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# **INFRASTRUCTURE REPORT**

**FOR**

# **PROPOSED DEVELOPMENT**

**AT**

**401-403 PARNELL ROAD  
PARNELL**

Report prepared by  
JNG ENGINEERS LTD  
24/5/2020  
jn

## 1. INTRODUCTION

JNG Engineers Ltd was engaged by Building Innovation Group, the owner, to investigate and carry out capacity investigation of the existing public stormwater and wastewater for the proposed new apartments at 401-403 Parnell Road, Parnell, Auckland. This development consists removing the existing buildings and to construct an apartment / retail building as shown on Archavium Ltd's drawing 030.

## 2. WASTEWATER

Auckland Council GIS plan shows that there is an existing 225mm public wastewater line along Parnell Road which the proposed development can connected onto.

A capacity check of the existing 225 mm public line has been carried out and it is found that the existing public line has adequate capacity. (calculation enclosed in appendix)

## 3. STORMWATER

The Auckland City Geomap shows that there is an existing 225mm public stormwater lines along Parnell Road which the development can connect onto.

An capacity assesement analysis for the first downstream manhole was carried out for a 10% AEP runoff. The existing 225mm public stormwater line shows that it has sufficient capacity for the existing catchment and the proposed development.

## 4. WATER SUPPLY

According to Auckland Council GIS, there is a 125 diameter watermain in front along the berm which can serve the proposed development.

According to the Auckland City Code of Urban Subdivision and Development, the commercial design flow (peak hourly flow) is 0.7 l/s/hectare, the total consumption for the proposed development is 0.3 l/s.

Therefore there is adequate flow in the public mains to supply directly to the proposed development.

## 6. FIRE DEMANDS

The NZFS water supply classification for the proposed development site is Class FW3 according to New Zealand Fire Service Code Of Practice For Firefighting Water Supplies (NZS PAS 4509:2008).

Geomap shows that there are more than 3 hydrants within 135m and 270m of the proposed development.

## 5. CONCLUSION

Based on our investigations and supporting calculations, it shows that the existing wastewater sewer, stormwater infrastructure and water reticulation system can support the proposed residential development.

This report has been prepared for the benefit of our client, Building Innovation Group, specifically relative to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose without our prior review and agreement.

We trust the above meets your present requirements. If there are any further queries, please do not hesitate to contact us.

Yours faithfully  
**JNG Engineers Ltd**



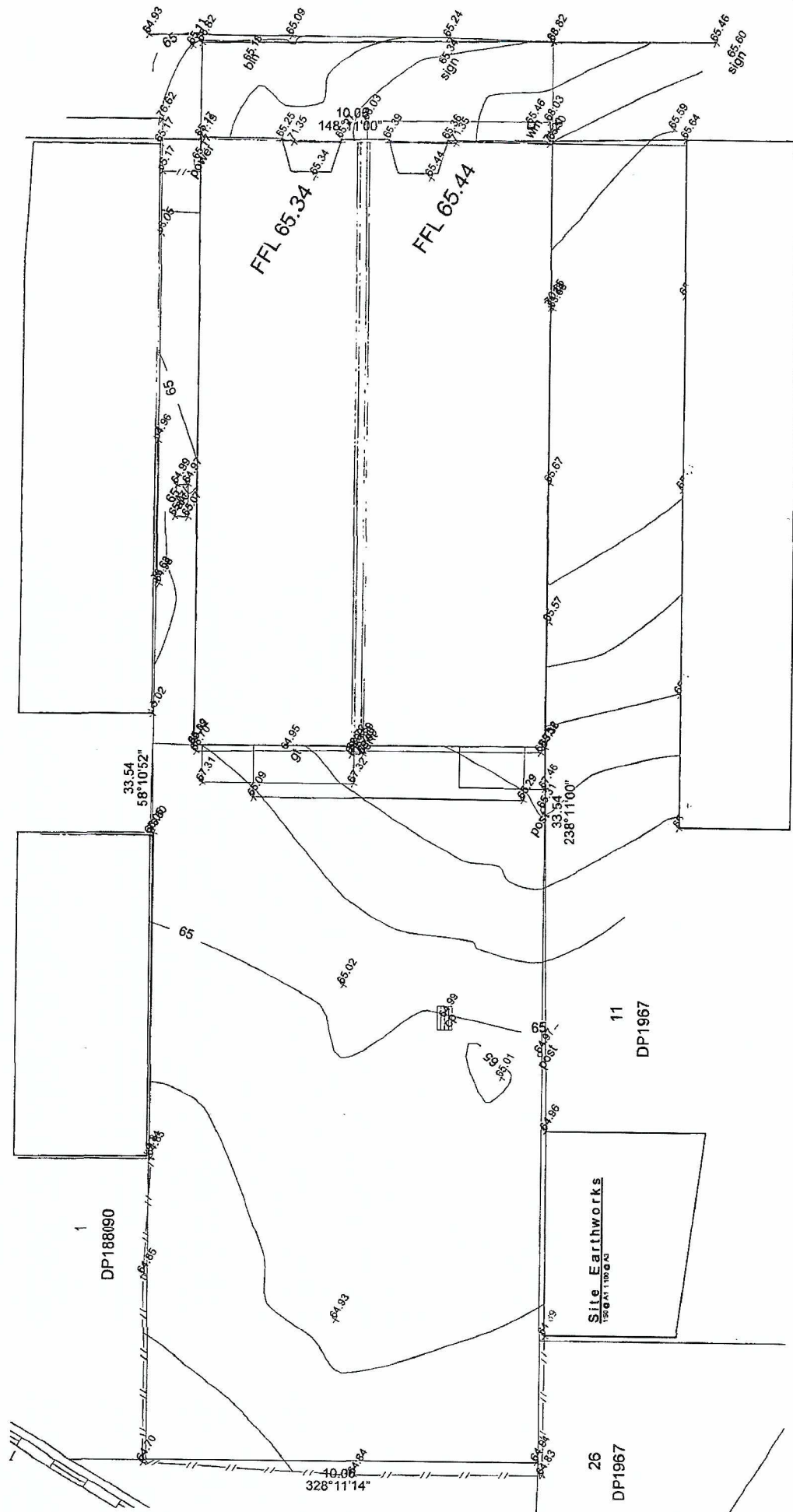
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**Joshua Ng**  
BSc(Hons), MIPENZ, CPEng, Int.PE  
Principal

## APPENDIX

- PLANS
- Stormwater capacity CALCULATIONS
- Wastewater capacity CALCULATIONS
- Water Supply Calculations



# PARNELL ROAD

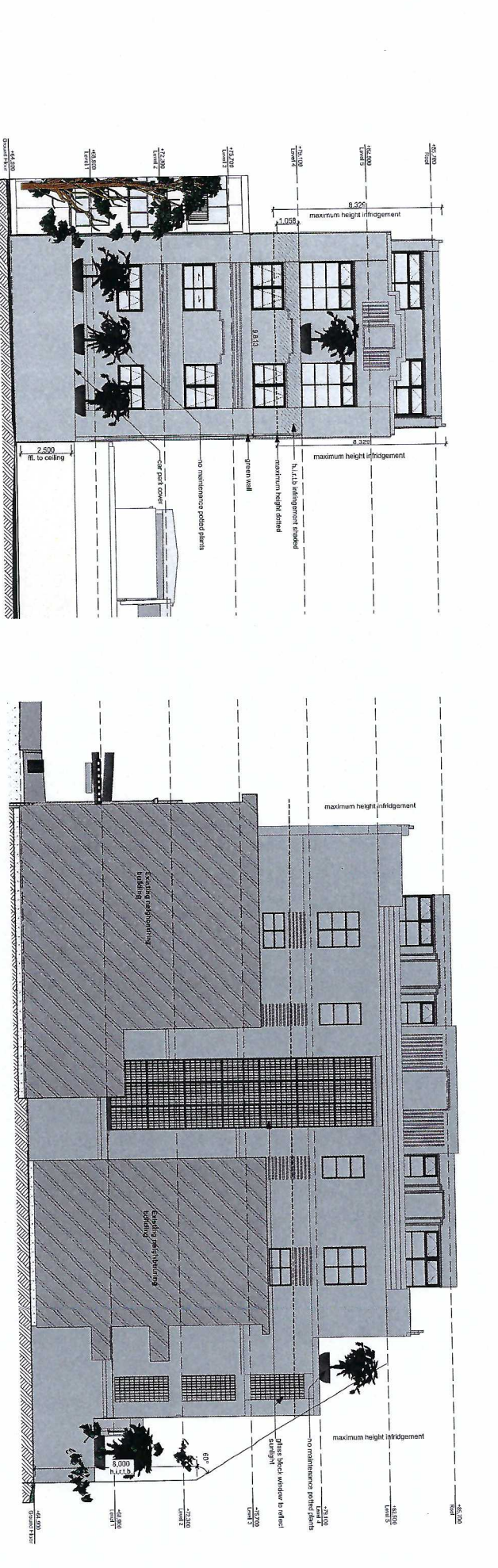
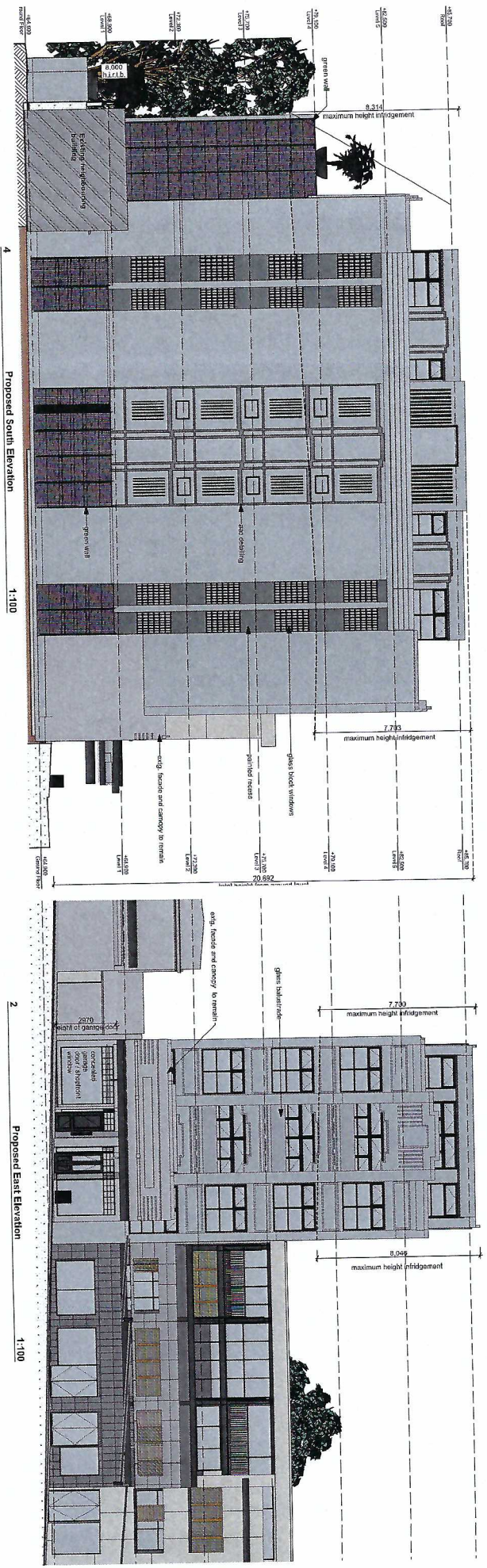


  
 Auckland Council  
 R/LUC/2015/4702  
 Approved Resource Consent Plan  
 17/08/2016

Site Survey  
 1:50 @ 1:200 @ 13







**SANITARY SEWER CALCULATION**      401-403 Parnell Road

Upper catchment area A = 2.13 ha

number of lots =  
 number of person per house = person  
 ADWF = 0.7 l/s/ha  
 ADWF = l/sec  
 PDWF = l/sec  
 PWWF = 1.49 l/sec

Proposed catchment area = 336 m<sup>2</sup>

number of apt = 5  
 number of person per house = 4  
 ADWF = 225 l/p/d  
 ADWF = 0.052083 l/sec  
 PDWF = 0.15625 l/sec  
 PWWF = 0.348958 l/sec

upper catchment area B & C

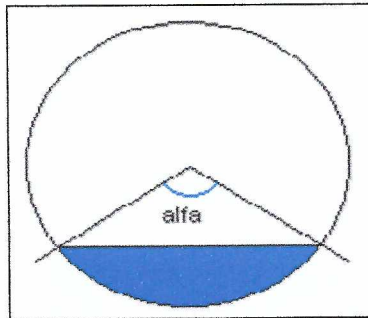
number of lots = m  
 number of person per house =  
 ADWF = l/m<sup>2</sup>/d  
 ADWF = 0 l/sec  
 PDWF = 0 l/sec  
 PWWF = 0 l/sec

TOTAL DISCHARGE = 1.838958 l/sec

Therefore existing 225mm diameter public line at 1% is satisfactory



## Sewer Pipe Self Cleansing



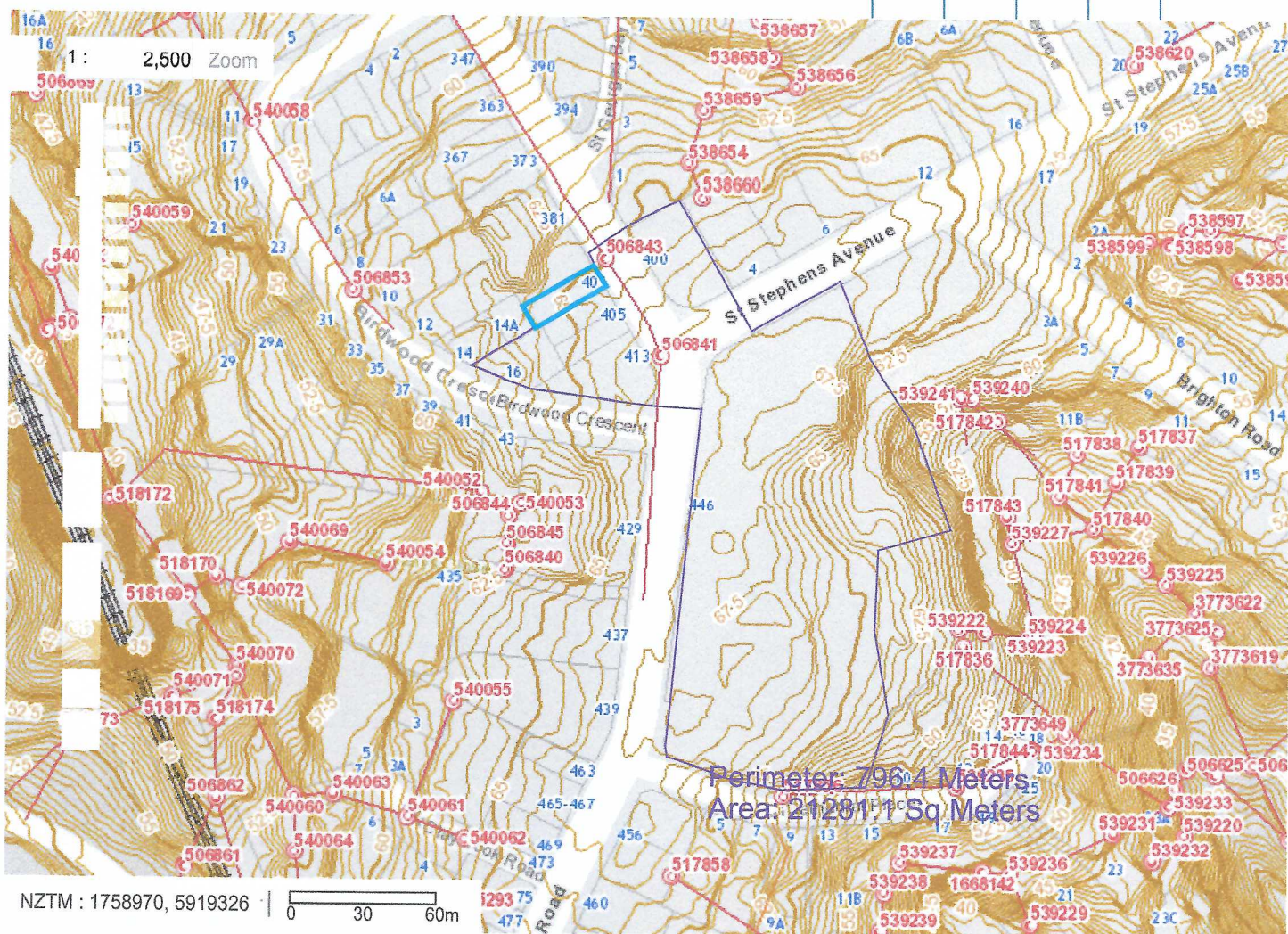
Pipe Diameter	225 mm	0.225 m
Flow Rate	5.5 l/s	(from above)
Gradient i	1 %	0.01
Mannings n value	0.011	

Using Mannings Formular =  $Q = A \times V$   
 $V = 1/n \times m^{2/3} \times i^{1/2}$   
 $m = A / P$

Assume Angle alfa =	340 degree	5.934119 rad	
Wetted Preimeter P =	0.667588 m		
Flow Cross Section A =	0.039716 m <sup>2</sup>	0.037552	-0.00216
Hydrolic Radius m =	0.059492 m		
Velocity based Alfa =	1.385415 m/s		
Flow Rate =	55.02341 l/s		

Therefore existing pipes have sufficient capacity for proposed development

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**Graphical Method for Peak Flow Rate**

**401-403 Parnell Road**

**Catchment details**

Catchment A

Area (ha) = 0.4386  
 Length (km) = 0.1207

Elevation (m)	h (m)	x (m)	$\Delta x$ (m)	ave h (m)	change in Area (m <sup>2</sup> )
62		0	0		
63		1	18.8	0.5	9.4
65		3	61.5	2	85.4
66.5		4.5	120.7	3.75	222

120.7 316.8

Slope  $Sc = 2A/L^2$  0.043

**RAINFALL**

10 yr ARI = 113x1.275 = 144 mm

2 yr ARI P24 = mm  
 10 yr ARI P24 = 144 mm  
 100 yr ARI P24 = mm

**RUNOFF CURVE NUMBER (CN) and INITIAL ABSTRACTION (Ia)**

Soil classification	Cover description	CURVE NUMBER CN	AREA ha	CN x AREA
tuff,ash	lawn	74	0.07	5.18
	building & paved area	98	0.41	40.18
				0
				0
		TOTAL	0.48	45.36

pervious area

$$\text{CN (weighted)} = \text{CN} \times \text{Area} / \text{total area} = 94.5$$

$$\text{Ia (weighted)} = 5 \times \text{pervious area} / \text{total area} = 0.72916667 \text{ mm}$$

### TIME of CONCENTRATION

$$\begin{aligned} \text{Channelisation factor } C &= 0.6 \text{ (from table 4.2)} \\ \text{Catchment Length } L &= 0.1207 \text{ km} \\ \text{Catchment Slope } S_c &= 0.043 \text{ m/m} \\ \text{runoff factor} &= \text{CN} / (200 - \text{CN}) = 0.896 \\ \text{tc} &= 0.14 \times C \times L^{0.66} \times (\text{runoff factor})^{-0.55} \times S_c^{-0.3} = 0.057 \\ \text{SCS Lag for HEC-HMS} &= t_p = 2/3 \text{tc} = 0.038 \end{aligned}$$

### Graphical Peak Flow Rate

#### Catchment Data

$$\begin{aligned} \text{Area } A &= 0.0048 \text{ km}^2 \\ \text{Runoff Curve No CN} &= 94.5 \\ \text{Initial abstraction } I_a &= 0.72916667 \text{ mm} \\ \text{Time of Concentration } t_c &= 0.057 \text{ hrs} \end{aligned}$$

$$\text{Calculated storage } S = 25.4 \times (1000 / \text{CN} - 10) = 14.78 \text{ mm}$$

Average recurrence interval ARI(yr)  
 24 hour rainfall depth, P24(mm)  
 Compute  $c^* = (P24 - 2I_a) / (P24 - 2I_a + 2S)$   
 Specific peak flow rate,  $q^*$  (from fig 5.1)  
 Peak flow rate,  $q_p = q^* \times A \times P24$  (m<sup>3</sup>/s)  
 Runoff depth,  $Q24 = (P24 - I_a)^2 / (P24 - I_a + S)$  (mm)  
 Runoff volume,  $V24 = 1000 \times Q24 \times A$  (m<sup>3</sup>)

Storm #1	Storm #2	Storm #3
2	10	100
0	144	0
	0.828	
	0.177	
0	0.1223424	0
	129.870	
0.000	623.378	0.000

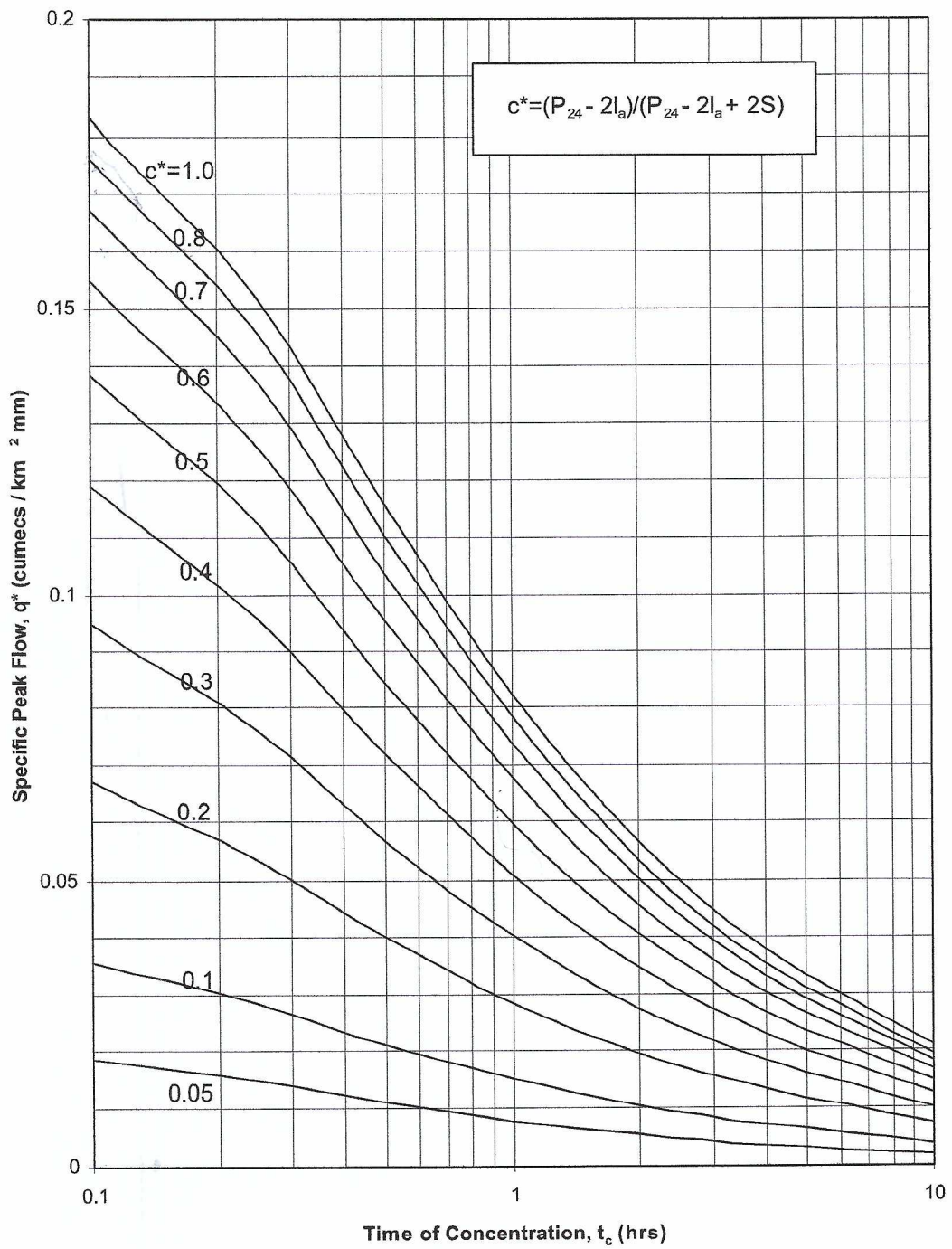
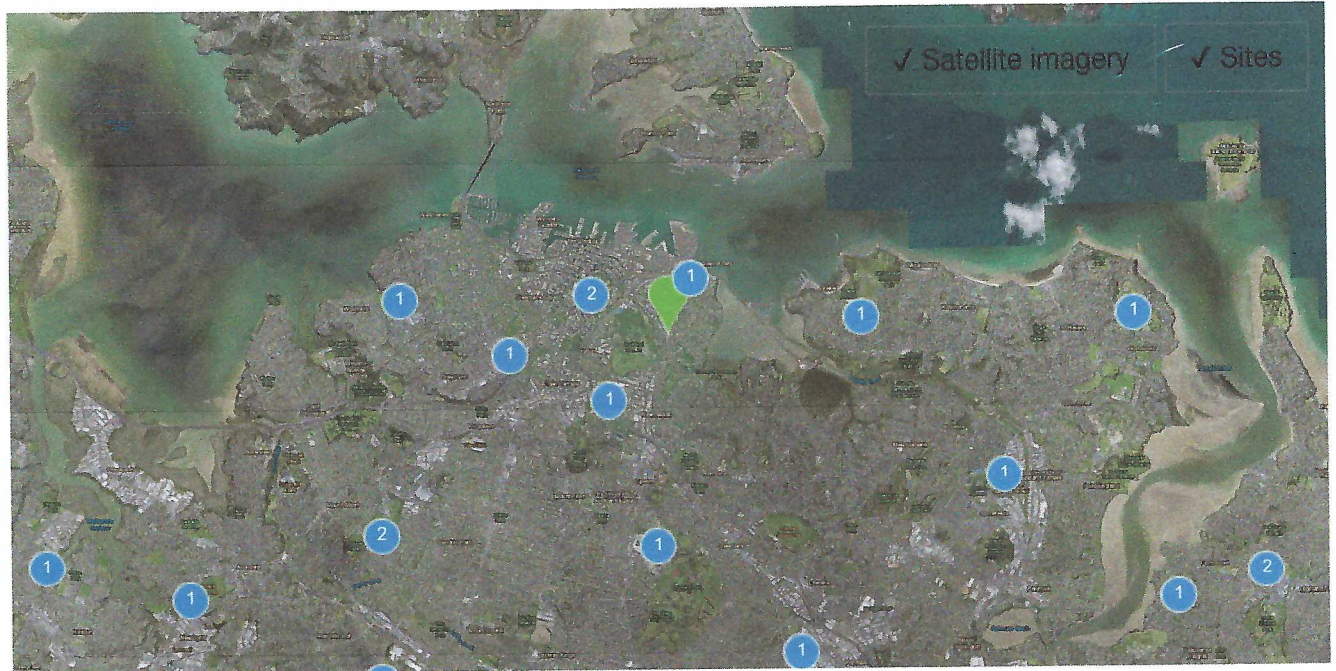


Figure 5.1 - Specific Peak Flow Rate

# High Intensity Rainfall Design System V4 (/)

## Location

Address search	401 parnell road
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## Site Information

To generate a set of results, either click on an existing data point, or a new location and enter a site name, then press the Generate Report button.

Latitude	-36.8587813
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Longitude	174.7825178
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Site Name	401 parnell road
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Site Id	
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### Output Table Format

- Depth - Duration - Frequency
- Intensity - Duration - Frequency

Generate Report
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Site Details	Historical Data	RCP2.6 Scenario	RCP4.5 Scenario	RCP6.0 Scenario
RCP8.5 Scenario				

**Rainfall depths (mm) :: Historical Data**

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	10.5	14.7	17.7	23.9	31.4	46.0	56.8	68.3	80.1	87.0	91.7	95.3
2	0.500	11.4	15.9	19.2	26.0	34.2	50.2	62.0	74.7	87.7	95.3	101	105
5	0.200	14.3	20.2	24.4	33.0	43.6	64.5	80.0	96.6	114	124	131	136
10	0.100	16.5	23.3	28.2	38.2	50.6	75.1	93.3	113	134	146	154	160
20	0.050	18.6	26.4	32.0	43.5	57.8	86.1	107	130	154	168	178	186
30	0.033	19.9	28.3	34.3	46.7	62.1	92.6	115	140	167	182	193	201
40	0.025	20.9	29.6	35.9	49.0	65.1	97.4	121	148	176	192	203	212
50	0.020	21.6	30.6	37.2	50.7	67.5	101	126	154	183	200	212	221
60	0.017	22.1	31.5	38.2	52.2	69.5	104	130	159	189	206	219	228
80	0.012	23.1	32.8	39.9	54.5	72.7	109	136	166	198	217	230	240
100	0.010	23.8	33.8	41.1	56.3	75.1	113	141	172	205	225	238	249
250	0.004	26.7	38.1	46.3	63.6	85.1	128	161	197	236	259	275	287

**Depth standard error (mm) :: Historical Data**

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	0.60	0.80	0.58	1.3	1.8	1.5	2.9	2.8	2.5	3.7	4.0	3.6
2	0.500	0.63	0.85	0.53	1.4	1.9	1.5	3.1	3.1	2.6	4.0	4.4	3.8
5	0.200	1.0	1.5	1.3	2.2	3.0	2.9	4.9	4.7	4.6	6.0	6.7	6.1
10	0.100	1.5	2.2	2.3	3.2	4.5	4.8	7.1	6.5	7.0	8.4	9.4	8.8
20	0.050	2.2	3.1	3.5	4.6	6.4	7.4	10	9.1	10	12	13	12
30	0.033	2.6	3.7	4.3	5.7	7.9	9.3	12	11	13	14	16	15
40	0.025	3.0	4.2	4.9	6.5	9.1	11	14	13	14	16	18	17
50	0.020	3.3	4.7	5.4	7.2	10	12	16	14	16	18	20	19
60	0.017	3.6	5.0	5.9	7.8	11	13	17	15	17	19	21	21

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
80	0.012	4.0	5.7	6.7	8.8	13	15	19	17	20	21	24	24
100	0.010	4.4	6.2	7.3	9.7	14	17	21	19	21	23	26	26
250	0.004	6.2	8.7	10	14	20	25	31	27	31	34	38	38

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**STORMWATER CALCULATION**

**401-403 PARNELL ROAD**

C = 0.85  
 N = 0.011  
 I = 122 mm/hr  
 C park = 0.15  
 10 year storm with climate change  
 TP108

MANHOLE	CATCHMENT AREA	Q	LENGTH	PIPE INVERT	PIPE INVERT	GRADIENT	PIPE DIA	PIPE AREA	Qcapacity	Qexcess
	PARK PROPERTY	CA	m	OUT	IN	%	m	m <sup>2</sup>	l/s	
	m <sup>2</sup>	m <sup>2</sup>	GIS	GIS	GIS					
SWMH1	4386	3728.1	64.74	60.82	64.4	5.53	0.225	0.03974	124.71	2.71
MH1-MH2	4386									

Therefore existing 225mm pipe is under capacity and detention tanks maybe required to attenuate flow to predevelopment flow







**WATER SUPPLY DEMAND**

401-403 Parnell Road

Number of units	=	5
number of person per unit	=	4 person
AWD	=	225 l/p/d
PWD	=	22500 l/p/d
PWD	=	0.3 l/sec