shore Boulevard is adequately sized to service the development. This trunk water main was sized to service the full development of the North Shore area so is able to cater for the proposed town centre demands.
- The existing DN250 PVC water main along Main St is adequately sized to service the proposed additional commercial development areas peak hour and fire flows.

- The proposed DN200 and DN150 water main extension along Nexus Drive along with the other existing DN150 and DN100 water mains throughout the North Shore Town Centre area are able to service the peak hour and fire flows.
- The water pressures along the proposed DN200 and DN150 water mains along the Nexus Drive extension are around 545 kPa at 12 noon (peak commercial demand period). The water pressures are reduced to 536 kPa at 7:00pm (peak residential demand period). The lower water pressures at 7pm are due to the significant residential development areas of North Shore along with the residential demands from the proposed North Shore lifestyle community.
- The water pressure on the existing DN250 PVC water main on Main St at the proposed offtake to the residential lifestyle community site is 545 kPa.
- The water pressure on the proposed “private” internal development water mains within the residential lifestyle community are reduced to a minimum of 536 kPa at 7:00 pm which is the peak residential demand period.
- All the water pressures in the North Shore Town Centre area are above 538 kPa and therefore meet the minimum peak hour water pressure requirement of 220 kPa.
- The velocity and headloss gradients for the existing and proposed water mains that will service the North Shore Town Centre area and the proposed lifestyle community off Main St are up to 0.35 m/s and 0.001 m/m respectively. These are in accordance with Council standards.
- With the inclusion of the 30 l/s commercial fire flows on the proposed DN150 water main extension on Nexus Drv, the water pressure is reduced to 528 kPa at 12 noon and to 522 kPa at 7:00pm. This water pressure is above the minimum allowable 120 kPa pressure.
- The velocity along the existing and proposed water mains in the North Shore Town Centre area with the inclusion of the 30 l/s fire flow is up to 1.06 m/s which is below the 4.0 m/s maximum value in the CTM Code.
- With the inclusion of the 15 l/s residential fire flows on the most distant node within the proposed residential lifestyle community (being Node J-15446), the water pressure is 514 kPa at 7:00 pm. This water pressure is above the minimum allowable 120 kPa pressure.

The WaterGEMS network modelling results are provided in Appendix B.

The water network modelling shows the existing water network in the North Shore development area and the proposed DN200 and DN150 water mains along the Nexus Drive extension are sufficiently sized to service the proposed North Shore Town Centre development. The existing DN250 water main along Main Street is also sufficiently sized to service the additional commercial developments along Main Street along with the proposed 310 lot residential lifestyle community development to the west of the town centre.

Figure 3.3 below from the WaterGEMS model illustrates the water pressure on the proposed water mains that will service the proposed North Shore Town Centre development.

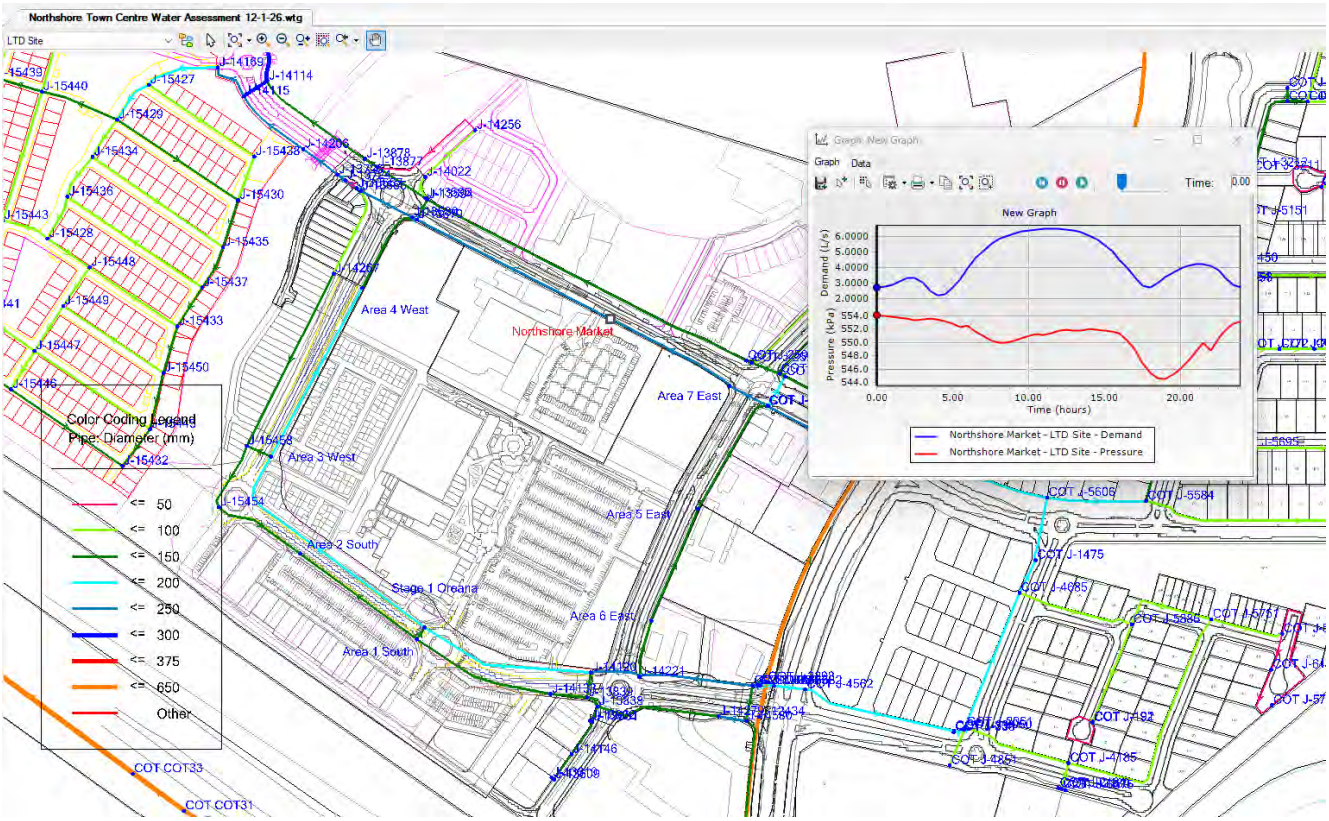
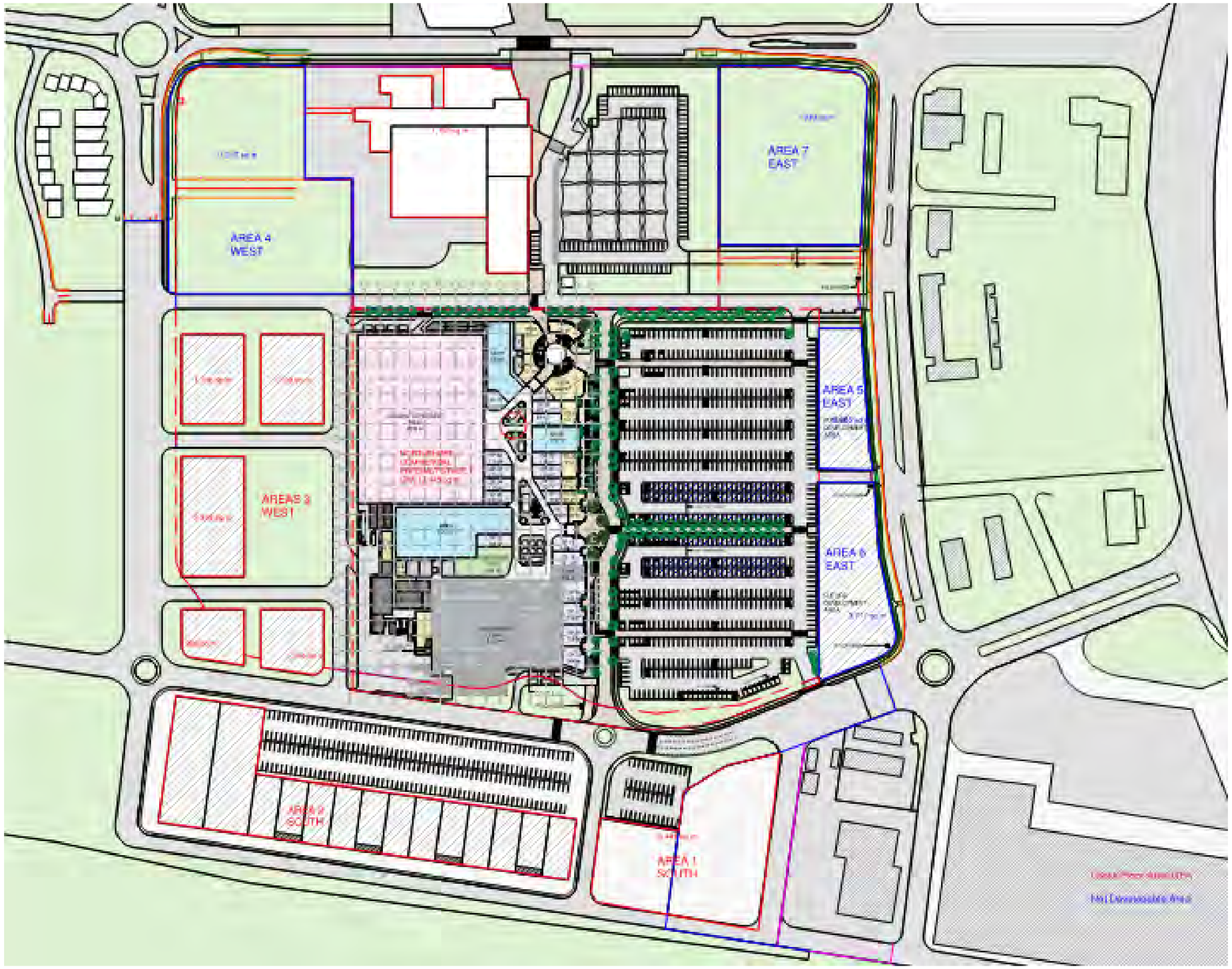


Figure 3.3 – Main St DN250 WaterGEMS Model Peak Hour Pressures

APPENDIX A
NORTH SHORE TOWN CENTRE & TOWN CENTRE LAYOUT PLANS



NORTH SHORE TOWN CENTRE – LAYOUT PLAN

NORTH SHORE LIFESTYLE COMMUNITY - MASTERPLAN

COMMUNAL LEGEND

1 ***Main Clubhouse***
"Northshore Homestead"
- Dance Floor / Function Hall
- Main Kitchen & Servery
- Bar / Lounge
- Recreation / Pool Tables
- Arts & Craft Area
- Resort Style Pool & Spa
- Gym / Outdoor Yoga
- Quite Game / Library
- Outdoor BBQ Area
- Outdoor Seating
- Hairdressing Salon
- Medical Consult Room
- Community Bus

2 ***Sports Precinct***
"Club Northshore"
- Bowling Green
- Pickleball Court

3 ***BBQ Area***
- Outdoor Kitchen
- Community Garden

4 ***Workshop***

LEGEND

18m / 9.6m	9.6m x 18m Lots	41	13%
18m / 11.3m	11.3m x 18m Lots	51	16%
18m / 12.8m	12.5m x 18m Lots	141	46%
18m / 14.5m	14.5m x 18m Lots	77	25%
	TOTAL	**310**	

CAR	**VIS CAR PARKING** *1 SPACE PER 5 DWELLINGS*	PROVIDED	62
8500 CARAVAN	**CARAVAN PARKING** *1 SPACE PER 10 DWELLINGS*	PROVIDED	24

- COMMUNAL FACILITIES
- GREEN PUBLIC SPACE
- BIO DETENTION
- Q100 FLOOD LEVEL - TBC*
- OVERLAND FLOW
- FENCE LINE
- FOOTPATH

MASTERPLAN

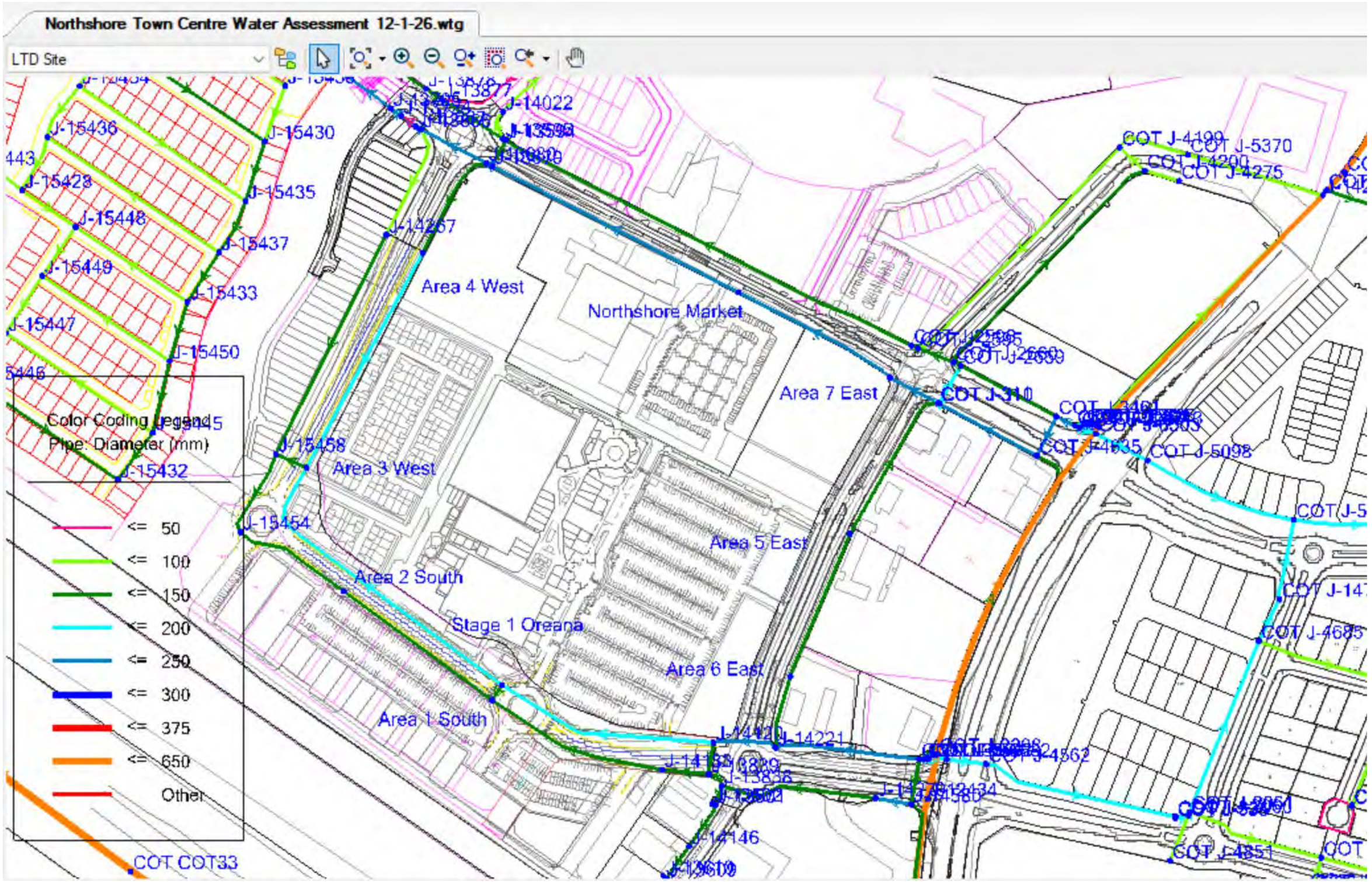
PROJECT NAME & ADDRESS
NORTH SHORE LIFESTYLE COMMUNITY
Part Majors Creek Junction, 74 Main Street, Burrell, Qld 4818

CLIENT	PROJECT No.	DATE	REVISION
INGENIA COMMUNITIES	25026	10/9/2025	I

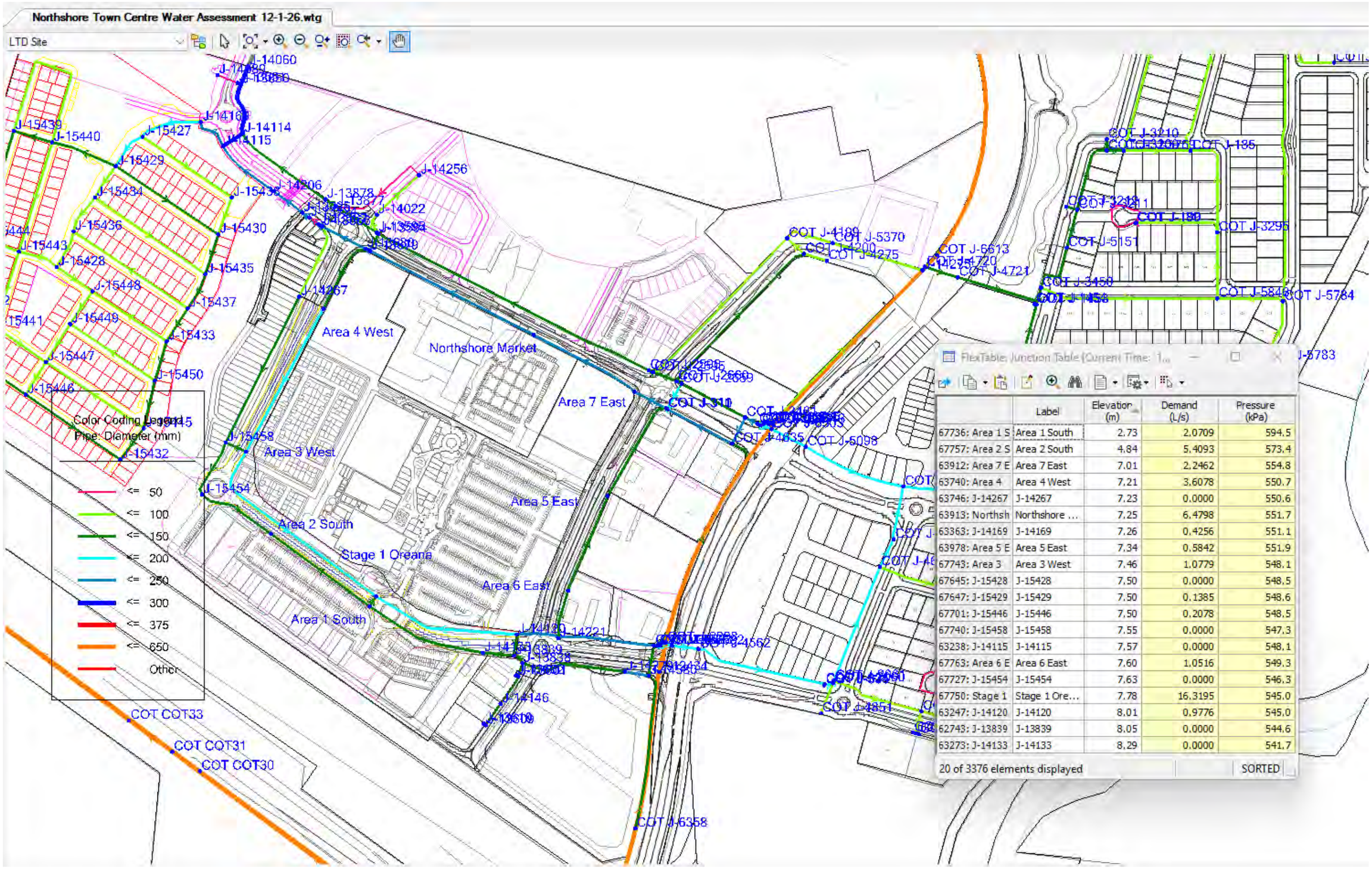
0 10 20 50 100
SCALE 1:2000

OGE Group Architects

APPENDIX B
WATER MODELLING FIGURE & RESULTS

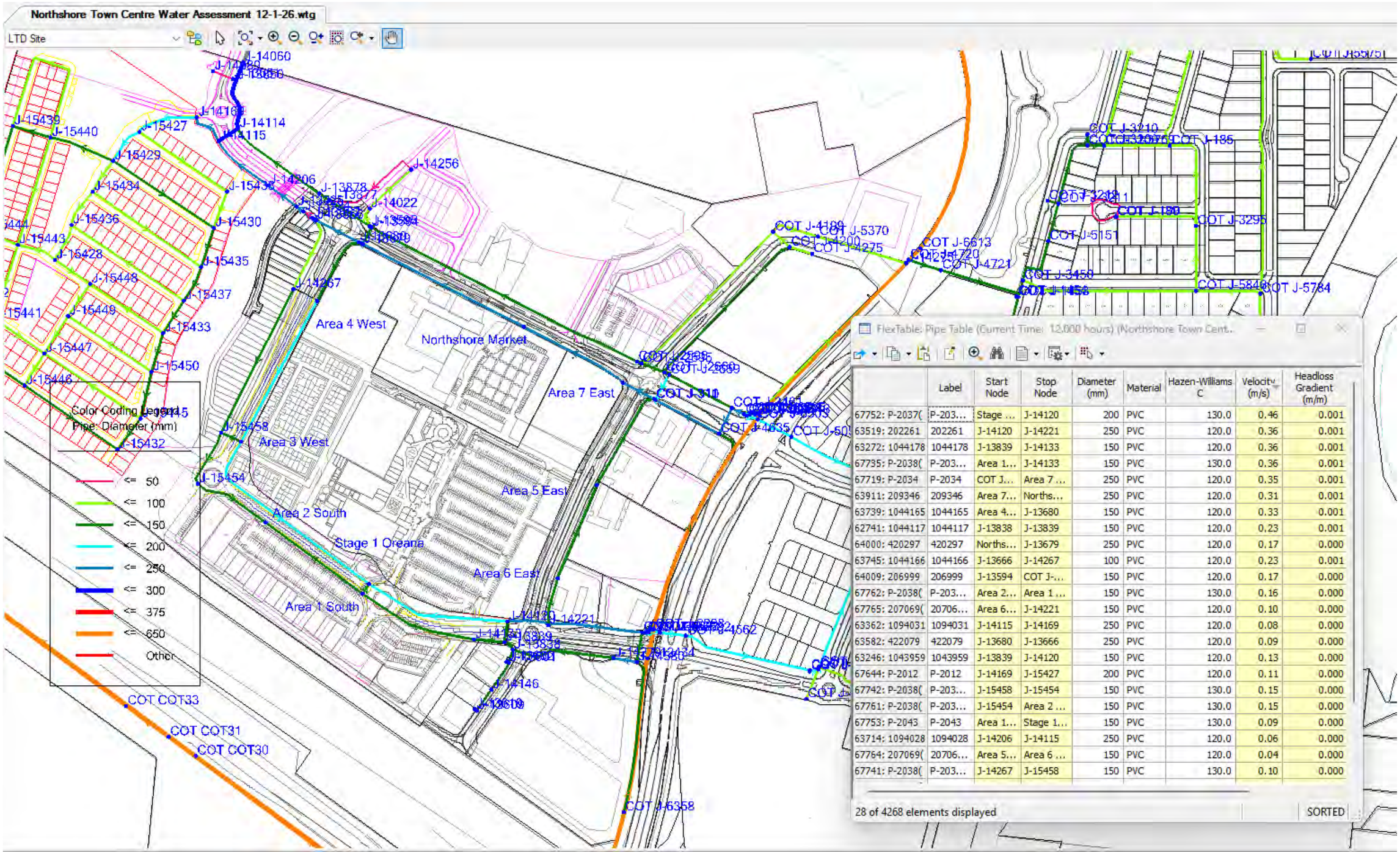


NORTH SHORE TOWN CENTRE – WATERGEMS MODELLING FIGURE



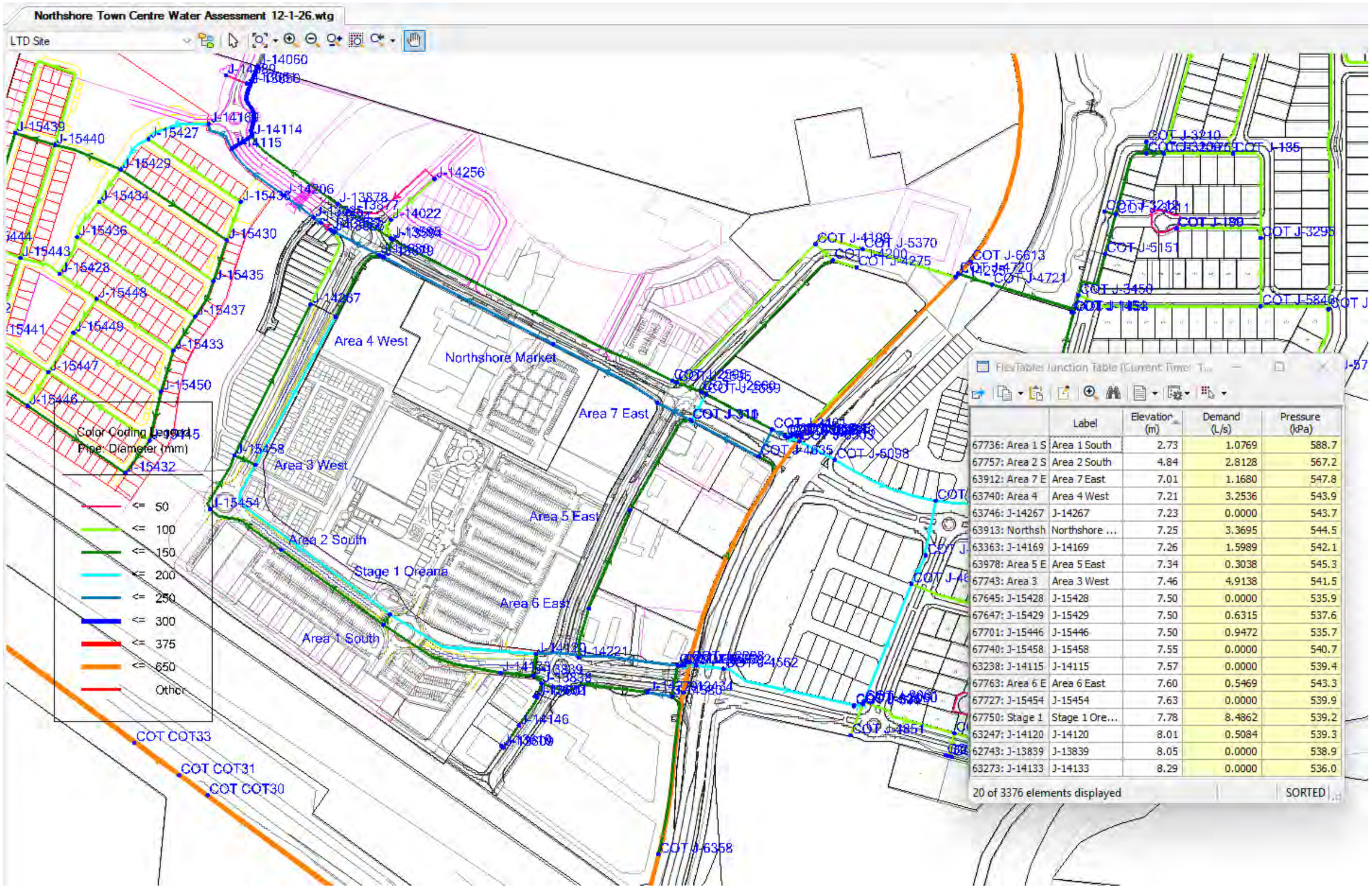
	Label	Elevation (m)	Demand (L/s)	Pressure (kPa)
67736: Area 1 S	Area 1 South	2.73	2.0709	594.5
67757: Area 2 S	Area 2 South	4.84	5.4093	573.4
63912: Area 7 E	Area 7 East	7.01	2.2462	554.8
63740: Area 4	Area 4 West	7.21	3.6078	550.7
63746: J-14267	J-14267	7.23	0.0000	550.6
63913: Northsh	Northshore ...	7.25	6.4798	551.7
63363: J-14169	J-14169	7.26	0.4256	551.1
63978: Area 5 E	Area 5 East	7.34	0.5842	551.9
67743: Area 3	Area 3 West	7.46	1.0779	548.1
67645: J-15428	J-15428	7.50	0.0000	548.5
67647: J-15429	J-15429	7.50	0.1385	548.6
67701: J-15446	J-15446	7.50	0.2078	548.5
67740: J-15458	J-15458	7.55	0.0000	547.3
63238: J-14115	J-14115	7.57	0.0000	548.1
67763: Area 6 E	Area 6 East	7.60	1.0516	549.3
67727: J-15454	J-15454	7.63	0.0000	546.3
67750: Stage 1	Stage 1 Ore...	7.78	16.3195	545.0
63247: J-14120	J-14120	8.01	0.9776	545.0
62743: J-13839	J-13839	8.05	0.0000	544.6
63273: J-14133	J-14133	8.29	0.0000	541.7

WATERGEMS MODELLING RESULTS – PEAK HOUR NODES (12 NOON)



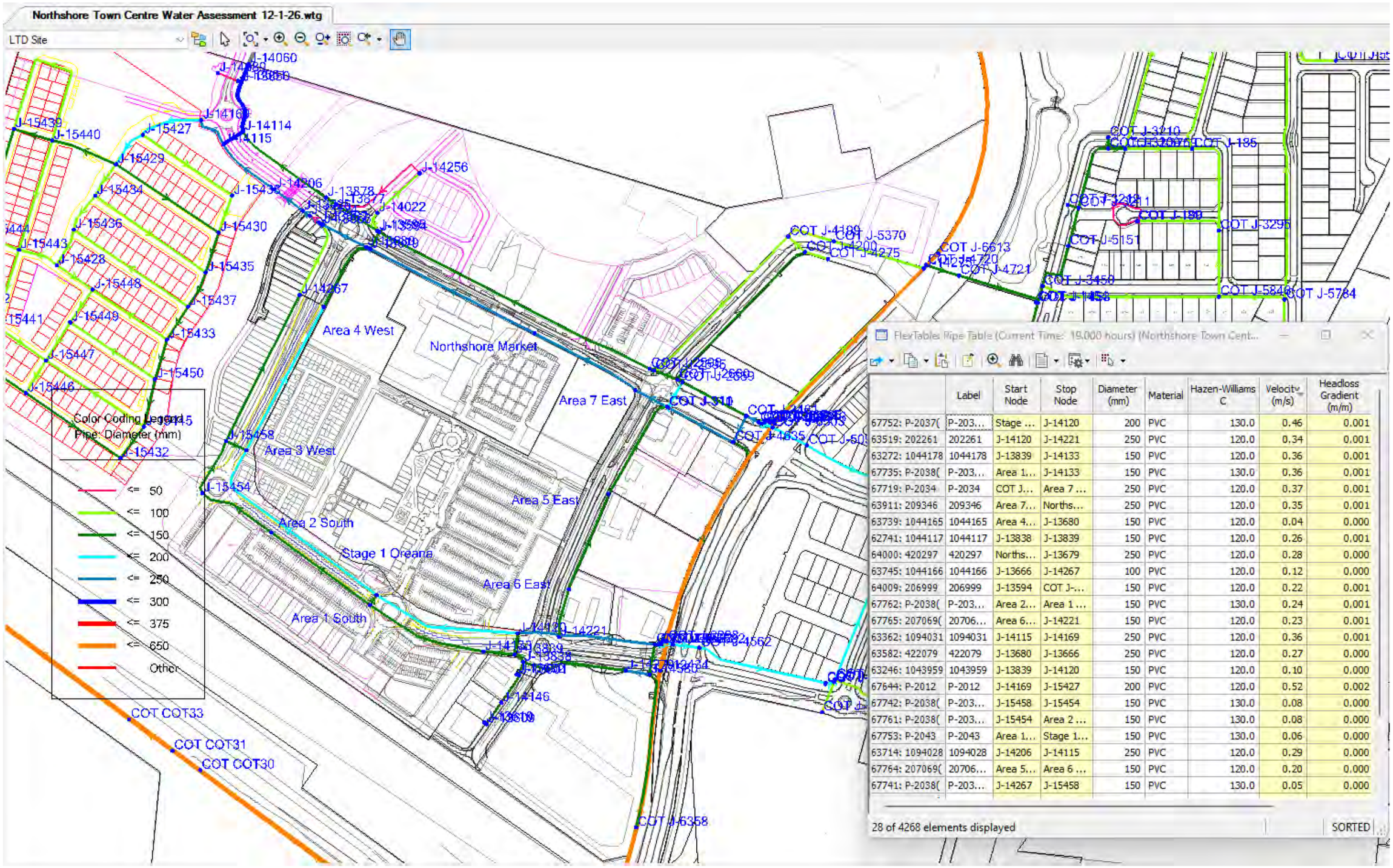
	Label	Start Node	Stop Node	Diameter (mm)	Material	Hazen-Williams C	Velocity (m/s)	Headloss Gradient (m/m)
67752: P-2037(	P-203...	Stage ...	J-14120	200	PVC	130.0	0.46	0.001
63519: 202261	202261	J-14120	J-14221	250	PVC	120.0	0.36	0.001
63272: 1044178	1044178	J-13839	J-14133	150	PVC	120.0	0.36	0.001
67735: P-2038(	P-203...	Area 1...	J-14133	150	PVC	130.0	0.36	0.001
67719: P-2034	P-2034	COT J...	Area 7 ...	250	PVC	120.0	0.35	0.001
63911: 209346	209346	Area 7...	Norths...	250	PVC	120.0	0.31	0.001
63739: 1044165	1044165	Area 4...	J-13680	150	PVC	120.0	0.33	0.001
62741: 1044117	1044117	J-13838	J-13839	150	PVC	120.0	0.23	0.001
64000: 420297	420297	Norths...	J-13679	250	PVC	120.0	0.17	0.000
63745: 1044166	1044166	J-13666	J-14267	100	PVC	120.0	0.23	0.001
64009: 206999	206999	J-13594	COT J-...	150	PVC	120.0	0.17	0.000
67762: P-2038(	P-203...	Area 2...	Area 1 ...	150	PVC	130.0	0.16	0.000
67765: 207069(	20706...	Area 6...	J-14221	150	PVC	120.0	0.10	0.000
63362: 1094031	1094031	J-14115	J-14169	250	PVC	120.0	0.08	0.000
63582: 422079	422079	J-13680	J-13666	250	PVC	120.0	0.09	0.000
63246: 1043959	1043959	J-13839	J-14120	150	PVC	120.0	0.13	0.000
67644: P-2012	P-2012	J-14169	J-15427	200	PVC	120.0	0.11	0.000
67742: P-2038(	P-203...	J-15458	J-15454	150	PVC	130.0	0.15	0.000
67761: P-2038(	P-203...	J-15454	Area 2 ...	150	PVC	130.0	0.15	0.000
67753: P-2043	P-2043	Area 1...	Stage 1...	150	PVC	130.0	0.09	0.000
63714: 1094028	1094028	J-14206	J-14115	250	PVC	120.0	0.06	0.000
67764: 207069(	20706...	Area 5...	Area 6 ...	150	PVC	120.0	0.04	0.000
67741: P-2038(	P-203...	J-14267	J-15458	150	PVC	130.0	0.10	0.000

WATERGEMS MODELLING RESULTS – PEAK HOUR PIPES (12 NOON)



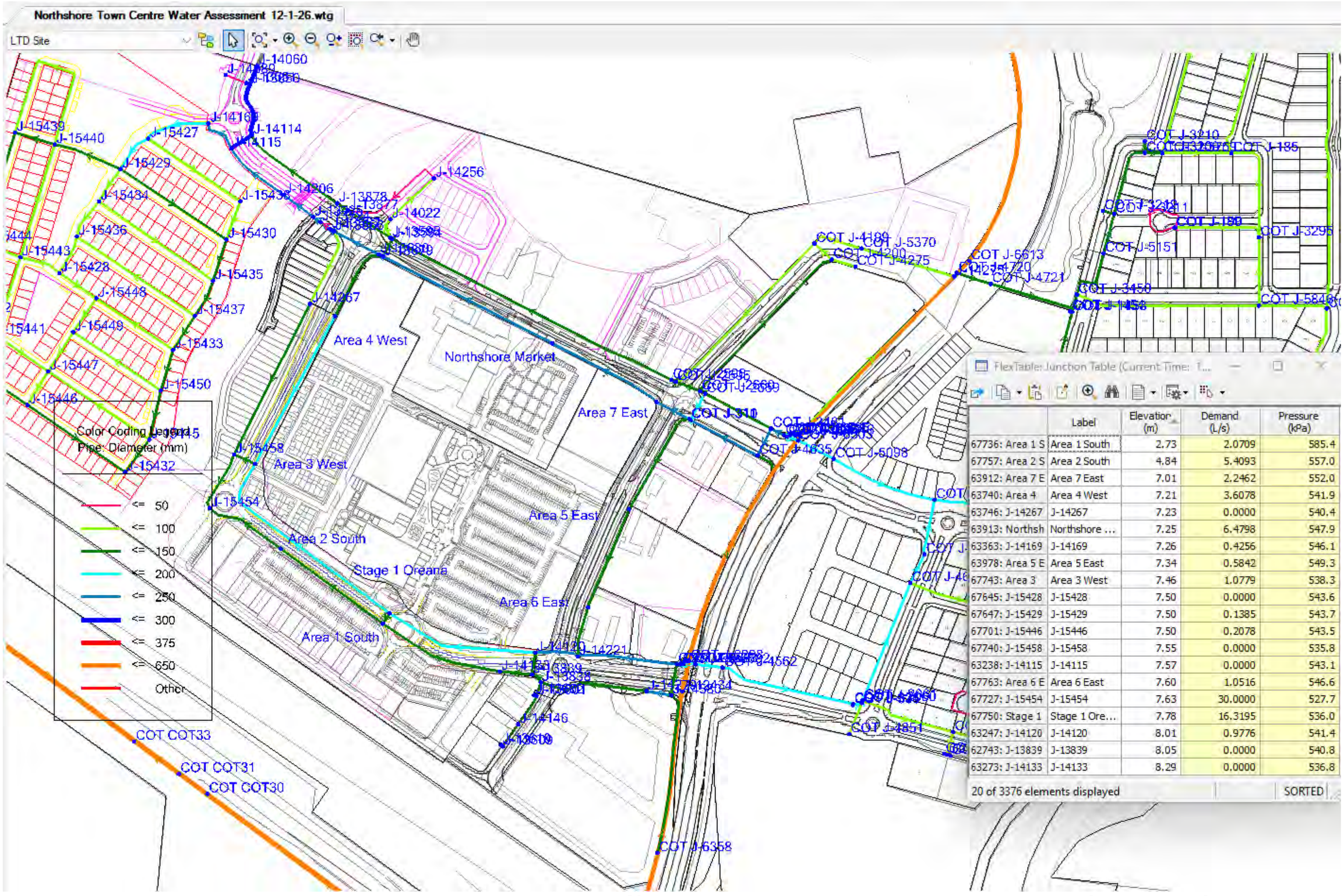
	Label	Elevation (m)	Demand (L/s)	Pressure (kPa)
67736: Area 1 S	Area 1 South	2.73	1.0769	588.7
67757: Area 2 S	Area 2 South	4.84	2.8128	567.2
63912: Area 7 E	Area 7 East	7.01	1.1680	547.8
63740: Area 4	Area 4 West	7.21	3.2536	543.9
63746: J-14267	J-14267	7.23	0.0000	543.7
63913: Northsh	Northshore ...	7.25	3.3695	544.5
63363: J-14169	J-14169	7.26	1.5989	542.1
63978: Area 5 E	Area 5 East	7.34	0.3038	545.3
67743: Area 3	Area 3 West	7.46	4.9138	541.5
67645: J-15428	J-15428	7.50	0.0000	535.9
67647: J-15429	J-15429	7.50	0.6315	537.6
67701: J-15446	J-15446	7.50	0.9472	535.7
67740: J-15458	J-15458	7.55	0.0000	540.7
63238: J-14115	J-14115	7.57	0.0000	539.4
67763: Area 6 E	Area 6 East	7.60	0.5469	543.3
67727: J-15454	J-15454	7.63	0.0000	539.9
67750: Stage 1	Stage 1 Ore...	7.78	8.4862	539.2
63247: J-14120	J-14120	8.01	0.5084	539.3
62743: J-13839	J-13839	8.05	0.0000	538.9
63273: J-14133	J-14133	8.29	0.0000	536.0

WATERGEMS MODELLING RESULTS – PEAK HOUR NODES (7:00 PM)



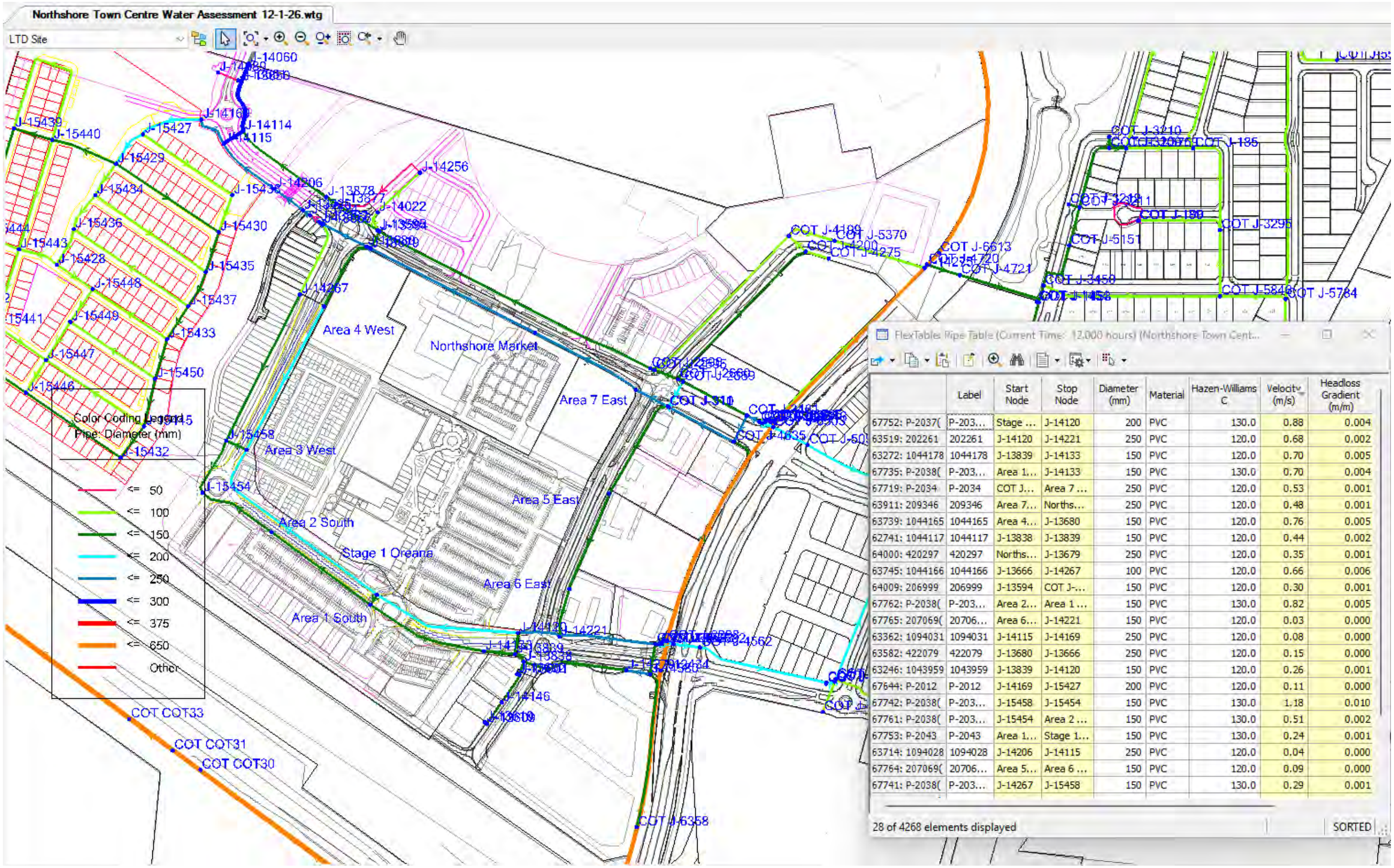
	Label	Start Node	Stop Node	Diameter (mm)	Material	Hazen-Williams C	Velocity (m/s)	Headloss Gradient (m/m)
67752: P-2037(	P-203...	Stage ...	J-14120	200	PVC	130.0	0.46	0.001
63519: 202261	202261	J-14120	J-14221	250	PVC	120.0	0.34	0.001
63272: 1044178	1044178	J-13839	J-14133	150	PVC	120.0	0.36	0.001
67735: P-2038(	P-203...	Area 1...	J-14133	150	PVC	130.0	0.36	0.001
67719: P-2034	P-2034	COT J...	Area 7 ...	250	PVC	120.0	0.37	0.001
63911: 209346	209346	Area 7...	Norths...	250	PVC	120.0	0.35	0.001
63739: 1044165	1044165	Area 4...	J-13680	150	PVC	120.0	0.04	0.000
62741: 1044117	1044117	J-13838	J-13839	150	PVC	120.0	0.26	0.001
64000: 420297	420297	Norths...	J-13679	250	PVC	120.0	0.28	0.000
63745: 1044166	1044166	J-13666	J-14267	100	PVC	120.0	0.12	0.000
64009: 206999	206999	J-13594	COT J-...	150	PVC	120.0	0.22	0.001
67762: P-2038(	P-203...	Area 2...	Area 1 ...	150	PVC	130.0	0.24	0.001
67765: 207069(	20706...	Area 6...	J-14221	150	PVC	120.0	0.23	0.001
63362: 1094031	1094031	J-14115	J-14169	250	PVC	120.0	0.36	0.001
63582: 422079	422079	J-13680	J-13666	250	PVC	120.0	0.27	0.000
63246: 1043959	1043959	J-13839	J-14120	150	PVC	120.0	0.10	0.000
67644: P-2012	P-2012	J-14169	J-15427	200	PVC	120.0	0.52	0.002
67742: P-2038(	P-203...	J-15458	J-15454	150	PVC	130.0	0.08	0.000
67761: P-2038(	P-203...	J-15454	Area 2 ...	150	PVC	130.0	0.08	0.000
67753: P-2043	P-2043	Area 1...	Stage 1...	150	PVC	130.0	0.06	0.000
63714: 1094028	1094028	J-14206	J-14115	250	PVC	120.0	0.29	0.000
67764: 207069(	20706...	Area 5...	Area 6 ...	150	PVC	120.0	0.20	0.000
67741: P-2038(	P-203...	J-14267	J-15458	150	PVC	130.0	0.05	0.000

WATERGEMS MODELLING RESULTS – PEAK HOUR PIPES (7:00 PM)



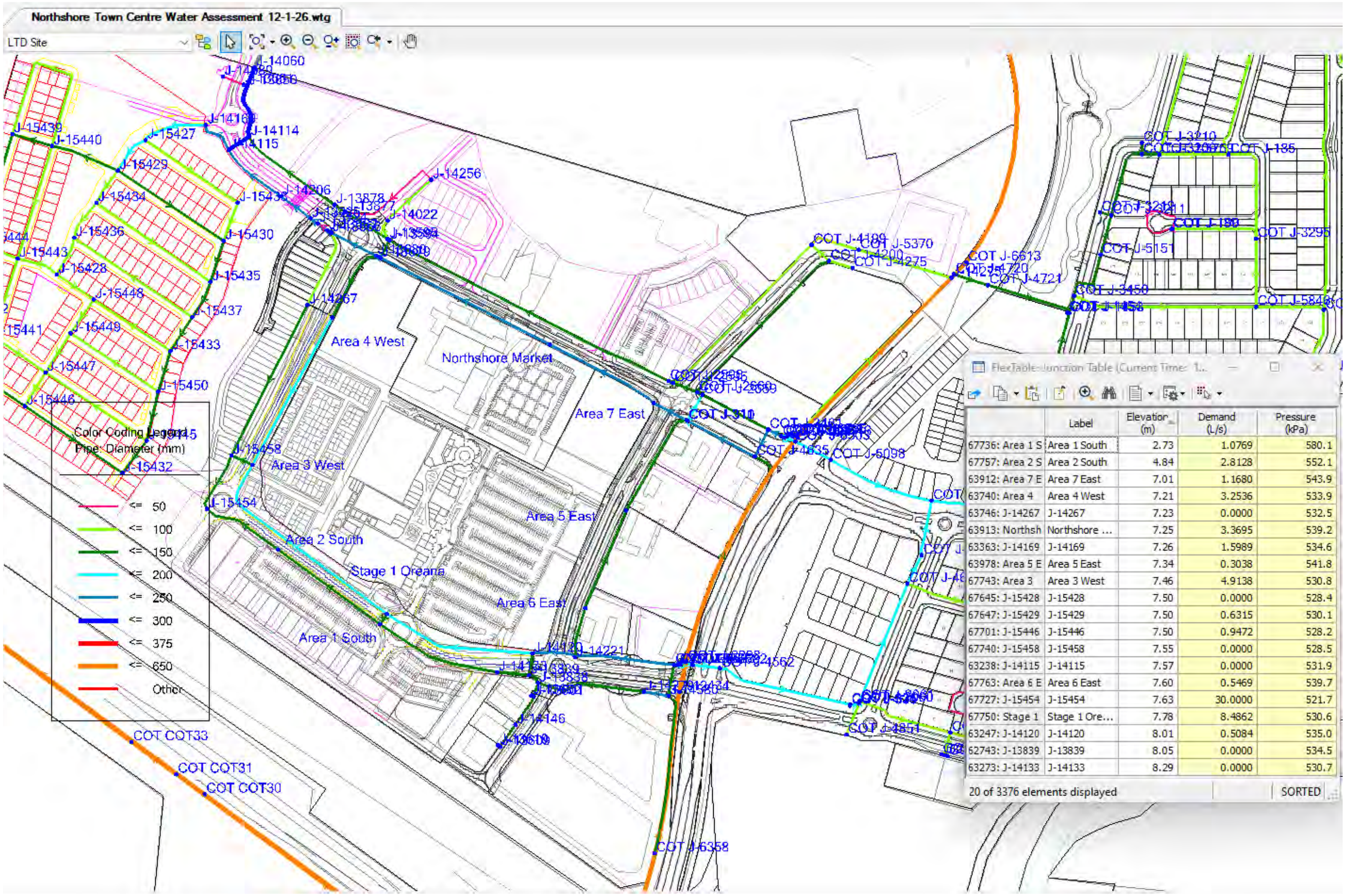
	Label	Elevation (m)	Demand (L/s)	Pressure (kPa)
67736: Area 1 S	Area 1 South	2.73	2.0709	585.4
67757: Area 2 S	Area 2 South	4.84	5.4093	557.0
63912: Area 7 E	Area 7 East	7.01	2.2462	552.0
63740: Area 4	Area 4 West	7.21	3.6078	541.9
63746: J-14267	J-14267	7.23	0.0000	540.4
63913: Northsh	Northshore ...	7.25	6.4798	547.9
63363: J-14169	J-14169	7.26	0.4256	546.1
63978: Area 5 E	Area 5 East	7.34	0.5842	549.3
67743: Area 3	Area 3 West	7.46	1.0779	538.3
67645: J-15428	J-15428	7.50	0.0000	543.6
67647: J-15429	J-15429	7.50	0.1385	543.7
67701: J-15446	J-15446	7.50	0.2078	543.5
67740: J-15458	J-15458	7.55	0.0000	535.8
63238: J-14115	J-14115	7.57	0.0000	543.1
67763: Area 6 E	Area 6 East	7.60	1.0516	546.6
67727: J-15454	J-15454	7.63	30.0000	527.7
67750: Stage 1	Stage 1 Ore...	7.78	16.3195	536.0
63247: J-14120	J-14120	8.01	0.9776	541.4
62743: J-13839	J-13839	8.05	0.0000	540.8
63273: J-14133	J-14133	8.29	0.0000	536.8

WATERGEMS MODELLING RESULTS – 30 l/s COMMERCIAL FIRE FLOW NODES (12 NOON)



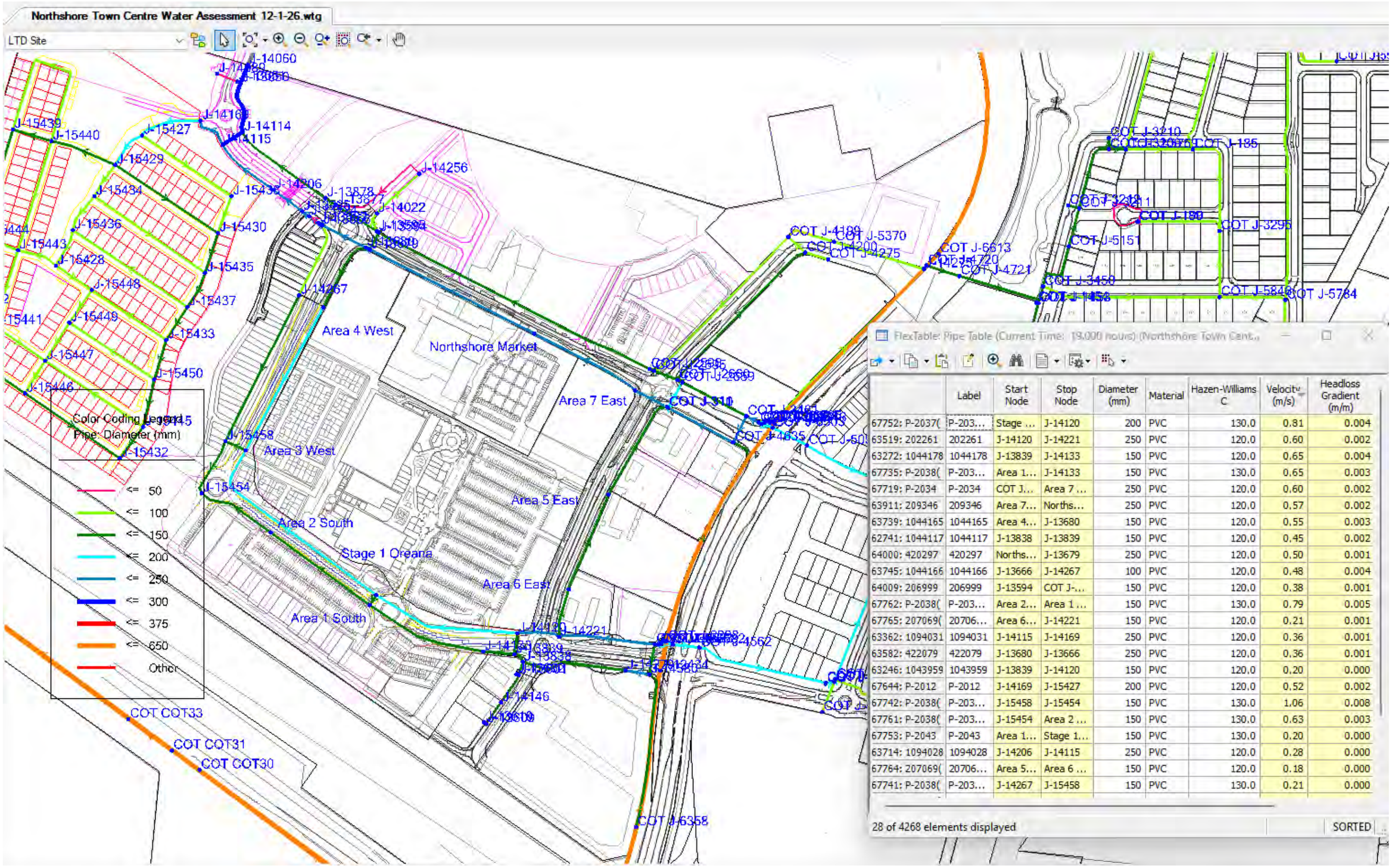
	Label	Start Node	Stop Node	Diameter (mm)	Material	Hazen-Williams C	Velocity (m/s)	Headloss Gradient (m/m)
67752: P-2037(	P-203...	Stage ...	J-14120	200	PVC	130.0	0.88	0.004
63519: 202261	202261	J-14120	J-14221	250	PVC	120.0	0.68	0.002
63272: 1044178	1044178	J-13839	J-14133	150	PVC	120.0	0.70	0.005
67735: P-2038(	P-203...	Area 1...	J-14133	150	PVC	130.0	0.70	0.004
67719: P-2034	P-2034	COT J...	Area 7 ...	250	PVC	120.0	0.53	0.001
63911: 209346	209346	Area 7...	Norths...	250	PVC	120.0	0.48	0.001
63739: 1044165	1044165	Area 4...	J-13680	150	PVC	120.0	0.76	0.005
62741: 1044117	1044117	J-13838	J-13839	150	PVC	120.0	0.44	0.002
64000: 420297	420297	Norths...	J-13679	250	PVC	120.0	0.35	0.001
63745: 1044166	1044166	J-13666	J-14267	100	PVC	120.0	0.66	0.006
64009: 206999	206999	J-13594	COT J-...	150	PVC	120.0	0.30	0.001
67762: P-2038(	P-203...	Area 2...	Area 1 ...	150	PVC	130.0	0.82	0.005
67765: 207069(	20706...	Area 6...	J-14221	150	PVC	120.0	0.03	0.000
63362: 1094031	1094031	J-14115	J-14169	250	PVC	120.0	0.08	0.000
63582: 422079	422079	J-13680	J-13666	250	PVC	120.0	0.15	0.000
63246: 1043959	1043959	J-13839	J-14120	150	PVC	120.0	0.26	0.001
67644: P-2012	P-2012	J-14169	J-15427	200	PVC	120.0	0.11	0.000
67742: P-2038(	P-203...	J-15458	J-15454	150	PVC	130.0	1.18	0.010
67761: P-2038(	P-203...	J-15454	Area 2 ...	150	PVC	130.0	0.51	0.002
67753: P-2043	P-2043	Area 1...	Stage 1...	150	PVC	130.0	0.24	0.001
63714: 1094028	1094028	J-14206	J-14115	250	PVC	120.0	0.04	0.000
67764: 207069(	20706...	Area 5...	Area 6 ...	150	PVC	120.0	0.09	0.000
67741: P-2038(	P-203...	J-14267	J-15458	150	PVC	130.0	0.29	0.001

WATERGEMS MODELLING RESULTS – 30 l/s COMMERCIAL FIRE FLOWS PIPES (12 NOON)



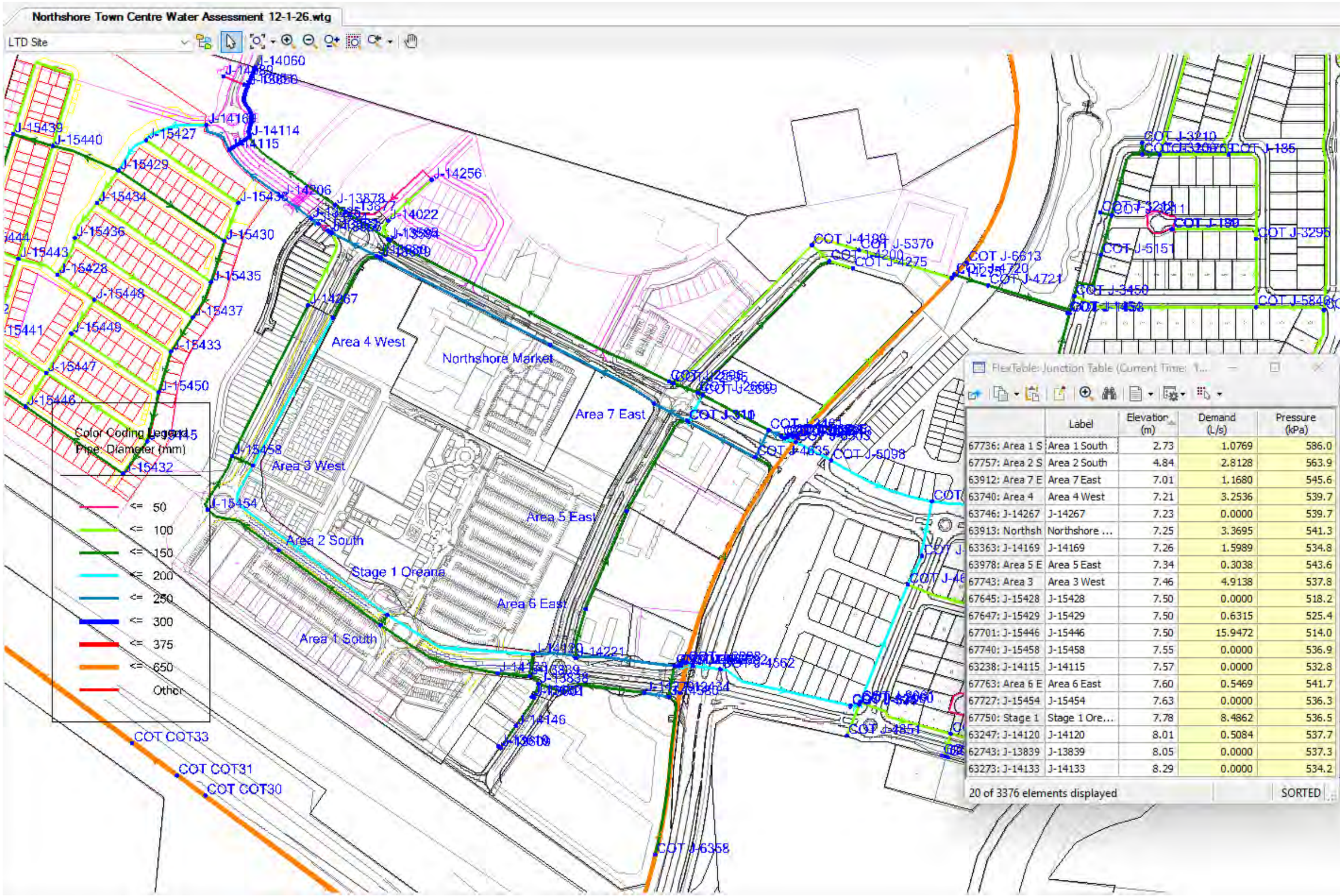
	Label	Elevation (m)	Demand (L/s)	Pressure (kPa)
67736: Area 1 S	Area 1 South	2.73	1.0769	580.1
67757: Area 2 S	Area 2 South	4.84	2.8128	552.1
63912: Area 7 E	Area 7 East	7.01	1.1680	543.9
63740: Area 4	Area 4 West	7.21	3.2536	533.9
63746: J-14267	J-14267	7.23	0.0000	532.5
63913: Northsh	Northshore ...	7.25	3.3695	539.2
63363: J-14169	J-14169	7.26	1.5989	534.6
63978: Area 5 E	Area 5 East	7.34	0.3038	541.8
67743: Area 3	Area 3 West	7.46	4.9138	530.8
67645: J-15428	J-15428	7.50	0.0000	528.4
67647: J-15429	J-15429	7.50	0.6315	530.1
67701: J-15446	J-15446	7.50	0.9472	528.2
67740: J-15458	J-15458	7.55	0.0000	528.5
63238: J-14115	J-14115	7.57	0.0000	531.9
67763: Area 6 E	Area 6 East	7.60	0.5469	539.7
67727: J-15454	J-15454	7.63	30.0000	521.7
67750: Stage 1	Stage 1 Ore...	7.78	8.4862	530.6
63247: J-14120	J-14120	8.01	0.5084	535.0
62743: J-13839	J-13839	8.05	0.0000	534.5
63273: J-14133	J-14133	8.29	0.0000	530.7

WATERGEMS MODELLING RESULTS – 30 l/s COMMERCIAL FIRE FLOW NODES (7:00 PM)



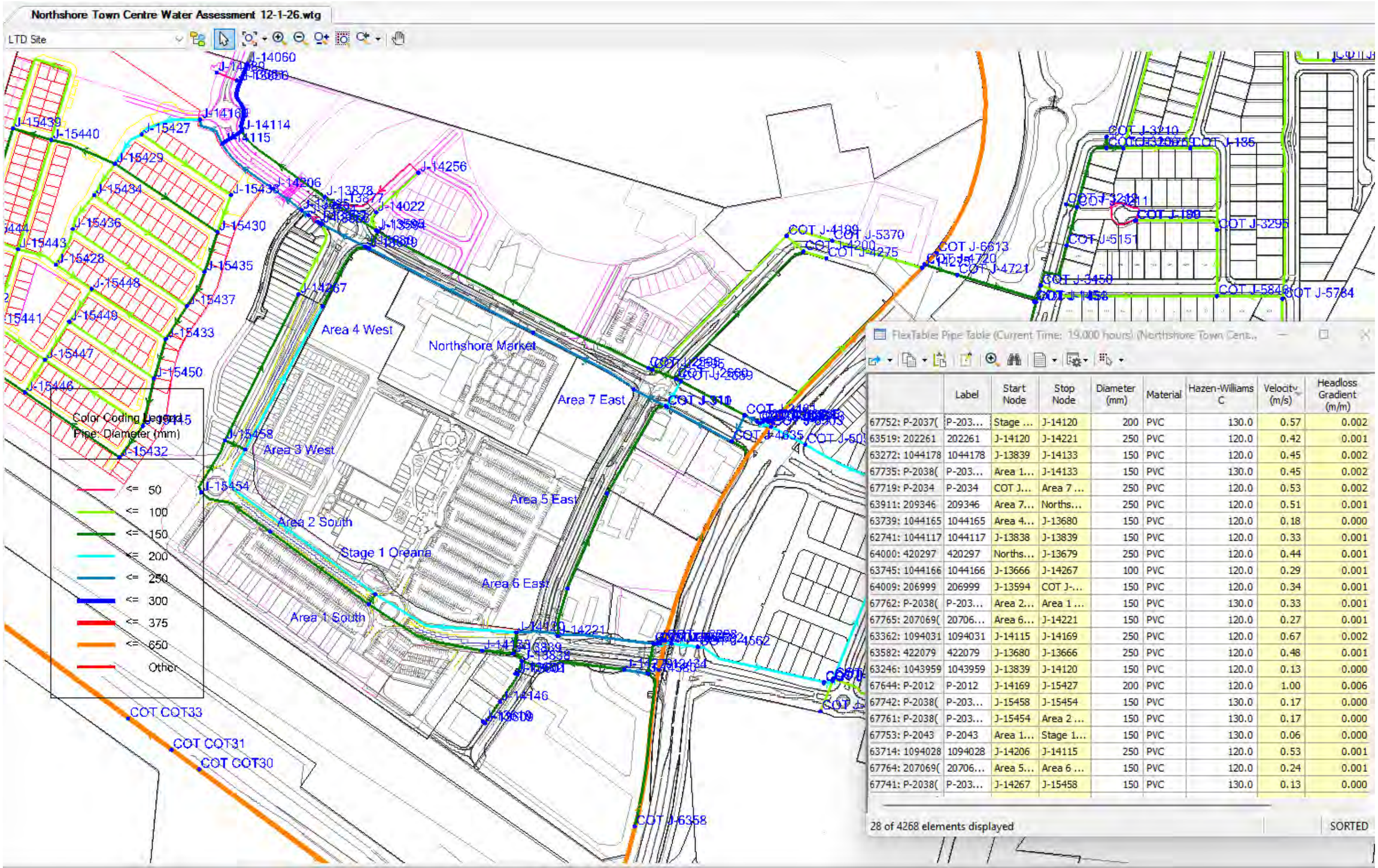
	Label	Start Node	Stop Node	Diameter (mm)	Material	Hazen-Williams C	Velocity (m/s)	Headloss Gradient (m/m)
67752: P-2037(	P-203...	Stage ...	J-14120	200	PVC	130.0	0.81	0.004
63519: 202261	202261	J-14120	J-14221	250	PVC	120.0	0.60	0.002
63272: 1044178	1044178	J-13839	J-14133	150	PVC	120.0	0.65	0.004
67735: P-2038(	P-203...	Area 1...	J-14133	150	PVC	130.0	0.65	0.003
67719: P-2034	P-2034	COT J...	Area 7 ...	250	PVC	120.0	0.60	0.002
63911: 209346	209346	Area 7...	Norths...	250	PVC	120.0	0.57	0.002
63739: 1044165	1044165	Area 4...	J-13680	150	PVC	120.0	0.55	0.003
62741: 1044117	1044117	J-13838	J-13839	150	PVC	120.0	0.45	0.002
64000: 420297	420297	Norths...	J-13679	250	PVC	120.0	0.50	0.001
63745: 1044166	1044166	J-13666	J-14267	100	PVC	120.0	0.48	0.004
64009: 206999	206999	J-13594	COT J-...	150	PVC	120.0	0.38	0.001
67762: P-2038(	P-203...	Area 2...	Area 1 ...	150	PVC	130.0	0.79	0.005
67765: 207069(	20706...	Area 6...	J-14221	150	PVC	120.0	0.21	0.001
63362: 1094031	1094031	J-14115	J-14169	250	PVC	120.0	0.36	0.001
63582: 422079	422079	J-13680	J-13666	250	PVC	120.0	0.36	0.001
63246: 1043959	1043959	J-13839	J-14120	150	PVC	120.0	0.20	0.000
67644: P-2012	P-2012	J-14169	J-15427	200	PVC	120.0	0.52	0.002
67742: P-2038(	P-203...	J-15458	J-15454	150	PVC	130.0	1.06	0.008
67761: P-2038(	P-203...	J-15454	Area 2 ...	150	PVC	130.0	0.63	0.003
67753: P-2043	P-2043	Area 1...	Stage 1...	150	PVC	130.0	0.20	0.000
63714: 1094028	1094028	J-14206	J-14115	250	PVC	120.0	0.28	0.000
67764: 207069(	20706...	Area 5...	Area 6 ...	150	PVC	120.0	0.18	0.000
67741: P-2038(	P-203...	J-14267	J-15458	150	PVC	130.0	0.21	0.000

WATERGEMS MODELLING RESULTS – 30 l/s COMMERCIAL FIRE FLOWS PIPES (7:00 PM)



	Label	Elevation (m)	Demand (L/s)	Pressure (kPa)
67736: Area 1 S	Area 1 South	2.73	1.0769	586.0
67757: Area 2 S	Area 2 South	4.84	2.8128	563.9
63912: Area 7 E	Area 7 East	7.01	1.1680	545.6
63740: Area 4	Area 4 West	7.21	3.2536	539.7
63746: J-14267	J-14267	7.23	0.0000	539.7
63913: Northsh	Northshore ...	7.25	3.3695	541.3
63363: J-14169	J-14169	7.26	1.5989	534.8
63978: Area 5 E	Area 5 East	7.34	0.3038	543.6
67743: Area 3	Area 3 West	7.46	4.9138	537.8
67645: J-15428	J-15428	7.50	0.0000	518.2
67647: J-15429	J-15429	7.50	0.6315	525.4
67701: J-15446	J-15446	7.50	15.9472	514.0
67740: J-15458	J-15458	7.55	0.0000	536.9
63238: J-14115	J-14115	7.57	0.0000	532.8
67763: Area 6 E	Area 6 East	7.60	0.5469	541.7
67727: J-15454	J-15454	7.63	0.0000	536.3
67750: Stage 1	Stage 1 Ore...	7.78	8.4862	536.5
63247: J-14120	J-14120	8.01	0.5084	537.7
62743: J-13839	J-13839	8.05	0.0000	537.3
63273: J-14133	J-14133	8.29	0.0000	534.2

WATERGEMS MODELLING RESULTS – 15 l/s RESIDENTIAL FIRE FLOW NODES (7:00 PM)



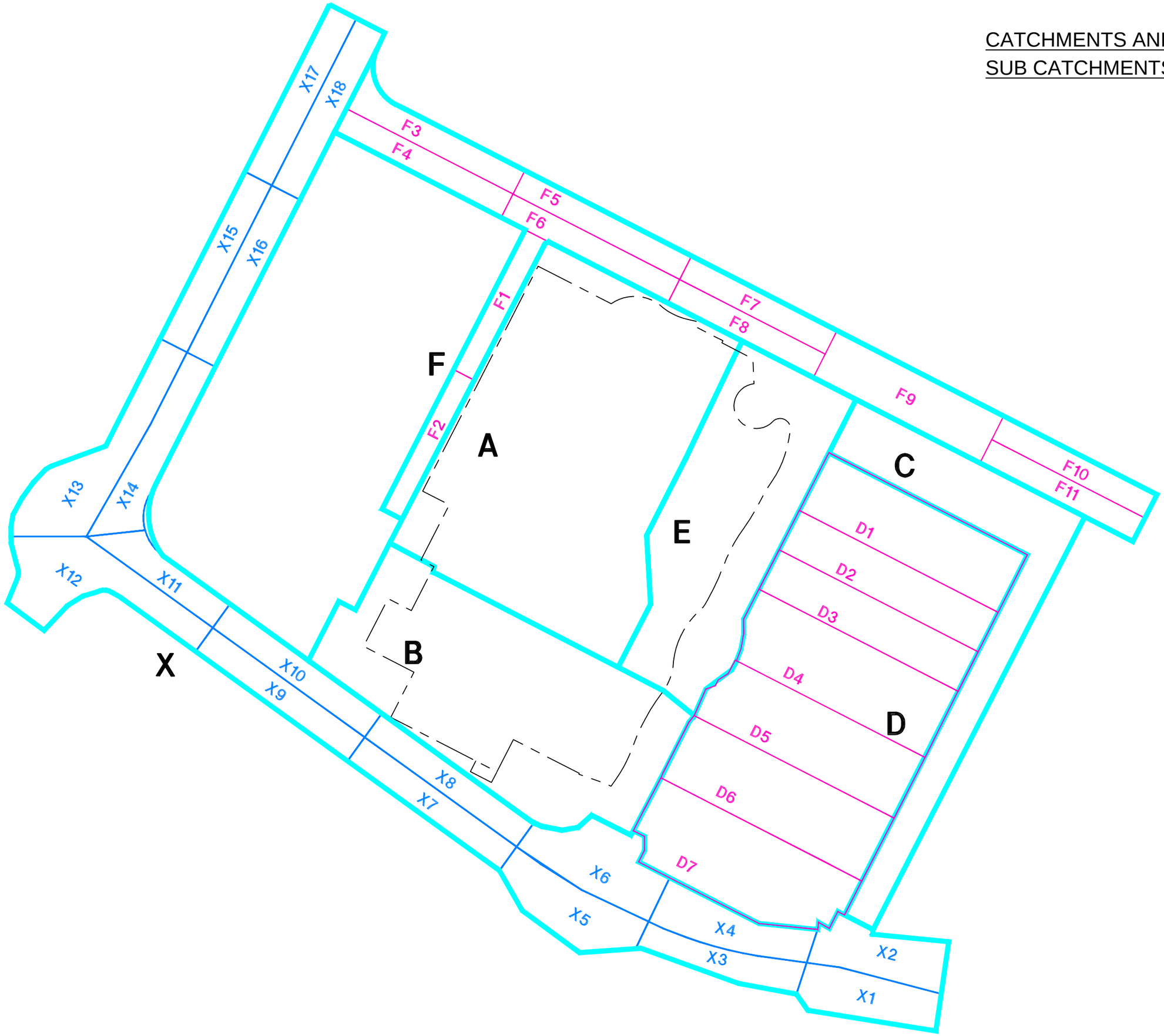
	Label	Start Node	Stop Node	Diameter (mm)	Material	Hazen-Williams C	Velocity (m/s)	Headloss Gradient (m/m)
67752: P-2037(	P-203...	Stage ...	J-14120	200	PVC	130.0	0.57	0.002
63519: 202261	202261	J-14120	J-14221	250	PVC	120.0	0.42	0.001
63272: 1044178	1044178	J-13839	J-14133	150	PVC	120.0	0.45	0.002
67735: P-2038(	P-203...	Area 1...	J-14133	150	PVC	130.0	0.45	0.002
67719: P-2034	P-2034	COT J...	Area 7 ...	250	PVC	120.0	0.53	0.002
63911: 209346	209346	Area 7...	Norths...	250	PVC	120.0	0.51	0.001
63739: 1044165	1044165	Area 4...	J-13680	150	PVC	120.0	0.18	0.000
62741: 1044117	1044117	J-13838	J-13839	150	PVC	120.0	0.33	0.001
64000: 420297	420297	Norths...	J-13679	250	PVC	120.0	0.44	0.001
63745: 1044166	1044166	J-13666	J-14267	100	PVC	120.0	0.29	0.001
64009: 206999	206999	J-13594	COT J-...	150	PVC	120.0	0.34	0.001
67762: P-2038(	P-203...	Area 2...	Area 1 ...	150	PVC	130.0	0.33	0.001
67765: 207069(	20706...	Area 6...	J-14221	150	PVC	120.0	0.27	0.001
63362: 1094031	1094031	J-14115	J-14169	250	PVC	120.0	0.67	0.002
63582: 422079	422079	J-13680	J-13666	250	PVC	120.0	0.48	0.001
63246: 1043959	1043959	J-13839	J-14120	150	PVC	120.0	0.13	0.000
67644: P-2012	P-2012	J-14169	J-15427	200	PVC	120.0	1.00	0.006
67742: P-2038(	P-203...	J-15458	J-15454	150	PVC	130.0	0.17	0.000
67761: P-2038(	P-203...	J-15454	Area 2 ...	150	PVC	130.0	0.17	0.000
67753: P-2043	P-2043	Area 1...	Stage 1...	150	PVC	130.0	0.06	0.000
63714: 1094028	1094028	J-14206	J-14115	250	PVC	120.0	0.53	0.001
67764: 207069(	20706...	Area 5...	Area 6 ...	150	PVC	120.0	0.24	0.001
67741: P-2038(	P-203...	J-14267	J-15458	150	PVC	130.0	0.13	0.000

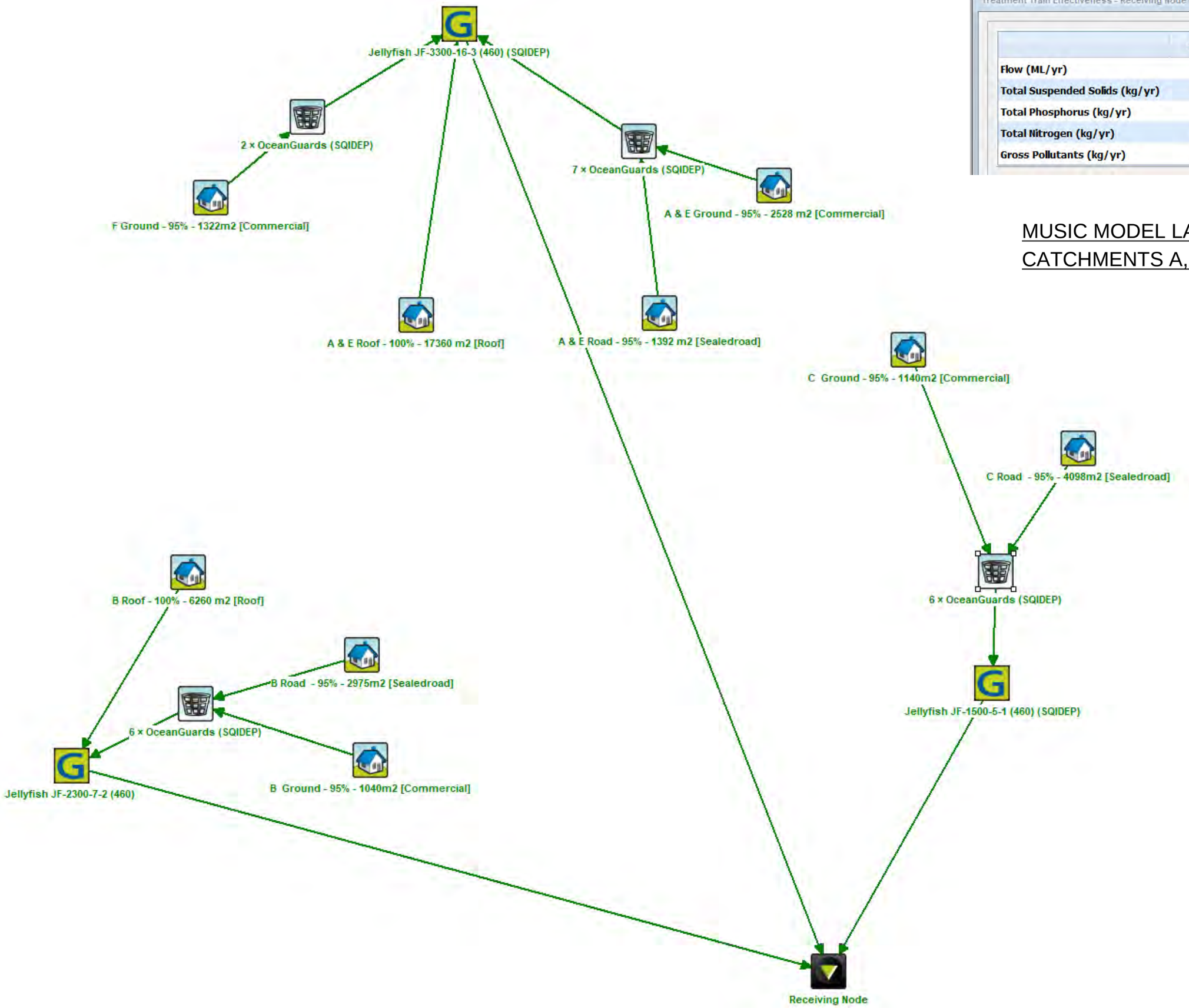
WATERGEMS MODELLING RESULTS – 15 l/s RESIDENTIAL FIRE FLOWS PIPES (7:00 PM)

APPENDIX C

MUSIC MODELLING

CATCHMENTS AND
SUB CATCHMENTS



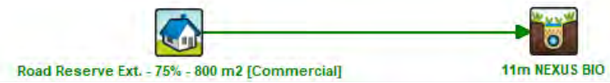
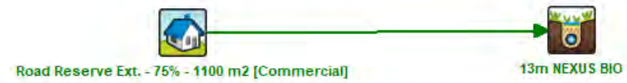


Treatment Train Effectiveness - Receiving Node

	Sources	Residual Load	% Reduction
Flow (ML/yr)	36.9	36.9	0
Total Suspended Solids (kg/yr)	4980	884	82.2
Total Phosphorus (kg/yr)	12.7	4.2	67
Total Nitrogen (kg/yr)	117	70.1	40
Gross Pollutants (kg/yr)	676	48.4	92.8

MUSIC MODEL LAYOUT FOR CATCHMENTS A, B, C, E AND F1-F2.

Train Name	Treatment Train Options for D SUB - Catchments
T 1	
T 2	
T 3	
T 4	
T 5	
T 6	
T 7	
T 8	
T 9	

Train Name	Treatment Train Options for X and F SUB - Catchments
T 20	
T 21	
T 22	
T 23	
T 24	
T 25	
T 26	

SUB CATCHMENT TREATMENT TRAINS (T1 - T26):

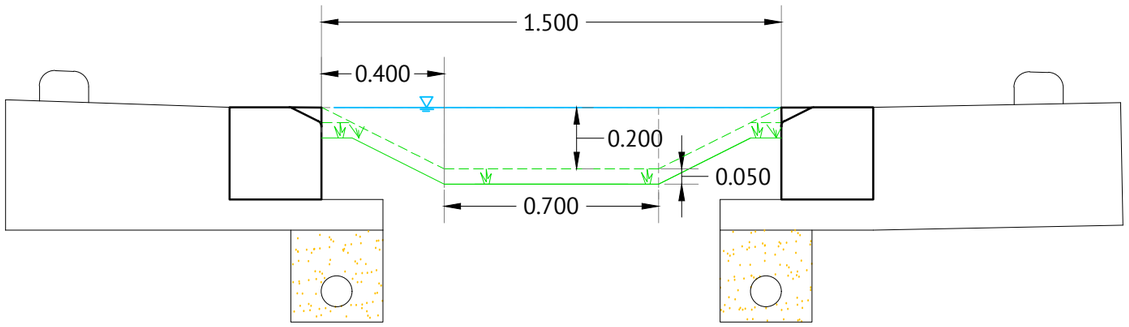
- MUSIC MODEL AND

- POLLUTANT REDUCTION RESULTS

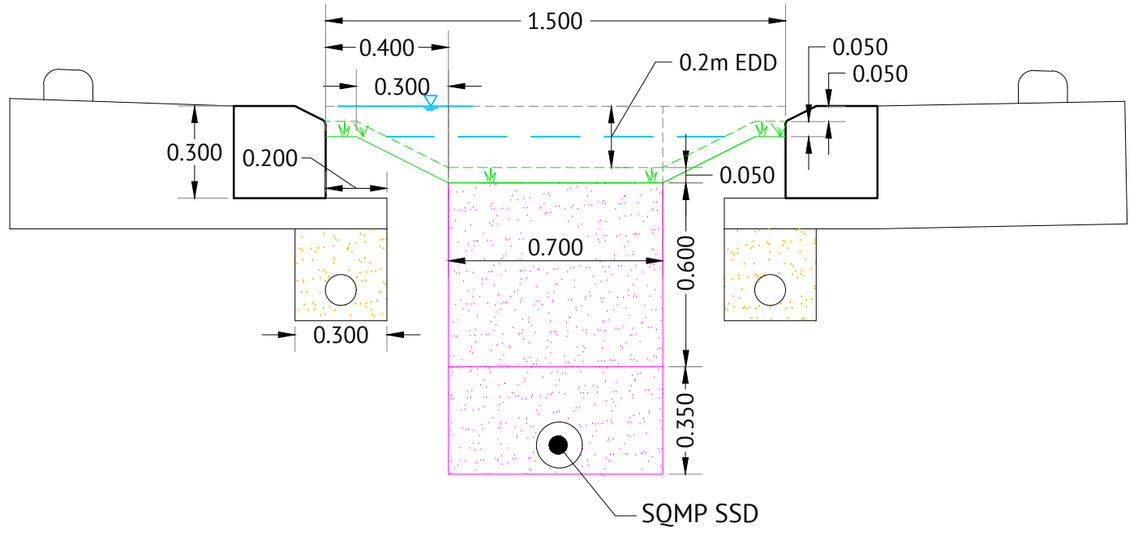
Treatment Train Name	TSS (% reduct.)	TP (% reduct.)	TN (% reduct.)	GP (% reduct.)
T1	96.0	84.2	67.8	100.0
T2	84.1	70.0	40.5	100.0
T3	84.9	70.5	40.3	100.0
T4	84.5	70.8	40.9	100.0
T5	84.2	70.0	40.1	100.0
T6	84.1	70.8	39.8	100.0
T7	84.1	71.0	39.7	100.0
T8	85.2	70.4	40.5	100.0
T9	87.4	73.4	40.4	100.0

Treatment Train Name	TSS (% reduct.)	TP (% reduct.)	TN (% reduct.)	GP (% reduct.)
T20	83.2	68.4	56.4	100.0
T21	80.8	66.9	53.3	100.0
T22	80.6	66.8	52.7	100.0
T23	80.2	66.8	53.2	100.0
T24	80.0	65.3	52.4	100.0
T25	79.0	65.4	51.7	100.0
T26	79.8	65.0	53.5	100.0

Document Set ID: 28352008
Version: 1, Version Date: 08/05/2026

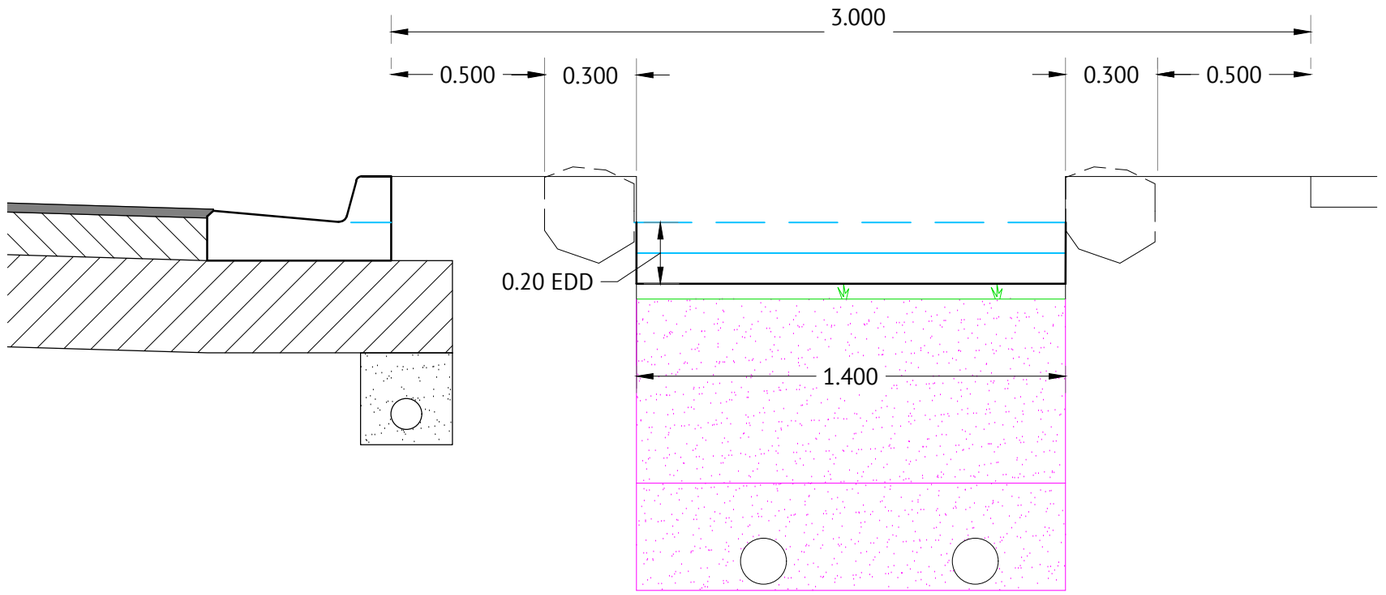


TYPICAL SWALE



TYPICAL BIO TYPE A

TYPICAL CROSS SECTIONAL DIMENSIONS
FOR BIOS AND SWALES



TYPICAL BIO TYPE B

Node Type	BioRetention NodeV4	BioRetention NodeV4	BioRetention NodeV4	BioRetention NodeV4	BioRetention NodeV4	BioRetention NodeV4	BioRetention NodeV4	BioRetention NodeV4	BioRetention NodeV4	BioRetention NodeV4	BioRetention NodeV4	BioRetention NodeV4	BioRetention NodeV4	BioRetention NodeV4	BioRetention NodeV4	BioRetention NodeV4
Node Name	21m NEXUS BIO	big Bioretention D7	22m Bioretention 1.5m	22m Bioretention 1.5m	23.5m Bioretention 1.5m	20m Bioretention 1.5m	19m Bioretention 1.5m	12m Bioretention 1.5m	14m NEXUS BIO	11m NEXUS BIO	17m NEXUS BIO	13m NEXUS BIO	12m NEXUS BIO	19m NEXUS BIO w 0.3 EDD	18m Bioretention 1.5m	18m Bioretention 1.5m
Node ID	5	9	10	32	35	38	41	43	44	45	46	47	48	49	57	60
General - Flux File Timestep (in seconds)	360	360	360	360	360	360	360	360	360	360	360	360	360	360	360	360
Inlet Properties - Low Flow By-pass (cubic metres per sec)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Inlet Properties - High Flow By-pass (cubic metres per sec)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Storage Properties - Extended Detention Depth (metres)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.2
Storage Properties - Surface Area (square metres)	29.4	101	24.2	24.2	25.85	22	20.9	13.2	19.6	15.4	23.8	18.2	16.8	26.6	19.8	19.8
Filter and Media Properties - Filter Area (square metres)	29.4	90	15.4	15.4	16.45	14	13.3	8.4	19.6	15.4	23.8	18.2	16.8	26.6	12.6	12.6
Filter and Media Properties - Unlined Filter Media Perimeter (metres)	44.8	60	45.4	45.4	48.4	41.4	39.4	25.4	30.8	24.8	36.8	28.8	26.8	40.8	37.4	37.4
Filter and Media Properties - Saturated Hydraulic Conductivity (mm/hr)	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180
Filter and Media Properties - Filter Depth (metres)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Filter and Media Properties - TN Content of Filter Media (mg/kg)	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800
Filter and Media Properties - Orthophosphate Content of Filter Media (mg/kg)	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Infiltration Properties - Exfiltration Rate (mm/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lining Properties - Base Lined	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vegetation Properties - Vegetation Properties	Vegetated with Effective Nutrient Removal Plants															
Outlet Properties - Overflow Weir Width (metres)	1	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1	1	1	1	1	1	1.2	1.2
Outlet Properties - Underdrain Present	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Outlet Properties - Submerged Zone With Carbon Present	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Outlet Properties - Submerged Zone Depth (metres)	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
Advanced Properties - Total Suspended Solids - k (m/yr)	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000
Advanced Properties - Total Suspended Solids - C* (mg/L)	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Advanced Properties - Total Phosphorus - k (m/yr)	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000
Advanced Properties - Total Phosphorus - C* (mg/L)	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
Advanced Properties - Total Nitrogen - k (m/yr)	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
Advanced Properties - Total Nitrogen - C* (mg/L)	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
Advanced Properties - Filter Media Soil Type	Loamy Sand															
Advanced Properties - Weir Coefficient	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Advanced Properties - Pet Scaling Factor	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Advanced Properties - Number of CSTR Cells	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Advanced Properties - Porosity of Filter Media	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
Advanced Properties - Porosity of Submerged Zone	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
Advanced Properties - Horizontal Flow Coefficient	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

Node Type	SwaleNode	SwaleNode	SwaleNode	SwaleNode	SwaleNode	SwaleNode	SwaleNode	SwaleNode	SwaleNode
Zoning Surface Type									
Node Name	12m internal Swale #	13 m internal Swale #	11m internal Swale #	13m internal Swale #	13m internal Swale #	13m internal Swale #	14m internal Swale #	14m internal Swale #	14m internal Swale #
Node ID	28	29	30	33	36	39	42	58	61
General - Flux File Timestep (in seconds)	360	360	360	360	360	360	360	360	360
Inlet Properties - Low Flow By-pass (cubic metres per sec)	0	0	0	0	0	0	0	0	0
Storage Properties - Length (metres)	12	13	11	13	13	13	14	14	14
Storage Properties - Bed Slope (%)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Storage Properties - Base Width (metres)	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Storage Properties - Top Width (metres)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Storage Properties - Depth (metres)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Storage Properties - Vegetation Height (metres)	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Storage Properties - Exfiltration Rate (mm/hr)	0	0	0	0	0	0	0	0	0
Advanced Properties - Number of CSTR Cells	10	10	10	10	10	10	10	10	10
Advanced Properties - Total Suspended Solids - k (m/yr)	8000	8000	8000	8000	8000	8000	8000	8000	8000
Advanced Properties - Total Suspended Solids - C* (mg/L)	20	20	20	20	20	20	20	20	20
Advanced Properties - Total Suspended Solids - C** (mg/L)	14	14	14	14	14	14	14	14	14
Advanced Properties - Total Phosphorus - k (m/yr)	6000	6000	6000	6000	6000	6000	6000	6000	6000
Advanced Properties - Total Phosphorus - C* (mg/L)	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
Advanced Properties - Total Phosphorus - C** (mg/L)	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
Advanced Properties - Total Nitrogen - k (m/yr)	500	500	500	500	500	500	500	500	500
Advanced Properties - Total Nitrogen - C* (mg/L)	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
Advanced Properties - Total Nitrogen - C** (mg/L)	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
Advanced Properties - Threshold Hydraulic Loading for C** (m/yr)	3500	3500	3500	3500	3500	3500	3500	3500	3500

Node Type	ReceivingNode	{Node Type}
Node Name	Receiving Node	{Node Name}
Node ID	52	{Node ID}

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Node Type	GPTNode	GPTNode	GPTNode	GenericNode	GenericNode	GenericNode	GPTNode
Node Name	7 × OceanGuards (SQIDEP)	6 × OceanGuards (SQIDEP)	6 × OceanGuards (SQIDEP)	Jellyfish JF-1500-5-1 (460) (SQIDEP)	Jellyfish JF-3300-16-3 (460) (SQIDEP)	Jellyfish JF-2300-7-2 (460)	2 × OceanGuards (SQIDEP)
Notes	SQIDEP OCEANGUARD NODE||This Treatment Node is in accordance with reductions from SQIDEP Verification Certificate. Contact Ocean Protect on 1300 354 722 or register at www.oceantprotect.com.au for design & confirmation details. |||* Treatment flow rate per						
Fluxes							
Flux File Timestep (in seconds)	1	1	1	1	1	1	1
Lo-flow bypass rate (cum/sec)	0	0	0	0	0	0	0
High Flow By-pass (cubic metres per sec)	0.14	0.12	0.12	0.0275	0.0875	0.04	0.04
Flow Transfer Enabled	0	0	0	0	0	0	0
Flow Transfer Function - Input #1	0	0	0	0	0	0	0
Flow Transfer Function - Output #1	0	0	0	0	0	0	0
Flow Transfer Function - Input #2	10	10	10	10	10	10	10
Flow Transfer Function - Output #2	10	10	10	10	10	10	10
GP Transfer Enabled	0	0	0	0	0	0	0
GP Transfer Function - Input #1	0	0	0	0	0	0	0
GP Transfer Function - Output #1	0	0	0	0	0	0	0
GP Transfer Function - Input #2	1000	1000	1000	1000	1000	1000	1000
GP Transfer Function - Output #2	0	0	0	0	0	0	0
TN Transfer Enabled	0	0	0	0	0	0	0
TN Transfer Function - Input #1	0	0	0	0	0	0	0
TN Transfer Function - Output #1	0	0	0	0	0	0	0
TN Transfer Function - Input #2	100	100	100	100	100	100	100
TN Transfer Function - Output #2	75.1	75.1	75.1	53.2	53.2	53.2	75.1
TP Transfer Enabled	0	0	0	0	0	0	0
TP Transfer Function - Input #1	0	0	0	0	0	0	0
TP Transfer Function - Output #1	0	0	0	0	0	0	0
TP Transfer Function - Input #2	10	10	10	10	10	10	10
TP Transfer Function - Output #2	3.53	3.53	3.53	4.3	4.3	4.3	3.53
TSS Transfer Enabled	0	0	0	0	0	0	0
TSS Transfer Function - Input #1	0	0	0	0	0	0	0
TSS Transfer Function - Output #1	0	0	0	0	0	0	0
TSS Transfer Function - Input #2	1000	1000	1000	1000	1000	1000	1000
TSS Transfer Function - Output #2	484	484	484	74	74	74	484
TSS Flow-Efficiency Enabled	1	1	1	1	1	1	1
TSS Flow-Efficiency Values	[0:1];[1:1]	[0:1];[1:1]	[0:1];[1:1]	[0:1];[1:1]	[0:1];[1:1]	[0:1];[1:1]	[0:1];[1:1]
TN Flow-Efficiency Enabled	1	1	1	1	1	1	1
TN Flow-Efficiency Values	[0:1];[1:1]	[0:1];[1:1]	[0:1];[1:1]	[0:1];[1:1]	[0:1];[1:1]	[0:1];[1:1]	[0:1];[1:1]
TP Flow-Efficiency Enabled	1	1	1	0	0	0	1
TP Flow-Efficiency Values	[0:1];[1:1]	[0:1];[1:1]	[0:1];[1:1]	[0:1];[1:1]	[0:1];[1:1]	[0:1];[1:1]	[0:1];[1:1]
GP Flow-Efficiency Enabled	1	1	1	1	1	1	1
GP Flow-Efficiency Values	[0:1];[1:1]	[0:1];[1:1]	[0:1];[1:1]	[0:1];[1:1]	[0:1];[1:1]	[0:1];[1:1]	[0:1];[1:1]

Link Name	Drainage Link	Drainage Link	Drainage Link	Drainage Link	Drainage Link	Drainage Link	Drainage Link	Drainage Link	Drainage Link	Drainage Link	Drainage Link	Drainage Link	Drainage Link	Drainage Link	Drainage Link	Drainage Link
Source Node ID	3	15	14	18	17	20	21	7	8	31	28	34	29	10	30	9
Target Node ID	4	1	1	2	2	3	3	30	29	28	32	33	58	60	59	58
Notes																
Routing	Not Routed	Not Routed	Not Routed	Not Routed	Not Routed	Not Routed	Not Routed	Not Routed	Not Routed	Not Routed	Not Routed	Not Routed	Not Routed	Not Routed	Not Routed	Not Routed
Muskingum K	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Muskingum Theta	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Secondary Outflow Components																

Link Name	Drainage Link	Drainage Link	Drainage Link	Drainage Link	Drainage Link	Drainage Link	Drainage Link	Drainage Link	Drainage Link	Drainage Link	Drainage Link	Drainage Link	Drainage Link	Drainage Link	Drainage Link	Drainage Link
Source Node ID	33	37	36	40	39	6	42	25	24	23	5	26	27	48	45	22
Target Node ID	35	36	38	39	41	42	43	44	46	47	48	45	59	58	61	60
Notes																
Routing	Not Routed	Not Routed	Not Routed	Not Routed	Not Routed	Not Routed	Not Routed	Not Routed	Not Routed	Not Routed	Not Routed	Not Routed	Not Routed	Not Routed	Not Routed	Not Routed
Muskingum K	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Muskingum Theta	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Secondary Outflow Components																

Link Name	Drainage Link	Drainage Link	Drainage Link	Drainage Link	Drainage Link	Drainage Link	Drainage Link	Drainage Link	Drainage Link	Drainage Link	Drainage Link	Drainage Link	Drainage Link	Drainage Link	Drainage Link	Drainage Link
Source Node ID	50	4	51	55	54	19	2	1	53	16	53	54	52	61	57	56
Target Node ID	49	52	55	53	53	54	54	53	53	53	42	43	44	25	24	23
Notes																
Routing	Not Routed	Not Routed	Not Routed	Not Routed	Not Routed	Not Routed	Not Routed	Not Routed	Not Routed	Not Routed	Not Routed	Not Routed	Not Routed	Not Routed	Not Routed	Not Routed
Muskingum K	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Muskingum Theta	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Secondary Outflow Components																

MUSIC MODEL PARAMETER FILE

DESCRIPTION

Job number **P004169 Northshore Retail Precinct**

File name P004169 Retail internal DEFAULT.sqz

VersionNumber 205 {MUSIC Setup File version number}

C:\Program Files (x86)\eWater\MUSIC 6 6.2.1.1576 HL\Met Data\Townsville 6 minutes

MeteorologicalTemplate (1990 - 1999).mlb

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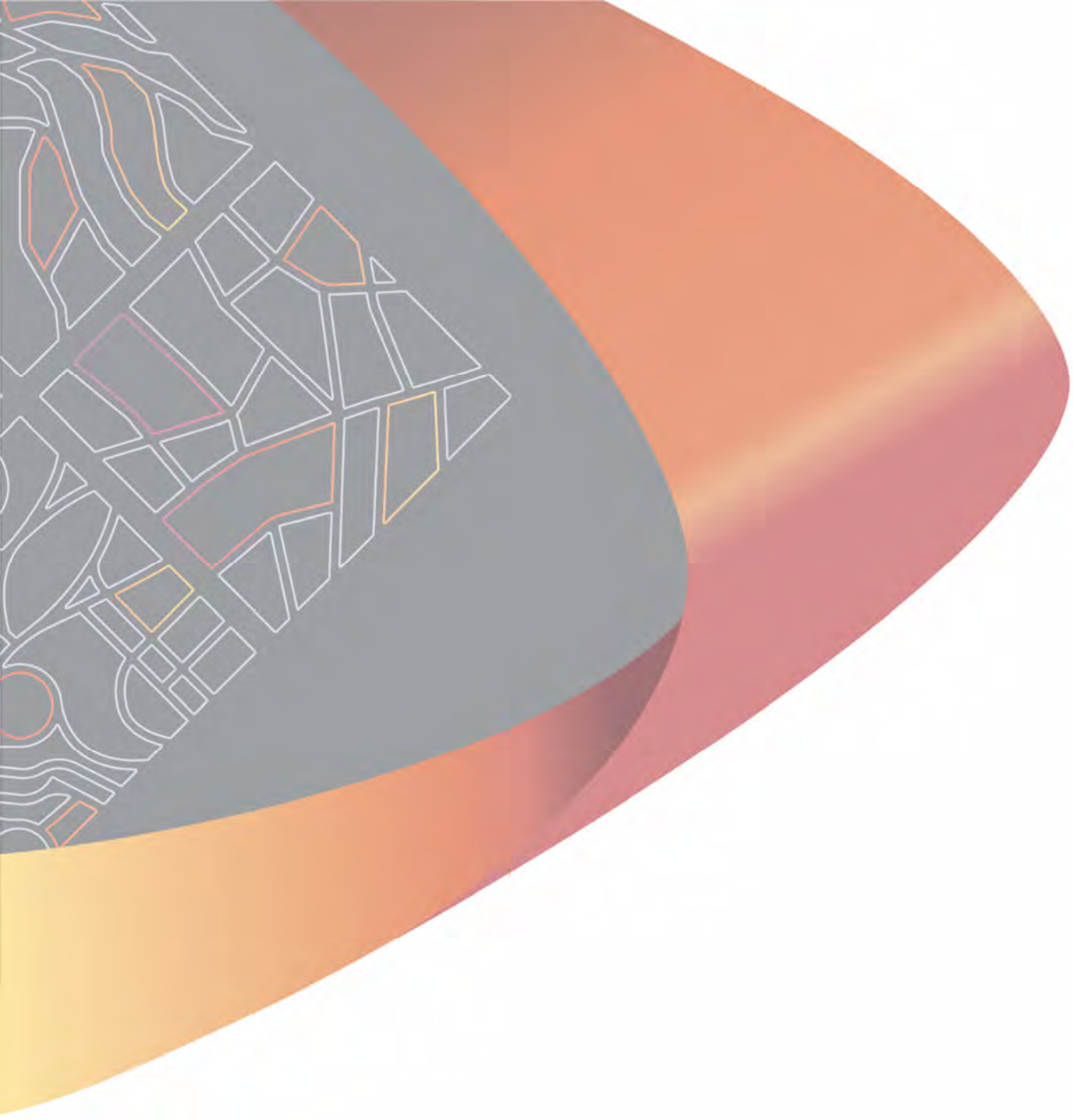
Node Type	UrbanSource Node	UrbanSource Node	UrbanSource Node	UrbanSource Node	UrbanSource Node	UrbanSource Node	UrbanSource Node	UrbanSource Node	UrbanSource Node	UrbanSource Node	UrbanSource Node	UrbanSource Node	UrbanSource Node	UrbanSource Node	UrbanSource Node	UrbanSource Node	UrbanSource Node	UrbanSource Node	UrbanSource Node	UrbanSource Node	UrbanSource Node	UrbanSource Node	UrbanSource Node	UrbanSource Node	UrbanSource Node
Zoning Surface Type	Sealedroad	Sealedroad	Sealedroad	Commercial	Sealedroad	Roof	Commercial	Sealedroad	Roof	Commercial	Sealedroad	Commercial	Commercial	Commercial	Commercial	Commercial	Commercial	Commercial	Sealedroad	Sealedroad	Sealedroad	Sealedroad	Commercial	Commercial	Sealedroad	Sealedroad
Node Name	900 sqm D	1640 sqm D int	1570 sqm D int	A & E Ground - 95% - 2528 m2	A & E Road - 95% - 1392 m2	A & E Roof - 100% - 17360 m2	B Ground - 95% - 1040m2	B Road - 95% - 2975m2	B Roof - 100% - 6260 m2	C Ground - 95% - 1140m2	C Road - 95% - 4098m2	Road Reserve Ext. - 75% - 800 m2	Road Reserve Ext. - 75% - 1900 m2	Road Reserve Ext. - 75% - 1500 m2	Road Reserve Ext. - 75% - 1200 m2	Road Reserve Ext. - 75% - 1100 m2	Road Reserve Ext. - 75% - 1000 m2	1500 sqm D.int	1640 sqm D.int	1450 sqm D.int	1400 sqm D.int	Road Reserve Ext. - 75% - 1900 m2	F Ground - 95% - 1322m2	1350 sqm D.int	1300 sqm D.int
Node ID	6	7	8	14	15	16	17	18	19	20	21	22	23	24	25	26	27	31	34	37	40	50	51	56	59
Areas - Total Area (ha)	0.09	0.164	0.157	0.252	0.139	1.736	0.104	0.298	0.626	0.114	0.41	0.08	0.19	0.15	0.12	0.11	0.1	0.15	0.164	0.145	0.14	0.19	0.132	0.135	0.13
Areas - Impervious (%)	95	95	95	95	95	100	95	95	100	95	95	75	75	75	75	75	75	95	95	95	95	75	95	95	95
Areas - Pervious (%)	5	5	5	5	5	0	5	5	0	5	5	25	25	25	25	25	25	5	5	5	5	25	5	5	5
Rainfall-Runoff - Impervious Area - Rainfall Threshold (mm/day)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Rainfall-Runoff - Pervious Area - Soil Storage Capacity (mm)	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250
Rainfall-Runoff - Pervious Area - Initial Storage (% of Capacity)	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Rainfall-Runoff - Pervious Area - Field Capacity (mm)	100	100	100	100	100	100	100	100	100	100	100	10	10	10	10	10	10	100	100	100	100	10	100	100	100
Rainfall-Runoff - Pervious Area - Infiltration Capacity Coefficient - a	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
Rainfall-Runoff - Pervious Area - Infiltration Capacity Exponent - b	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Rainfall-Runoff - Groundwater Properties - Initial Depth (mm)	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Rainfall-Runoff - Groundwater Properties - Daily Recharge Rate (%)	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Rainfall-Runoff - Groundwater Properties - Daily Baseflow Rate (%)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Rainfall-Runoff - Groundwater Properties - Daily Deep Seepage Rate (%)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Total Suspended Solids - Base Flow Concentration - Mean (log mg/L)	0.78	0.78	0.78	0.78	0.78	0	0.78	0.78	0	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Total Suspended Solids - Base Flow Concentration - Std Dev (log mg/L)	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39
Total Suspended Solids - Base Flow Concentration - Estimation Method	Stochastically generated																								
Total Suspended Solids - Base Flow Concentration - Serial Correlation (R squared)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Suspended Solids - Storm Flow Concentration - Mean (log mg/L)	2.43	2.43	2.43	2.16	2.43	1.3	2.16	2.43	1.3	2.16	2.43	2.16	2.16	2.16	2.16	2.16	2.16	2.43	2.43	2.43	2.43	2.16	2.16	2.43	2.43
Total Suspended Solids - Storm Flow Concentration - Std Dev (log mg/L)	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38
Total Suspended Solids - Storm Flow Concentration - Estimation Method	Stochastically generated																								
Total Suspended Solids - Storm Flow Concentration - Serial Correlation (R squared)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Phosphorus - Base Flow Concentration - Mean (log mg/L)	-0.6	-0.6	-0.6	-0.6	-0.6	0	-0.6	-0.6	0	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
Total Phosphorus - Base Flow Concentration - Std Dev (log mg/L)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Total Phosphorus - Base Flow Concentration - Estimation Method	Stochastically generated																								
Total Phosphorus - Base Flow Concentration - Serial Correlation (R squared)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Phosphorus - Storm Flow Concentration - Mean (log mg/L)	-0.3	-0.3	-0.3	-0.39	-0.3	-0.89	-0.39	-0.3	-0.89	-0.39	-0.3	-0.39	-0.39	-0.39	-0.39	-0.39	-0.39	-0.3	-0.3	-0.3	-0.3	-0.39	-0.39	-0.3	-0.3
Total Phosphorus - Storm Flow Concentration - Std Dev (log mg/L)	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34
Total Phosphorus - Storm Flow Concentration - Estimation Method	Stochastically generated																								
Total Phosphorus - Storm Flow Concentration - Serial Correlation (R squared)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Nitrogen - Base Flow Concentration - Mean (log mg/L)	0.32	0.32	0.32	0.32	0.32	0	0.32	0.32	0	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32
Total Nitrogen - Base Flow Concentration - Std Dev (log mg/L)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Total Nitrogen - Base Flow Concentration - Estimation Method	Stochastically generated																								
Total Nitrogen - Base Flow Concentration - Serial Correlation (R squared)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Nitrogen - Storm Flow Concentration - Mean (log mg/L)	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37
Total Nitrogen - Storm Flow Concentration - Std Dev (log mg/L)	0.034	0.034	0.034	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.034	0.034	0.034	0.034	0.34	0.34	0.034	0.034
Total Nitrogen - Storm Flow Concentration - Estimation Method	Stochastically generated																								
Total Nitrogen - Storm Flow Concentration - Serial Correlation (R squared)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Import Flow Properties - Import Flow Enabled	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Import Flow Properties - Import Flow File																									
Import Flow Properties - Header lines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Import Flow Properties - Baseflow Column	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Import Flow Properties - Impervious Stormflow Column	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Import Flow Properties - Pervious Stormflow Column	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Import Flow Properties -m3/s																									
Import Flow Properties - Catchment Area for GP (ha)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1



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