

SUITABILITY REPORT



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SUITABILITY REPORT

Fantail Lane
Whareora
(Lot 5 DP 546886)

SUITABILITY REPORT

Fantail Lane

Whareora

(Lot 5 DP 546886)

Report prepared for: DHS Construction

Report prepared by: Liam Fuller

Report reviewed by: Matthew Jacobson

Report reference: 18232

Date: 30 March 2022



association of
consulting and
engineering

Issue	Details	Date
1	Building Consent Issue	30 March 2022

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SUITABILITY REPORT

Fantail Lane Whareora

(Lot 5 DP 546886)

1.0 Introduction

RS Eng Ltd (RS Eng) has been engaged by DHS Construction to investigate the suitability of their client's property (Lot 5 DP 546886) for residential construction. The purpose of this report is to assess the suitability of the building site, making foundation and earthworks recommendations and detail the design of an on-site wastewater disposal system and stormwater attenuation system.

The client proposes to construct a four-bedroom terraced dwelling founded on a conventional concrete slab with masonry block retaining and a waffle raft concrete slab.

2.0 Site Description

This 2970m² property is located on the western side of Fantail Lane, approximately 300m northwest of its intersection with Clapham Road. The property encompasses a ridgeline aligned northwest to southeast. Slopes on the north-eastern side of the ridge are moderately graded (approximately 15°). Slopes falling towards the southwest are steeply graded (approximately 20° - 40°) which is bounded by the Hatea River and covered in native bush. An earth fill bund is located along the crest of the steep southwestern slopes, with fill being placed on the building area from the neighbouring site. An existing driveway provides access to the proposed building platform. Groundcover for the remaining site is mown lawn.



Figure 1: Lot 5 DP 546886

3.0 Desk Study

3.1 Referenced/Reviewed Documents

The following documents have been referenced in this report:

- GNS – Geology Of The Whangarei Area – Edbrooke & Brook – 2009.
- Property Consent Notice: 12045418.3.
- Soil & Rock Consultants – *“Geotechnical Completion Report for Residential Subdivision, 84 Sands Road, Glenbervie, Whangarei, 6 May 2020.”*
- Soil & Rock Consultants – *“Geotechnical Investigation for Proposed Residential Subdivision, 84 Sands Road, Glenbervie, 8 November 2019.”*

3.2 Site Geology

The GNS 1:250,000 scale New Zealand Geology Web Map shows that the property is located within an area underlain by Kerikeri Volcanics, which is described as follows: *“Basalt lava, volcanic plugs and minor tuff.”*

3.3 Aerial Photography

RS Eng has undertaken a review of historical aerial photography, specifically an image from 1969, refer to Figure 2 below. Due to the majority of property being covered in bush and regenerating scrub, it is difficult to observe any slope features. The construction of Fantail Lane has since been completed as part of the subdivision, as well as earthworks which have been carried out over the area and within the wetland to the north.



Figure 2: 1969 Aerial Image, Red Marker Indicates Building Area (Source: www.retrolens.nz)

3.4 Subdivision Report

The underlying subdivision was reported on by Soil & Rock Consultants as referenced above. The property was divided into three areas categorised as Zone A, Zone B, And Zone C. the following relevant recommendations and statements were made.

- *“We consider that sloping ground within residential lots of the subdivision is stable in the ‘global’ sense and suitable for residential development from that point of view, however shallow soil creep cannot be ruled out where slopes are steeper than 1V:4H.”*
- *Residential building platforms have been formed during earthworks within ‘Zone A: Residential Building Zone’ and Zone B: Specific Design Zone’. There will be no structures within ‘Zone C: No-Build Zone’ however, some of the building platforms are in close proximity to Zone C which should be considered by the designer of any structure in that area.*
- *The soils present are considered to lie in Site Class M – Moderately Reactive. Surface movements of up to 44mm should be expected and allowed for in design.*
- *Any proposal to excavate deeper than 600mm (exclusive of topsoil and spread/piled foundation excavations) shall be referred to a Geotechnical Engineer for advice.*
- *We consider that the stiff natural soils over most of ‘Zone A: Residential Building Zone’ provide a suitable founding stratum for spread footings and/or short (Senton) piles. A Dependable Bearing Capacity of 150kPa (Ultimate Bearing Capacity = 300kPa, $\phi_{bc} = 0.5$) is available for shallow foundations designed to NZS3604:2011 and embedded into stiff natural ground and/or engineered fill to the requirements of Section 5 (Expansive Soils).*
- *Piled foundations may be required as follows:*
 - *Where the structural demands are greater than that given for shallow foundations.*
 - *Where steep slopes (steeper than 14°) are present.*
 - *Where bridging of services is required.*
- *If piles are required, they should be of the bored type. Static design of bored piles can be carried out using the following parameters: A Design End Bearing Capacity of 450kPa (Ultimate End Bearing Capacity = 900kPa, $\phi_{pc} = 0.5$) is available for piled foundations embedded at least 3.0m into stiff natural ground (Structural design may require deeper embedment).*
- *Zone B: Specific Design Zone’ is defined as areas that are generally suitable for residential development, however, require a site-and-proposal-specific geotechnical investigation, specific design of building foundations (e.g. piled foundations) and potentially also design for slope stability works (e.g. barrier pile walls, installation of buttress drainage etc) depending on the geometry and scale of earthworks proposed at the time.*
- *Specific design of foundations and further subsoil investigation may be required prior Building Consent application for the lots within Zone B.*
- *The site-specific investigation, assessment and design should be undertaken by a Chartered Professional Engineer experienced in geotechnical engineering.*

- *Our recommendations previously reported in this regard are that the ‘areal’ dispersal rate of the wastewater dispersal system should not exceed 3.0L/m²/day and that in-ground soakage systems are not suited to either wastewater or stormwater dispersal. The dispersal should take the form of pressure-compensated dripper lines (wastewater) or a dispersal system that is located within the topsoil layer and designed to ‘bubble-up’ and disperse within the topsoil (not soak into the underlying clayey subgrade) for both wastewater and stormwater.”*

The relevant Consent Notice Conditions for the property state the following.

- *“The location and foundation of any building shall be certified by a suitably experienced Chartered Professional Engineer prior to issue of any Building Consent, noting the location of instability areas on Council’s Geographical Information Systems maps.*
- *At the time of building consent provide suitable evidence/design to illustrate that stormwater attenuation will be provided for all impervious surfaces to ensure compliance with Chapter 4, and more specifically Section 4.1.1 of Council’s Environmental Engineering Standards 2010, to the satisfaction of the Development Engineering Officer.*
- *On Lots 1 – 8 a maintenance contract for the on-site wastewater system shall be in place at all times which includes inspections and maintenance of both the wastewater treatment and disposal systems.*
- *At the time of building consent, provide suitable evidence to illustrate that stormwater disposal across any boundaries will not exceed that which existed pre-development for storm events up to and including the 1% annual exceedance probability (+20% to accommodate for climate change).”*

3.5 Natural Hazard

The Whangarei District Council has designated this property as being within a zone of low and high instability hazards. The proposed dwelling is located within both of these zones. The following is a definition of the Low Instability Hazard Zone:

“Erosion or landslide morphology is not apparent. Not considered to be at risk of instability. May, however, be at risk as a result of natural events, or development. Steeper slopes may be subject to soil creep.”

The following is a definition of the High Instability Hazard Zone:

“This land appears to be either subject to erosion or slippage, or is likely to be subject to erosion or slippage within the next 100 years based on geomorphic evidence. This land is generally considered to be geotechnically unsuitable for development, unless works can be undertaken to avoid, remedy or mitigate the hazard.”

4.0 Field Investigation

Technicians from this office visited the property on 9 February 2022 to undertake a walkover inspection and two hand augered boreholes. The walkover inspection observed a bund of fill placed above the steep slopes to the west of the building area. A pile of fill from the neighbouring excavations was also placed at the building area. Small localised features of shallow seated instability (approximately 1.0m deep) were evident approximately 60m northwest of the proposed dwelling on the southwestern facing slope within the native bush where slopes become steep, likely due to erosion.

The hand augers were dug to a maximum depth of 4.0m. Geotechnics Shear Vane readings were taken at regular intervals throughout the hand augers. See Appendix A for hand auger test locations and results.

5.0 Subsoil Conditions

Interpretation of subsurface conditions are based on the investigations shown on the drawings in Appendix A. The conditions are summarised below.

- Topsoil was recorded at depths of up to 200mm.
- Residual soils were encountered to a maximum depth of 2.0m, consisting of clayey SILT, being very stiff, moist and having low plasticity. In-Situ Undrained Shear Strengths range between 94kPa to greater than 200kPa.
- Completely weathered basalt was encountered to a depth between 2.0m – 4.0m, consisting of clayey SILT, being very stiff, moist and having low plasticity. In-Situ Undrained Shear Strengths range between 117kPa and 143kPa.
- Groundwater was not recorded during investigations and is considered unlikely within 5.0m of the ground surface given the underlying geology and surrounding topography.

6.0 Geotechnical Assessment

6.1 Slope Stability

The common mechanism of slope failure on this terrain is a shallow seated translation failure, generally caused by uncontrolled stormwater eroding the toe support of the slope, or improper development. The walkover inspection observed an existing fill bund placed on the edge of the steep western slope. This can lead to surcharge loading of the slope, and as such, RS Eng recommend the existing fill be removed.

Localised shallow seated slope instability (approximately 1.0m deep) was observed during the walkover inspection on the steep southwestern facing slope (>35°) approximately 60m northwest building site. The Kerikeri Volcanic soils on this terrain is generally considered stable at slopes up to 30°.

The building plans show a small portion of the garage area located within Hazard Zone C: No Build Zone as per the subdivision report. As this area does match the steep slopes indicated using NRC LiDAR contours, it is likely this zone has been interpreted from the WDC Hazard maps.

RS Eng completed a cross section through this area and steep southwestern facing slope, adopting a conservative 20° regression line from the base of the Hatea River. This indicated approximately 2.0m of material which could be subject to potential instability. It is recommended that a soldier pile wall is installed adjacent to the garage and drive designed to provide 2.0m of retaining below existing ground level. See attached drawings in Appendix A for soldier pile wall location.

Ground slopes at the building area are in the vicinity of 13° - 15°. As per the subdivision report recommendations, foundations on slopes steeper than 14° require specific design to account for shallow soil creep.

Provided the recommendations of this report and complied with, RS Eng considers the building works to be at a low risk of slope instability.

6.2 Liquefaction

Considering the proposal is positioned on land underlain by the Kerikeri Volcanic Group, and is elevated approximately 57 meters above sea level (OTP Datum), RS Eng considers the risk of liquefaction to be low.

6.3 Expansive Soils

The clayey soils encountered on-site are likely to be subject to volumetric change with seasonal changes in moisture content (wet winters / dry summers); this is known as expansive or reactive soils. Apart from seasonal changes in moisture content other factors that can influence soil moisture content at the include:

- Influence of garden watering and site drainage.
- The presence of large trees close to buildings. Large trees can cause variation in the soil moisture content for a distance of up to 1.5 times their mature height.
- Initial soil moisture conditions during construction, especially during summer and more so during a drought. Building platforms that have dried out after initial excavation should be thoroughly wet prior to any floor slabs being poured.
- Plumbing leaks.

Based on the recommendations of the subdivision report by Soil & Rock Consultants who completed specific laboratory testing at the subdivision stage, RS Eng concur with the Class M – ‘Moderately Reactive’ soil classification as per AS 2870 and B1/AS1 of the NZ Building Code.

6.4 Shallow Soil Creep

Seasonal changes in moisture content of clayey soils cause shrink/swell effects (expansive soils). On slopes generally in excess of 14° the seasonal shrink/swell characteristics and gravity cause the surface soil to slowly move downslope. This can be accelerated and exaggerated by stock. Soil creep can affect shallower slope angles underlain by weaker materials, but may not affect steeper slopes when soil strengths are high.

Shallow creep was not evident on the moderate slopes at the building site, however the slopes have recently been filled and re-contoured, meaning the visual features that typically indicate soil creep may not have had time to become apparent over the ground surface. As per recommendations on the subdivision report, soil creep cannot be ruled out where slopes are steeper than 1V:4H (14°). **RS Eng therefore recommend foundations on slopes exceeding 14° be designed to account for 1.0m of horizontal forces associated with soil creep.**

7.0 On-site Wastewater Disposal

7.1 Site Evaluation

The land available for effluent disposal is moderately sloped (less than 15°) and linear convergent. Subsoil investigation have assessed the soil as Category 4 as per AS/NZS1547. Water supply is via two rainwater storage tanks, and it is proposed to use standard water reduction fixtures across the dwelling. **We recommend the use of a secondary treatment system loading sub surface pressure considering the slopes available exceed 10°.**

7.2 Design

The proposed dwelling has four bedrooms. The design calculations are presented in Table 1 below.

Table 1: Wastewater Disposal Calculations

Number of Bedrooms	4	No.
Number of Persons	6	No.
Flow Allowance	145	L/person/Day
Total Flow	870	L/Day
Irrigation Rate (DIR)	3.0	L/m ² /day
Slope Reduction Factor	N/A	%
Irrigation Area Required	290	m ²
Irrigation Line Spacing	1.0	m

7.3 Northland Regional Council Discharge Compliance

Table 2 below demonstrates compliance with the Northland Regional Council's New Regional Plan.

Table 2: NRC Permitted Discharge Compliance

Feature	Proposed Regional Plan	Available
Identified Stormwater Flow Path	5m	>5.0m
River, Lake, Pond, Stream, Dam or Wetland	15m	>15m
Existing Water Supply Bore	20m	>20m
Property Boundary	1.5m	>1.5m
Groundwater	0.6m	>0.6m
10m Buffer Zone	Slopes >10°	Required
Floodplain Exclusion	5% AEP	N/A
Reserve area	30%	30%

As the disposal field is located on slopes steeper than 10°, as per the Northland Regional Council's (NRC) New Regional Plan, a 10m vegetated buffer zone is required downslope of the disposal field. RS Eng has been advised by the NRC that the buffer zone is to be included as part of the disposal field, and thus must also comply with the surface water setbacks and other relevant rules. Due to the placement of the dwelling and driveway on the property, proposed earthworks and no building zone outlined in the subdivision report, a buffer zone of only 6.0m was achieved. Additionally, the buffer zone does not comply with the 5.0m setback from the roadside drain, however the effluent disposal field and reserve area comply with this requirement. Accordingly, a Resource Consent from the Northland Regional Council will be required.

7.4 Assessment of Environmental Effects

As mentioned above, due to the limited space available for wastewater disposal, a 10m buffer zone downslope of the lowest irrigation to comply with the NRC New Regional Plan surface water setback rules is not achievable. Resource Consent will be required from the Northland Regional Council.

The disposal field is to be planted, and an irrigation loading rate of 3.0mm/day has been adopted in system design. The drip line will be trenched a minimum of 50mm – 100mm into the topsoil and covered with bark or mulch. A 5.0m vegetated buffer zone will be implemented below the irrigation lines. Stormwater control over the disposal field will be managed by a retaining wall located up slope acting as a stormwater cut-off drain. Stormwater from impervious surfaces will be collected and directed to a dish drain on the driveway which is proposed to feed the roadside drain. Accordingly, the risk of surface water breakout or contamination from the disposal field is considered to be low.

Based on the above assessment of environmental effects, RS Eng consider the risk of environmental effects beyond the property boundary as a result of the proposed wastewater discharge to be no more than minor.

8.0 Stormwater Assessment

8.1 Attenuation

Considering the recommendations in the Consent Notice, stormwater attenuation is required. The new dwelling is proposed to have a roof and new drive area of 304m² and 189m², respectively. Impervious surfaces allow little or no infiltration of stormwater into the ground causing a greater volume of rainfall runoff. To maintain pre-development stormwater flows from the property stormwater attenuation is required. This minimises any potential adverse effects on downstream properties and/or council services.

The Whangarei District Council (WDC) Environmental Engineering Standards (EES) requires attenuation of stormwater runoff from any increase in impervious areas so that post development peak flows are less than 80% of pre-development. The WDC EES specifies that the flows be attenuated for the 20% and 1% Annual Exceedance Probability (AEP) events.

It is proposed to direct stormwater runoff from the roof of the new dwelling into two rainwater storage tanks with restricted outlets which reduce the peak flows to predevelopment levels. The attenuation tank restricts stormwater runoff from the roof sufficiently to compensate for the increased flows from the paved area.

The pre-development and post-development runoff was modelled using HydroCAD. The United States Department of Agriculture Technical Release 55 (TR55) Type 1A method was adopted for calculating the run-off flow, using rainfall depths from HIRDS 4 (High Intensity Rainfall Design System, NIWA) including an addition 20% for climate change as required by WDC EES. The subsoils have been assessed as clayey silts, designated as Group C soils with fair grass cover, from WDC EES. Table 3 includes a summary of the stormwater attenuation modelling.

The WDC EES Section 4.12.3 states that when stormwater is being re-used (i.e. water supply from rainwater tanks) then a reduction in attenuation volume is allowed. Table 4.4 of the WDC EES specifies a 50% reduction in attenuation for 304m² using two 25,000L water tanks. Included below is the calculation of storage adjustment to account for this in HydroCAD.

$$\text{Storage adjustment} = 1 / \left[1 - \left(\text{Reduction} * \frac{\text{Roof Area}}{\text{Total Area}} \right) \right]$$

Table 3: Stormwater Attenuation Design Summary

	Pre-development		Post-development	
Permeable Area (m ²) Grassed	493		0	
Impervious Area (m ²) Roof	0		304	
Paving	0		189	
Peak flow l/s	20% AEP	1% AEP	20% AEP	1% AEP
From surfaces	3.55	7.53	+20% 6.06	+20% 10.76
80% (design flows reqd.)	2.84	6.03		
Total attenuated flows			2.83	5.98
Tank storage required			20.5m ³	30.8m ³
Attenuation Tank Summary				
Tank	Two 25,000L Duracrete			
Tank Diameter	3.6m			
	Diameter		Depth from Overflow	
Primary Orifice	19mm		1.0m	
Secondary Orifice	36mm		0.3m	

9.0 Engineering Recommendations

9.1 Site Subsoil Class

In accordance with NZS 1170.5:2004, Section 3.12.3 the site has been assessed for its Site Subsoil Class. Based on the observation listed above RS Eng considers the site soils lie within Site Class C “Shallow Soil Site.”

9.2 Earthworks

To form a level access to and create a building platform for the proposed dwelling, earthworks are proposed. To suitably develop the building area, we recommend as follows:

- Cuts and fills shall be limited to a maximum depth of 3.0m and 2.0m respectively without further geotechnical assessment.
- Cuts exceeding a depth of 1.0m shall be retained by a wall specifically designed by a Chartered Professional Engineer without further geotechnical assessment.
- No fill shall be placed within 10.0m of the crest of the steep western facing slopes.
- All fills shall be retained by a wall specifically designed by a Chartered Professional Engineer without further geotechnical assessment.
- Cut batters not supported by a wall should be sloped at angles less than 1V to 3H (18°).
- Any retaining wall shall be specifically designed by a Chartered Professional Engineer to account for at least 1.0m of shallow soil creep below existing ground level, using the assessed parameters detailed in Table 4 below.
- The soldier pile wall west of the dwelling shall be specifically designed by a Chartered Professional Engineer to account for at least 2.0m of shallow soil creep below existing ground level, using the assessed parameters detailed in Table 4 below.
- Site works shall generally be completed in accordance with NZS4431.

9.3 Shallow Foundations

It is proposed to construct a timber framed type dwelling founded on masonry block wall with conventional concrete slab and a waffle raft concrete slab. To suitably found the proposed dwelling RS Eng recommend the following.

- All leading-edge foundations (including deck foundations) on slopes exceeding 14° shall be specifically designed by a Chartered Professional Engineer to resist the lateral soil forces associated with at least 1.0m of shallow soil creep below existing ground level.

The following recommendations have been made for foundations that do not require specific design for shallow soil creep:

- The waffle raft slab shall be specifically designed for Class M soil and be placed on a minimum of 150mm compacted granular hardfill extending 1.0m beyond the building envelope.
- Isolated standard NZS3604 type foundations shall extend to a minimum depth of 0.5m below cleared ground level to account for moderately expansive soils.
- Conventional concrete slab foundations in accordance with NZS3604 and NZS4229 will be suitable provided they extended to a minimum depth of 0.5m below clear ground level to account for moderately expansive soils.

Notwithstanding the recommendations of this report, for specific design of shallow foundations RS Eng has assessed the following:

- 300kPa Ultimate Bearing Capacity (Geotechnical Ultimate).
- 150kPa Dependable Bearing Capacity (Ultimate Limit State).
- 100kPa Allowable Bearing Capacity (Serviceability Limit State).

9.4 Soldier Pile & Timber Pole Retaining Walls

Soldier pile and retaining walls shall be specifically designed by a suitably experienced Chartered Professional Engineer familiar with the contents of this report, using the assessed soil parameters presented in Table 4. Where retaining walls are located adjacent to buildings and boundaries effects of deformation should be considered.

Table 4: Assessed Soldier Pile Retaining Wall Design Parameters

Parameter	Residual Clay SILT
Soil Density (kN/m ³)	19
Friction Angle (°)	30
Drained Cohesion, (kPa)	0
Undrained Shear Strength (kPa)	60
Pressure Coefficient	Ko

9.5 Masonry Retaining Walls

Masonry retaining walls shall be specifically designed by a suitably experienced Chartered Professional Engineer familiar with the contents of this report, using the assessed soil parameters presented in Table 5. Where retaining walls are incorporated in buildings or located adjacent to buildings and boundaries effects of deformation should be considered.

Table 5: Assessed Soldier Pile Retaining Wall Design Parameters

Parameter	Residual Clay SILT
Soil Density (kN/m ³)	19
Friction Angle (°)	30
Drained Cohesion, (kPa)	0
Pressure Coefficient	Ko

For specific design of masonry retaining wall foundations, RS Eng has assessed the following:

- 300kPa Ultimate Bearing Capacity (Geotechnical Ultimate).
- 150kPa Dependable Bearing Capacity (Ultimate Limit State).
- 100kPa Allowable Bearing Capacity (Serviceability Limit State).

9.6 Stormwater Disposal

Uncontrolled and concentrated stormwater discharges can result in erosion and slope instability. RS Eng recommends that stormwater overflow from the attenuation tanks be directed to a dish drain installed in the driveway, which shall be directed to the roadside drain east of the proposed dwelling. The driveway shall also be shaped to direct water to the dish drain.

10.0 Drawing Review

It is recommended that RS Eng Ltd carry out a review of final development drawings prior to submittal for building consent and / or resource consent. The review is to confirm that the recommendations outlined in this report have been applied in full and correctly to the design.

11.0 Construction Monitoring and Producer Statements

RS Eng recommend a suitably experienced Chartered Professional Engineer monitor the construction of the following works:

- Foundation excavations to confirm foundations extend into suitable ground.
- Testing of compacted hardfill to confirm compliance with NZS4431.
- Soldier pile / retaining wall foundations to confirm foundations extend into suitable ground.

Any works not inspected will be excluded from future producer statements (PS4) to be issued by RS Eng. In any event, where doubt exists regarding inspections, this office should be contacted for advice, and provided with reasonable notice of inspections.

12.0 Conclusions

It is the conclusion of RS Eng Ltd that the building area is suitable for the proposal provided the recommendations and limitations stated within this report are adhered to.

RS Eng Ltd also concludes that subject to the recommendations of this report, in terms of Section 72 of the Building Act 2004;

(a) the building work to which an application for a building consent relates will not accelerate, worsen, or result in slippage or subsidence on the land on which the building work is to be carried out or any other property; and

(b) the land is neither subject to nor likely to be subject to slippage or subsidence.

13.0 Limitations

This report has been prepared solely for the benefit of our client and the Whangarei District Council. The purpose is to determine the engineering suitability of the proposed new dwelling, in relation to the material covered by the report. The reliance by other parties on the information, opinions or recommendations contained therein shall, without our prior review and agreement in writing, do so at their own risk.

Recommendations and opinions in this report are based on data obtained as previously detailed. The nature and continuity of subsoil conditions away from the test locations are inferred and it should be appreciated that actual conditions could vary from those assumed. If during the construction process, conditions are encountered that differ from the inferred conditions on which the report has been based, RS Eng should be contacted immediately.

Construction site safety is the responsibility of the builder/contractor. The recommendations included herein should not be construed as direction of the contractor's methods, construction sequencing or procedures. RS Eng can provide recommendations if specifically engaged to, upon request.

This report does not address matters relating to the National Environmental Standard for Contaminated Sites, and if applicable separate advice should be sought on this matter from a suitably qualified person.

Prepared by:



Liam Fuller
Engineering Technician

Reviewed by:

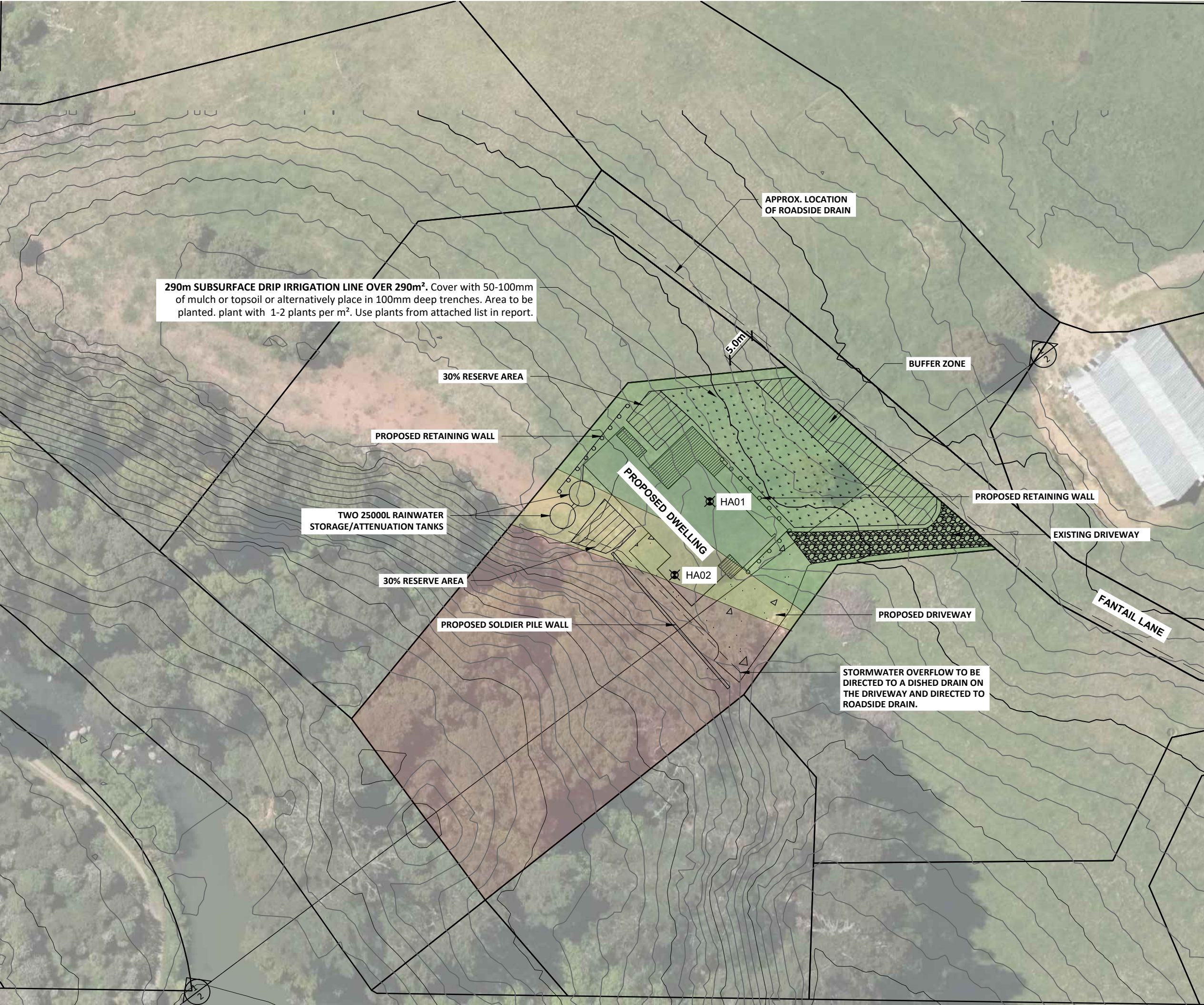


Matthew Jacobson
Director
BE(Civil), CPEng, IntPE(NZ), CMEngNZ

RS Eng Ltd

Appendix A

Drawings



- NOTES:
- Do not scale off drawings.
 - These drawings are to be read in conjunction with specifications - plans take precedence.
 - If any part of these documents are unclear, please contact RSEng Ltd.
 - This plan is copyright to RSEng Ltd and should not be reproduced without prior permission.

KEY

- ✖ Hand Auger Location
- ⊕ Scala Penetrometer Location
- Shallow Foundations
- SED
- No Build Zone

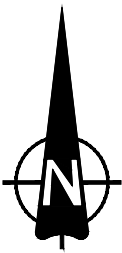
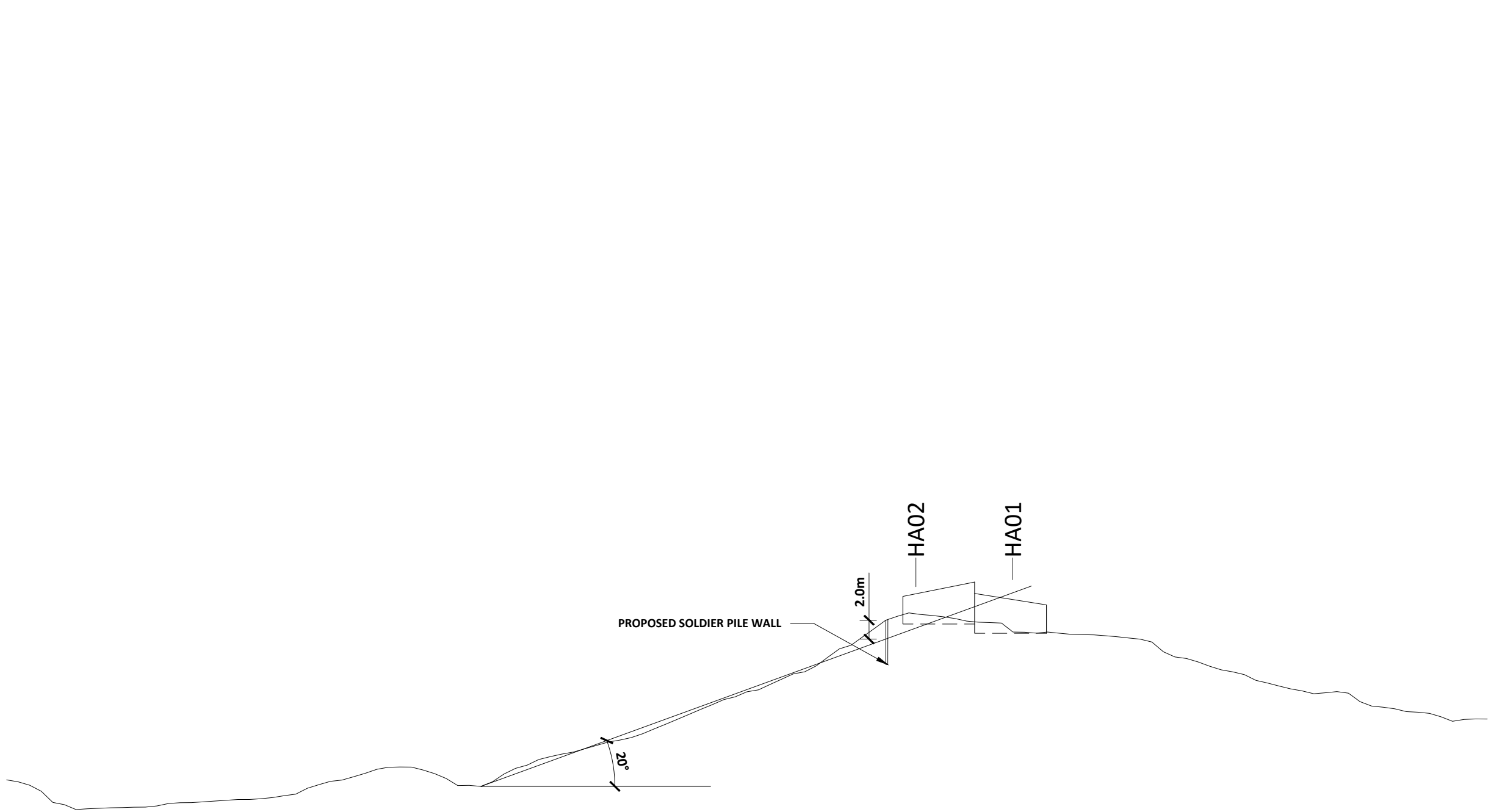
Contours are shown at 1.0m crs.
Contours are derived from LiDAR (2018)
and are shown at OTP64 Vertical Datum.



RS Eng Ltd

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Title			
NEW DWELLING SITE PLAN			
Client			
DHS CONSTRUCTION			
Location			
FANTAIL LANE WHAREORA			
16-2-22	A	Original Issue	
Date	Rev	Notes	
Scale	1:500	Original	A3
Drawn by	LF	Approved by	MJ
File	18232	Rev	Sheet
			1



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- KEY**
- ✂ Hand Auger Location
 - ⊕ Scala Penetrometer Location
 - Shallow Foundations
 - SED
 - No Build Zone

Contours are shown at 0.5m crs.
Contours are derived from LiDAR (2018)
and are shown at OTP64 Vertical Datum.



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Title

NEW DWELLING
CROSS SECTION

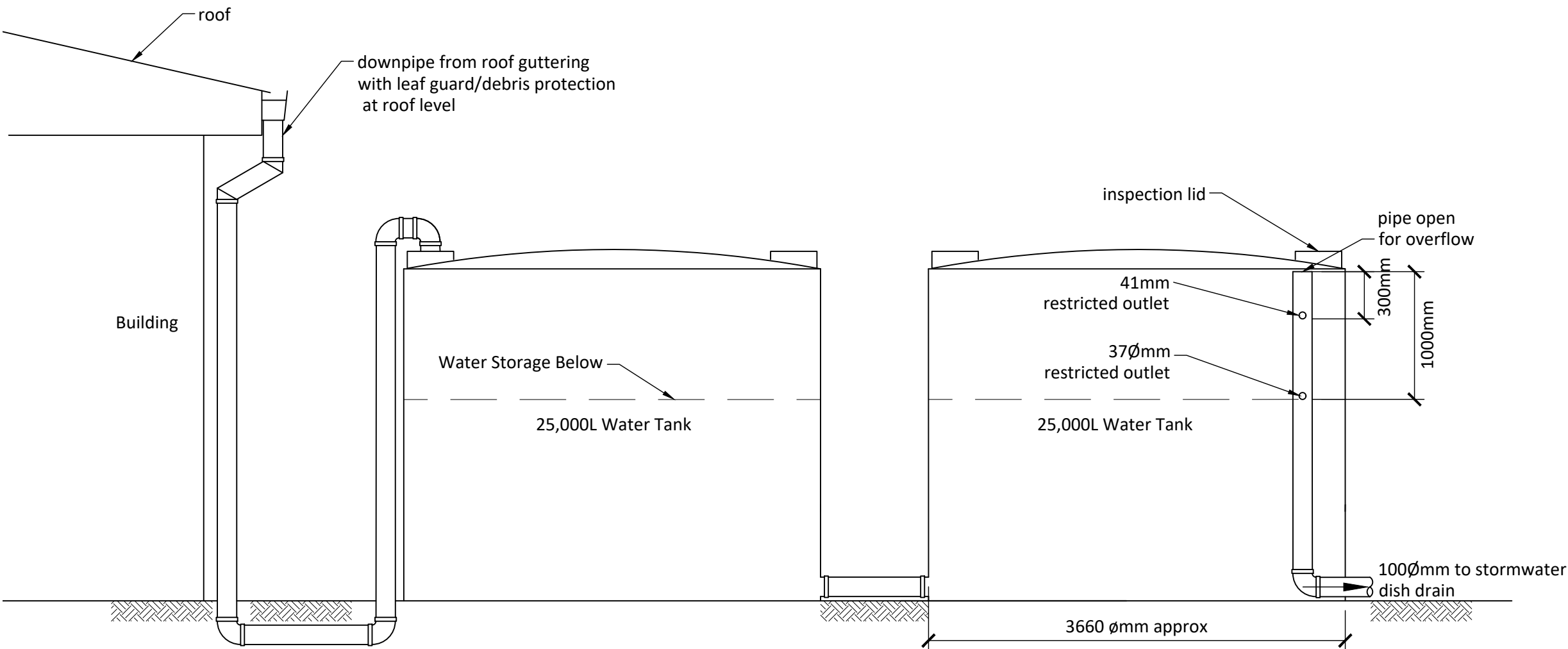
Client

DHS CONSTRUCTION

Location


FANTAIL LANE
WHAREORA

16-2-22	A	Original Issue
Date	Rev	Notes
Scale	Original	Rev
1:500	A3	
Drawn by	Approved by	File
LF	MJ	18232
		Sheet
		2



STORMWATER ATTENUATION TANK DETAIL

- NOTES:
- Tank installation and footing to manufacturers instructions.
 - All tank penetrations and pipe connections to manufacturers instructions.
 - Leaf guard/debris protection to manufacturers instructions.
 - All services should be located on-site prior to commencement of works.
 - All works to be constructed to WDC Environmental Engineering Standards.
 - Locations of features shown approximate only.
 - This plan is copyright to Richardson Stevens Consultants (1996) Ltd and should not be reproduced without prior permission.



RS Eng Ltd

09 438 3273
office@RSEng.co.nz
2 Seaview Road,
Whangarei 0110

Title

STORMWATER ATTENUATION
TYPICAL DETAIL

Client

DSH CONSTRUCTION

Location

FANTAIL LANE
WHAREORA

18-2-22	A	ORIGINAL ISSUE
Date	Rev	Notes
File	Scale	Rev
18232	NTS	A
Drawn by	Original	Sheet
LF	A3	1

Appendix B

Subsurface Investigations



HOLE NO.:
HA1

CLIENT:	DHS Construction
PROJECT:	Geotechnical Investigations

JOB NO.:
18232

SITE LOCATION: Lot 5 Fantail Lane, Whareora
CO-ORDINATES: 1721318mE, 6049919mN

ELEVATION: Ground

START DATE: 09/02/2022
END DATE: 09/02/2022
LOGGED BY: CH


Groundwater Not Encountered

PHOTO(S)

REMARKS

WATER

INVESTIGATION TYPE

- Standing Water Level
 Out flow
 In flow

- ☒ Hand Auger
☐ Test Pit



HOLE NO.:
HA2

CLIENT:	DHS Construction
PROJECT:	Geotechnical Investigations

JOB NO.:
18232

SITE LOCATION: Lot 5 Fantail Lane, Whareora
CO-ORDINATES: 1721312mE, 6049912mN

ELEVATION: Ground

Kerikeri Volcanics


Groundwater Not Encountered

PHOTO(S)

REMARKS

WATER

INVESTIGATION TYPE

 Standing Water Level
 Out flow
 In flow

☒ Hand Auger

☐ Test Pit

Appendix C

On-site Wastewater Disposal Details

Irrigation Field Installation Details

- Use a system producing secondary treated effluent.
- **Use 249m (minimum) of Sub Surface Pressure Compensating Drip irrigation line**, with Arkal filters, flushing and air release valves fitted.
- Irrigation line is to be laid in a 50-100mm (minimum) trench (sub surface) or covered in mulch surface).
- Irrigation line is to be laid with the contour.
- Disposal Field to be Planted.
- System to be installed and maintained as per manufacturer's recommendations including regular de-sludging of the primary treatment tank.
- Disposal area to be protected from stock and vehicles.
- Refer to "How to look after your septic tank" (published by the Northland Regional Council) when protecting the disposal area.
- The system will require the use of water reduction fixtures, i.e. dual flush 6/3 litre water closets, shower-flow restrictors, aerator tap fittings and water conserving automatic washing machines.

Irrigation Line Specification

- Distribution is to be via drip irrigation line with self-compensating pressure drip emitters.
- Install an Arkal disc filter at the outlet of the treatment system. Install pressure checkpoints on either side of the filter to allow for gauges to check for blockages. Install pressure checkpoints at the end of each lateral.
- Install either manual or automatic flushing valves at the end of each lateral. Install air release valves in the high points of the irrigation field.
- Allow 5m head loss from semi-blocked filter and ensure 12m of end pressure for the lowest emitter in the field.
- Ensure there is laminar flow through all lines in the field. Ensure flushing velocity is greater than 0.5m/s.
- **Use drip irrigation line with 1.0m dripper spacing and 1.0m spacing between lateral.**

Suitable Plant Species for Evapo – Transpiration Systems

(Source: NRC *“Looking after your household Sewerage System”*)

Native Shrubs and Trees

- Coprosma
- Hebe
- Manuka
- Weeping Mapou
- Flax (Fast)
- Pokaka (slow)
- Cabbage Tree (fast)
- Rangiora (fast)
- Lacebark (fast)
- Ribbonwood (fast)
- Poataniwha
- Heketara
- Poataniweta
- Kohuhu (fast)

Grasses

- Jointed Twig Sedge
- Longwood Tussock
- Pukio
- Toetoe (native species)
- Umbrella Sedge
- Oioi
- Hooksedge

Introduced Species

- Canna Lilies
- Taro
- Aralia
- Fuschia
- Philodendrons
- Begonias

Appendix D

Stormwater Attenuation Design and Details



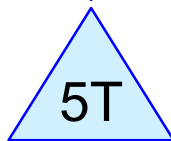
Predevelopment



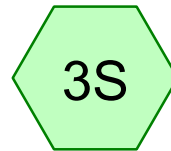
80% Flows



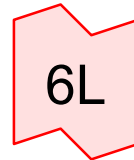
Post-Dev Roof



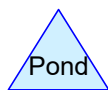
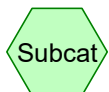
Water Tank



Paving



total post dev



Routing Diagram for 18232 Attenuation

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18232 Attenuation

Type IA 24-hr 1% AEP Rainfall=276 mm, Ia/S=0.06

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Page 1

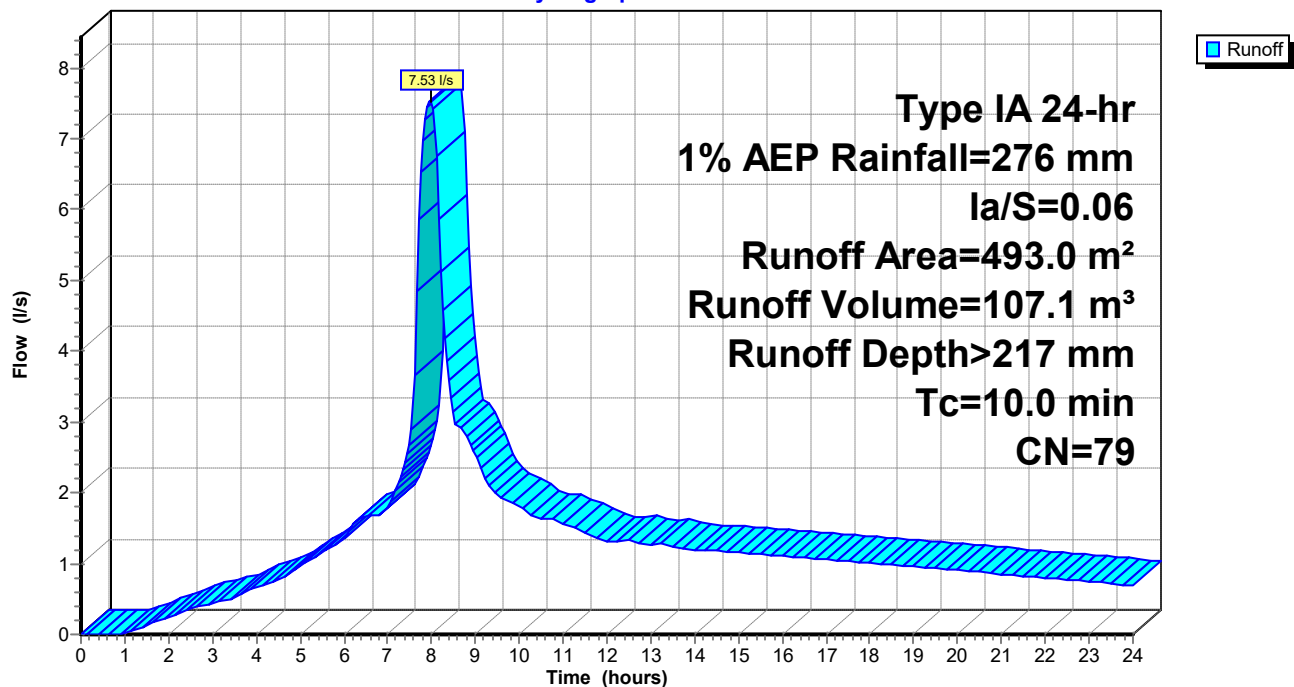
Summary for Subcatchment 1S: PredevelopmentRunoff = 7.53 l/s @ 7.97 hrs, Volume= 107.1 m³, Depth> 217 mmRunoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 1% AEP Rainfall=276 mm, Ia/S=0.06

Area (m ²)	CN	Description
493.0	79	50-75% Grass cover, Fair, HSG C
493.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m ³ /s)	Description
10.0					Direct Entry,

Subcatchment 1S: Predevelopment

Hydrograph



18232 Attenuation

Type IA 24-hr 1% AEP Rainfall=276 mm, Ia/S=0.06

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Page 2

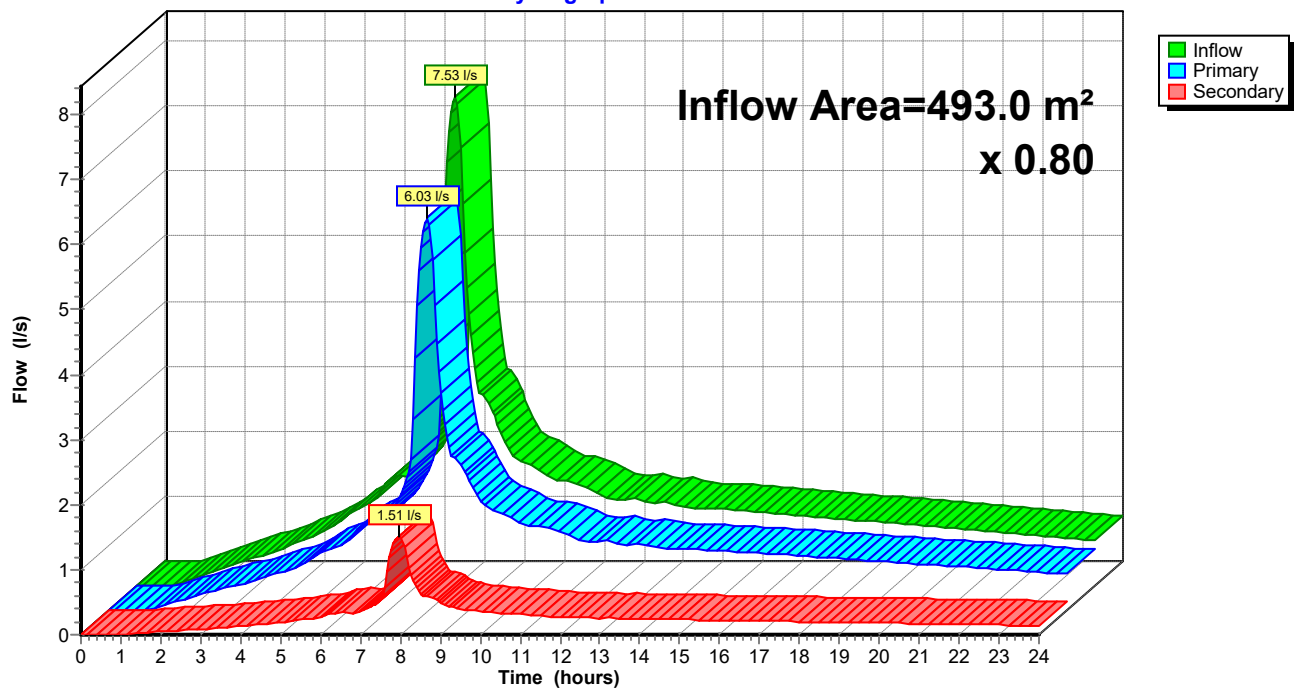
Summary for Link 4L: 80% Flows

Inflow Area = 493.0 m², 0.00% Impervious, Inflow Depth > 217 mm for 1% AEP event
Inflow = 7.53 l/s @ 7.97 hrs, Volume= 107.1 m³
Primary = 6.03 l/s @ 7.97 hrs, Volume= 85.7 m³, Atten= 20%, Lag= 0.0 min
Secondary = 1.51 l/s @ 7.97 hrs, Volume= 21.4 m³

Primary outflow = Inflow x 0.80, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 4L: 80% Flows

Hydrograph



18232 AttenuationType IA 24-hr 20% AEP Rainfall=156 mm, $Ia/S=0.06$

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Page 3

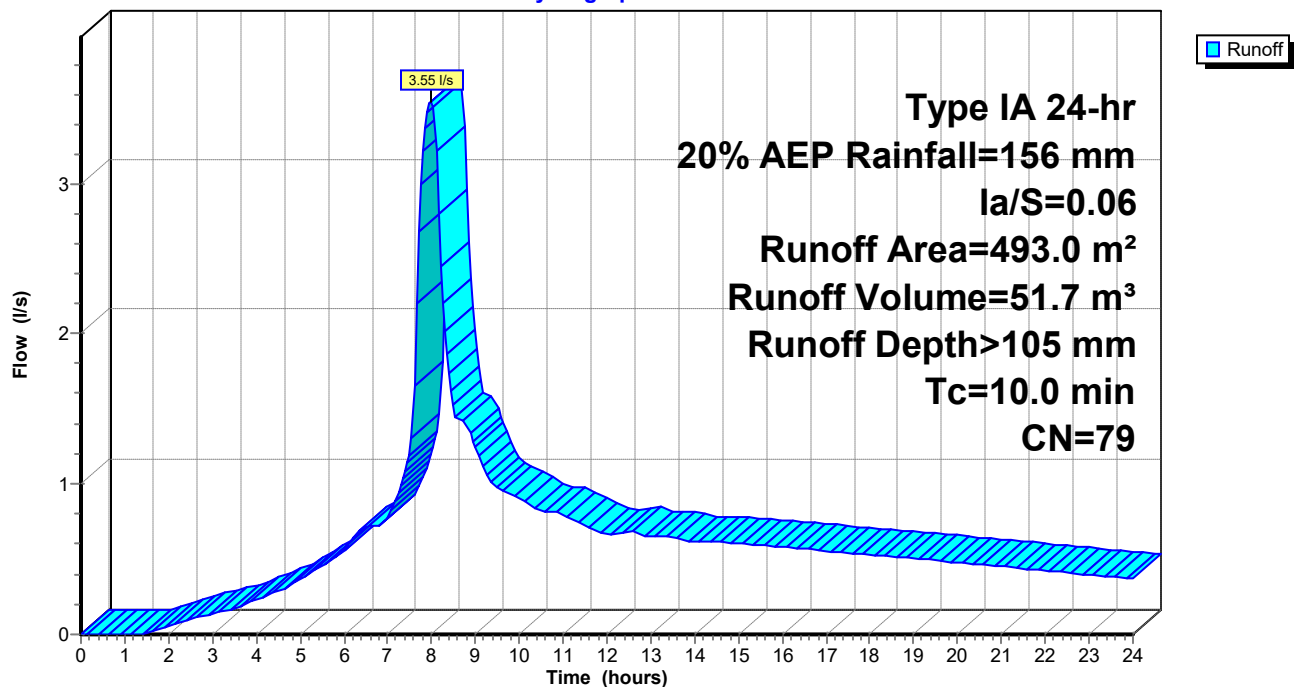
Summary for Subcatchment 1S: PredevelopmentRunoff = 3.55 l/s @ 7.98 hrs, Volume= 51.7 m³, Depth> 105 mmRunoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 20% AEP Rainfall=156 mm, $Ia/S=0.06$

Area (m ²)	CN	Description
493.0	79	50-75% Grass cover, Fair, HSG C
493.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m ³ /s)	Description
10.0					Direct Entry,

Subcatchment 1S: Predevelopment

Hydrograph



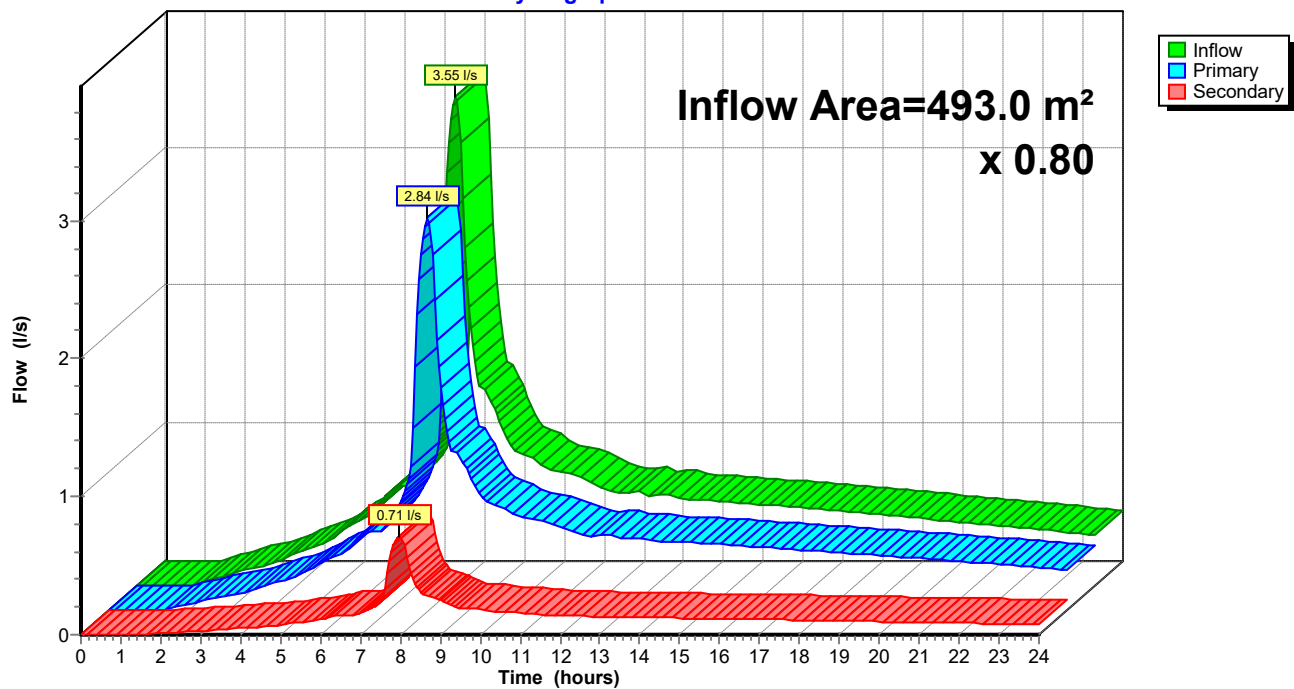
Summary for Link 4L: 80% Flows

Inflow Area = 493.0 m², 0.00% Impervious, Inflow Depth > 105 mm for 20% AEP event
Inflow = 3.55 l/s @ 7.98 hrs, Volume= 51.7 m³
Primary = 2.84 l/s @ 7.98 hrs, Volume= 41.4 m³, Atten= 20%, Lag= 0.0 min
Secondary = 0.71 l/s @ 7.98 hrs, Volume= 10.3 m³

Primary outflow = Inflow x 0.80, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 4L: 80% Flows

Hydrograph



18232 AttenuationType IA 24-hr 1% AEP+20% Rainfall=331 mm, $Ia/S=0.06$

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Page 1

Summary for Subcatchment 2S: Post-Dev RoofRunoff = 6.64 l/s @ 7.94 hrs, Volume= 98.7 m³, Depth> 325 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

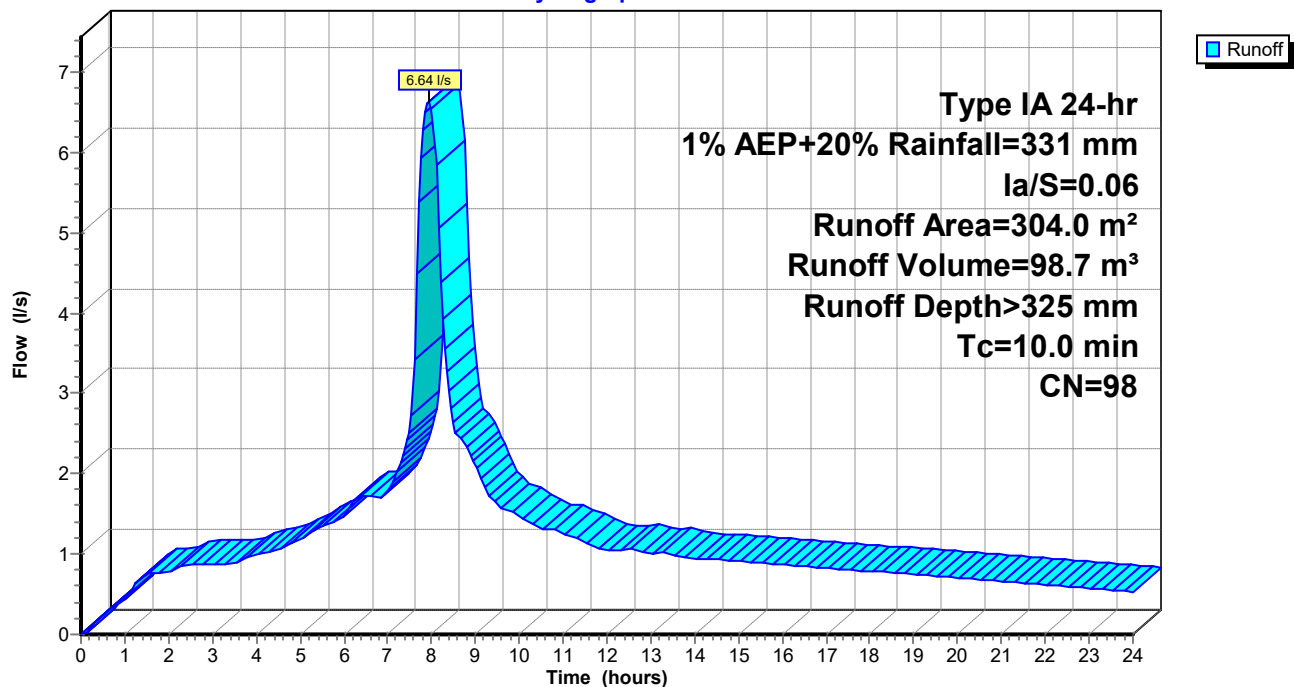
Type IA 24-hr 1% AEP+20% Rainfall=331 mm, $Ia/S=0.06$

	Area (m ²)	CN	Description
*	304.0	98	House roof
	304.0		100.00% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m ³ /s)	Description
10.0					Direct Entry,

Subcatchment 2S: Post-Dev Roof

Hydrograph



18232 Attenuation

Type IA 24-hr 1% AEP+20% Rainfall=331 mm, Ia/S=0.06

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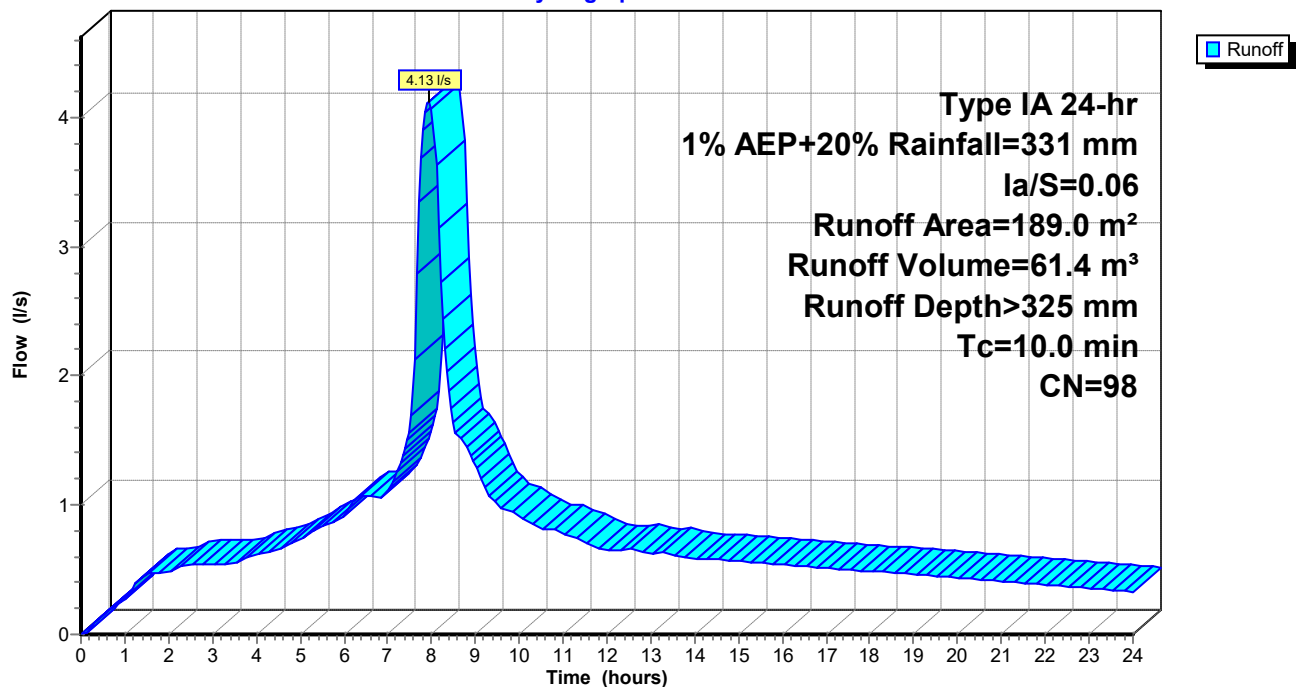
Summary for Subcatchment 3S: PavinigRunoff = 4.13 l/s @ 7.94 hrs, Volume= 61.4 m³, Depth> 325 mmRunoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 1% AEP+20% Rainfall=331 mm, Ia/S=0.06

Area (m ²)	CN	Description
189.0	98	Paved parking, HSG D
189.0		100.00% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m ³ /s)	Description
10.0					Direct Entry,

Subcatchment 3S: Pavinig

Hydrograph



18232 Attenuation

Type IA 24-hr 1% AEP+20% Rainfall=331 mm, Ia/S=0.06

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Page 3

Summary for Pond 5T: Water Tank

Inflow Area = 304.0 m², 100.00% Impervious, Inflow Depth > 325 mm for 1% AEP+20% event
 Inflow = 6.64 l/s @ 7.94 hrs, Volume= 98.7 m³
 Outflow = 2.31 l/s @ 8.84 hrs, Volume= 78.3 m³, Atten= 65%, Lag= 54.2 min
 Primary = 2.31 l/s @ 8.84 hrs, Volume= 78.3 m³

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
 Peak Elev= 1.043 m @ 8.84 hrs Surf.Area= 29.5 m² Storage= 30.8 m³

Plug-Flow detention time= 266.0 min calculated for 78.2 m³ (79% of inflow)
 Center-of-Mass det. time= 126.4 min (768.4 - 641.9)

Volume	Invert	Avail.Storage	Storage Description
#1	0.000 m	75.3 m ³	3.60 mD x 2.55 mH Vertical Cone/Cylinder x 2.9

Device	Routing	Invert	Outlet Devices
#1	Primary	0.000 m	19 mm Vert. Orifice/Grate C= 0.600
#2	Primary	0.700 m	36 mm Vert. Orifice/Grate C= 0.600

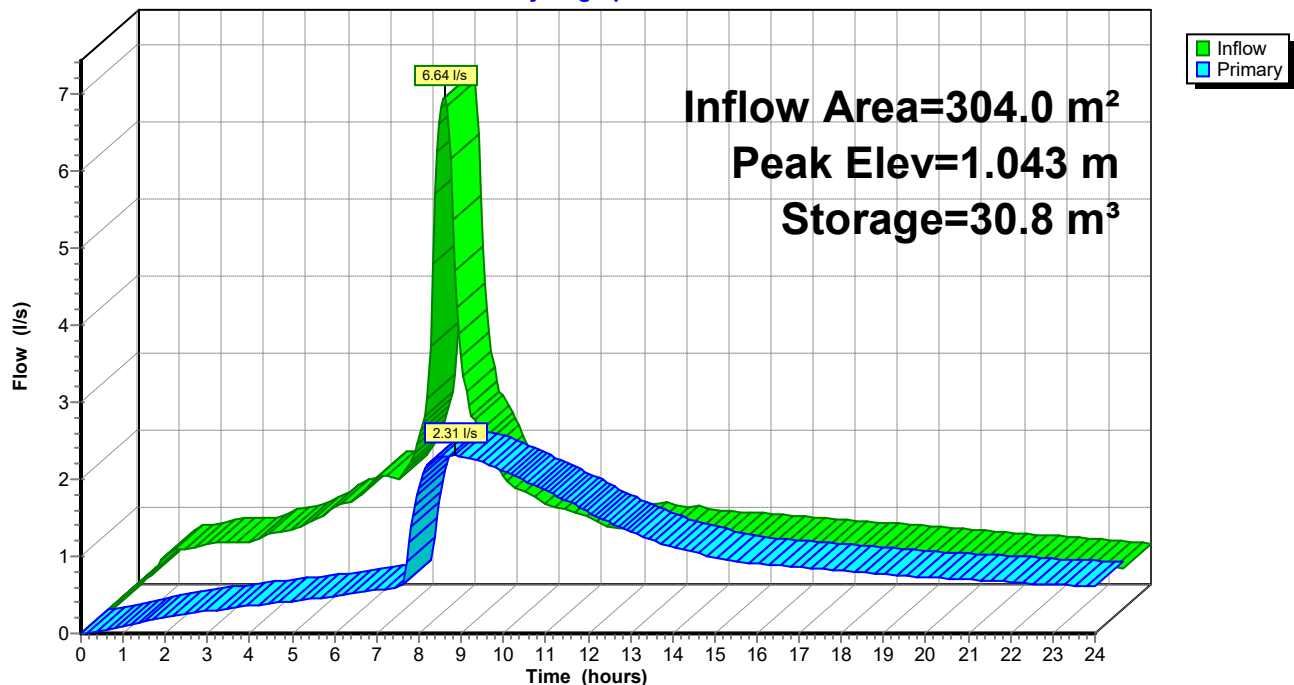
Primary OutFlow Max=2.31 l/s @ 8.84 hrs HW=1.043 m (Free Discharge)

1=Orifice/Grate (Orifice Controls 0.77 l/s @ 2.70 m/s)

2=Orifice/Grate (Orifice Controls 1.54 l/s @ 1.51 m/s)

Pond 5T: Water Tank

Hydrograph



18232 Attenuation

Type IA 24-hr 1% AEP+20% Rainfall=331 mm, Ia/S=0.06

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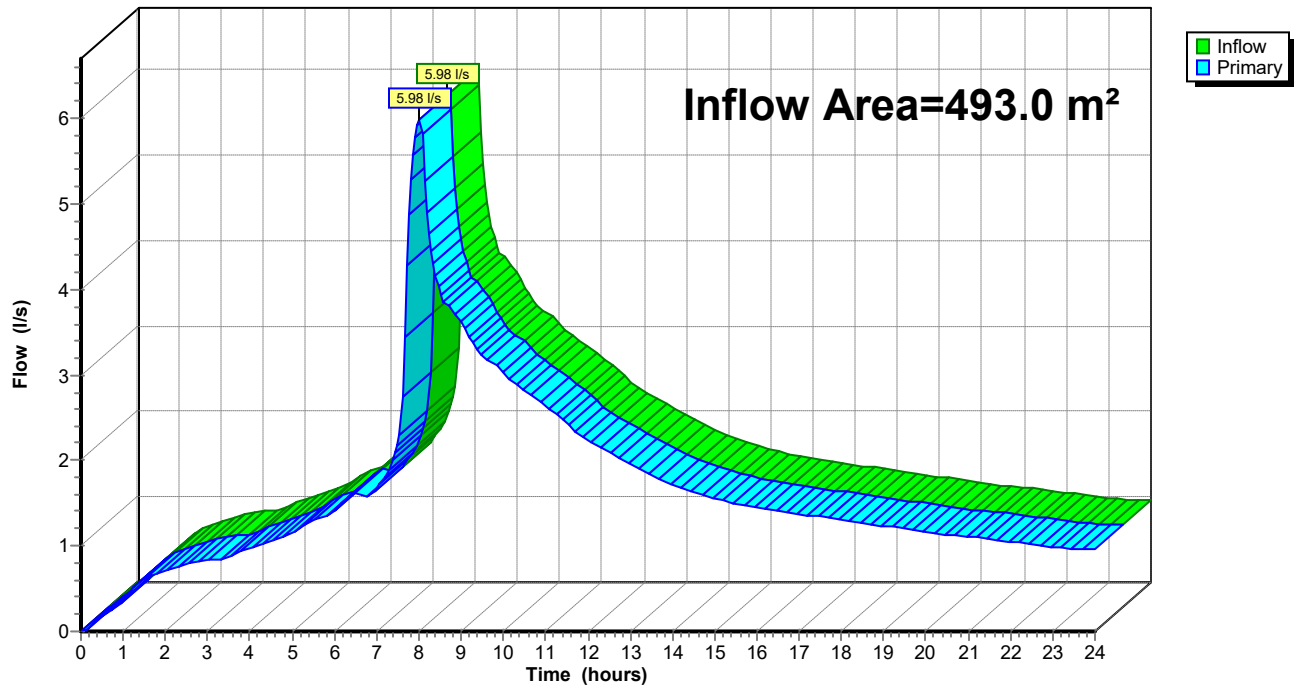
Summary for Link 6L: total post dev

Inflow Area = 493.0 m², 100.00% Impervious, Inflow Depth > 283 mm for 1% AEP+20% event
Inflow = 5.98 l/s @ 8.01 hrs, Volume= 139.7 m³
Primary = 5.98 l/s @ 8.01 hrs, Volume= 139.7 m³, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 6L: total post dev

Hydrograph



18232 Attenuation

Type IA 24-hr 20% AEP +20% Rainfall=187 mm, Ia/S=0.06

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Page 5

Summary for Subcatchment 2S: Post-Dev RoofRunoff = 3.74 l/s @ 7.94 hrs, Volume= 55.1 m³, Depth> 181 mm

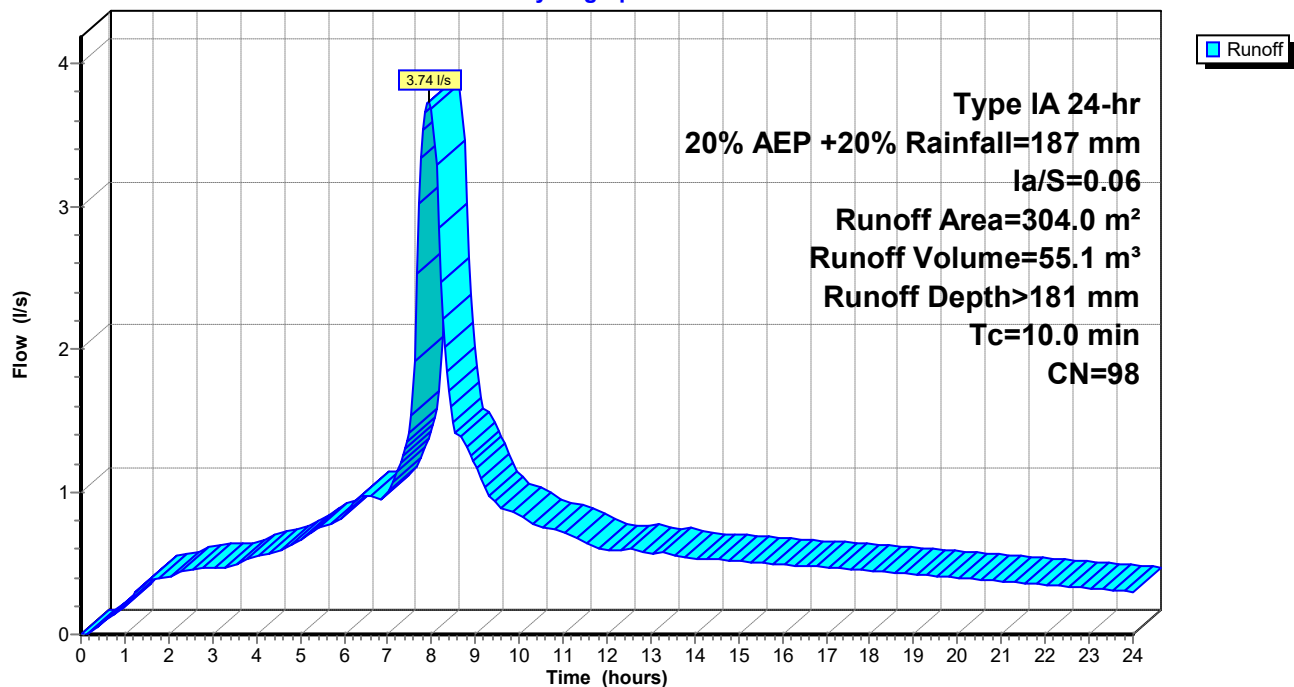
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 20% AEP +20% Rainfall=187 mm, Ia/S=0.06

	Area (m ²)	CN	Description
*	304.0	98	House roof
	304.0		100.00% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m ³ /s)	Description
10.0					Direct Entry,

Subcatchment 2S: Post-Dev Roof

Hydrograph



18232 Attenuation

Type IA 24-hr 20% AEP +20% Rainfall=187 mm, Ia/S=0.06

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Page 6

Summary for Subcatchment 3S: PavingigRunoff = 2.32 l/s @ 7.94 hrs, Volume= 34.2 m³, Depth> 181 mm

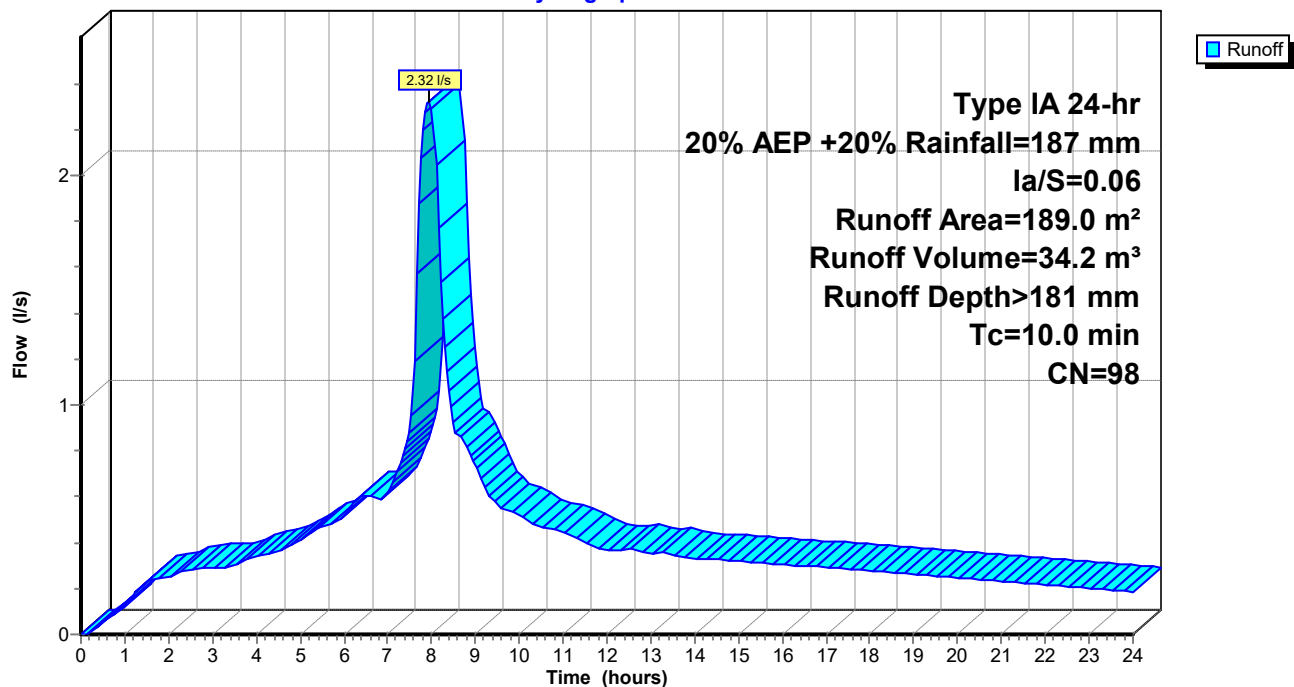
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 20% AEP +20% Rainfall=187 mm, Ia/S=0.06

Area (m ²)	CN	Description
189.0	98	Paved parking, HSG D
189.0		100.00% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m ³ /s)	Description
10.0					Direct Entry,

Subcatchment 3S: Pavingig

Hydrograph



18232 Attenuation

Type IA 24-hr 20% AEP +20% Rainfall=187 mm, Ia/S=0.06

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Page 7

Summary for Pond 5T: Water Tank

Inflow Area = 304.0 m², 100.00% Impervious, Inflow Depth > 181 mm for 20% AEP +20% event
Inflow = 3.74 l/s @ 7.94 hrs, Volume= 55.1 m³
Outflow = 0.62 l/s @ 11.66 hrs, Volume= 40.6 m³, Atten= 83%, Lag= 223.1 min
Primary = 0.62 l/s @ 11.66 hrs, Volume= 40.6 m³

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 0.696 m @ 11.66 hrs Surf.Area= 29.5 m² Storage= 20.5 m³

Plug-Flow detention time= 369.8 min calculated for 40.6 m³ (74% of inflow)
Center-of-Mass det. time= 200.8 min (848.5 - 647.7)

Volume	Invert	Avail.Storage	Storage Description
#1	0.000 m	75.3 m ³	3.60 mD x 2.55 mH Vertical Cone/Cylinder x 2.9

Device	Routing	Invert	Outlet Devices
#1	Primary	0.000 m	19 mm Vert. Orifice/Grate C= 0.600
#2	Primary	0.700 m	36 mm Vert. Orifice/Grate C= 0.600

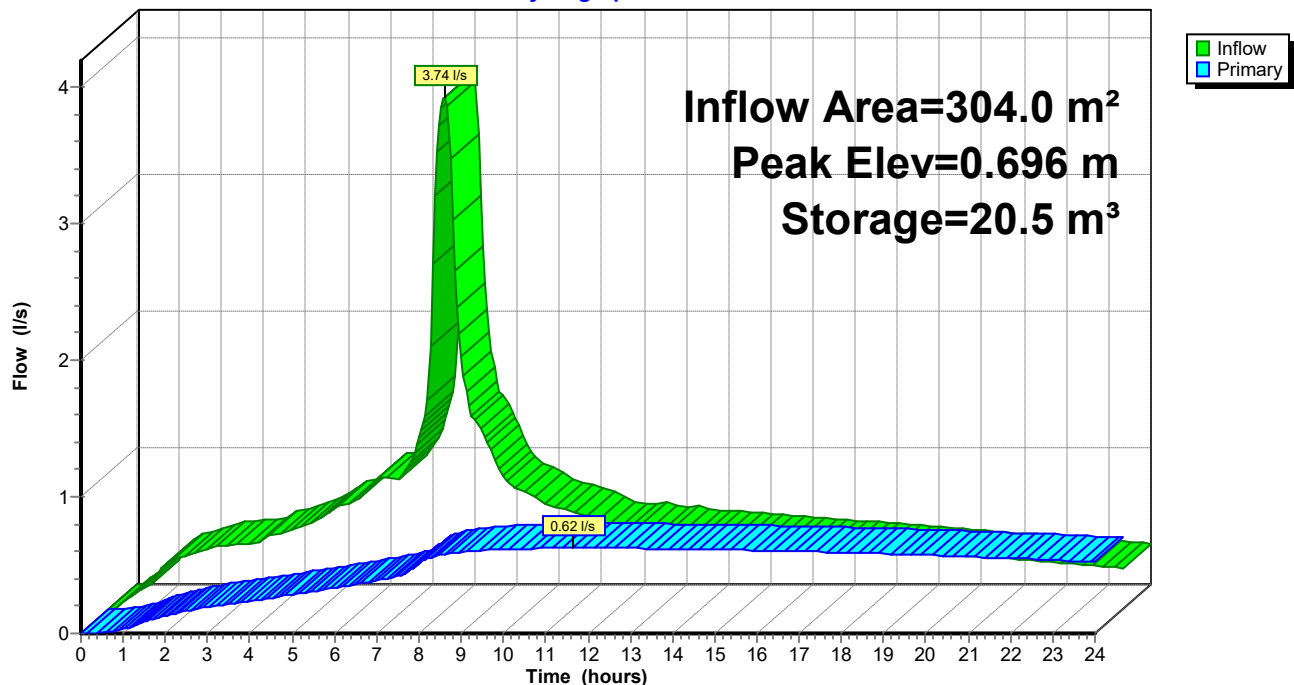
Primary OutFlow Max=0.62 l/s @ 11.66 hrs HW=0.696 m (Free Discharge)

1=Orifice/Grate (Orifice Controls 0.62 l/s @ 2.20 m/s)

2=Orifice/Grate (Controls 0.00 l/s)

Pond 5T: Water Tank

Hydrograph



18232 Attenuation

Type IA 24-hr 20% AEP +20% Rainfall=187 mm, Ia/S=0.06

Prepared by {enter your company name here}

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Page 8

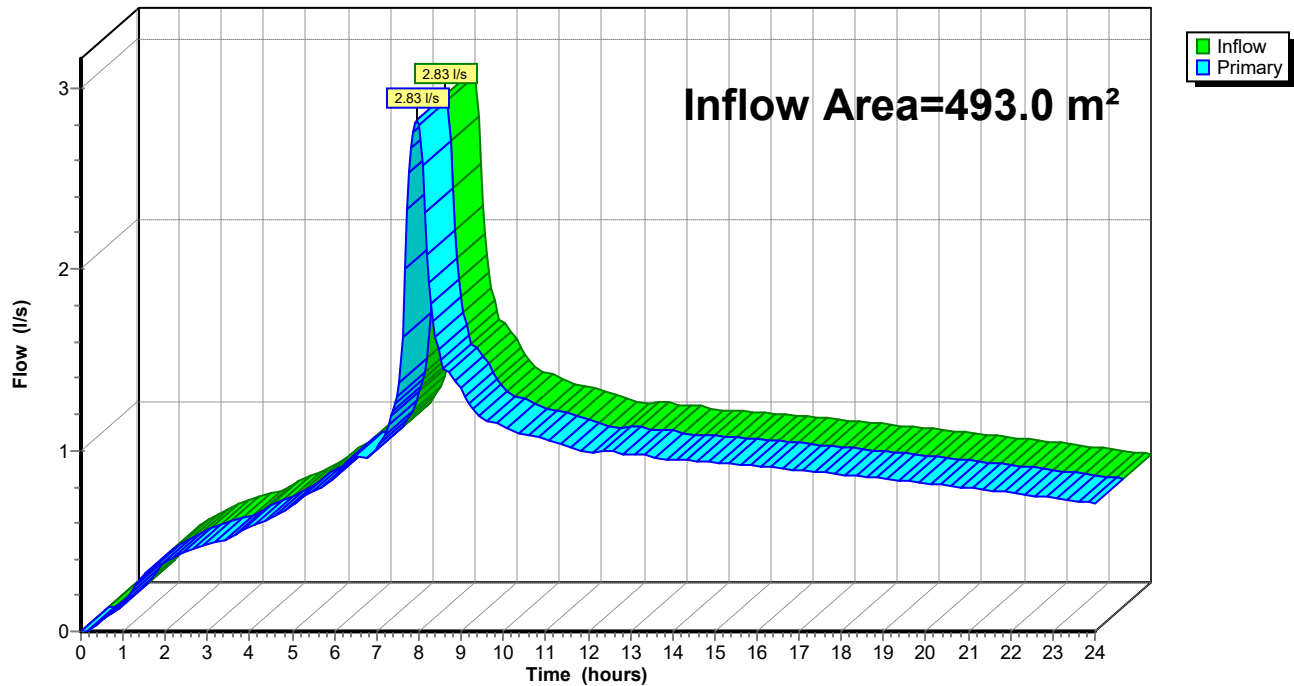
Summary for Link 6L: total post dev

Inflow Area = 493.0 m², 100.00% Impervious, Inflow Depth > 152 mm for 20% AEP +20% event
Inflow = 2.83 l/s @ 7.96 hrs, Volume= 74.9 m³
Primary = 2.83 l/s @ 7.96 hrs, Volume= 74.9 m³, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 6L: total post dev

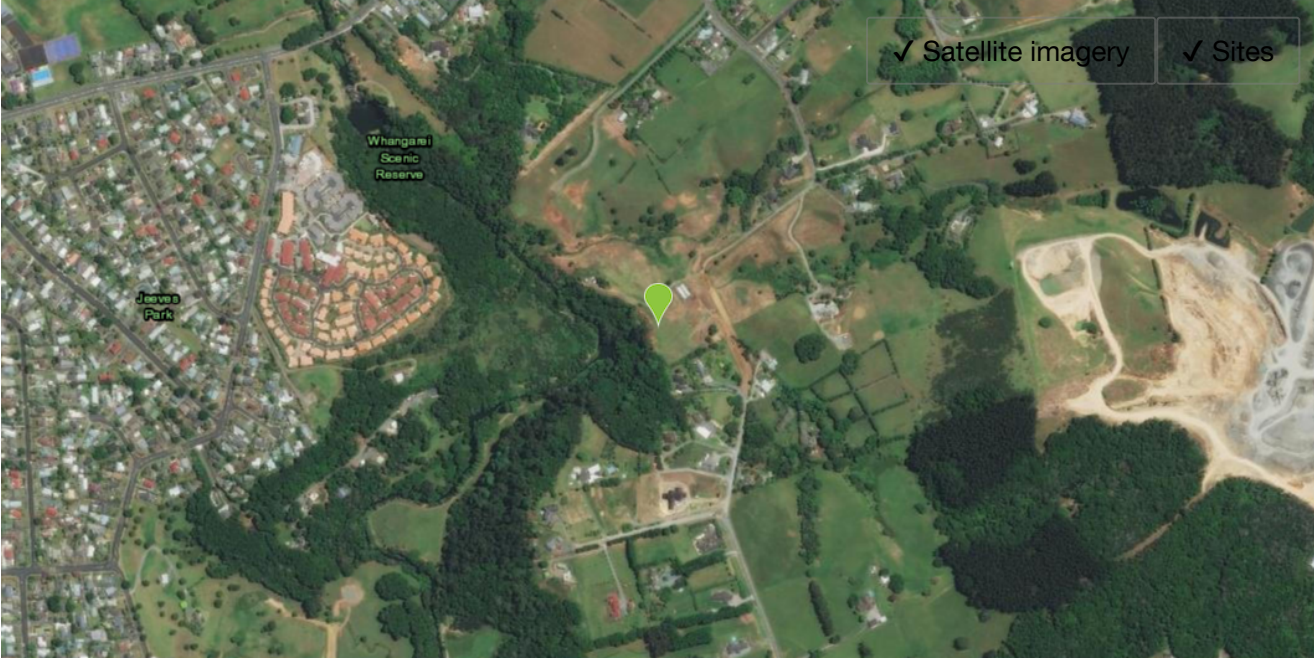
Hydrograph



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	-35.68756077756044
----------	--------------------

Longitude	174.3410539627075
-----------	-------------------

Site Name	Custom Location
-----------	-----------------

Site Id	
---------	--

Output Table Format

- ☒ Depth - Duration - Frequency
- ☐ Intensity - Duration - Frequency

Generate Report

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	10.3	15.2	18.9	27.4	38.9	64.4	85.1	108	132	145	153	159
2	0.500	11.4	16.7	20.9	30.2	42.8	70.9	93.6	119	145	159	168	175
5	0.200	15.0	22.0	27.4	39.6	56.2	93.0	123	156	190	209	220	229
10	0.100	17.6	25.9	32.3	46.7	66.1	109	144	183	223	245	259	268
20	0.050	20.3	29.9	37.3	53.8	76.2	126	166	211	256	281	297	308
30	0.033	22.0	32.2	40.2	58.0	82.2	136	179	227	276	303	320	332
40	0.025	23.1	33.9	42.3	61.1	86.5	143	188	239	290	318	336	349
50	0.020	24.0	35.2	44.0	63.4	89.8	148	195	248	301	330	349	362
60	0.017	24.7	36.3	45.3	65.3	92.5	153	201	255	310	340	359	372
80	0.012	25.9	38.0	47.4	68.3	96.7	160	210	267	324	355	375	389
100	0.010	26.8	39.3	49.0	70.6	100	165	217	276	335	367	388	402
250	0.004	30.3	44.5	55.5	79.9	113	186	245	311	377	414	437	453
Depth standard error (mm) :: Historical Data													
ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	1.2	1.5	1.7	2.5	3.5	6.7	9.8	15	19	22	23	24
2	0.500	1.3	1.7	1.9	2.7	3.8	7.4	11	16	21	24	25	27
5	0.200	1.9	2.4	2.8	3.9	5.6	10	15	22	29	33	34	37
10	0.100	2.5	3.2	3.7	5.2	7.5	13	19	27	34	39	41	45
20	0.050	3.2	4.3	5.0	6.9	10	18	25	32	41	46	49	53
30	0.033	3.7	5.0	5.9	8.2	12	21	29	35	45	51	53	58
40	0.025	4.1	5.6	6.6	9.3	14	23	32	38	48	54	57	62
50	0.020	4.4	6.1	7.2	10	15	26	35	40	50	57	60	65
60	0.017	4.7	6.6	7.7	11	16	28	38	42	52	59	62	68

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
80	0.012	5.3	7.3	8.6	12	18	31	42	44	56	63	66	72
100	0.010	5.7	8.0	9.3	14	20	34	46	47	59	66	70	76
250	0.004	7.8	11	13	20	29	50	65	58	72	81	85	93

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Appendix D

Assessment of Environmental Effects

Part B Assessment of Environmental Effects –

Discharge Treated Sewage Effluent to Land



Putting Northland first

Whāngārei Office	Phone:	(09) 470 1200
	Fax:	(09) 470 1202
Kaitiāia Office	Phone:	(09) 408 6600
Ōpua Office	Phone:	(09) 402 7516
Dargaville Office	Phone:	(09) 439 3300
Free Phone		0800 002 004
Email		mailroom@nrc.govt.nz
Website		www.nrc.govt.nz

This application is made under Section 88/Section 127 of the
Resource Management Act 1991

To: Consents Department
Northland Regional Council
Private Bag 9021
Whāngārei Mail Centre
Whāngārei 0148

PART B – ASSESSMENT OF ENVIRONMENTAL EFFECTS

Your application must include an Assessment of Effects on the Environment. This form is a guide to help you prepare one.

An assessment of effects is required so that you and others can understand what happens to the environment when you discharge domestic wastewater ("treated sewage effluent") to land. This will help you to propose ways to minimise those effects to the Regional Council's satisfaction.

The degree of detail required is in proportion to the scale of the environmental effects of your proposal. If you are required to apply for a Consent to discharge sewage effluent into or onto land, then you will most probably need a qualified engineer (or similar) to design your on-site system. The information requested below is the minimum detail that your engineer must supply.

Please note that the word "*environment*" includes the surrounding waterways and groundwater, surrounding coastal water, adjoining land, any surrounding resource users, and local iwi.

It is advised that you make an appointment with an appropriate Council Officer to discuss your application prior to lodging it. This will help you to supply all the required information at the onset and ensure the efficient processing of your application.

A. Description of the Proposed Activity

A.1 What is the intended water supply?

- ☒ Rainwater collection
- ☐ Community or bore water supply
- ☐ Other (*please specify*): _____

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A.2 What is the source of the wastewater? *(please tick the appropriate box and answer those questions)*



Domestic House

How many bedrooms are there in the house?

4

Will the house be permanently occupied?



Yes



No



Small Motel/Campground/Hostel/Marae/Sports Club

What is the maximum number of occupants that your facility can accommodate?

How frequently does this maximum occupancy occur and for what length of time?

What is the typical number of occupants during the other periods of the year?



Shared On-site Systems/Subdivisions

How many individual lots are/will the treatment and disposal system be servicing?

What will be the average number of bedrooms per house?

What is the area of the lot on which the discharge will occur?

m²



Other

Provide details of the source of effluent, the number of persons contributing to the wastewater and the source of water supply for the facility.

A.3 What is the likely maximum daily volume of wastewater to be discharged? 870 litres

The Wastewater Treatment System

A.4 What is your Proposed Wastewater Treatment System?

(please tick appropriate box and answer the associated questions)



Septic Tank

What is the capacity of the tank?

litres

Will an effluent filter be fitted on the outlet?



Yes



No



Aerated Wastewater Treatment System (AWTS)

What brand is the AWTS?

TBC

Will a programmed maintenance contract be entered into with the treatment systems manufacturer or agent?



Yes



No



Other, what level of treatment do you consider the wastewater receives through your "other" treatment system?



Primary



Secondary

Describe the proposed "other" treatment system

The Wastewater Disposal System

A.5 What is your proposed disposal system? *(please tick the appropriate box and answer the associated questions)*

☐ **Soakage Trench/Bed System**

What are the dimensions of the proposed soakage trenches/beds?

Width _____ m

Depth _____ m

What is the total length of all the soakage trenches/beds? _____ m

How will the soakage trench/bed system be loaded?

☐ Trickle

☐ Pump

☐ Dose loaded via a syphon

Has a 100% reserve area of undeveloped land been allowed for in the disposal system design?

☐ Yes

☐ No, what percentage has been allowed for and why?

What is the proposed loading rate to the trenches/beds? _____ mm/day

☒ **Irrigation Lines**

What area will the irrigation lines cover? 249 m²

What is the distance between adjacent irrigation lines? 1.0 m

What is the distance between adjacent drip emitters along the irrigation line? 1.0 m

What brand is the irrigation line? Netafim

What is the proposed aerial loading rate to the disposal area? 3.5 mm/day

Has a 30% reserve area of undeveloped land been allowed for in the disposal system design?

☒ Yes

☐ No, what percentage has been allowed for and why?

☐ **Other** *(please describe)* _____

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A.6 What is the intended ground cover within the disposal area after the disposal system is operational?
(ie. what plant species do you intend to plant, if any)

Planted, refer to RS Eng Report Ref. #18232

B. Site Details

B.1 You **must** attach a map that shows the following:

- ☒ The location of your lot in relation to the nearest town.
- ☒ The legal property boundaries of your lot and the distance of your disposal system (including reserve area) from those boundaries.
- ☒ The layout of your disposal system (including reserve area) within your lot boundaries.
- ☒ The location of any groundwater bores within 20 metres of your disposal system (including reserve area).
- ☒ The location of any surface water (ie. streams, roadside drains, lakes and rivers) within 20 metres of your disposal system (including reserve area).

B.2 What is the map reference of the proposed disposal system? *(if known)*

NZMS 260 Series map number:

Easting	N/A	(seven digit number)
Northing	N/A	(seven digit number)

B.3 Which District Council is the property administered under?

☐ Kaipara

☐ Far North

☒ Whangarei

B.4 What is the slope of the proposed disposal area?

☐ Flat

☒ Slightly sloping (5°-15°)

☐ Steep (>15°)

B.5 Are any drainage controls required?

☐ Yes, describe Retaining wall above disposal field. runoff from impervious surfaces directed to dish drain on driveway.

☐ No, state why not

B.6 Was a soakage test (percolation test) performed at the location of the proposed disposal system?
(please tick the appropriate box and answer those questions)

☐ Yes

What was the date of the test? _____

What were the weather conditions prior to the soakage test? _____

What is the average soakage rate of the disposal area? (please ensure the individual soakage test results are included with this application) _____ mm/hr

Are the locations of the soakage tests marked on the map that shows the layout of the disposal system?

☐ Yes

☐ No, state why not



No, what are the reasons for not performing a soakage test?
Visual assessment undertaken as per AS/NZS1547:2012

B.7 Was any groundwater encountered during the site investigation?

☐ No

☐ Yes, at what depth? _____ m

B.8 What is the estimated winter groundwater level for the disposal area? >4.0 m

How was this winter groundwater level determined? _____
Subsoil Investigations (Hand Augers)

B.9 Has a detailed soil profile been included with this application form?

☒ Yes

☐ No, state why not _____

B.10 What is the estimated soil category of the disposal area?

☐ 1: Gravel and sands, Rapidly draining

☐ 2: Sandy loams, Well drained

☐ 3: Loams, Moderately well drained

☒ 4: Clay loams, Imperfectly drained

☐ 5: Light clays, Poorly drained

☐ 6: Medium to heavy clays, Very poorly drained

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Please state the criteria used for selecting the above soil category?
As per AS/NZS1547:2012

C. Assessment of Effects on the Environment

An assessment of effects should be proportional to the scale and significance of the proposed activity. Where your discharge could have an adverse effect on the environment, a detailed environmental assessment is required.

C.1 Affected Parties

Note: If you are proposing to dispose of your wastewater using a deep soakage system the determination of affected parties can be more complex, especially with relation to groundwater users. It is recommended that you contact the Regional Council to help determine who the affected parties from your proposal may be.

Are there any groundwater bores within 20 metres of any part of the disposal system (including reserve area) that are not owned by the applicant?

☐

Yes

☒

No

If you have answered **Yes** then you will need to gain the written approvals of all the owners of neighbouring groundwater bores identified by the above question.

If written approvals cannot be obtained from all affected parties, describe what effect your discharge may have on the neighbouring groundwater bore and the steps you propose to take to minimise (ie. mitigate) these effects *(attach a separate sheet if necessary)*

C.2 Given the estimated winter groundwater level (see Question B8) and your proposed treatment and disposal system, what is the risk of groundwater contamination occurring and why?

No more than minor, refer to RS Eng Report Ref. #18232.

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C.3 What is the smallest horizontal separation distance between the disposal system (including reserve area) and any nearby watercourse, including roadside water table drains? >5.0m m

C.4 Given the smallest horizontal separation distance to the nearest surface watercourse and your proposed treatment and disposal system (including reserve area), what is the risk of surface water contamination occurring and why? _____

Risk is low, refer to RS Eng Report Ref. #18232

C.5 Consultation

Have you consulted with any of the following potentially affected parties:

	Yes	No
Neighbours	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Department of Conservation <i>(if relevant)</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Fish & Game Council <i>(if relevant)</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
District Council <i>(if relevant)</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Local iwi <i>(specify):</i> _____	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Other <i>(specify):</i> _____	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Please ensure all of the relevant questions on this form have been answered fully.

If you have any queries relating to information requirements or wish to meet with a Council Consents Officer, please contact the Northland Regional Council.

Northland Regional Council Offices:			
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