DEANE CONSULTANCY LTD
Peter@deanecl.nz

19/106/C-A

Panetiki Ltd, 20 Omaha Block Access Rd
Flood Analysis of Overland Flowpath Adjacent to Accommodation Unit 05

Preamble:

The Auckland Council require a flood report to quantify the flood risk to Accommodation Unit 05 should the 600mm diameter culvert under the roadway block during a flood event. The total catchment area (page 1) is 49,370m2 (ie 4.94 ha or 0.049 km2). The existing dwelling on site is built over the 600mm diameter culvert pipe. It is proposed to remove this building and construct a new Accommodation Unit 05 over approximately the same footprint (page 3).

Page 1 attached shows the catchment in question at pre-development stage. Deane Consultancy has been engaged to provide a flood report.

Proposed post development catchment:

The proposed development will capture rainstorm from all impermeable areas. This will be controlled by reuse and detention tanks for roof water, and detention tankage in the case of paved areas. The bulk of the catchment will remain undeveloped in bush and lawns with a number of larger trees, mainly pohutukawa. The conservative assumption that the catchment will be 50% developed has been made in the flood assessment calculations.

Flood analysis:

Two calculations are made for the 1 in 100 year flood flow:

The Rational formula (page 4 attached)	1.19 cumec
TP108 method (worksheets p 5 and 6 attached)	1.75 cumec

The higher 1.75 cumec figure is recommended for design.

Floodway:

Should the 600mm culvert pipe block, the flood flow will cross the roadway. This is the current overland flow path which can be seen on page 2 attached. The blue line shown on council geomaps is accurate and does approximate the current situation. The crest of the roadway at the lowest point of the sag curve is at about 8.5m RL.

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The decision has been made that Accommodation Unit 05 will be built on timber piles or poles with no base boarding. It will be raised significantly higher than the existing building with a floor level of approximately 8.50m RL (ie equal to the crest of the road), or 700mm above ground level at the flood-way (see pages 3 and 4). If necessary a small amount of superficial soil can be scraped to form the flood-way at the roadside edge of the building. To the south of there, the existing ground falls away and the 500mm clearance to flood level is easily achieved. Calculations for the flood-way using the Mannings formula are on page 4 and cross section X-X on page 3 indicates the minimum cross section required. Beyond the rear of the house, floodwaters will then be free to spill over the bank down to the beach as they are free to do now.

Summary:

By use of conservative analyses, a 100 year ARI flood flow of 1.75 cumec has been calculated. The proposed construction of Accommodation Unit 05 and associated landscaping work, if detailed as specified in this report, will not impede flood flows from the overland flow path should the culvert block.

No diversion of runoff to another catchment will occur. Flood waters will pass at below 500mm freeboard from the floor level of the unit.

Recommendations:

That Deane Consultancy be engaged to check final site plans for Unit 05 to ensure that the requirements of this report are adopted in the plans. In addition, it is recommended that we also observe building and landscape construction in the areas affected by this report.

Environmental effects:

No diversion to another catchment occurs. There are no effects whatsoever on any other properties. All runoff is controlled in scour free channels. Environmental impacts are less than minor.

P A Deane, CMEngNZ,CPEng.
27 November, 2021.

Attachments:

Page 1 (A3) Catchment boundaries.
Page 2 (A3) Geomaps
Page 3 (A3) Floodway, proposed building locations
Page 4-10: Catchment analyses

Address | Search the map...

Info | Legend | Results

1 : 2,500 Zoom

Catchments And Hydrology

Emergency Management

Biodiversity(Public)

LandCover

Marine Moorings

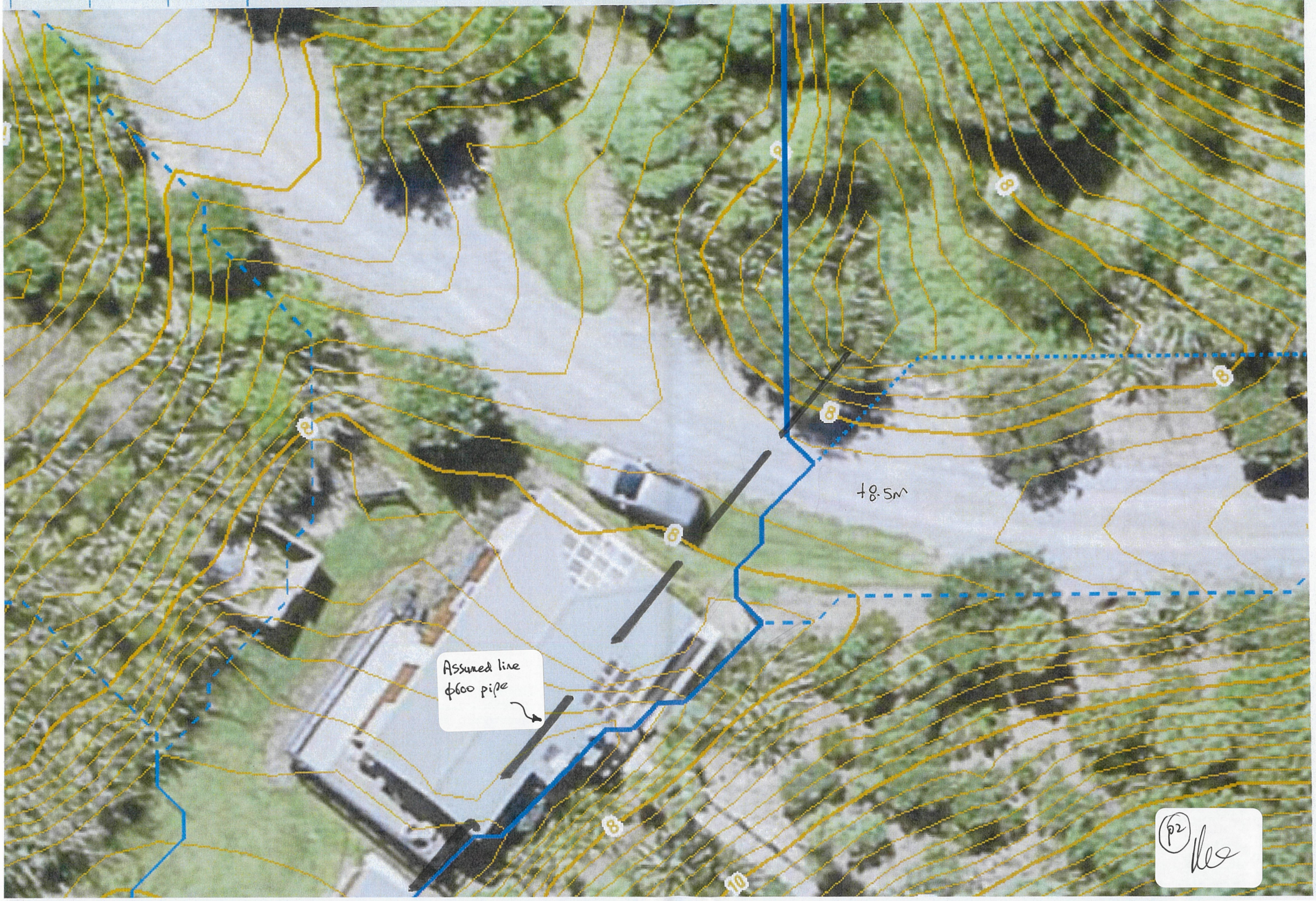
Address

Contours

Landbase

Basemap

P1


8
8
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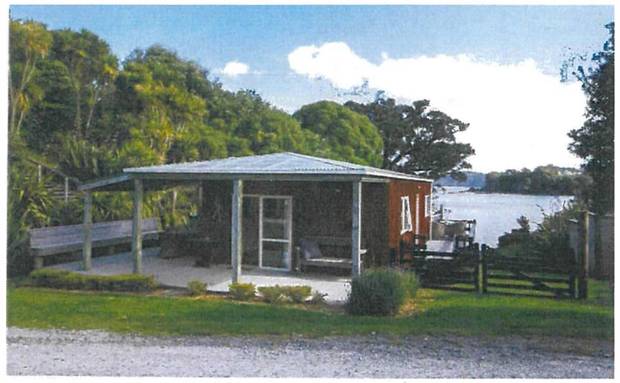
8
10
+8.5m
Assumed line
ϕ600 pipe
P2



Images of existing building on site

EXISTING USE RIGHTS

EXISTING BUILDING AND SHED

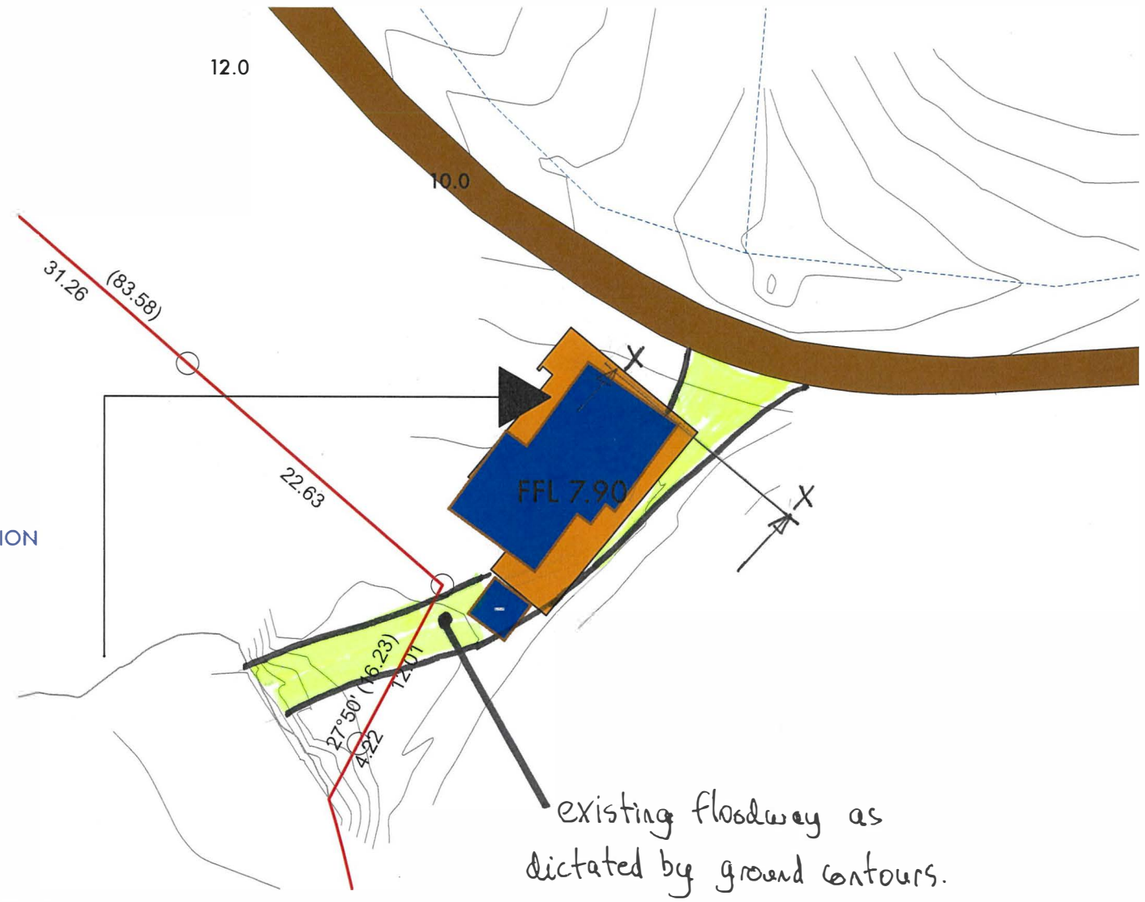
- BUILDING COVERAGE - BUILDING 100.68m²
SHED 9.10m²

PROPOSED BUILDING

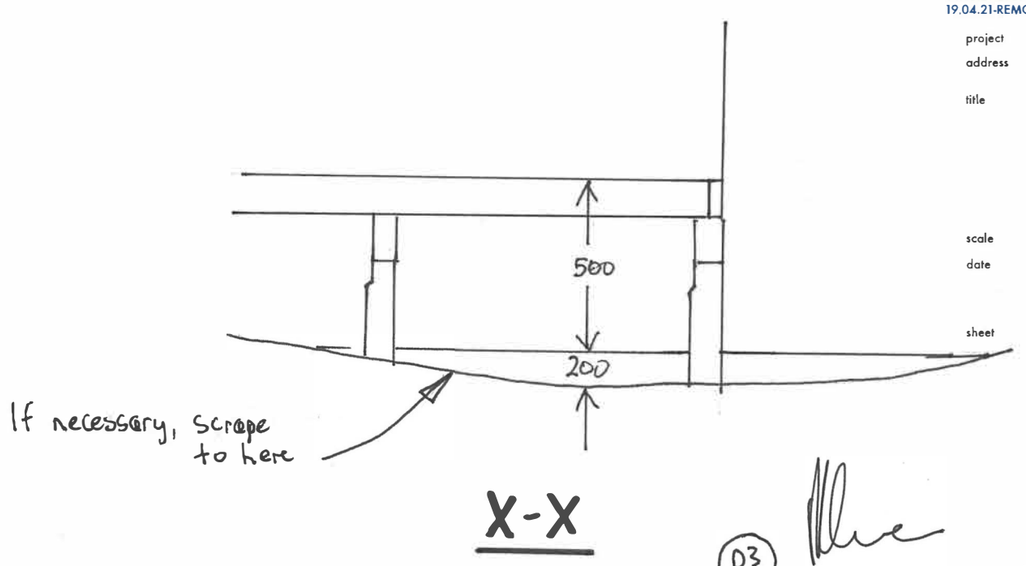
-BUILDING COVERAGE 150m²

-PROPOSED INCREASED BUILDING COVERAGE OVER EXISTING BUILDING COVERAGE
+ 40.2m²

VISITOR ACCOMMODATION



PROPOSED VISITOR ACCOMMODATION UNIT 05



10.09.21-RESOURCE CONSENT ISSUE
25.08.21-REVISED DRIVEWAY
14.05.21-UPDATED TO REFLECT WW/SW PLANS
19.04.21-REMOVED HELIPAD/PAVILION POSITION

project PANETIKI
address Address - 20 Omaha Block Access Road
title

REPLACEMENT/ MODIFICATION TO EXISTING BUILDING

scale 1:200 @ A1 size
date 02/12/21
RESOURCE CONSENT
sheet TP.10

gra
geoff richards architects ltd
1 fleet st devonport 0626
p o box 32.556 devonport 0744
auckland new zealand
ph 09 446 0800

contractor to verify all dimensions on site

DEANE CONSULTANCY LTD
peter@deanecl.nz 021 252 6121

Client: Paretiki | Page 4
Job: Rational formula
Date: 24/1/24 Signed:

C undeveloped = 0.35 C developed = 0.90

Select c = 0.65 (50% developed case) C

Tc assume 10min.

RCP 8.5 scenario (see pg-7)

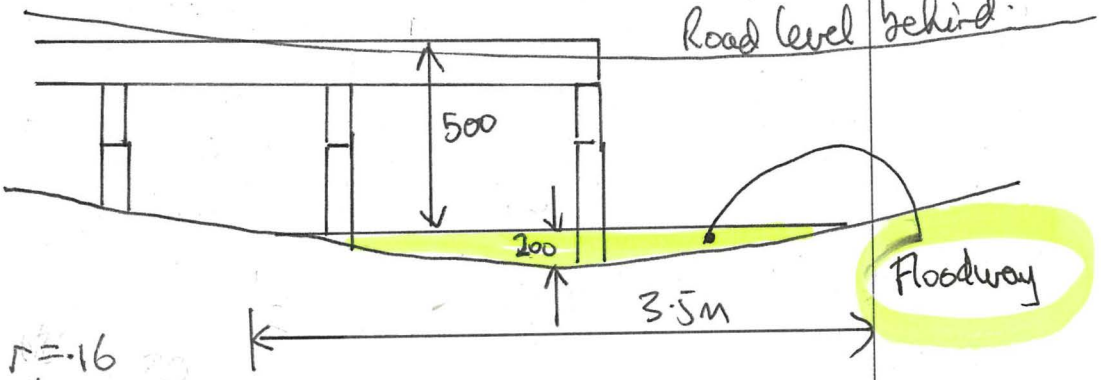
Select 22.6mm/10min (1in 100 year)

∴ I = 6 × 22.6 mm/hr = 136 mm/hr I

A = 69,370 m² = 0.069 km² A

∴ Q (cumec) = .278 CIA
= .278 × .65 × 136 × .069 m³s⁻¹
= 1.19 m³s⁻¹

Manning's formula:



A = .56 m²
P = 3.5m ∴ r = .16
r^2/3 = .30

n = .025 (bare ground)

S = 10% S^1/2 = .316

∴ Q = .56 × .30 × .316 / .025 = 2.12 m³s⁻¹
> 1.75 m³s⁻¹ ∴ OK

Worksheet 1: Runoff Parameters and Time of Concentration

Project Panetiki **By** PADeane **Date** 24/11/21

Location Accom. 5 **Checked** _____ **Date** _____

Circle one: Present Developed : Partial future dev't assumed.

1. Runoff Curve Number (CN) and Initial Abstraction (Ia)

Soil name and classification	Cover description (cover type, treatment, and hydrologic condition)	Curve Number CN*	Area ha	Product of CN × area
Waitemata	Trees, Lawns	74	2.47	1.83
series	50% developed.	98	2.67	2.42
		Totals =		4.25

* from Appendix B

$$\text{CN (weighted)} = \frac{\text{total product}}{\text{total area}} = \frac{4.25}{4.94} = 0.86$$

$$\text{Ia (weighted)} = \frac{5 \times \text{pervious area}}{\text{total area}} = \frac{5 \times .5}{} = 2.5 \text{ mm}$$

2. Time of Concentration

Channelisation factor ..... C = 0.8 (from Table 4.2)

Catchment length ..... L = 0.42 km (along drainage path)

Catchment slope ..... S_c = .133 m/m (by equal area method)

Runoff factor, $\frac{CN}{200 - CN} = \frac{86}{200 - 86} = 0.754$

$$t_c = 0.14\ C\ L^{0.66} \left(\frac{CN}{200 - CN}\right)^{-0.55} S_c^{-0.30}$$

$$= 0.14 \times .8 \times .42^{0.66} \times .754^{-0.55} \times .133^{-0.30} = 0.135 \text{ hrs}$$

SCS Lag for HEC-HMS… $t_p = 2/3\ t_c$ = 8.1 min.

(P5)

Worksheet 2: Graphical Peak Flow Rate

Project Paretiki **By** PADeae **Date** 24/11/21

Location Acom. 5 **Checked** _____ **Date** _____

Circle one: **Present** **Developed** _____

1. Data

   Catchment area ..... A = .049 km^2

   Runoff curve number ..... CN = 86 (from Worksheet 1)

   Initial abstraction ..... Ia = 2.5 mm (from Worksheet 1)

   Time of concentration ..... t_c = .135 hrs (from Worksheet

1)

2. Calculate storage, $S = \left(\frac{1000}{CN} - 10\right) 25.4$ = 41.3 mm

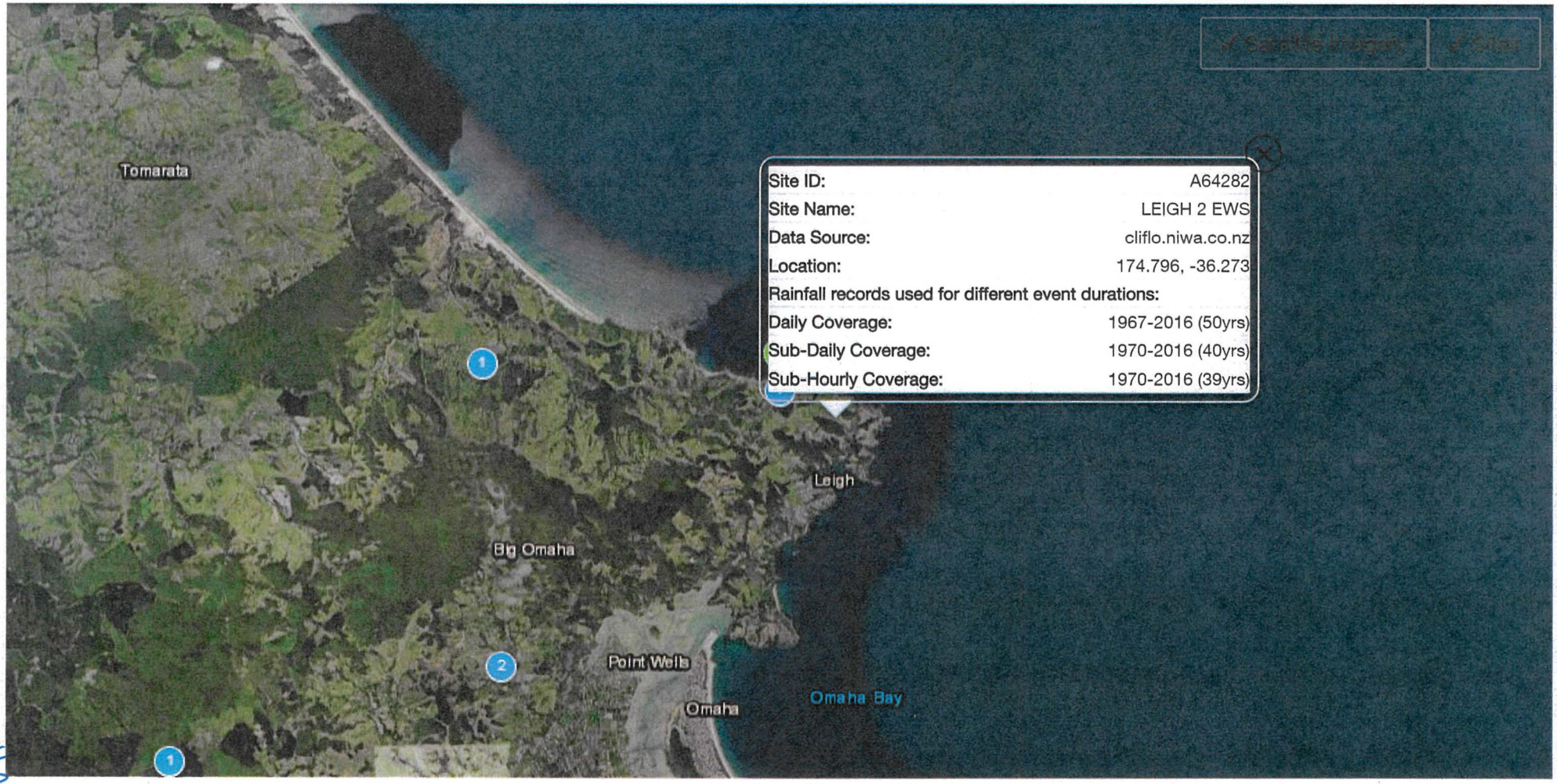
	Storm #1	Storm #2	Storm #3
3. Average recurrence interval, ARI (yr)	100		
4. 24 hour rainfall depth, P_{24} (mm)	210	Fig A6	
5. Compute $c^* = \frac{P_{24} - 2Ia}{P_{24} - 2Ia + 2S}$	.71		
6. Specific peak flow rate, q* (from figure 5.1)	.17		
7. Peak flow rate, $q_p = q^* A P_{24}$ (m^3/s)	1.75		
8. Runoff depth, $Q_{24} = \frac{(P_{24} - Ia)^2}{(P_{24} - Ia) + S}$ (mm)			
9. Runoff volume, $V_{24} = 1000 \times Q_{24} A$ (m^3)			

P6

High Intensity Rainfall Design System V4 (/)

Location

Address search Enter your address and press enter to search



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	
Longitude	
Site Name	
Site Id	A64282

Output Table Format

- (●) Depth - Duration - Frequency
- ( ) Intensity - Duration - Frequency

Generate Report

Results

Spreadsheet Download

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

Rainfall depths (mm) :: RCP8.5 for the period 2031-2050

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	8.69	13.4	17.0	24.6	34.2	52.9	66.0	79.4	91.6	97.7	101	104
2	0.500	9.56	14.7	18.7	27.1	37.7	58.3	72.8	87.4	101	108	112	115
5	0.200	12.5	19.3	24.5	35.6	49.6	76.8	96.1	115	133	143	148	152
10	0.100	14.7	22.7	28.8	41.9	58.4	90.6	113	136	158	169	175	180
20	0.050	17.0	26.2	33.2	48.4	67.5	105	131	158	183	196	204	209
30	0.033	18.3	28.3	35.9	52.3	73.0	114	142	171	198	212	221	226
40	0.025	19.3	29.8	37.8	55.1	76.9	120	150	180	209	224	233	239
50	0.020	20.0	31.0	39.3	57.3	80.0	125	156	188	218	233	242	249
60	0.017	20.6	32.0	40.5	59.1	82.5	129	161	194	225	241	250	257
80	0.012	21.6	33.5	42.5	62.0	86.6	135	169	203	236	253	263	270
100	0.010	22.4	34.7	44.0	64.2	89.7	140	175	211	245	262	273	280
250	0.004	25.5	39.5	50.1	73.2	102	160	201	242	281	300	313	321

Area Select.

Rainfall depths (mm) :: RCP8.5 for the period 2081-2100

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	10.3	15.9	20.1	29.2	40.3	60.8	74.5	88.5	100	106	109	112
2	0.500	11.4	17.6	22.2	32.3	44.7	67.4	82.8	97.7	111	118	122	124
5	0.200	15.0	23.2	29.4	42.7	59.1	89.6	110	130	148	157	162	166
10	0.100	17.7	27.4	34.7	50.4	69.9	106	131	154	176	187	193	197
20	0.050	20.5	31.6	40.1	58.4	81.0	123	152	179	204	217	224	229

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
30	0.033	22.1	34.2	43.4	63.2	87.7	134	164	194	222	235	243	248
40	0.025	23.3	36.0	45.7	66.5	92.4	141	174	205	234	249	257	262
50	0.020	24.2	37.5	47.6	69.3	96.2	147	181	213	244	259	268	273
60	0.017	25.0	38.6	49.0	71.5	99.3	152	187	221	252	268	277	282
80	0.012	26.2	40.6	51.5	75.0	104	159	196	231	265	281	290	297
100	0.010	27.1	42.0	53.3	77.7	108	165	204	240	275	292	302	308
250	0.004	30.8	47.8	60.7	88.6	123	189	233	275	315	334	346	353

P10