

05th August 2020

PROJECT: 30 & 40 SANDSPIT ROAD, COCKLE BAY

Further to the meeting on the 27th July 2020, DHC Consulting Ltd have carried out the wastewater calculations as requested by Watercare Services Ltd.

Please find the calculations and assumptions appended to this letter.

Appendices:

- Appendix A Wastewater Calculations Assumptions
- Appendix B Wastewater Calculations Summary
- Appendix C Detailed Wastewater Calculations
- Appendix D Catchment Plans

Regards,

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APPENDIX A

Wastewater Calculations Assumptions

03rd August 2020

30 & 40 SANDSPIT ROAD, COCKLE BAY

WASTEWATER CAPACITY CALCULATIONS ASSUMPTIONS

1. Number of residential houses within the upstream catchment of each pipe have been counted based on the Auckland Council Geomaps Aerial Image (2017).
2. Number of students (school roll) and staff for the Cockle Bay School and Shelly Park School were based on Google searches and were confirmed via phone. A conservative increase can be accommodated if requested by Watercare
3. Invert levels, diameters, lengths and material of the pipes are based on Auckland Council Geomaps information.
4. The gradients of the pipes were calculated based on the Invert Levels and Lengths of the pipes based on Auckland Council Geomaps information.
5. The gradient of the wastewater pipe no. 718744 was assumed to be 1% conservatively as no information is shown on Auckland Council Geomaps in regard to this pipe.
6. Design wastewater flow allowance and peaking factors based on *Table 5.1.1.* of the Wastewater Code of Practice by Watercare.

Table 5.1.1 – Design residential design wastewater flow allowance and peaking factors

Residential property type	Design wastewater flow allowance	Design wastewater peaking factors	
	Litres per person per day (L/p/d)	Peaking factor: Self-Cleansing Design Flow (Normal PDWF)	Peaking factor: Peak Design Flow (PWWF or Exceptional PDWF)
<i>Up to three storey residential development</i>	180	3.0	6.7
<i>High-rise residential (or mixed-use) buildings four storeys and above</i>	180	3.0	5.0

7. Design residential occupancy allowances (number of people per house) based on *Table 5.1.2.* of the Wastewater Code of Practice by Watercare.

Table 5.1.2 Design residential occupancy allowances

Number of bedrooms (Notes 1 and 2)	Occupancy for design purposes (i.e. people)
1	2
2-4	3
More than 5	Specific agreement with Watercare
Unknown	For high rise apartments (four floors or more) and other residential assume a design occupancy rate of 5 per dwelling unit.
<p>Table notes:</p> <ol style="list-style-type: none"> Where large dwellings are proposed, which have additional rooms beyond those allocated as dining, lounge and bedroom e.g. family, office, study or sleepouts which have the potential to be used as bedrooms, an additional occupancy allowance should be made on the basis of 1 extra person times the ratio of the total floor area of the additional room(s) to that of the smallest designated bedroom. For residential retirement villages without a hospital facility and that have single bedroom units then a design occupancy rate of 1.5 may be considered. 	

- The wastewater flows and peaking factors for the Schools were approximated and based on 5.3.5.1.1. *New infrastructure design flow*, table F of the Wastewater Code of Practice by Watercare. As per Point 2 above, we could conservatively increase this if requested by Watercare. To keep the calculations straightforward we've used a Design Flowrate of 15l/s/d for both staff and students.

F. Other facility design wastewater flows and peaking factors:

Other facility types		Design wastewater flow allowance	Design wastewater peaking factors	
			Peaking factor: Self-Cleaning Design Flow (Normal PDWF)	Peaking factor: Peak Design Flow (PWWF or Exceptional PDWF)
Hospitals	Day facility (treatment facilities, wards)	280 Litres per bed per day	2.0	5.0
	Night and day facility (24-hour operation)	570 Litres per bed per day	1.5	5.0
	Staff	45 litres per employee per day	2.0	5.0
Child day-care	Children	42 Litres per child per day	2.0	6.7
	Staff	45 Litres per employee per day		
School (day students)	Primary school	15 Litres per student per day	2.0	6.7
	Secondary school	20 Litres per student per day	2.0	6.7
	Staff	45 Litres per employee per day	2.0	6.7
School (boarding)	Secondary school	140 Litres per student per day	3.0	6.7
Student accommodation		140 Litres per person per day	3.0	6.7
Hotels and motels	Guests	180 Litres per room per day	3.0	6.7
	Staff	45 Litres per employee per day	3.0	6.7
Community halls and churches and/or facilities with intermittent use		10 Litres per seat per day	2.0	Peak discharge to be based upon the fixture-unit rating for the facility as defined in NZS 3500.2 (2015).
<p>General principles to be applied:</p> <ol style="list-style-type: none"> For activities that operate 24 hours a day (or close to a 24 hours day) the Self-Cleaning Design Flow Peaking Factor = 1.5 because wastewater is discharged over a 24-hour period. For activities where water is consumed and discharged into the sewer at a relatively even rate throughout a typical working day, e.g. over an 8-12 hour period, the Self-Cleaning Design Flow Peaking Factor = 2.0. For activities where water is consumed at higher rates at certain periods of day e.g. hotel/motel with morning and evening peaks in usage, the Self-Cleaning Design Flow Peaking Factor = 3.0. For facilities with intermittent use, the Self-Cleaning Design Flow Peaking Factor = 2.0. For activities where a large number of people can be expected to use multiple water fixtures simultaneously e.g. community halls and conference halls, the Peak Design Flow shall be based on the number of water fixtures / appliances, as per NZS 3500.2 Plumbing and Drainage: Part 2: Sanitary plumbing and drainage. 				

9. The capacity of the pipes was calculated based on Colebrook-White formula according to 5.3.5.2 *Hydraulic design of pipelines* of the Wastewater Code of Practice by Watercare.

10. The Colebrook-White Coefficient (k) was assumed based on *Table 5.2- Guide to roughness coefficients for wastewater lines* of the Wastewater Code of Practice by Watercare.

Table 5.2 – Guide to roughness coefficients for wastewater lines

Material	Colebrook-White coefficient k (mm)	Manning roughness coefficient (n)
<i>All pipe material and lining types for gravity systems and low pressure collection systems (PWC), flowing full.</i>	1.5	0.013
<i>All pipe material and lining types for pressure rising mains, flowing full</i>	0.6	0.011
NOTE – (1) These values take into account possible effects of rubber ring joints, slime, and debris. (2) The n and k values apply for pipes up to DN 300.		

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APPENDIX B

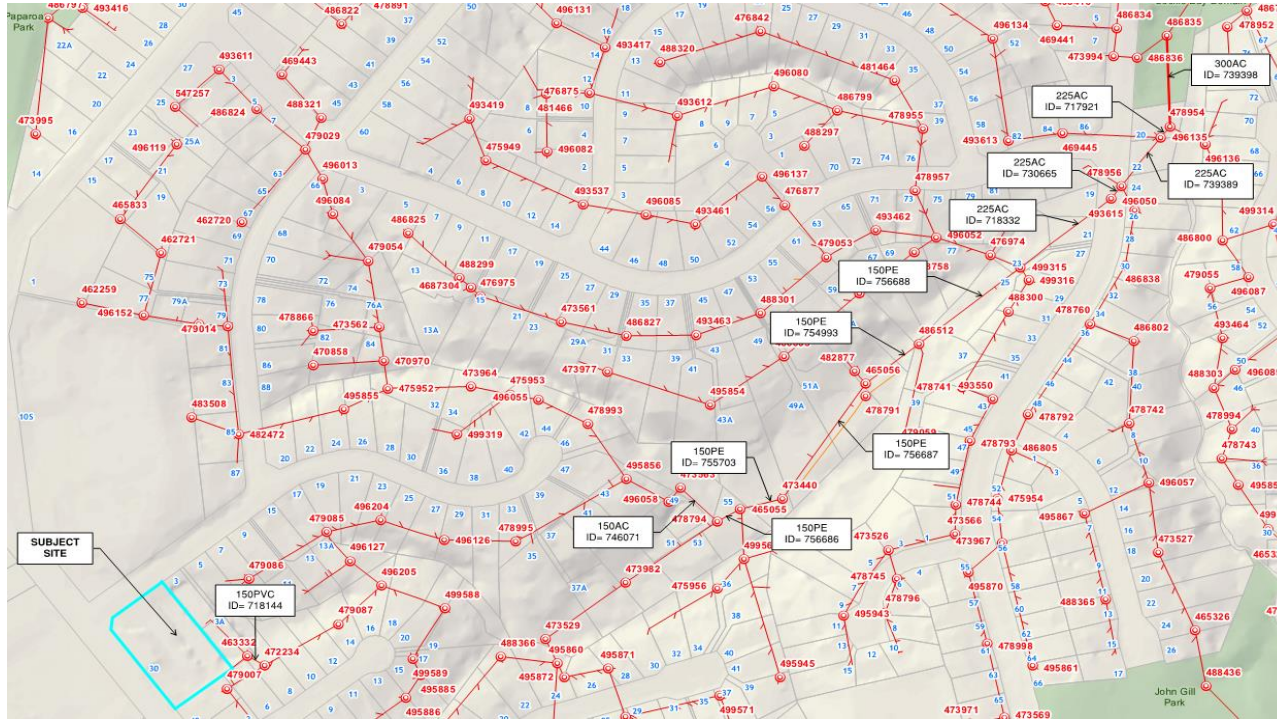
Wastewater Calculations Summary

WASTEWATER CALCULATIONS
SUMMARY OF CAPACITY CHECK CALCULATIONS

Project : 30-40 Sandspit Road
Client: Box Property Investment Trust
Calculation by: NF
Checked by: NF

Job No: 4520
Date: 29/07/2020

LOCATION OF EXISTING PUBLIC PIPES



CAPACITY CHECK- EXISTING AND POST DEVELOPMENT

WW Pipe ID	Diameter (mm)	IL (upst)	IL (downst)	Length (m)	Gradient (%)	Material	Pipe Capacity (l/s)	Number of Houses	Peak Design Flow Ex Conditions (l/s)	Peak Design Flow Post Devel (l/s)	Approx. % proportion of development flows	Incremental Peak Design Flow Increase (l/s)	Additional Capacity (l/s)	Additional Capacity as a percentage
718144	150	-	-	13.00	1.00%	PVC	15.46	3	0.17	2.43	93.1%			
746071	150	20.57	14.82	33.5	17.16%	AC	64.39	107	6.01	9.03	33.4%	5.84	58.38	90.7%
756686	150	14.82	14.59	17.4	1.32%	PE	17.79	325	15.13	17.28	12.4%	9.12	2.66	15.0%
755703	150	14.59	13.89	28	2.50%	PE	24.51	333	15.47	17.62	12.2%	0.33	9.04	36.9%
756687	150	13.89	11.82	99.4	2.08%	PE	22.36	335	15.55	17.70	12.1%	0.08	6.81	30.5%
754993	150	11.82	10.37	44.9	3.23%	PE	27.87	336	15.59	17.74	12.1%	0.04	12.28	44.1%
756688	150	10.37	8.85	86.7	1.75%	PE	20.51	340	15.76	17.91	12.0%	0.17	4.75	23.1%
718332	225	8.85	7.46	77.0	1.81%	AC	61.35	501	22.50	24.65	8.7%	6.74	38.85	63.3%
730665	225	7.46	6.07	10.5	13.24%	AC	166.55	501	22.50	24.65	8.7%	0.00	144.05	86.5%
739389	225	6.07	5.15	43.9	2.10%	AC	66.12	617	27.36	29.51	7.3%	4.86	38.76	58.6%
717921	225	5.15	4.85	9.4	3.19%	AC	81.66	641	28.36	30.51	7.0%	1.01	53.29	65.3%
739398	300	4.85	4.41	62.5	0.70%	AC	82.13	840	36.70	38.85	5.5%	8.33	45.43	55.3%

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APPENDIX C

Detailed Wastewater Calculations

WASTEWATER CALCULATIONS

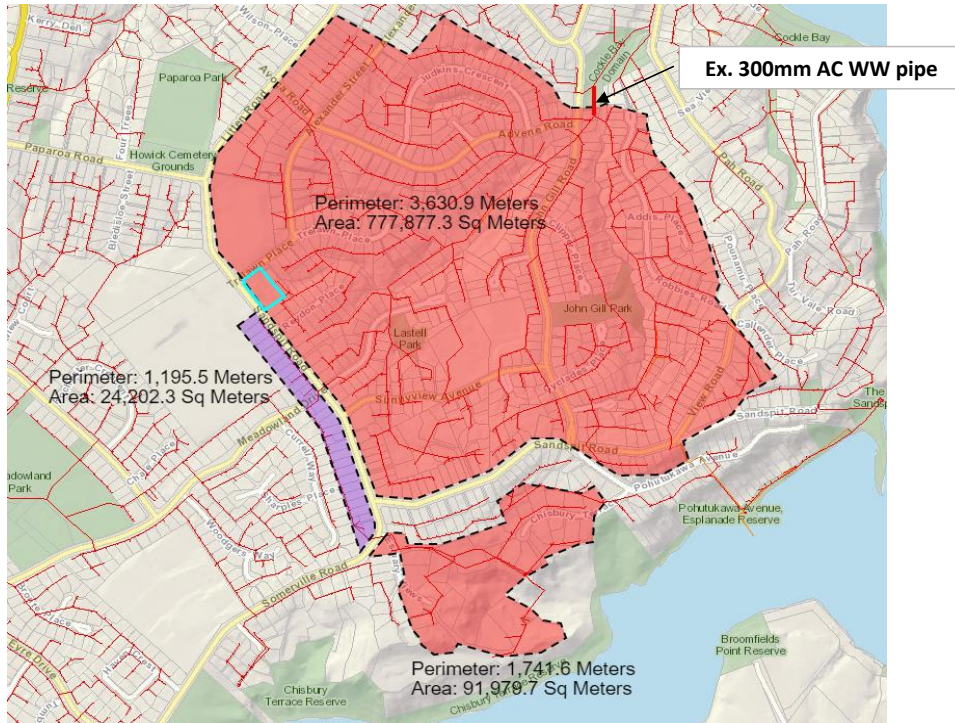
CAPACITY CHECK FOR EXISTING WW PIPE

Project : 30-40 Sandspit Road
 Client: Box Property Investment Trust
 Calculation by: NF
 Checked by: NF

Job No: 4520
 Date: 29/07/2020



PIPE ID: 739398 CATCHMENT PLAN



WASTEWATER CODE OF PRACTICE REQUIREMENTS

Table 5.1.1 – Design residential design wastewater flow allowance and peaking factors

Residential property type	Design wastewater flow allowance Litres per person per day (L/p/d)	Design wastewater peaking factors	
		Peaking factor: Self-Cleansing Design Flow (Normal PDWF)	Peaking factor: Peak Design Flow (PWWF or Exceptional PDWF)
Up to three storey residential development	180	3.0	6.7
High-rise residential (or mixed-use) buildings four storeys and above	180	3.0	5.0

Table 5.1.2 Design residential occupancy allowances

Number of bedrooms (Notes 1 and 2)	Occupancy for design purposes (i.e. people)
1	2
2-4	3
More than 5	Specific agreement with Watercare
Unknown	For high rise apartments (four floors or more) and other residential assume a design occupancy rate of 5 per dwelling unit.

Table notes:

- Where large dwellings are proposed, which have additional rooms beyond those allocated as dining, lounge and bedroom e.g. family, office, study or sleepouts which have the potential to be used as bedrooms, an additional occupancy allowance should be made on the basis of 1 extra person times the ratio of the total floor area of the additional room(s) to that of the smallest designated bedroom.
- For residential retirement villages without a hospital facility and that have single bedroom units then a design occupancy rate of 1.5 may be considered.

Other facility types	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)	
Hospitals	Day facility (treatment facilities, wards)	280 Litres per bed per day	2.0	5.0
	Night and day facility (24-hour operation)	570 Litres per bed per day	1.5	5.0
	Staff	45 litres per employee per day	2.0	5.0
Child day-care	Children	42 Litres per child per day	2.0	6.7
	Staff	45 Litres per employee per day		
School (day students)	Primary school	15 Litres per student per day	2.0	6.7
	Secondary school	20 Litres per student per day	2.0	6.7
	Staff	45 Litres per employee per day	2.0	6.7

WASTEWATER CALCULATIONS

CAPACITY CHECK FOR EXISTING WW PIPE

Project : 30-40 Sandspit Road **Job No:** 4520
Client: Box Property Investment Trust
Calculation by: NF **Date:** 29/07/2020
Checked by: NF



PRE-DEVELOPMENT AND POST-DEVELOPMENT SCENARIO

Catchment A: Residential - Single House Zone

Residential

Average Site Area	
Number of dwellings	840 dwellings
Number of people per dwelling	3 people
Occupants-Catchment	2520 people
Occupants-Development	154 people
Total Occupants	2674 people

Design Wastewater Flow Allowance	180 l/p/d
Design ADWF (Ex Conditions)	5.25 l/s
Design ADWF (Post Development)	5.57 l/s
Peaking Factor	6.70
Peak Design Flow (Ex Conditions)	35.18 l/s
Peak Design Flow (Post Development)	37.32 l/s

Primary School

Cockle Bay School # students	711 students
Cockle Bay School # staff	71.1 people
Total number of people	782.1

Primary School

Shelly Park School # students	479
Shelly Park School # staff	47.9
Total number of people	526.9

Design Wastewater Flow Allowance	15 l/s/d
Design ADWF	0.23 l/s
Peaking Factor	6.70
Peak Design Flow	1.52 l/s

<u>Peak Design Flow- Catchment A (Ex Conditions)</u>	<u>36.70</u>
<u>Peak Design Flow- Catchment A (Post Development)</u>	<u>38.85 l/s</u>

Catchment B: Residential - Mixed Housing Suburban Zone

Total Catchment Area	24,202
Primary School Area	0
Residential Area	24,202

Residential

Average Site Area	0
Number of dwellings	0
Number of people per dwelling	3
Total of occupants	0

Design Wastewater Flow Allowance	180
Design ADWF	0.00
Peaking Factor	6.70
Peak Design Flow	0.00

<u>Peak Design Flow- Catchment B</u>	<u>0.00</u>
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Total Peak Design Flow (Ex Conditions)	36.70	Capacity Check
Total Peak Design Flow (Post Development)	38.85	OK

Invert levels of the existing pipe were taken from AC Geopmaps System information

DESCRIPTION	Pipe diameter (mm)	Upstream (IL)	Downstream (IL)	Pipe Length (m)	Colebrook-White K (mm)	Pipe gradient	Flow velocity (m/s)	Pipe capacity (l/s)
Ex. 300mm AC WW pipe	300	4.85	4.41	62.5	1.5	0.70%	1.16	82.13

WASTEWATER CALCULATIONS

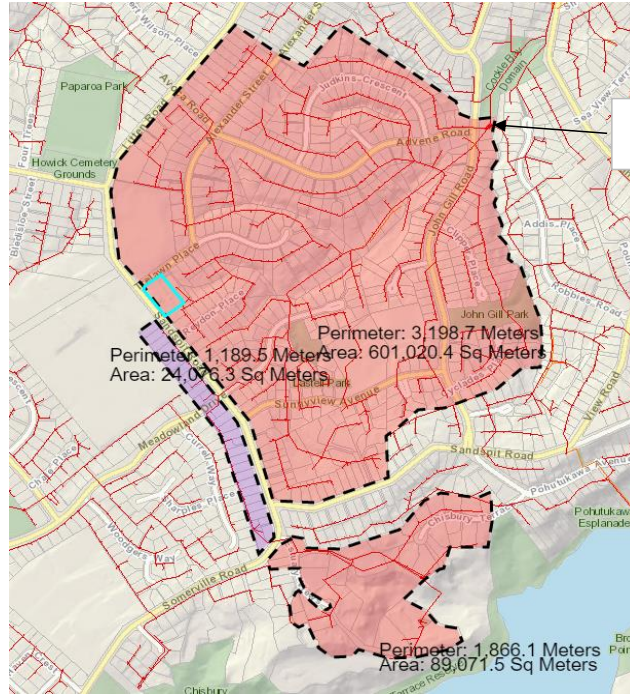
CAPACITY CHECK FOR EXISTING WW PIPE

Project : 30-40 Sandspit Road
 Client: Box Property Investment Trust
 Calculation by: NF
 Checked by: NF

Job No: 4520
 Date: 29/07/2020



PIPE ID: 717921 CATCHMENT PLAN



Pipe being checked

WASTEWATER CODE OF PRACTICE REQUIREMENTS

Table 5.1.1 – Design residential design wastewater flow allowance and peaking factors

Residential property type	Design wastewater flow allowance	Design wastewater peaking factors	
	Litres per person per day (L/p/d)	Peaking factor: Self-Cleansing Design Flow (Normal PDWF)	Peaking factor: Peak Design Flow (PWWF or Exceptional PDWF)
Up to three storey residential development	180	3.0	6.7
High-rise residential (or mixed-use) buildings four storeys and above	180	3.0	5.0

Table 5.1.2 Design residential occupancy allowances

Number of bedrooms (Notes 1 and 2)	Occupancy for design purposes (i.e. people)
1	2
2-4	3
More than 5	Specific agreement with Watercare
Unknown	For high rise apartments (four floors or more) and other residential assume a design occupancy rate of 5 per dwelling unit.

Table notes:

- Where large dwellings are proposed, which have additional rooms beyond those allocated as dining, lounge and bedroom e.g. family, office, study or sleepouts which have the potential to be used as bedrooms, an additional occupancy allowance should be made on the basis of 1 extra person times the ratio of the total floor area of the additional room(s) to that of the smallest designated bedroom.
- For residential retirement villages without a hospital facility and that have single bedroom units then a design occupancy rate of 1.5 may be considered.

Other facility types	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)	
Hospitals	Day facility (treatment facilities, wards)	280 Litres per bed per day	2.0	5.0
	Night and day facility (24-hour operation)	570 Litres per bed per day	1.5	5.0
	Staff	45 Litres per employee per day	2.0	5.0
Child day-care	Children	42 Litres per child per day	2.0	6.7
	Staff	45 Litres per employee per day		
School (day students)	Primary school	15 Litres per student per day	2.0	6.7
	Secondary school	20 Litres per student per day	2.0	6.7
	Staff	45 Litres per employee per day	2.0	6.7

WASTEWATER CALCULATIONS

CAPACITY CHECK FOR EXISTING WW PIPE

Project : 30-40 Sandspit Road
 Client: Box Property Investment Trust
 Calculation by: NF
 Checked by: NF

Job No: 4520
 Date: 29/07/2020



PRE-DEVELOPMENT AND POST-DEVELOPMENT SCENARIO

Catchment A: Residential - Single House Zone

Residential

Average Site Area	
Number of dwellings	641
Number of people per dwelling	3
Total of occupants (Ex Conditions)	1923
Occupants-Development	154
Total of occupants (Post Development)	2077

Design Wastewater Flow Allowance	180
Design ADWF (Ex Conditions)	4.01
Design ADWF (Post Development)	4.33
Peaking Factor	6.70
Peak Design Flow (Ex Conditions)	26.84
Peak Design Flow (Post Development)	28.99

Primary School

Cockle Bay School # students	711
Cockle Bay School # staff	71.1
Total number of people	782.1

Design Wastewater Flow Allowance	15
Design ADWF	0.14
Peaking Factor	6.70
Peak Design Flow	0.91

<u>Peak Design Flow- Catchment A (Ex Conditions)</u>	<u>27.75</u>
<u>Peak Design Flow- Catchment A (Post Development)</u>	<u>29.90</u>

Catchment B: Residential - Mixed Housing Suburban Zone

Total Catchment Area	24,076
Primary School Area	12,327
Residential Area	11,749

Residential

Average Site Area	400
Number of dwellings	0
Number of people per dwelling	3
Total of occupants	0

Design Wastewater Flow Allowance	180
Design ADWF	0.00
Peaking Factor	6.70
Peak Design Flow	0.00

Primary School

Shelly Park School # students	479
Shelly Park School # staff	47.9
Total number of people	526.9

Design Wastewater Flow Allowance	15
Design ADWF	0.09
Peaking Factor	6.70
Peak Design Flow	0.61

<u>Peak Design Flow- Catchment B</u>	<u>0.61</u>
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Total Peak Design Flow (Ex Conditions)	28.36	OK
Total Peak Design Flow (Post Development)	30.51	OK

DESCRIPTION	Pipe diameter (mm)	Upstream (IL)	Downstream (IL)	Pipe Length (m)	Colebrook-White K (mm)	Pipe gradient	Flow velocity (m/s)	Pipe capacity (l/s)
Ex. 225mm AC WW pipe	225	5.15	4.85	9.4	1.5	3.19%	2.05	81.6551

WASTEWATER CALCULATIONS

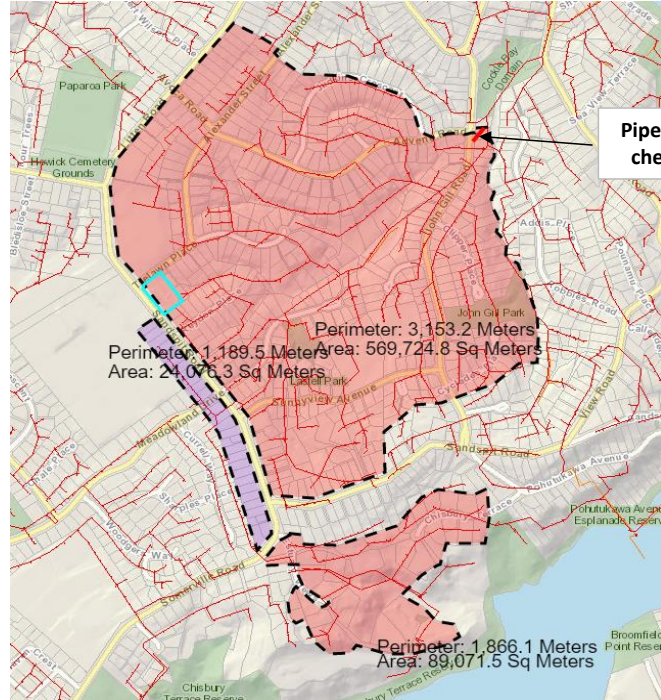
CAPACITY CHECK FOR EXISTING WW PIPE

Project : 30-40 Sandspit Road
 Client: Box Property Investment Trust
 Calculation by: NF
 Checked by: NF

Job No: 4520
 Date: 29/07/2020



PIPE ID: 739389 CATCHMENT PLAN



WASTEWATER CODE OF PRACTICE REQUIREMENTS

Table 5.1.1 – Design residential design wastewater flow allowance and peaking factors

Residential property type	Design wastewater flow allowance	Design wastewater peaking factors	
	Litres per person per day (L/p/d)	Peaking factor: Self-Cleansing Design Flow (Normal PDWF)	Peaking factor: Peak Design Flow (PWWF or Exceptional PDWF)
Up to three storey residential development	180	3.0	6.7
High-rise residential (or mixed-use) buildings four storeys and above	180	3.0	5.0

Table 5.1.2 Design residential occupancy allowances

Number of bedrooms (Notes 1 and 2)	Occupancy for design purposes (i.e. people)
1	2
2-4	3
More than 5	Specific agreement with Watercare
Unknown	For high rise apartments (four floors or more) and other residential assume a design occupancy rate of 5 per dwelling unit.

Table notes:

- Where large dwellings are proposed, which have additional rooms beyond those allocated as dining, lounge and bedroom e.g. family, office, study or sleepouts which have the potential to be used as bedrooms, an additional occupancy allowance should be made on the basis of 1 extra person times the ratio of the total floor area of the additional room(s) to that of the smallest designated bedroom.
- For residential retirement villages without a hospital facility and that have single bedroom units then a design occupancy rate of 1.5 may be considered.

Other facility types		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)
Hospitals	Day facility (treatment facilities, wards)	280 Litres per bed per day	2.0	5.0
	Night and day facility (24-hour operation)	570 Litres per bed per day	1.5	5.0
	Staff	45 litres per employee per day	2.0	5.0
Child day-care	Children	42 Litres per child per day	2.0	6.7
	Staff	45 Litres per employee per day		
School (day students)	Primary school	15 Litres per student per day	2.0	6.7
	Secondary school	20 Litres per student per day	2.0	6.7
	Staff	45 Litres per employee per day	2.0	6.7

WASTEWATER CALCULATIONS

CAPACITY CHECK FOR EXISTING WW PIPE

Project : 30-40 Sandspit Road **Job No:** 4520
Client: Box Property Investment Trust
Calculation by: NF **Date:** 29/07/2020
Checked by: NF



PRE-DEVELOPMENT AND POST-DEVELOPMENT SCENARIO

Catchment A: Residential - Single House Zone

Residential

Average Site Area	600 m ²
Number of dwellings	617 dwellings
Number of people per dwelling	3 people
Total of occupants (Ex Conditions)	1851 people
Occupants-Development	154 people
Total of occupants (Post Development)	2005 people

Design Wastewater Flow Allowance	180 l/p/d
Design ADWF (Ex Conditions)	3.86 l/s
Design ADWF (Post Development)	4.18 l/s
Peaking Factor	6.70
Peak Design Flow (Ex Conditions)	25.84 l/s
Peak Design Flow (Post Development)	27.99 l/s

Primary School

Cockle Bay School # students	711 students
Cockle Bay School # staff	71.1 people
Total number of people	782.1

Design Wastewater Flow Allowance	15 l/s/d
Design ADWF	0.14 l/s
Peaking Factor	6.70
Peak Design Flow	0.91 l/s

<u>Peak Design Flow- Catchment A (Ex Conditions)</u>	<u>26.75 l/s</u>
Peak Design Flow- Catchment A (Post Development)	28.90

Catchment B: Residential - Mixed Housing Suburban Zone

Total Catchment Area	24,076 m ²
Primary School Area	12,327
Residential Area	11,749

Residential

Average Site Area	400 m ²
Number of dwellings	0 dwellings
Number of people per dwelling	3
Total of occupants	0 people

Design Wastewater Flow Allowance	180 l/p/d
Design ADWF	0.00 l/s
Peaking Factor	6.70
Peak Design Flow	0.00 l/s

Primary School

Shelly Park School # students	479
Shelly Park School # staff	47.9
Total number of people	526.9

Design Wastewater Flow Allowance	15 l/s/d
Design ADWF	0.09 l/s
Peaking Factor	6.70
Peak Design Flow	0.61 l/s

<u>Peak Design Flow- Catchment B</u>	<u>0.61 l/s</u>
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Total Peak Design Flow (Ex Conditions)	27.36 l/s	Capacity Check OK
Total Peak Design Flow (Post Development)	29.51 l/s	

DESCRIPTION	Pipe diameter (mm)	Upstream (IL)	Downstream (IL)	Pipe Length (m)	Colebrook-White K (mm)	Pipe gradient	Flow velocity (m/s)	Pipe capacity (l/s)
Ex. 225mm AC WW pipe	225	6.07	5.15	43.9	1.5	2.10%	1.66	66.1224

WASTEWATER CALCULATIONS

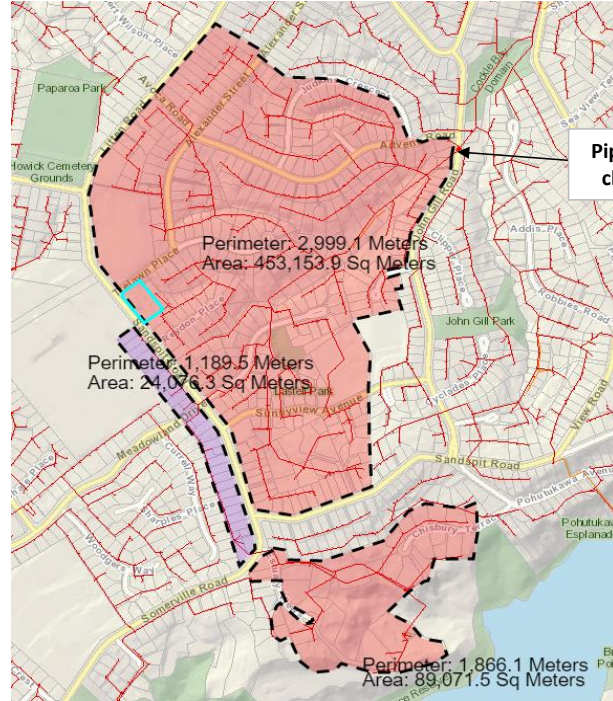
CAPACITY CHECK FOR EXISTING WW PIPE

Project : 30-40 Sandspit Road
 Client: Box Property Investment Trust
 Calculation by: NF
 Checked by: NF

Job No: 4520
 Date: 29/07/2020



PIPE ID: 730665 CATCHMENT PLAN



WASTEWATER CODE OF PRACTICE REQUIREMENTS

Table 5.1.1 – Design residential design wastewater flow allowance and peaking factors

Residential property type	Design wastewater flow allowance	Design wastewater peaking factors	
	Litres per person per day (L/p/d)	Peaking factor: Self-Cleansing Design Flow (Normal PDWF)	Peaking factor: Peak Design Flow (PWWF or Exceptional PDWF)
Up to three storey residential development	180	3.0	6.7
High-rise residential (or mixed-use) buildings four storeys and above	180	3.0	5.0

Table 5.1.2 Design residential occupancy allowances

Number of bedrooms (Notes 1 and 2)	Occupancy for design purposes (i.e. people)
1	2
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Table notes:

- Where large dwellings are proposed, which have additional rooms beyond those allocated as dining, lounge and bedroom e.g. family, office, study or sleepouts which have the potential to be used as bedrooms, an additional occupancy allowance should be made on the basis of 1 extra person times the ratio of the total floor area of the additional room(s) to that of the smallest designated bedroom.
- For residential retirement villages without a hospital facility and that have single bedroom units then a design occupancy rate of 1.5 may be considered.

Other facility types	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)	
Hospitals	Day facility (treatment facilities, wards)	280 Litres per bed per day	2.0	5.0
	Night and day facility (24-hour operation)	570 Litres per bed per day	1.5	5.0
	Staff	45 litres per employee per day	2.0	5.0
Child day-care	Children	42 Litres per child per day	2.0	6.7
	Staff	45 Litres per employee per day		
School (day students)	Primary school	15 Litres per student per day	2.0	6.7
	Secondary school	20 Litres per student per day	2.0	6.7
	Staff	45 Litres per employee per day	2.0	6.7

WASTEWATER CALCULATIONS

CAPACITY CHECK FOR EXISTING WW PIPE

Project : 30-40 Sandspit Road **Job No:** 4520
Client: Box Property Investment Trust
Calculation by: NF **Date:** 29/07/2020
Checked by: NF



PRE-DEVELOPMENT AND POST-DEVELOPMENT SCENARIO

Catchment A: Residential - Single House Zone

Residential

Average Site Area	600 m ²
Number of dwellings	501 dwellings
Number of people per dwelling	3 people
Total of occupants (Ex Conditions)	1503 people
Occupants-Development	154 people
Total of occupants (Post Development)	1657 people

Design Wastewater Flow Allowance	180 l/p/d
Design ADWF (Ex Conditions)	3.13 l/s
Design ADWF (Post Development)	3.45 l/s
Peaking Factor	6.70
Peak Design Flow (Ex Conditions)	20.98 l/s
Peak Design Flow (Post Development)	23.13 l/s

Primary School

Cockle Bay School # students	711 students
Cockle Bay School # staff	71.1 people
Total number of people	782.1

Design Wastewater Flow Allowance	15 l/s/d
Design ADWF	0.14 l/s
Peaking Factor	6.70
Peak Design Flow	0.91 l/s

<u>Peak Design Flow- Catchment A (Ex Conditions)</u>	<u>21.89 l/s</u>
<u>Peak Design Flow- Catchment A (Post Development)</u>	<u>24.04</u>

Catchment B: Residential - Mixed Housing Suburban Zone

Total Catchment Area	24,076 m ²
Primary School Area	12,327
Residential Area	11,749

Residential

Average Site Area	400 m ²
Number of dwellings	0 dwellings
Number of people per dwelling	3
Total of occupants	0 people

Design Wastewater Flow Allowance	180 l/p/d
Design ADWF	0.00 l/s
Peaking Factor	6.70
Peak Design Flow	0.00 l/s

Primary School

Shelly Park School # students	479
Shelly Park School # staff	47.9
Total number of people	526.9

Design Wastewater Flow Allowance	15 l/s/d
Design ADWF	0.09 l/s
Peaking Factor	6.70
Peak Design Flow	0.61 l/s

<u>Peak Design Flow- Catchment B</u>	<u>0.61 l/s</u>
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Total Peak Design Flow (Ex Conditions)	22.50 l/s
Total Peak Design Flow (Post Development)	24.65 l/s
	2.15

Capacity Check

OK

OK

DESCRIPTION	Pipe diameter (mm)	Upstream (IL)	Downstream (IL)	Pipe Length (m)	Colebrook-White K (mm)	Pipe gradient	Flow velocity (m/s)	Pipe capacity (l/s)
Ex. 225mm AC WW pipe	225	7.46	6.07	10.5	1.5	13.24%	4.19	166.55

WASTEWATER CALCULATIONS

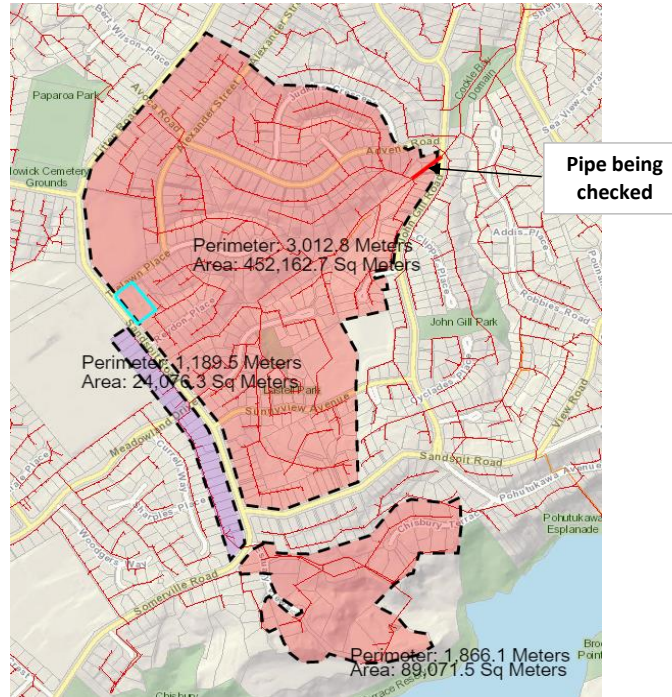
CAPACITY CHECK FOR EXISTING WW PIPE

Project : 30-40 Sandspit Road
 Client: Box Property Investment Trust
 Calculation by: NF
 Checked by: NF

Job No: 4520
 Date: 29/07/2020



PIPE ID: 718332
CATCHMENT PLAN



WASTEWATER CODE OF PRACTICE REQUIREMENTS

Table 5.1.1 – Design residential design wastewater flow allowance and peaking factors

Residential property type	Design wastewater flow allowance	Design wastewater peaking factors	
	Litres per person per day (L/p/d)	Peaking factor: Self-Cleansing Design Flow (Normal PDWF)	Peaking factor: Peak Design Flow (PWWF or Exceptional PDWF)
Up to three storey residential development	180	3.0	6.7
High-rise residential (or mixed-use) buildings four storeys and above	180	3.0	5.0

Table 5.1.2 Design residential occupancy allowances

Number of bedrooms (Notes 1 and 2)	Occupancy for design purposes (i.e. people)
1	2
2-4	3
More than 5	Specific agreement with Watercare
Unknown	For high rise apartments (four floors or more) and other residential assume a design occupancy rate of 5 per dwelling unit.

Table notes:

- Where large dwellings are proposed, which have additional rooms beyond those allocated as dining, lounge and bedroom e.g. family, office, study or sleepouts which have the potential to be used as bedrooms, an additional occupancy allowance should be made on the basis of 1 extra person times the ratio of the total floor area of the additional room(s) to that of the smallest designated bedroom.
- For residential retirement villages without a hospital facility and that have single bedroom units then a design occupancy rate of 1.5 may be considered.

Other facility types	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)	
Hospitals	Day facility (treatment facilities, wards)	280 Litres per bed per day	2.0	5.0
	Night and day facility (24-hour operation)	570 Litres per bed per day	1.5	5.0
	Staff	45 Litres per employee per day	2.0	5.0
Child day-care	Children	42 Litres per child per day	2.0	6.7
	Staff	45 Litres per employee per day	2.0	6.7
School (day students)	Primary school	15 Litres per student per day	2.0	6.7
	Secondary school	20 Litres per student per day	2.0	6.7
	Staff	45 Litres per employee per day	2.0	6.7

WASTEWATER CALCULATIONS

CAPACITY CHECK FOR EXISTING WW PIPE

Project : 30-40 Sandspit Road **Job No:** 4520
Client: Box Property Investment Trust
Calculation by: NF **Date:** 29/07/2020
Checked by: NF



PRE-DEVELOPMENT AND POST-DEVELOPMENT SCENARIO

Catchment A: Residential - Single House Zone

Residential

Average Site Area 600 m²
 Number of dwellings 501 dwellings
 Number of people per dwelling 3 people
 Total of occupants (Ex Conditions) 1503 people
Occupants-Development **154 people**
Total of occupants (Post Development) **1657 people**

Design Wastewater Flow Allowance 180 l/p/d
 Design ADWF (Ex Conditions) 3.13 l/s
Design ADWF (Post Development) **3.45 l/s**
 Peaking Factor 6.70
 Peak Design Flow (Ex Conditions) 20.98 l/s
Peak Design Flow (Post Development) **23.13 l/s**

Primary School

Cockle Bay School # students 711 students
 Cockle Bay School # staff 71.1 people
 Total number of people 782.1

Design Wastewater Flow Allowance 15 l/s/d
 Design ADWF 0.14 l/s
 Peaking Factor 6.70
 Peak Design Flow 0.91 l/s

Peak Design Flow- Catchment A (Ex Conditions) **21.89 l/s**
Peak Design Flow- Catchment A (Post Development) **24.04**

Catchment B: Residential - Mixed Housing Suburban Zone

Total Catchment Area 24,076 m²
 Primary School Area 12,327
 Residential Area 11,749

Residential

Average Site Area 400 m²
 Number of dwellings 0 dwellings
 Number of people per dwelling 3
 Total of occupants 0 people

Design Wastewater Flow Allowance 180 l/p/d
 Design ADWF 0.00 l/s
 Peaking Factor 6.70
 Peak Design Flow 0.00 l/s

Primary School

Shelly Park School # students 479
 Shelly Park School # staff 47.9
 Total number of people 526.9

Design Wastewater Flow Allowance 15 l/s/d
 Design ADWF 0.09 l/s
 Peaking Factor 6.70
 Peak Design Flow 0.61 l/s

Peak Design Flow- Catchment B **0.61 l/s**

Total Peak Design Flow (Ex Conditions) **22.50 l/s**
Total Peak Design Flow (Post Development) **24.65 l/s**

Capacity Check
 OK
 OK

DESCRIPTION	Pipe diameter (mm)	Upstream (IL)	Downstream (IL)	Pipe Length (m)	Colebrook-White K (mm)	Pipe gradient	Flow velocity (m/s)	Pipe capacity (l/s)
Ex. 225mm AC WW pipe	225	8.85	7.46	77	1.5	1.81%	1.54	61.35

WASTEWATER CALCULATIONS

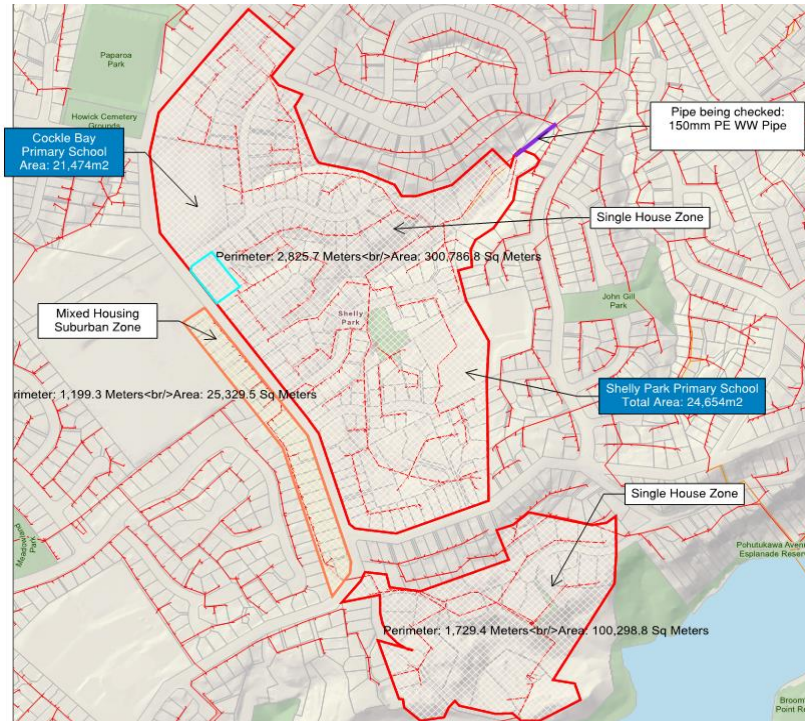
CAPACITY CHECK FOR EXISTING WW PIPE

Project : 30-40 Sandspit Road
 Client: Box Property Investment Trust
 Calculation by: NF
 Checked by: NF

Job No: 4520
 Date: 29/07/2020



PIPE ID: 756686 CATCHMENT PLAN



WASTEWATER CODE OF PRACTICE REQUIREMENTS

Table 5.1.1 – Design residential design wastewater flow allowance and peaking factors

Residential property type	Design wastewater flow allowance	Design wastewater peaking factors	
	Litres per person per day (L/p/d)	Peaking factor: Self-Cleansing Design Flow (Normal PDWF)	Peaking factor: Peak Design Flow (PWWF or Exceptional PDWF)
Up to three storey residential development	180	3.0	6.7
High-rise residential (or mixed-use) buildings four storeys and above	180	3.0	5.0

Table 5.1.2 Design residential occupancy allowances

Number of bedrooms (Notes 1 and 2)	Occupancy for design purposes (i.e. people)
1	2
2-4	3
More than 5	Specific agreement with Watercare
Unknown	For high rise apartments (four floors or more) and other residential assume a design occupancy rate of 5 per dwelling unit.

Table notes:

- Where large dwellings are proposed, which have additional rooms beyond those allocated as dining, lounge and bedroom e.g. family, office, study or sleepouts which have the potential to be used as bedrooms, an additional occupancy allowance should be made on the basis of 1 extra person times the ratio of the total floor area of the additional room(s) to that of the smallest designated bedroom.
- For residential retirement villages without a hospital facility and that have single bedroom units then a design occupancy rate of 1.5 may be considered.

Other facility types	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)	
Hospitals	Day facility (treatment facilities, wards)	280 Litres per bed per day	2.0	5.0
	Night and day facility (24-hour operation)	570 Litres per bed per day	1.5	5.0
	Staff	45 litres per employee per day	2.0	5.0
Child day-care	Children	42 Litres per child per day		
	Staff	45 Litres per employee per day	2.0	6.7
School (day students)	Primary school	15 Litres per student per day	2.0	6.7
	Secondary school	20 Litres per student per day	2.0	6.7
	Staff	45 Litres per employee per day	2.0	6.7

WASTEWATER CALCULATIONS

CAPACITY CHECK FOR EXISTING WW PIPE

Project : 30-40 Sandspit Road **Job No:** 4520
Client: Box Property Investment Trust
Calculation by: NF **Date:** 29/07/2020
Checked by: NF



PRE-DEVELOPMENT AND POST-DEVELOPMENT SCENARIO

Catchment A: Residential - Single House Zone

Residential

Average Site Area	600 m ²
Number of dwellings	340 dwellings
Number of people per dwelling	3 people
Total of occupants (Ex Conditions)	1020 people
Occupants-Development	154 people
Total of occupants (Post Development)	1174 people

Design Wastewater Flow Allowance	180 l/p/d
Design ADWF (Ex Conditions)	2.13 l/s
Design ADWF (Post Development)	2.45 l/s
Peaking Factor	6.70
Peak Design Flow (Ex Conditions)	14.24 l/s
Peak Design Flow (Post Development)	16.39 l/s

Primary School

Cockle Bay School # students	711 students
Cockle Bay School # staff	71.1 people
Total number of people	782.1

Design Wastewater Flow Allowance	15 l/s/d
Design ADWF	0.14 l/s
Peaking Factor	6.70
Peak Design Flow	0.91 l/s

<u>Peak Design Flow- Catchment A (Ex Conditions)</u>	<u>15.15 l/s</u>
<u>Peak Design Flow- Catchment A (Post Development)</u>	<u>17.30</u>

Catchment B: Residential - Mixed Housing Suburban Zone

Total Catchment Area	25,330 m ²
Primary School Area	12,327
Residential Area	13,003

Residential

Average Site Area	400 m ²
Number of dwellings	0 dwellings
Number of people per dwelling	3
Total of occupants	0 people

Design Wastewater Flow Allowance	180 l/p/d
Design ADWF	0.00 l/s
Peaking Factor	6.70
Peak Design Flow	0.00 l/s

Primary School

Shelly Park School # students	479
Shelly Park School # staff	47.9
Total number of people	526.9

Design Wastewater Flow Allowance	15 l/s/d
Design ADWF	0.09 l/s
Peaking Factor	6.70
Peak Design Flow	0.61 l/s

<u>Peak Design Flow- Catchment B</u>	<u>0.61 l/s</u>
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Total Peak Design Flow (Ex Conditions)	15.76 l/s	Capacity Check OK OK
Total Peak Design Flow (Post Development)	17.91 l/s	

DESCRIPTION	Pipe diameter (mm)	Upstream (IL)	Downstream (IL)	Pipe Length (m)	Colebrook-White K (mm)	Pipe gradient	Flow velocity (m/s)	Pipe capacity (l/s)
Ex. 150mm PE WW pipe	150	10.37	8.85	86.7	1.5	1.75%	1.16	20.5065

WASTEWATER CALCULATIONS

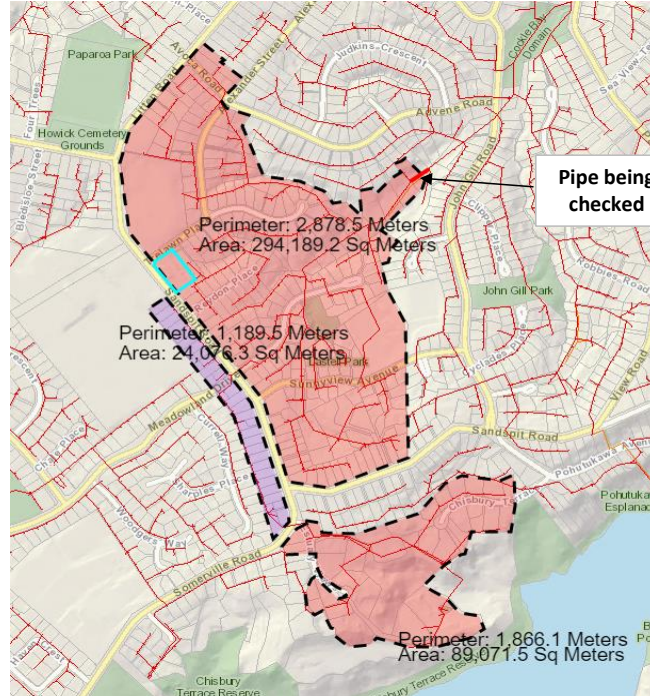
CAPACITY CHECK FOR EXISTING WW PIPE

Project : 30-40 Sandspit Road
 Client: Box Property Investment Trust
 Calculation by: NF
 Checked by: NF

Job No: 4520
 Date: 29/07/2020



PIPE ID: 754993 CATCHMENT PLAN



WASTEWATER CODE OF PRACTICE REQUIREMENTS

Table 5.1.1 – Design residential design wastewater flow allowance and peaking factors

Residential property type	Design wastewater flow allowance	Design wastewater peaking factors	
	Litres per person per day (L/p/d)	Peaking factor: Self-Cleansing Design Flow (Normal PDWF)	Peaking factor: Peak Design Flow (PWWF or Exceptional PDWF)
Up to three storey residential development	180	3.0	6.7
High-rise residential (or mixed-use) buildings four storeys and above	180	3.0	5.0

Table 5.1.2 Design residential occupancy allowances

Number of bedrooms (Notes 1 and 2)	Occupancy for design purposes (i.e. people)
1	2
2-4	3
More than 5	Specific agreement with Watercare
Unknown	For high rise apartments (four floors or more) and other residential assume a design occupancy rate of 5 per dwelling unit.

Table notes:

- Where large dwellings are proposed, which have additional rooms beyond those allocated as dining, lounge and bedroom e.g. family, office, study or sleepouts which have the potential to be used as bedrooms, an additional occupancy allowance should be made on the basis of 1 extra person times the ratio of the total floor area of the additional room(s) to that of the smallest designated bedroom.
- For residential retirement villages without a hospital facility and that have single bedroom units then a design occupancy rate of 1.5 may be considered.

Other facility types	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)	
Hospitals	Day facility (treatment facilities, wards)	280 Litres per bed per day	2.0	5.0
	Night and day facility (24-hour operation)	570 Litres per bed per day	1.5	5.0
	Staff	45 Litres per employee per day	2.0	5.0
Child day-care	Children	42 Litres per child per day	2.0	6.7
	Staff	45 Litres per employee per day		
School (day students)	Primary school	15 Litres per student per day	2.0	6.7
	Secondary school	20 Litres per student per day	2.0	6.7
	Staff	45 Litres per employee per day	2.0	6.7

WASTEWATER CALCULATIONS

CAPACITY CHECK FOR EXISTING WW PIPE

Project : 30-40 Sandspit Road **Job No:** 4520
Client: Box Property Investment Trust
Calculation by: NF **Date:** 29/07/2020
Checked by: NF



PRE-DEVELOPMENT AND POST-DEVELOPMENT SCENARIO

Catchment A: Residential - Single House Zone

Residential

Average Site Area	600 m ²
Number of dwellings	336 dwellings
Number of people per dwelling	3 people
Total of occupants (Ex Conditions)	1008 people

Occupants-Development	154 people
Total of occupants (Post Development)	1162 people

Design Wastewater Flow Allowance	180 l/p/d
Design ADWF (Ex Conditions)	2.10 l/s
Design ADWF (Post Development)	2.42 l/s
Peaking Factor	6.70
Peak Design Flow (Ex Conditions)	14.07 l/s
Peak Design Flow (Post Development)	16.22 l/s

Primary School

Cockle Bay School # students	711 students
Cockle Bay School # staff	71.1 people
Total number of people	782.1

Design Wastewater Flow Allowance	15 l/s/d
Design ADWF	0.14 l/s
Peaking Factor	6.70
Peak Design Flow	0.91 l/s

<u>Peak Design Flow- Catchment A (Ex Conditions)</u>	<u>14.98 l/s</u>
<u>Peak Design Flow- Catchment A (Post Development)</u>	<u>17.13</u>

Catchment B: Residential - Mixed Housing Suburban Zone

Total Catchment Area	24,076 m ²
Primary School Area	12,327
Residential Area	11,749

Residential

Average Site Area	400 m ²
Number of dwellings	0 dwellings
Number of people per dwelling	3
Total of occupants	0 people

Design Wastewater Flow Allowance	180 l/p/d
Design ADWF	0.00 l/s
Peaking Factor	6.70
Peak Design Flow	0.00 l/s

Primary School

Shelly Park School # students	479
Shelly Park School # staff	47.9
Total number of people	526.9

Design Wastewater Flow Allowance	15 l/s/d
Design ADWF	0.09 l/s
Peaking Factor	6.70
Peak Design Flow	0.61 l/s

<u>Peak Design Flow- Catchment B</u>	<u>0.61 l/s</u>
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Total Peak Design Flow (Ex Conditions)	15.59 l/s	Capacity Check
Total Peak Design Flow (Post Development)	17.74 l/s	

DESCRIPTION	Pipe diameter (mm)	Upstream (IL)	Downstream (IL)	Pipe Length (m)	Colebrook-White K (mm)	Pipe gradient	Flow velocity (m/s)	Pipe capacity (l/s)
Ex. 150mm PE WW pipe	150	11.82	10.37	44.9	1.5	3.23%	1.58	27.87

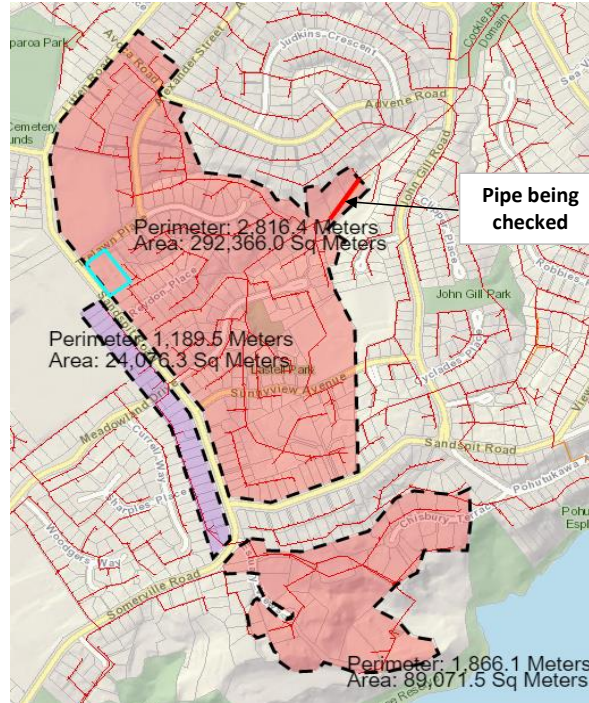
WASTEWATER CALCULATIONS

CAPACITY CHECK FOR EXISTING WW PIPE

Project : 30-40 Sandspit Road **Job No:** 4520
Client: Box Property Investment Trust
Calculation by: NF **Date:** 29/07/2020
Checked by: NF



PIPE ID: 756687 CATCHMENT PLAN



WASTEWATER CODE OF PRACTICE REQUIREMENTS

Table 5.1.1 – Design residential design wastewater flow allowance and peaking factors

Residential property type	Design wastewater flow allowance	Design wastewater peaking factors	
	Litres per person per day (L/p/d)	Peaking factor: Self-Cleansing Design Flow (Normal PDWF)	Peaking factor: Peak Design Flow (PWWF or Exceptional PDWF)
Up to three storey residential development	180	3.0	6.7
High-rise residential (or mixed-use) buildings four storeys and above	180	3.0	5.0

Table 5.1.2 Design residential occupancy allowances

Number of bedrooms (Notes 1 and 2)	Occupancy for design purposes (i.e. people)
1	2
2-4	3
More than 5	Specific agreement with Watercare
Unknown	For high rise apartments (four floors or more) and other residential assume a design occupancy rate of 5 per dwelling unit.

Table notes:

- Where large dwellings are proposed, which have additional rooms beyond those allocated as dining, lounge and bedroom e.g. family, office, study or sleepouts which have the potential to be used as bedrooms, an additional occupancy allowance should be made on the basis of 1 extra person times the ratio of the total floor area of the additional room(s) to that of the smallest designated bedroom.
- For residential retirement villages without a hospital facility and that have single bedroom units then a design occupancy rate of 1.5 may be considered.

Other facility types	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)	
Hospitals	Day facility (treatment facilities, wards)	280 Litres per bed per day	2.0	5.0
	Night and day facility (24-hour operation)	570 Litres per bed per day	1.5	5.0
	Staff	45 litres per employee per day	2.0	5.0
Child day-care	Children	42 Litres per child per day	2.0	6.7
	Staff	45 Litres per employee per day		
School (day students)	Primary school	15 Litres per student per day	2.0	6.7
	Secondary school	20 Litres per student per day	2.0	6.7
	Staff	45 Litres per employee per day	2.0	6.7

WASTEWATER CALCULATIONS

CAPACITY CHECK FOR EXISTING WW PIPE

Project : 30-40 Sandspit Road **Job No:** 4520
Client: Box Property Investment Trust
Calculation by: NF **Date:** 29/07/2020
Checked by: NF



PRE-DEVELOPMENT AND POST-DEVELOPMENT SCENARIO

Catchment A: Residential - Single House Zone

<u>Residential</u>	
Average Site Area	600 m ²
Number of dwellings	335 dwellings
Number of people per dwelling	3 people
Total of occupants (Ex Conditions)	1005 people
Occupants-Development	154 people
Total of occupants (Post Development)	1159 people
Design Wastewater Flow Allowance	180 l/p/d
Design ADWF (Ex Conditions)	2.09 l/s
Design ADWF (Post Development)	2.41 l/s
Peaking Factor	6.70
Peak Design Flow (Ex Conditions)	14.03 l/s
Peak Design Flow (Post Development)	16.18 l/s
<u>Primary School</u>	
Cockle Bay School # students	711 students
Cockle Bay School # staff	71.1 people
Total number of people	782.1
Design Wastewater Flow Allowance	15 l/s/d
Design ADWF	0.14 l/s
Peaking Factor	6.70
Peak Design Flow	0.91 l/s
<u>Peak Design Flow- Catchment A (Ex Conditions)</u>	<u>14.94 l/s</u>
<u>Peak Design Flow- Catchment A (Post Development)</u>	<u>17.09</u>

Catchment B: Residential - Mixed Housing Suburban Zone

Total Catchment Area	24,076 m ²
Primary School Area	12,327
Residential Area	11,749
<u>Residential</u>	
Average Site Area	400 m ²
Number of dwellings	0 dwellings
Number of people per dwelling	3
Total of occupants	0 people
Design Wastewater Flow Allowance	180 l/p/d
Design ADWF	0.00 l/s
Peaking Factor	6.70
Peak Design Flow	0.00 l/s
<u>Primary School</u>	
Shelly Park School # students	479
Shelly Park School # staff	47.9
Total number of people	526.9
Design Wastewater Flow Allowance	15 l/s/d
Design ADWF	0.09 l/s
Peaking Factor	6.70
Peak Design Flow	0.61 l/s
<u>Peak Design Flow- Catchment B</u>	<u>0.61 l/s</u>
Total Peak Design Flow (Ex Conditions)	15.55 l/s
Total Peak Design Flow (Post Development)	17.70 l/s

Capacity Check
OK
OK

DESCRIPTION	Pipe diameter (mm)	Upstream (IL)	Downstream (IL)	Pipe Length (m)	Colebrook-White K (mm)	Pipe gradient	Flow velocity (m/s)	Pipe capacity (l/s)
Ex. 150mm PE WW pipe	150	13.89	11.82	99.4	1.5	2.08%	1.27	22.36

WASTEWATER CALCULATIONS

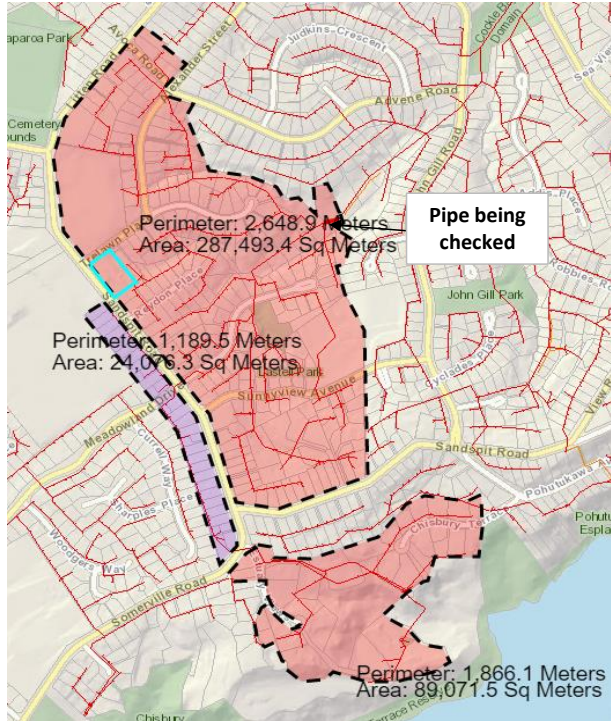
CAPACITY CHECK FOR EXISTING WW PIPE

Project : 30-40 Sandspit Road
Client: Box Property Investment Trust
Calculation by: NF
Checked by: NF

Job No: 4520
Date: 29/07/2020



**PIPE ID: 755703
 CATCHMENT PLAN**



WASTEWATER CODE OF PRACTICE REQUIREMENTS

Table 5.1.1 – Design residential design wastewater flow allowance and peaking factors

Residential property type	Design wastewater flow allowance	Design wastewater peaking factors	
	Litres per person per day (L/p/d)	Peaking factor: Self-Cleansing Design Flow (Normal PDWF)	Peaking factor: Peak Design Flow (PWWF or Exceptional PDWF)
Up to three storey residential development	180	3.0	6.7
High-rise residential (or mixed-use) buildings four storeys and above	180	3.0	5.0

Table 5.1.2 Design residential occupancy allowances

Number of bedrooms (Notes 1 and 2)	Occupancy for design purposes (i.e. people)
1	2
2-4	3
More than 5	Specific agreement with Watercare
Unknown	For high rise apartments (four floors or more) and other residential assume a design occupancy rate of 5 per dwelling unit.

Table notes:

- Where large dwellings are proposed, which have additional rooms beyond those allocated as dining, lounge and bedroom e.g. family, office, study or sleepouts which have the potential to be used as bedrooms, an additional occupancy allowance should be made on the basis of 1 extra person times the ratio of the total floor area of the additional room(s) to that of the smallest designated bedroom.
- For residential retirement villages without a hospital facility and that have single bedroom units then a design occupancy rate of 1.5 may be considered.

Other facility types	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)	
Hospitals	Day facility (treatment facilities, wards)	280 Litres per bed per day	2.0	5.0
	Night and day facility (24-hour operation)	570 Litres per bed per day	1.5	5.0
	Staff	45 litres per employee per day	2.0	5.0
Child day-care	Children	42 Litres per child per day	2.0	6.7
	Staff	45 Litres per employee per day		
School (day students)	Primary school	15 Litres per student per day	2.0	6.7
	Secondary school	20 Litres per student per day	2.0	6.7
	Staff	45 Litres per employee per day	2.0	6.7

WASTEWATER CALCULATIONS

CAPACITY CHECK FOR EXISTING WW PIPE

Project : 30-40 Sandspit Road **Job No:** 4520
Client: Box Property Investment Trust
Calculation by: NF **Date:** 29/07/2020
Checked by: NF



PRE-DEVELOPMENT AND POST-DEVELOPMENT SCENARIO

Catchment A: Residential - Single House Zone

Residential

Average Site Area	600 m ²
Number of dwellings	333 dwellings
Number of people per dwelling	3 people
Total of occupants (Ex Conditions)	999 people
Occupants-Development	154 people
Total of occupants (Post Development)	1153 people

Design Wastewater Flow Allowance	180 l/p/d
Design ADWF (Ex Conditions)	2.08 l/s
Design ADWF (Post Development)	2.40 l/s
Peaking Factor	6.70
Peak Design Flow (Ex Conditions)	13.94 l/s
Peak Design Flow (Post Development)	16.09 l/s

Primary School

Cockle Bay School # students	711 students
Cockle Bay School # staff	71.1 people
Total number of people	782.1

Design Wastewater Flow Allowance	15 l/s/d
Design ADWF	0.14 l/s
Peaking Factor	6.70
Peak Design Flow	0.91 l/s

<u>Peak Design Flow- Catchment A (Ex Conditions)</u>	<u>14.85 l/s</u>
<u>Peak Design Flow- Catchment A (Post Development)</u>	<u>17.00</u>

Catchment B: Residential - Mixed Housing Suburban Zone

Total Catchment Area	24,076 m ²
Primary School Area	12,327
Residential Area	11,749

Residential

Average Site Area	400 m ²
Number of dwellings	0 dwellings
Number of people per dwelling	3
Total of occupants	0 people

Design Wastewater Flow Allowance	180 l/p/d
Design ADWF	0.00 l/s
Peaking Factor	6.70
Peak Design Flow	0.00 l/s

Primary School

Shelly Park School # students	479
Shelly Park School # staff	47.9
Total number of people	526.9

Design Wastewater Flow Allowance	15 l/s/d
Design ADWF	0.09 l/s
Peaking Factor	6.70
Peak Design Flow	0.61 l/s

<u>Peak Design Flow- Catchment B</u>	<u>0.61 l/s</u>
--------------------------------------	-----------------

Total Peak Design Flow (Ex Conditions)	15.47 l/s
Total Peak Design Flow (Post Development)	17.62 l/s

Capacity Check
OK
OK

DESCRIPTION	Pipe diameter (mm)	Upstream (IL)	Downstream (IL)	Pipe Length (m)	Colebrook-White K (mm)	Pipe gradient	Flow velocity (m/s)	Pipe capacity (l/s)
Ex. 150mm PE WW pipe	150	14.59	13.89	28	1.5	2.50%	1.39	24.51

WASTEWATER CALCULATIONS

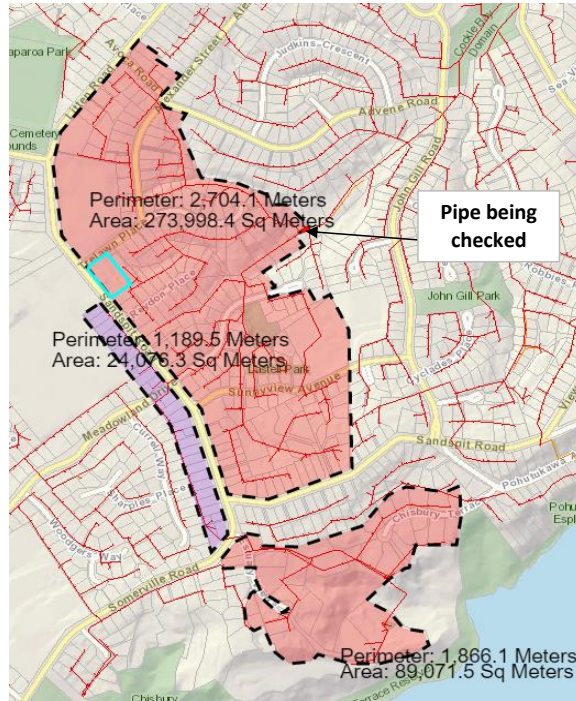
CAPACITY CHECK FOR EXISTING WW PIPE

Project : 30-40 Sandspit Road
Client: Box Property Investment Trust
Calculation by: NF
Checked by: NF

Job No: 4520
Date: 29/07/2020



PIPE ID: 756686 CATCHMENT PLAN



WASTEWATER CODE OF PRACTICE REQUIREMENTS

Table 5.1.1 – Design residential design wastewater flow allowance and peaking factors

Residential property type	Design wastewater flow allowance	Design wastewater peaking factors	
	Litres per person per day (L/p/d)	Peaking factor: Self-Cleansing Design Flow (Normal PDWF)	Peaking factor: Peak Design Flow (PWWF or Exceptional PDWF)
Up to three storey residential development	180	3.0	6.7
High-rise residential (or mixed-use) buildings four storeys and above	180	3.0	5.0

Table 5.1.2 Design residential occupancy allowances

Number of bedrooms (Notes 1 and 2)	Occupancy for design purposes (i.e. people)
1	2
2-4	3
More than 5	Specific agreement with Watercare
Unknown	For high rise apartments (four floors or more) and other residential assume a design occupancy rate of 5 per dwelling unit.

Table notes:

- Where large dwellings are proposed, which have additional rooms beyond those allocated as dining, lounge and bedroom e.g. family, office, study or sleepouts which have the potential to be used as bedrooms, an additional occupancy allowance should be made on the basis of 1 extra person times the ratio of the total floor area of the additional room(s) to that of the smallest designated bedroom.
- For residential retirement villages without a hospital facility and that have single bedroom units then a design occupancy rate of 1.5 may be considered.

Other facility types	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)	
Hospitals	Day facility (treatment facilities, wards)	280 Litres per bed per day	2.0	5.0
	Night and day facility (24-hour operation) Staff	570 Litres per bed per day 45 litres per employee per day	1.5	5.0
Child day-care	Children	42 Litres per child per day	2.0	6.7
	Staff	45 Litres per employee per day	2.0	6.7
School (day students)	Primary school	15 Litres per student per day	2.0	6.7
	Secondary school	20 Litres per student per day	2.0	6.7
	Staff	45 Litres per employee per day	2.0	6.7

WASTEWATER CALCULATIONS

CAPACITY CHECK FOR EXISTING WW PIPE

Project : 30-40 Sandspit Road Job No: 4520
 Client: Box Property Investment Trust
 Calculation by: NF Date: 29/07/2020
 Checked by: NF



PRE-DEVELOPMENT AND POST-DEVELOPMENT SCENARIO

Catchment A: Residential - Single House Zone

Residential

Average Site Area	600 m ²
Number of dwellings	325 dwellings
Number of people per dwelling	3 people
Total of occupants (Ex Conditions)	975 people
Occupants-Development	154 people
Total of occupants (Post Development)	1129 people

Design Wastewater Flow Allowance	180 l/p/d
Design ADWF (Ex Conditions)	2.03 l/s
Design ADWF (Post Development)	2.35 l/s
Peaking Factor	6.70
Peak Design Flow (Ex Conditions)	13.61 l/s
Peak Design Flow (Post Development)	15.76 l/s

Primary School

Cockle Bay School # students	711 students
Cockle Bay School # staff	71.1 people
Total number of people	782.1

Design Wastewater Flow Allowance	15 l/s/d
Design ADWF	0.14 l/s
Peaking Factor	6.70
Peak Design Flow	0.91 l/s

<u>Peak Design Flow- Catchment A (Ex Conditions)</u>	<u>14.52 l/s</u>
<u>Peak Design Flow- Catchment A (Post Development)</u>	<u>16.67</u>

Catchment B: Residential - Mixed Housing Suburban Zone

Total Catchment Area	24,076 m ²
Primary School Area	12,327
Residential Area	11,749

Residential

Average Site Area	400 m ²
Number of dwellings	0 dwellings
Number of people per dwelling	3
Total of occupants	0 people

Design Wastewater Flow Allowance	180 l/p/d
Design ADWF	0.00 l/s
Peaking Factor	6.70
Peak Design Flow	0.00 l/s

Primary School

Shelly Park School # students	479
Shelly Park School # staff	47.9
Total number of people	526.9

Design Wastewater Flow Allowance	15 l/s/d
Design ADWF	0.09 l/s
Peaking Factor	6.70
Peak Design Flow	0.61 l/s

<u>Peak Design Flow- Catchment B</u>	<u>0.61 l/s</u>
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Total Peak Design Flow (Ex Conditions)	15.13 l/s
Total Peak Design Flow (Post Development)	17.28 l/s

Capacity Check
OK
OK

DESCRIPTION	Pipe diameter (mm)	Upstream (l/l)	Downstream (l/l)	Pipe Length (m)	Colebrook-White K (mm)	Pipe gradient	Flow velocity (m/s)	Pipe capacity (l/s)
Ex. 150mm PE WW pipe	150	14.82	14.59	17.4	1.5	1.32%	1.01	17.79

WASTEWATER CALCULATIONS

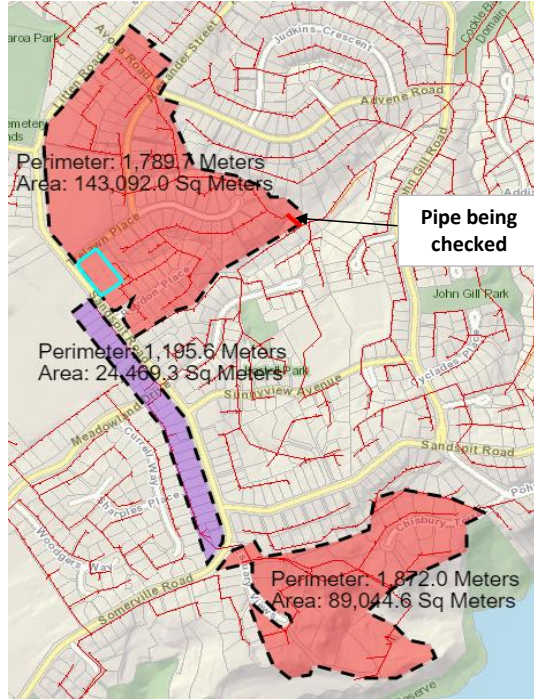
CAPACITY CHECK FOR EXISTING WW PIPE

Project : 30-40 Sandspit Road
Client: Box Property Investment Trust
Calculation by: NF
Checked by: NF

Job No: 4520
Date: 29/07/2020



PIPE ID: 746071 CATCHMENT PLAN



WASTEWATER CODE OF PRACTICE REQUIREMENTS

Table 5.1.1 – Design residential design wastewater flow allowance and peaking factors

Residential property type	Design wastewater flow allowance	Design wastewater peaking factors	
	Litres per person per day (L/p/d)	Peaking factor: Self-Cleansing Design Flow (Normal PDWF)	Peaking factor: Peak Design Flow (PWWF or Exceptional PDWF)
Up to three storey residential development	180	3.0	6.7
High-rise residential (or mixed-use) buildings four storeys and above	180	3.0	5.0

Table 5.1.2 Design residential occupancy allowances

Number of bedrooms (Notes 1 and 2)	Occupancy for design purposes (i.e. people)
1	2
2-4	3
More than 5	Specific agreement with Watercare
Unknown	For high rise apartments (four floors or more) and other residential assume a design occupancy rate of 5 per dwelling unit.

Table notes:
 1. Where large dwellings are proposed, which have additional rooms beyond those allocated as dining, lounge and bedroom e.g. family, office, study or sleepouts which have the potential to be used as bedrooms, an additional occupancy allowance should be made on the basis of 1 extra person times the ratio of the total floor area of the additional room(s) to that of the smallest designated bedroom.
 2. For residential retirement villages without a hospital facility and that have single bedroom units then a design occupancy rate of 1.5 may be considered.

Other facility types	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)	
Hospitals	Day facility (treatment facilities, wards)	280 Litres per bed per day	2.0	5.0
	Night and day facility (24-hour operation)	570 Litres per bed per day	1.5	5.0
	Staff	45 litres per employee per day	2.0	5.0
Child day-care	Children	42 Litres per child per day	2.0	6.7
	Staff	45 Litres per employee per day		
School (day students)	Primary school	15 Litres per student per day	2.0	6.7
	Secondary school	20 Litres per student per day	2.0	6.7
	Staff	45 Litres per employee per day	2.0	6.7

WASTEWATER CALCULATIONS

CAPACITY CHECK FOR EXISTING WW PIPE

Project : 30-40 Sandspit Road
Client: Box Property Investment Trust
Calculation by: NF
Checked by: NF

Job No: 4520
Date: 29/07/2020



PRE-DEVELOPMENT AND POST-DEVELOPMENT SCENARIO

Catchment A: Residential - Single House Zone

Residential

Average Site Area	600 m ²	
Number of dwellings	107 dwellings	
Number of people per dwelling	3 people	
Total of occupants (Ex Conditions)	321 people	
Occupants-Development	216 people	
Total of occupants (Post Development)	537 people	

Design Wastewater Flow Allowance	180 l/p/d	
Design ADWF (Ex Conditions)	0.67 l/s	
Design ADWF (Post Development)	1.12 l/s	
Peaking Factor	6.70	
Peak Design Flow (Ex Conditions)	4.48 l/s	
Peak Design Flow (Post Development)	7.50 l/s	

Primary School

Cockle Bay School # students	711 students	
Cockle Bay School # staff	71.1 people	
Total number of people	782.1	

Design Wastewater Flow Allowance	15 l/s/d	45
Design ADWF	0.12 l/s	0.01234375
Peaking Factor	6.70	
Peak Design Flow	0.91 l/s	

<u>Peak Design Flow- Catchment A (Ex Conditions)</u>	<u>5.39 l/s</u>	
<u>Peak Design Flow- Catchment A (Post Development)</u>	<u>8.41</u>	

Catchment B: Residential - Mixed Housing Suburban Zone

Total Catchment Area	24,076 m ²	
Primary School Area	12,327	
Residential Area	11,749	

Residential

Average Site Area	400 m ²	
Number of dwellings	0 dwellings	
Number of people per dwelling	3	
Total of occupants	0 people	

Design Wastewater Flow Allowance	180 l/p/d	
Design ADWF	0.00 l/s	
Peaking Factor	6.70	
Peak Design Flow	0.00 l/s	

Primary School

Shelly Park School # students	479	
Shelly Park School # staff	47.9	
Total number of people	526.9	

Design Wastewater Flow Allowance	15 l/s/d	45
Design ADWF	0.08 l/s	0.008315972
Peaking Factor	6.70	
Peak Design Flow	0.61 l/s	

<u>Peak Design Flow- Catchment B</u>	<u>0.62 l/s</u>	
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Total Peak Design Flow (Ex Conditions)	6.01 l/s	Capacity Check
Total Peak Design Flow (Post Development)	9.03 l/s	OK

DESCRIPTION	Pipe diameter (mm)	Upstream (IL)	Downstream (IL)	Pipe Length (m)	Colebrook-White K (mm)	Pipe gradient	Flow velocity (m/s)	Pipe capacity (l/s)
Ex. 150mm AC WW pipe	150	20.57	14.82	33.5	1.5	17.16%	3.64	64.39

WASTEWATER CALCULATIONS

CAPACITY CHECK FOR EXISTING WW PIPE

Project : 30-40 Sandspit Road
Client: Box Property Investment Trust
Calculation by: NF
Checked by: NF

Job No: 4520
Date: 29/07/2020



PIPE ID: 718144
CATCHMENT PLAN



WASTEWATER CODE OF PRACTICE REQUIREMENTS

Table 5.1.1 – Design residential design wastewater flow allowance and peaking factors

Residential property type	Design wastewater flow allowance Litres per person per day (L/p/d)	Design wastewater peaking factors	
		Peaking factor: Self-Cleansing Design Flow (Normal PDWF)	Peaking factor: Peak Design Flow (PWWF or Exceptional PDWF)
Up to three storey residential development	180	3.0	6.7
High-rise residential (or mixed-use) buildings four storeys and above	180	3.0	5.0

Table 5.1.2 Design residential occupancy allowances

Number of bedrooms (Notes 1 and 2)	Occupancy for design purposes (i.e. people)
1	2
2-4	3
More than 5	Specific agreement with Watercare
Unknown	For high rise apartments (four floors or more) and other residential assume a design occupancy rate of 5 per dwelling unit.

Table notes:
 1. Where large dwellings are proposed, which have additional rooms beyond those allocated as dining, lounge and bedroom e.g. family, office, study or sleepouts which have the potential to be used as bedrooms, an additional occupancy allowance should be made on the basis of 1 extra person times the ratio of the total floor area of the additional room(s) to that of the smallest designated bedroom.
 2. For residential retirement villages without a hospital facility and that have single bedroom units then a design occupancy rate of 1.5 may be considered.

Catchment : Residential - Single House Zone

Number of dwellings (existing lots)	4 dwellings
Number of units (proposed development)	54
Number of people per dwelling	3
Total of occupants	174 people
Design Wastewater Flow Allowance	180 l/p/d
Design ADWF (Ex Conditions)	0.025 l/s
Design ADWF (Post Development)	0.36 l/s
Peaking Factor	6.70
PWWF- Peak Design Flow (Ex Conditions)	0.168 l/s
PWWF- Peak Design Flow (Post Development)	2.43 l/s

Capacity Check
OK
OK

Pipe gradient assumed conservatively as not information is shown on AC GIS

DESCRIPTION	Pipe diameter (mm)	Upstream (IL)	Downstream (IL)	Pipe Length (m)	Colebrook-White K (mm)	Pipe gradient	Flow velocity (m/s)	Pipe capacity (l/s)
Ex. 150mm PVC WW pipe	150	-	-	-	1.5	1.00%	0.87	15.46

Therefore, the existing downstream wastewater pipe has enough capacity to receive flows from the proposed development.

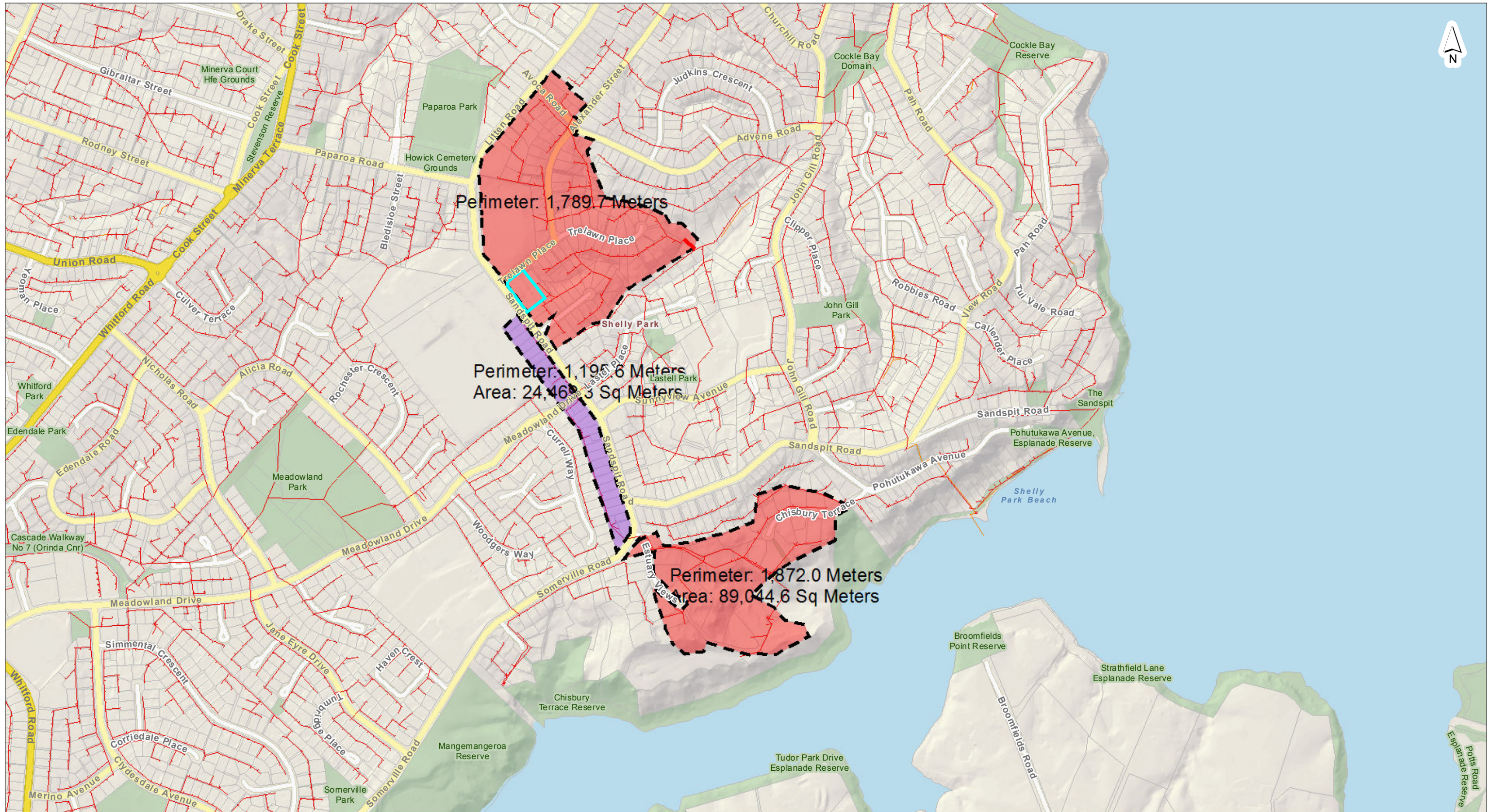
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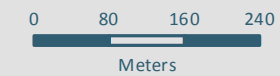
APPENDIX D

Catchment Plans



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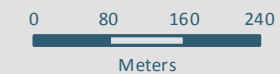
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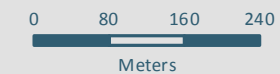
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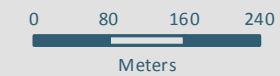
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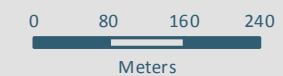
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