GOLOVIN

OVERLAND FLOWPATH DESIGNATION

1 Kiwi Place, Neverland

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Prepared by Dr Steven Joynes

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Contents

1	INTRODUCTION
1.1	Statement of Issues1
1.2	Target audience1
1.3	Site Location1
1.4	Sources of data2
1.5	Calibration Locations2
1.6	Technical and operational reports2
2	ANALYSIS AND RESULTS
2.1	Scheme Plan3
2.2	Hydrology3
2.3	Hydraulic Analysis4
3	SUMMARY8

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References

- 1. TP108 Guidelines for Stormwater Runoff Modelling in the Auckland Region, Auckland Council
- TP10 Stormwater Management Guidelines: Design Guidelines Manual, Auckland Council

1 INTRODUCTION

1.1 Statement of Issues

The client owns 1 Kiwi Place, Neverland. He wishes to develop it from a one dwelling Lot to a two Lot subdivision. The existing house will remain. Connor Surveyors Ltd has designed a scheme plan. The objective of this report is to understand the overland flowpath identified by the Auckland Council GIS and to mitigate its impact, if necessary.

1.2 Target audience

The quality, quantity and tenure of the report should consider the following audience.

- a) Auckland Council engineering consent staff
- b) Connor Surveyors Ltd staff

1.3 Site Location

The site is 1 Kiwi Place, Neverland. The property is about 0.12ha. Figure 1.1 shows the property boundary to be developed. The blue lines indicate the identified overland flowpaths.



Figure 1.1 – Site Location and property Boundary

1.4 Sources of data

Attribute	Organisation
Catchment Plans	Connor Surveyors Ltd
Contours	Auckland Council GIS viewer
Hydrology sites	None
Rainfall gauging	None
Ground spot heights	Connor Surveyors Ltd
Flow & WL data	Not available
Flood level evidence	None

Table 1.1 – Source of Data

1.5 Calibration Locations

There is no known calibration of this catchment.

1.6 Technical and operational reports

There a no known relevant reports pertaining to this property.

2 ANALYSIS AND RESULTS

2.1 Scheme Plan

Figure 2.1 shows the scheme plan.



Figure 2.1 – Scheme layout

2.2 Hydrology

Figure 2.2 shows the catchment boundary for the overland flow path. The area is 6,838m². The elevation drops from RL66.5m to RL51.0m over a distance of 220m. The curve number for the pervious area is 74. There are 13 dwellings in the catchment with an estimate impermeable area of 3,900m². This gives an average curve number of 87.69 and an initial abstraction of 2.15mm. This data was put into the spreadsheet in Figure 2.3 to give a 100-year peak flow of 0.276m³/s. TP108 gives a 100-year, 24-hour rainfall of 190mm. With a climate change factor of 16.8% this gives a full depth of 221.92mm.

Figure 2.2 – Catchment Boundary



Figure 2.3 – TP108 Calculation

Catchment Area	ha	0.6838
Catchment slope		0.070
Catchment length	km	0.22
Impermeable		
Catchment Area		0.390
la		0
Curve Number		98
Permeable		
Catchment Area		0.294
la		5
Curve Number		74
Channel factor		0.6
24-hour rainfall	mm	221.92
Weighted curve number		87.69
la weighted	mm	2.15
tc	hours	0.08
tp	hours	0.17
Storage S	mm	36
c*=(P24-2la)/(P24-2la+2S)		0.753
q* (from Fig. 6.1)	Approx!!	0.182
q peak	m3/s	0.276
Q24	mm	189.1
V24	m3	1293

2.3 Hydraulic Analysis

A simple hydraulic analysis was done using HEC-RAS to generate a flood level given the

available overflow width. There are six cross-sections and it assumed the existing house is impermeable and therefore a conservative solution is provided. A Manning's n of 0.02 was used as it reflects the combination of the smoothness of the concrete driveway and the roughness of the garden. It is assumed the downstream flow control is normal flow due to steepness of topography and obvious lack of impedance. The peak 100-year flow calculated was put into HEC-RAS as a steady state flow due to the scale of the channel where attenuation or storage is not an issue. Figure 2.4 shows the model layout and Figure 2.5 illustrates a typical cross-section.







Figure 2.6 shows the hydraulic grade line for the overland flowpath through 1 Kiwi Place. It can be seen that the depth of flow is about 0.1m and the flow is at or almost critical. Table 2.1 provides the flow level, depth, width and velocity at the five cross-sections within the property.





Cross-	Flood Level	Depth	Width	Velocity
section	RL(m)	(m)	(m)	(m/s)
RS6	52.77	0.11	9.45	0.66
RS5	52.49	0.11	6.46	0.75
RS4	51.93	0.06	8.25	0.71
RS3	51.59	0.09	9.61	0.66
RS2	50.73	0.09	8.49	0.69

Table 2.1 – Summary of key hydraulic parameters

3 Summary

A subdivision is proposed for 1 Kiwi Place. The Auckland Council GIS identifies an overland flow path through the property. The estimate peak 100-year flow is 0.276m³/s. A hydraulic profile through the property shows the flood depth to be about 0.1m with velocities of about 0.7m/s.

As long as there is a clearway about 10m wide through the property there should be no problem.