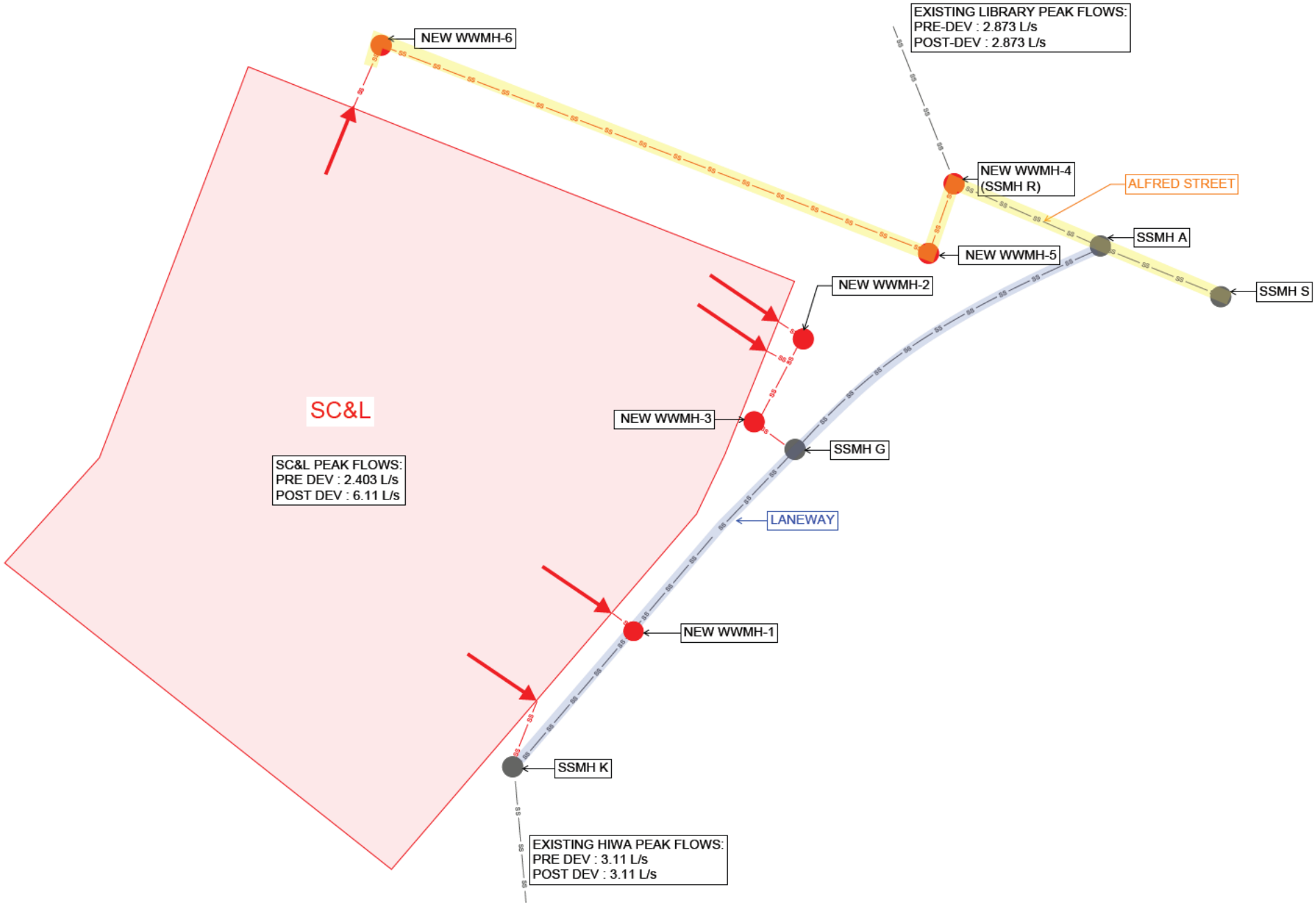
B

Appendix B – Detailed Calculations

WASTEWATER FLOW SCHEMATICS



Project Name:	UoA Student Centre
Job No.:	5013381
Client:	UoA
Building Type:	Existing Library B109
Calcs by:	Luke C
Reviewed by:	Selina Z
Date:	9/07/2026

Design Standards

The Auckland Code of Practice for Land Development and Subdivision - Water and Wastewater Code of Practice for Land Development and Subdivision - Chapter 5: Wastewater

Commercial development design wastewater flows and peaking factors:

Table 5.1.3 Commercial - dry retail, office and wet retail design wastewater flow allowance and peaking factors

Commercial activity type	Design wastewater flow allowance	Design wastewater peaking factors	
		Peaking factor: Self-Cleansing Design Flow (Normal PDWF)	Peaking factor: Peak Design Flow(PWWF or Exceptional PDWF)
Dry retail (Note 1) (where kitchen/toilets are not normally made available to customers)	1 person per 50m² net floor area at 65 litres per person per day.	2.0	5.0
Office buildings and dry retail where toilet facilities, etc. are provided to customers.	1 person per 15m² net floor area at 65 litres per person per day.	2.0	5.0
Wet retail (Note 2): Food and or beverage retail/preparation e.g. coffee shop, restaurant, bar, butcher, fresh fruit and vegetable retail.	15 litres per day per net m² of floor area (including kitchen and dining areas).	2.0	6.7

Commercial activity type	Design wastewater flow allowance	Design wastewater peaking factors	
		Peaking factor: Self-Cleansing Design Flow (Normal PDWF)	Peaking factor: Peak Design Flow(PWWF or Exceptional PDWF)
Unknown and site area >10ha, <100ha	1 L/s/ha (complete land area)	2.0	6.7
Site area >100ha	Refer to transmission design standards	-	-

Table notes:

1. Dry retail is where water is normally only used by staff for their own personal food preparation / toileting needs. Examples include: clothes shop, hardware retail.
2. Wet retail is where water is used to prepare food product for customers. Examples include: café, lunch bar, restaurant, butchery, fresh fruit and vegetable, food court-bar and supermarkets.

Important:
Net floor area is the total floor area of the building (exclude any open land areas), less non-productive areas, such as:
lobbies; lifts; machine rooms; electrical services; stairwells; fire escapes; corridors and other passages used in common with other occupiers; car parking areas; etc. If net area is unknown, and the type of buildings are unknown, it can be assumed that the Net floor area is = 80% of the gross floor area of the building.

As a guide to how activities will be assessed, commercial washing activities such as car / boat washing activities, etc. would be regarded as a "wet-industry" and not as a commercial - wet retail, as the water is being used as a part of a process (washing). Large-scale food-processing (i.e. for supply to commercial customers, as opposed to on-site retail customers) would be regarded as an industrial type activity. Preparation / manufacture of non-food based products, is also regarded as an industrial activity. Industry design flows are detailed in the section below.

PDWF - Self Cleansing Design Flow

Type	Net Floor Area (m^2)	Person	Litres per day per net m^2 of floor area	Design wastewater flow (litres) allowance per person per day	Peaking Factor	Design Flow (l/s)
Office buildings	11456.4	764		65	2	1.149
					Total PDWF flow	1.149

PWWF - Peak Design Flow

Type	Net Floor Area (m^2)	Person	Litres per day per net m^2 of floor area	Design wastewater flow (litres) allowance per person per day	Peaking Factor	Design Flow (l/s)
Office buildings	11456.4	764		65	5	2.873
					Total PWWF flow	2.873

Assumptions:

1. Building plan areas were derived from aerial imagery measurements. Building storeys were estimated using google street view. Building usage was assumed to be commercial office

2. Building floor areas are all high level estimates and may be subject to change



Project Name:	UoA Student Centre
Job No.:	5013381
Client:	UoA
Building Type:	SC&L Pre-Development
Calcs by:	Luke C
Reviewed by:	Selina Z
Date:	9/07/2026

Design Standards

The Auckland Code of Practice for Land Development and Subdivision - Water and Wastewater Code of Practice for Land Development and Subdivision - Chapter 5: Wastewater

Commercial development design wastewater flows and peaking factors:

Table 5.1.3 Commercial - dry retail, office and wet retail design wastewater flow allowance and peaking factors

Commercial activity type	*Design wastewater flow allowance*	*Design wastewater peaking factors*	
		Peaking factor: Self-Cleansing Design Flow (Normal PDWF)	*Peaking factor: Peak Design Flow(PWWF or Exceptional PDWF)*
Dry retail (Note 1) (where kitchen/toilets are not normally made available to customers)	*1 person per 50m² net floor area at 65 litres per person per day.*	*2.0*	*5.0*
Office buildings and dry retail where toilet facilities, etc. are provided to customers.	*1 person per 15m² net floor area at 65 litres per person per day.*	*2.0*	*5.0*
Wet retail (Note 2): Food and or beverage retail/preparation e.g. coffee shop, restaurant, bar, butcher, fresh fruit and vegetable retail.	*15 litres per day per net m² of floor area (including kitchen and dining areas).*	*2.0*	*6.7*

Commercial activity type	*Design wastewater flow allowance*	*Design wastewater peaking factors*	
		Peaking factor: Self-Cleansing Design Flow (Normal PDWF)	*Peaking factor: Peak Design Flow(PWWF or Exceptional PDWF)*
Unknown and site area >10ha, <100ha	*1 L/s/ha (complete land area)*	*2.0*	*6.7*
Site area >100ha	*Refer to transmission design standards*	-	-

Table notes:

1. *Dry retail is where water is normally only used by staff for their own personal food preparation / toileting needs. Examples include: clothes shop, hardware retail.*
2. *Wet retail is where water is used to prepare food product for customers. Examples include: café, lunch bar, restaurant, butchery, fresh fruit and vegetable, food court-bar and supermarkets.*

Important:

Net floor area is the total floor area of the building (exclude any open land areas), less non-productive areas, such as:
lobbies; lifts; machine rooms; electrical services; stairwells; fire escapes; corridors and other passages used in common with other occupiers; car parking areas; etc. If net area is unknown, and the type of buildings are unknown, it can be assumed that the Net floor area is = 80% of the gross floor area of the building.

As a guide to how activities will be assessed, commercial washing activities such as car / boat washing activities, etc. would be regarded as a "wet-industry" and not as a commercial - wet retail, as the water is being used as a part of a process (washing). Large-scale food-processing (i.e. for supply to commercial customers, as opposed to on-site retail customers) would be regarded as an industrial type activity. Preparation / manufacture of non-food based products, is also regarded as an industrial activity. Industry design flows are detailed in the section below.

PDWF - Self Cleansing Design Flow

Type	Net Floor Area (m^2)	Person	Litres per day per net m^2 of floor area	Design wastewater flow (litres) allowance per person per day	Peaking Factor	Design Flow (l/s)
Wet Retail	556.22		15		2	0.193
Office buildings	7001.42	467		65	2	0.702
					Total PDWF flow	0.895

PWWF - Peak Design Flow

Type	Net Floor Area (m^2)	Person	Litres per day per net m^2 of floor area	Design wastewater flow (litres) allowance per person per day	Peaking Factor	Design Flow (l/s)
Wet Retail	556.22		15		6.7	0.647
Office buildings	7001.42	467		65	5	1.756
					Total PWWF flow	2.403

Assumptions:

1. Building plan areas were derived from aerial imagery measurements. Building storeys were estimated using google street view. Building usage was assumed to be commercial office, except for "Shadows Bar," which was classified as wet retail.

2. Building floor areas are all high level estimates and may be subject to change



Project Name:	UoA Student Centre
Job No.:	5013381
Client:	UoA
Building Type:	SC&L Post-Development
Calcs by:	Luke C
Reviewed by:	Selina Z
Date:	29/10/2026

Design Standards

The Auckland Code of Practice for Land Development and Subdivision - Water and Wastewater Code of Practice for Land Development and Subdivision - Chapter 5: Wastewater

Commercial development design wastewater flows and peaking factors:

Table 5.1.3 Commercial - dry retail, office and wet retail design wastewater flow allowance and peaking factors

Commercial activity type	Design wastewater flow allowance	Design wastewater peaking factors	
		Peaking factor: Self-Cleansing Design Flow (Normal PDWF)	Peaking factor: Peak Design Flow(PWWF or Exceptional PDWF)
Dry retail (Note 1) (where kitchen/toilets are not normally made available to customers)	1 person per 50m² net floor area at 65 litres per person per day.	2.0	5.0
Office buildings and dry retail where toilet facilities, etc. are provided to customers.	1 person per 15m² net floor area at 65 litres per person per day.	2.0	5.0
Wet retail (Note 2): Food and or beverage retail/preparation e.g. coffee shop, restaurant, bar, butcher, fresh fruit and vegetable retail.	15 litres per day per net m² of floor area (including kitchen and dining areas).	2.0	6.7

Commercial activity type	Design wastewater flow allowance	Design wastewater peaking factors	
		Peaking factor: Self-Cleansing Design Flow (Normal PDWF)	Peaking factor: Peak Design Flow(PWWF or Exceptional PDWF)
Unknown and site area >10ha, <100ha	1 L/s/ha (complete land area)	2.0	6.7
Site area >100ha	Refer to transmission design standards	-	-

Table notes:

1. Dry retail is where water is normally only used by staff for their own personal food preparation / toileting needs. Examples include: clothes shop, hardware retail.
2. Wet retail is where water is used to prepare food product for customers. Examples include: café, lunch bar, restaurant, butchery, fresh fruit and vegetable, food court-bar and supermarkets.

Important:

Net floor area is the total floor area of the building (exclude any open land areas), less non-productive areas, such as:
lobbies; lifts; machine rooms; electrical services; stairwells; fire escapes; corridors and other passages used in common with other occupiers; car parking areas; etc. If net area is unknown, and the type of buildings are unknown, it can be assumed that the Net floor area is = 80% of the gross floor area of the building.

As a guide to how activities will be assessed, commercial washing activities such as car / boat washing activities, etc. would be regarded as a "wet-industry" and not as a commercial - wet retail, as the water is being used as a part of a process (washing). Large-scale food-processing (i.e. for supply to commercial customers, as opposed to on-site retail customers) would be regarded as an industrial type activity. Preparation / manufacture of non-food based products, is also regarded as an industrial activity. Industry design flows are detailed in the section below.

PDWF - Self Cleansing Design Flow

Type	Net Floor Area (m²)	Person	Litres per day per net m² of floor area	Design wastewater flow (litres) allowance per person per day	Peaking Factor	Design Flow (l/s)
Wet Retail	182		15		2	0.06
Superlabs	1832		11		5	1.12
Office buildings	17554	1170		65	2	1.76
					Total PDWF flow	2.94

PWWF - Peak Design Flow

Type	Net Floor Area (m²)	Person	Litres per day per net m² of floor area	Design wastewater flow (litres) allowance per person per day	Peaking Factor	Design Flow (l/s)
Wet Retail	182		15		6.7	0.21
Superlabs	1832		11		6.7	1.50
Office buildings	17554	1170		65	5	4.40
					Total PWWF flow	6.11

Assumptions:

1. New building is assumed to be Commercial - office buildings where toilet facilities etc. are provided to users.

2. Building Net Floor Area (NFA) is based on 100% FTAA Substantive Application Architectural & Landscape Design Report dated October 2026. It is assumed all rooms including plant rooms are counted as NFA. Terraces are excluded from NFA calculations.

3. Superlabs are considered as heavy dry industry.

182 m²	Food and Beverage
400 m²	Student Support & Clubs
8,725 m²	Library and Study
2,881 m²	Teaching and Learning space
1,832 m²	Superlabs
474 m²	Visitor Centre
5,074 m²	Common (core and circulation)
19,568 m²	Total GFA (excl terraces, voids)

Beca Ltd

JOB NO: 5013381
CALCS BY: Luke C DATE: 9/07/2026
REVIEWED BY: Selina Z DATE: 26/08/2026

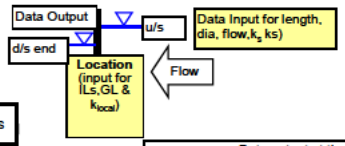
Hydraulic Grade Line Analysis:

Project Description WW Alfred St Pre-development

Downstream HGL (m)	37.68
Downstream Distance (m)	0
Flow Factor	1 (Actual/Specified)

Basis of computations
Calculations are from downstream (d/s) to upstream (u/s) as per the table input.
Energy ($E_{u/s}$)= $E_{d/s}+S_f\Delta x+k_{local}v^2/2g$
$HGL_{u/s}=E_{u/s}-v^2/2g$
Where S_f is the friction slope based on Colebrook-White and v is the pipe velocity.
If HGL falls below the pipe overt, some partial full condition is assumed.

Notes:
Input
The following table can input 20 components.
Inputa data starts at the d/s end and progresses u/s
Input data on pipe dia, flow, and k_s applies to the pipe u/s.
Terminate list by making length = -1.0

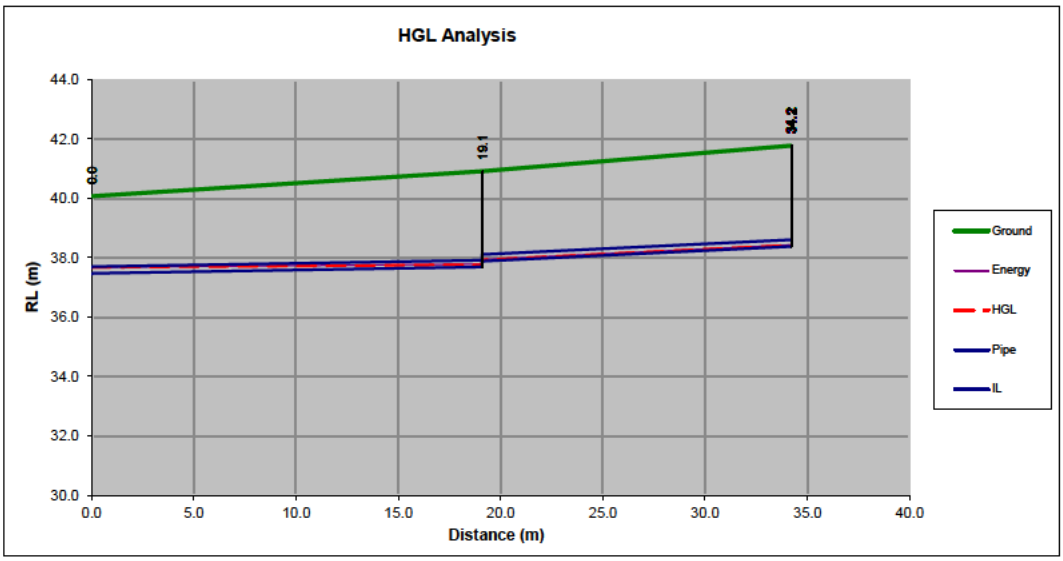


Grade 1 150

2.873 + 2.403 + 3.11 = 8.386 L/s

Location	Length (to u/s-m)	Pipe dia. (m)	Invert level (d/s-RL m)	Invert level (u/s-RL(m)	Ground level (d/s-RL m)	Specified Flow (m^3/s)	k_s (mm)	k_{local} (u/s)	Data output at the u/s end of the pipe (see diagram) Distance (m)	Actual Flow (m^3/s)	Pipe full Vel (m/s)	Pipe slope (m/m)	HGL (m)	Energy (m)	Freeboard to GL (m)
SSMH S	19.1	0.225	37.45	37.47	40.08	0.008	1.5	0.2	0.00	0.008	0.20	0.0115	37.68	37.68	2.40
SSMH A	15.1	0.225	37.69	37.88	40.91	0.003	1.5	0.2	19.10	0.003	0.07	0.0331	37.76	37.79	3.15
SSMH R	-1		38.38	38.46	41.78				34.20				38.42	38.44	3.36

2.873 L/s



Recommended local manhole losses (k_{local}) for haunched MHs
(Losses based on d/s velocity)

Deviation Angle °	No surcharge	With Surcharge Lateral inflow None	With Surcharge Lateral inflow Some	Drop MH
0	0.2	0.2	0.5	1.5
45	0.5	0.5	1.0	1.5
90	1.2	1.5	1.5	2.0

Total energy change (m)	**0.76**
Energy loss due to friction (m)	0.01
Energy loss due to local headlosses (m)	0.00
Energy loss due to geometry (m)	0.75

Beca Ltd

JOB NO: 5013381
CALCS BY: Luke C DATE 9/07/2026
REVIEWED BY: Selina Z DATE 29/10/2026

Hydraulic Grade Line Analysis:

Project Description WW Alfred St Post-development

Downstream HGL (m)	37.68
Downstream Distance (m)	0
Flow Factor	1 (Actual/Specified)

Basis of computations
Calculations are from downstream (d/s) to upstream (u/s) as per the table input.
Energy ($E_{u/s}$)= $E_{d/s}+S_f\Delta x+k_{local}v^2/2g$
$HGL_{u/s}=E_{u/s}-v^2/2g$
Where S_f is the friction slope based on Colebrook-White and v is the pipe velocity.
If HGL falls below the pipe overt, some partial full condition is assumed.

Notes:
Input
The following table can input 20 components.
Inputa data starts at the d/s end and progresses u/s
Input data on pipe dia, flow, and k_s applies to the pipe u/s.
Terminate list by making length = -1.0

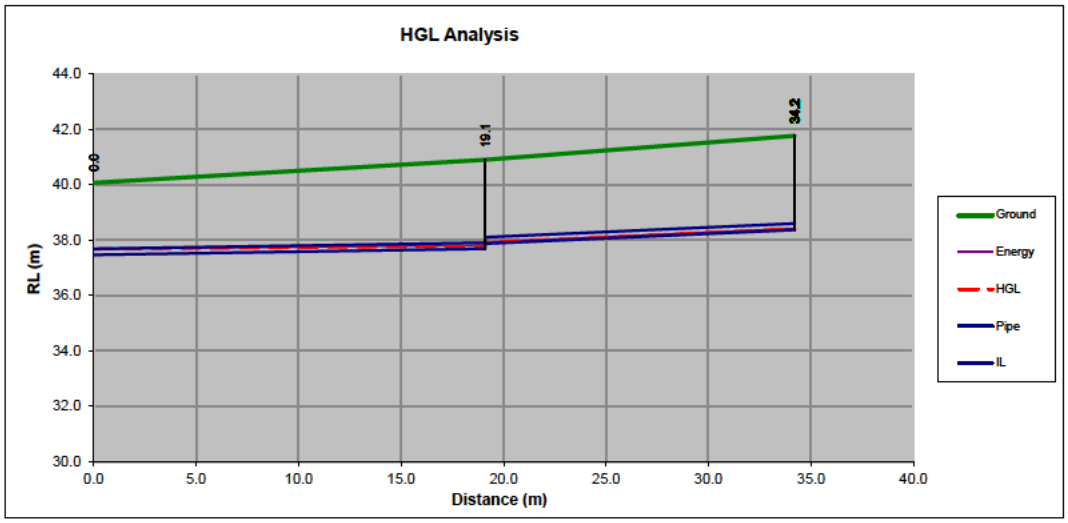
Data Output | u/s | Data Input for length, dia, flow, k_s ks)
d/s end | Location (input for ILs,GL & k_{local}) | Flow

Grade 1 150

2.873 + 6.11 + 3.11 = 12.093 L/s

Location	Length (to u/s-m)	Pipe dia. (m)	Invert level (d/s-RL m)	Invert level (u/s-RL(m)	Ground level (d/s-RL m)	Specified Flow (m^3/s)	k_s (mm)	k_{local} (u/s)	Data output at the u/s end of the pipe (see diagram) Distance (m)	Actual Flow (m^3/s)	Pipe full Vel (m/s)	Pipe slope (m/m)	HGL (m)	Energy (m)	Freeboard to GL (m)
SSMH S	19.1	0.225	37.45	37.47	40.08	0.012	1.5	0.5	0.00	0.012	0.30	0.0115	37.68	37.68	2.40
SSMH A	15.1	0.225	37.69	37.88	40.91	0.003	1.5	0.2	19.10	0.003	0.07	0.0331	37.78	37.81	3.13
SSMH R	-1		38.38	38.46	41.78				34.20				38.42	38.44	3.36

2.873 L/s



Recommended local manhole losses (k_{local}) for haunched MHs
(Losses based on d/s velocity)

Deviation Angle °	No surcharge	With Surcharge Lateral inflow None	With Surcharge Lateral inflow Some	Drop MH
0	0.2	0.2	0.5	1.5
45	0.5	0.5	1.0	1.5
90	1.2	1.5	1.5	2.0

Total energy change (m)	**0.76**
Energy loss due to friction (m)	0.01
Energy loss due to local headlosses (m)	0.00
Energy loss due to geometry (m)	0.74

Beca Ltd

JOB NO: 5013381
CALCS BY: Luke C DATE 13/07/2026
REVIEWED BY: Selina Z DATE 26/08/2026

Hydraulic Grade Line Analysis:

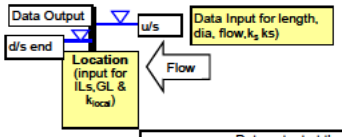
Project Description WW Laneway Pre-development

Downstream HGL (m)	37.99
Downstream Distance (m)	0
Flow Factor	1 (Actual/Specified)

Basis of computations
Calculations are from downstream (d/s) to upstream (u/s) as per the table input.
Energy ($E_{u/s}$)= $E_{d/s}+S_f\Delta x+k_{local}v^2/2g$
$HGL_{u/s}=E_{u/s}-v^2/2g$
Where S_f is the friction slope based on Colebrook-White and v is the pipe velocity.
If HGL falls below the pipe overt, some partial full condition is assumed.

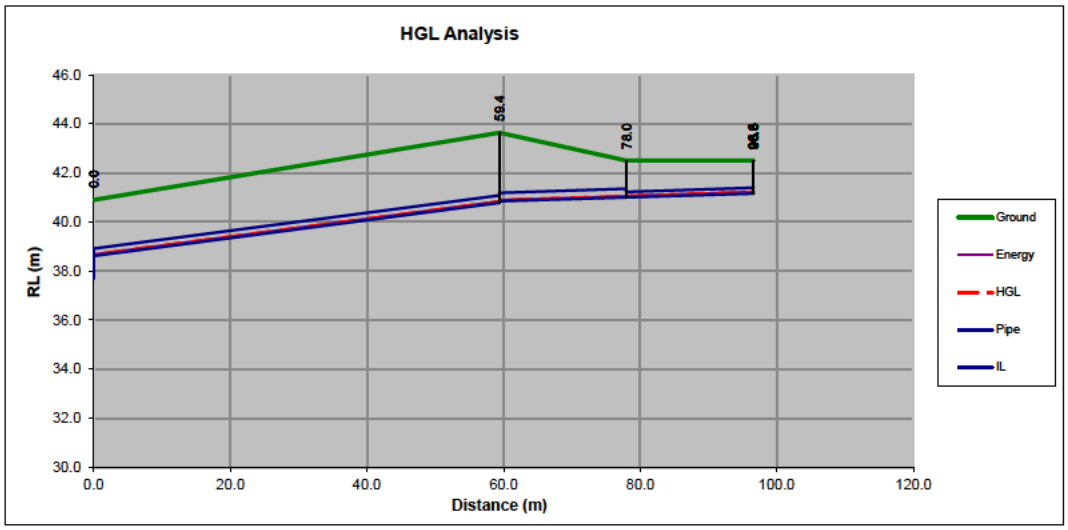
Notes:
Input
The following table can input 20 components.
Inputa data starts at the d/s end and progresses u/s
Input data on pipe dia, flow, and k_s applies to the pipe u/s.
Terminate list by making length = -1.0

Grade 1 150



Location	Length (to u/s-m)	Pipe dia. (m)	Invert level (d/s-RL m)	Invert level (u/s-RL(m)	Ground level (d/s-RL m)	Specified Flow (m^3/s)	k_s (mm)	k_{local} (u/s)	Data output at the u/s end of the pipe (see diagram): Distance (m)	Actual Flow (m^3/s)	Pipe full Vel (m/s)	Pipe slope (m/m)	HGL (m)	Energy (m)	Freeboard to GL (m)
SSMH A	59.4	0.3	37.69	38.62	40.91	0.006	1.5	0.5	0.00	0.006	0.08	0.0364	38.68	38.69	2.23
SSMH G	18.6	0.35	40.78	40.84	43.65	0.006	1.5	0.2	59.40	0.006	0.06	0.0086	40.84	40.85	2.81
Change in size	18.6	0.225	41.00	41.00	42.50	0.006	1.5	0.2	78.00	0.006	0.14	0.0091	41.05	41.07	1.45
SSMH K	-1		41.17	41.27	42.50	0.006	1.5	0.2					41.23	41.25	1.27

2.403 + 3.11 = 5.513 L/s



Recommended local manhole losses (k_{local}) for haunched MHs
(Losses based on d/s velocity)

Deviation Angle °	No surcharge	With Surcharge Lateral inflow: None	With Surcharge Lateral inflow: Some	Drop MH
0	0.2	0.2	0.5	1.5
45	0.5	0.5	1.0	1.5
90	1.2	1.5	1.5	2.0

Total energy change (m)	**3.26**
Energy loss due to friction (m)	0.01
Energy loss due to local headlosses (m)	0.00
Energy loss due to geometry (m)	3.26

Beca Ltd

JOB NO: 5013381
CALCS BY: Luke C DATE 13/07/2026
REVIEWED BY: Selina Z DATE 29/10/2026

Hydraulic Grade Line Analysis:

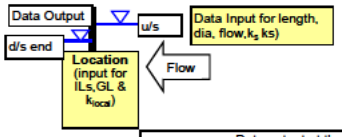
Project Description WW Laneway Post-development

Downstream HGL (m)	37.99
Downstream Distance (m)	0
Flow Factor	1 (Actual/Specified)

Basis of computations
Calculations are from downstream (d/s) to upstream (u/s) as per the table input.
Energy ($E_{u/s}$)= $E_{d/s}+S_f\Delta x+k_{local}v^2/2g$
$HGL_{u/s}=E_{u/s}-v^2/2g$
Where S_f is the friction slope based on Colebrook-White and v is the pipe velocity.
If HGL falls below the pipe overt, some partial full condition is assumed.

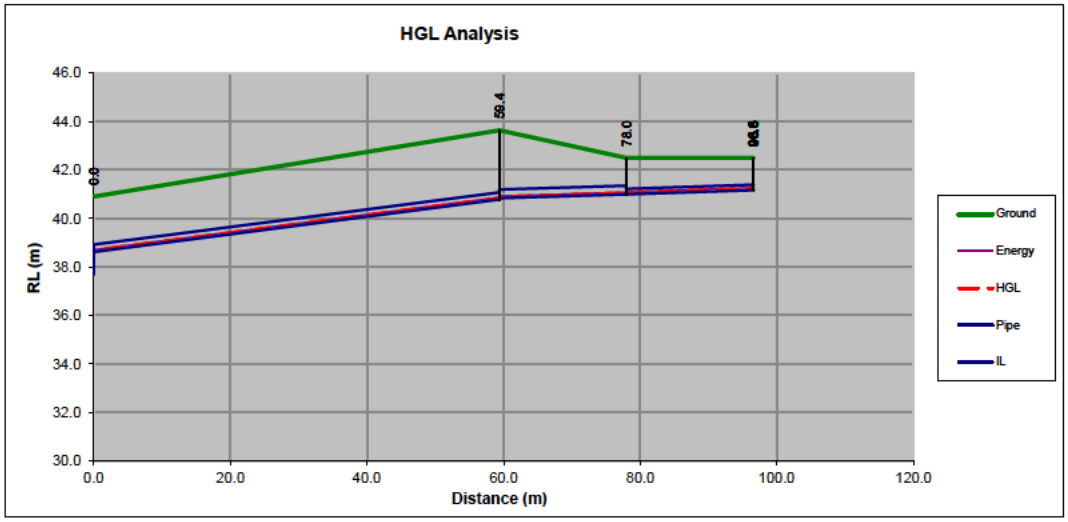
Notes:
Input
The following table can input 20 components.
Inputa data starts at the d/s end and progresses u/s
Input data on pipe dia, flow, and k_s applies to the pipe u/s.
Terminate list by making length = -1.0

Grade 1 150



Location	Length (to u/s-m)	Pipe dia. (m)	Invert level (d/s-RL m)	Invert level (u/s-RL(m)	Ground level (d/s-RL m)	Specified Flow (m^3/s)	k_s (mm)	k_{local} (u/s)	Data output at the u/s end of the pipe (see diagram): Distance (m)	Actual Flow (m^3/s)	Pipe full Vel (m/s)	Pipe slope (m/m)	HGL (m)	Energy (m)	Freeboard to GL (m)
SSMH A	59.4	0.3	37.69	38.62	40.91	0.009	1.5	0.5	0.00	0.009	0.13	0.0364	38.69	38.72	2.22
SSMH G	18.6	0.35	40.78	40.84	43.65	0.009	1.5	0.2	59.40	0.009	0.10	0.0086	40.85	40.88	2.80
Change in size	18.6	0.225	41.00	41.00	42.50	0.009	1.5	0.2	78.00	0.009	0.23	0.0091	41.07	41.09	1.43
SSMH K	-1		41.17	41.27	42.50	0.009	1.5	0.2					41.25	41.28	1.25

6.11 + 3.11 = 9.22 L/s



Recommended local manhole losses (k_{local}) for haunched MHs
(Losses based on d/s velocity)

Deviation Angle °	No surcharge	With Surcharge Lateral inflow: None	With Surcharge Lateral inflow: Some	Drop MH
0	0.2	0.2	0.5	1.5
45	0.5	0.5	1.0	1.5
90	1.2	1.5	1.5	2.0

Total energy change (m)	**3.29**
Energy loss due to friction (m)	0.01
Energy loss due to local headlosses (m)	0.00
Energy loss due to geometry (m)	3.27

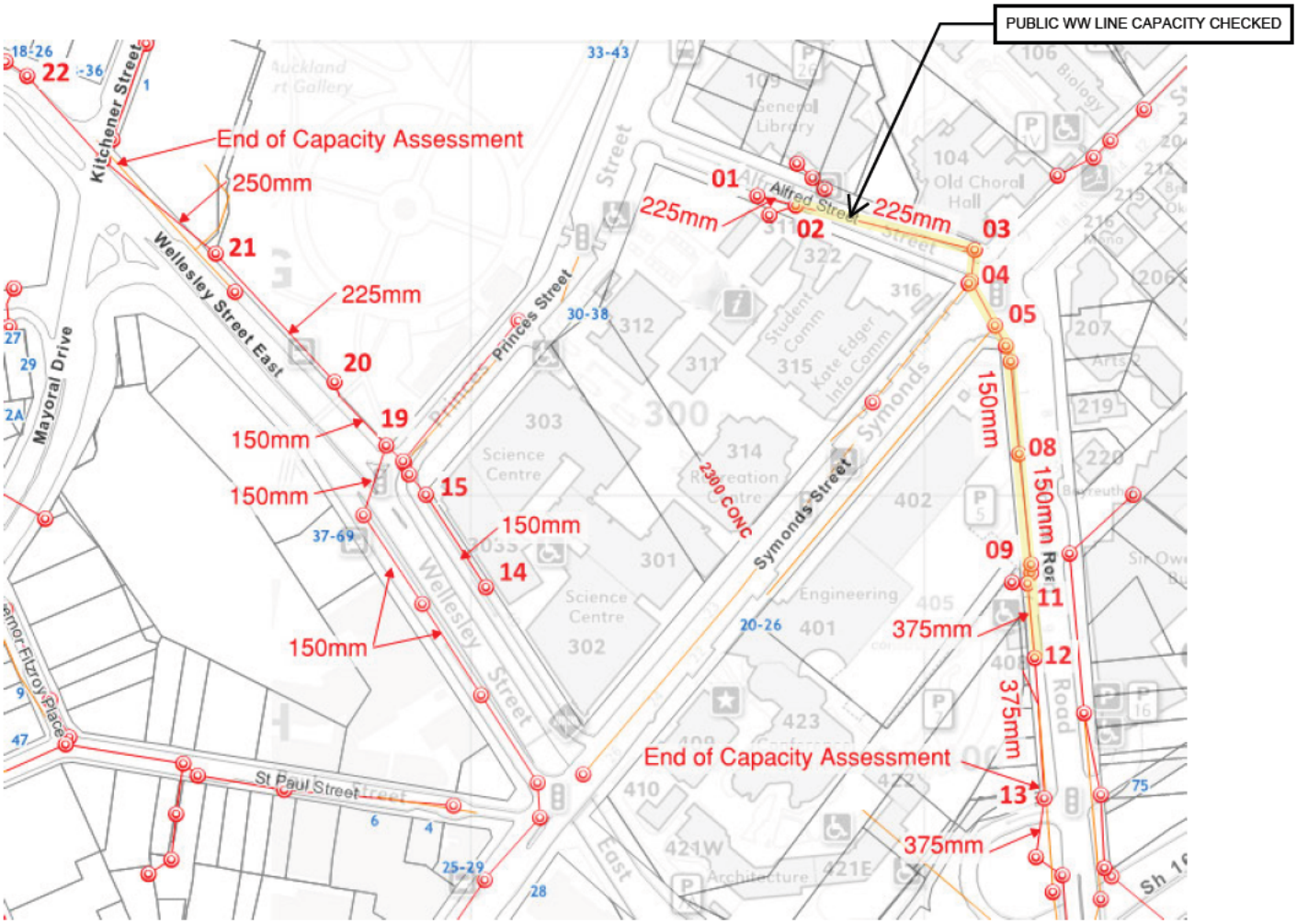


Figure 6.2: Details of the Downstream Sanitary Sewers (Auckland Council GIS).

Table 6.4: Summary of Sanitary Sewer Capacity Assessment

	Distance (m)	Slope (%)	Pipe Dia. (mm)	Pipe Full Capacity (l/s)	Pipe Half Full Capacity (l/s)	Estimated Wastewater Flow			
						Average Flow (l/s)	PDWF (l/s)	PWWF (l/s)	Added in SC&L Post-dev Flow
Sanitary Sewer Under Alfred Street									
SS02	81.1	5.3%	225	**103.1**	**65.0**	1.2	**1.9**	**5.3**	9.0
SS03	14.3	9.2%	150	**46.1**	**29.0**	1.6	**2.7**	**7.7**	11.4
SS04	21.3	13.8%	150	**56.7**	**35.7**	2.0	**3.5**	**10.4**	14.1
SS05	10.4	7.5%	300	**264.8**	**166.8**	2.0	**3.5**	**10.4**	14.1
SS06	7.4	32.4%	150	**86.7**	**54.6**	2.0	**3.5**	**10.4**	14.1
SS07	40.7	1.2%	150	**16.7**	**10.5**	2.0	**3.5**	**10.4**	14.1
SS08	48.6	4.6%	150	**32.8**	**20.6**	3.0	**5.5**	**17.4**	21.1
SS09	3.8	8.9%	150	**45.5**	**28.7**	3.0	**5.5**	**17.4**	21.1
SS10	4.9	33.9%	375	**1020.6**	**642.8**	3.0	**5.5**	**17.4**	21.1
SS11	32.9	4.3%	375	**363.0**	**228.6**	5.1	**9.7**	**31.4**	35.1
SS12	61.8	3.9%	375	**347.0**	**218.5**	5.1	**9.7**	**31.4**	35.1
Sanitary Sewer Under Wellesley Street									
SS14	41.9	7.0%	150	**40.4**	**25.4**	1.2	**2.3**	**7.8**	
SS15	22.4	3.1%	150	**26.9**	**17.0**	1.3	**2.1**	**8.7**	
SS16	1.60	56.2%	150	**114.2**	**71.9**	1.3	**2.1**	**8.7**	
SS17	1.30	11.5%	150	**51.7**	**32.6**	1.3	**2.1**	**8.7**	
SS18	10.40	2.2%	150	**22.6**	**14.3**	1.3	**2.1**	**8.7**	
SS19	35.90	9.3%	150	**46.5**	**29.3**	5.2	**11.6**	**28.2**	
SS20	78.20	8.6%	225	**131.8**	**83.0**	5.2	**11.6**	**28.2**	
SS21	63.5	13.7%	250	**220.5**	**138.9**	5.2	**11.6**	**28.2**	

Water Demand Calculations

Beca Project Number		5013381
Client		UoA
Site Location		30-38 Princes Street Auckland
Project Name		UoA Student Centre
Facility Type		SC&L Pre-Development
Calcs by		LC
Reviewed by		SZ
Date		26/08/2026

Minimum Water Demand Calculation

Based on The Auckland Council Code of Practice for Land Development and Subdivision Chapter 6 (Water) Section 6.3.5.6

Site	Net Floor Area (m^2)	Person	Design water flow allowance Litres per person per day (as per Table 6.1.c and 6.1.b)	Minimum Water Demand (L/d)
Office building	7001	467	65	30339
Wet Retail Area	556		15	8343
			Minimum Water Demand (Average Daily Demand)	**38683**

Peak Flow Calculation

Based on The Auckland Council Code of Practice for Land Development and Subdivision Chapter 6 (Water) Section 6.3.5.3

Average Daily Demand	38683	Litres per day
Peak Factor (PF)	2	(For populations less than 2000)
(Average Day demand x PF)	77366	Litres per day
(Peak Day Demand / 24) x 2.5	8059	Litres per hour
Peak Flow	**2.24**	**Litres per second**

Code of Practice References

Table 6.1.c – Wet and dry commercial assumed design allowances

Commercial activity type	*Design water flow allowance*
Dry retail (Note 1) *(where kitchen/toilets are not normally made available to customers)*	*1 person per 50m² net floor area at 65 litres per person per day.*
Office buildings and dry retail where toilet facilities, etc. are provided to customers.	*1 person per 15m² net floor area at 65 litres per person per day.*
Wet retail (Note 2): *Food and or beverage retail/preparation e.g. coffee shop, restaurant, bar, butcher, fresh fruit and vegetable retail.*	*15 litres per day per net m² of floor area (including kitchen and dining areas).*

Table notes:

1. *Dry retail is where water is normally only used by staff for their own personal food preparation / toileting needs. Examples include: clothes shop, hardware retail.*
2. *Wet retail is where water is used to prepare food product for customers. Examples include: café, lunch bar, restaurant, butchery, fresh fruit and vegetable, food court-bar and supermarkets.*
3. *Assuming no significant irrigation.*

Important:
Net floor area is the total floor area of the building (exclude any open land areas),, less non-productive areas, such as:
lobbies; lifts; machine rooms; electrical services; stairwells; fire escapes; corridors and other passages used in common with other occupiers; car parking areas; etc. If net area is unknown, and the type of buildings are unknown, it can be assumed that the Net floor area is = 80% of the gross floor area of the building.

As a guide to how activities will be assessed, commercial washing activities such as car / boat washing activities, etc. would be regarded as a "wet-industry" and not as a commercial - wet retail, as the water is being used as a part of a process (washing). Large-scale food-processing (i.e. for supply to commercial customers, as opposed to on-site retail customers) would be regarded as an industrial type activity. Preparation / manufacture of non-food based products, is also regarded as an industrial activity. Industry design flows are detailed in the section below.

6.3.5.3 Peak flows

Water demands vary on a regional basis depending on a variety of climatic conditions and consumer use patterns. *Watercare* will provide historically-based demand information appropriate for design.

Where peak demands are required for the design of a distribution system, the value shall be calculated from the following formulae:

Peak Day Demand (over a 12-month period) = Average Day Demand x PF

Unless specified otherwise by *Watercare*:

(a) PF = 1.5 for populations over 10,000;
(b) PF = 2 for populations below 2,000.
(c) Interpolated between 1.5 and 2 for populations between 10,000 and 2,000

Peak Hourly Demand = Average Hourly Demand (on peak day) x PF (over a 24-hour period)

Unless specified otherwise by *Watercare, the peaking factor shall be 2.5*

Peak flow calculation example:

For a new land-subdivision of 50 new dwellings with three bedrooms per dwelling use:

Design Population = 50 dwellings x 3 people = 150 people

Average daily demand = 150 x 220 = 33000 L/d (see section 6.3.5.6 for minimum demand)

Peak day demand = 33000 x 2 = 66000 L/d

Peak hourly demand = (66000 / 24) x 2.5 = 6875 L/h

= 6875 / 3600 = 1.9 L/s

Assumptions:

1. Building plan areas were derived from aerial imagery measurements. Building storeys were estimated using google street view. Building usage was assumed to be commercial office, except for "Shadows Bar," which was classified as wet retail.

2. Building floor areas are all high level estimates and may be subject to change

Water Demand Calculations

Beca Project Number	5013381
Client	UoA
Site Location	30-38 Princes Street Auckland
Project Name	UoA Student Centre
Facility Type	SC&L Post-Development
Calcs by	LC
Reviewed by	SZ
Date	29/10/2026

Minimum Water Demand Calculation

Based on The Auckland Council Code of Practice for Land Development and Subdivision Chapter 6 (Water) Section 6.3.5.6

Site	Net Floor Area (m^2)	Person	Design water flow allowance Litres per person per day (as per Table 6.1.c and 6.1.b)	Minimum Water Demand (L/d)
Office building	17554	1170	65	76067
Superlabs	1832		11	20152
Wet Retail Area	182		15	2730
			Minimum Water Demand (Average Daily Demand)	**98949**

Peak Flow Calculation

Based on The Auckland Council Code of Practice for Land Development and Subdivision Chapter 6 (Water) Section 6.3.5.3

Average Daily Demand	98949	Litres per day
Peak Factor (PF)	2	(For populations less than 2000)
(Average Day demand x PF)	197899	Litres per day
(Peak Day Demand / 24) x 2.5	20614	Litres per hour
Peak Flow	**5.73**	**Litres per second**

Code of Practice References

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Table notes:

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Important:

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For a new land-subdivision of 50 new dwellings with three bedrooms per dwelling use:

Design Population = 50 dwellings x 3 people = 150 people

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Peak day demand = 33000 x 2 = 66000 L/d

Peak hourly demand = (66000 / 24) x 2.5 = 6875 L/h

= 6875 / 3600 = 1.9 L/s

Assumptions:

1. New building is assumed to be Commercial - office buildings where toilet facilities etc. are provided to users.

2. Building Net Floor Area (NFA) is based on 100% FTAA Substantive Application Architectural & Landscape Design Report dated October 2026. It is assumed all rooms including plant rooms are counted as NFA. Terraces are excluded from NFA calculations.

3. Superlabs are considered as heavy dry industry.