# Stormwater Design Report

Version B

**Section 41 SO 13711, Tauranga Bay Road, Westport**

Prepared for Tauranga Bay Holdings Limited

510322

eliot sinclair

# Stormwater Design Report

Section 41 SO 13711, Tauranga Bay Road, Westport

Prepared for Tauranga Bay Holdings Limited

510322

**Quality Control Certificate**

Eliot Sinclair & Partners Limited

eliotsinclair.co.nz

| Action | Name | Signature | Date |
|---|---|---|---|
| **Prepared by:** | Sattyajit Ghogare<br>Civil Engineer<br>MEngNZ<br>sattyajit.ghogare@eliotsinclair.co.nz |  | 22 July 2025 |
| **Reviewed by:** | Joshua Purdon<br>Civil Engineer<br>BE(Hons) Civil<br>joshua.purdon@eliotsinclair.co.nz |  | 22 July 2025 |
| **Directed and approved for release by:** | James Tomkinson<br>Civil Engineer<br>BE CMEngNZ CPEng<br>James.tomkinson@eliotsinclair.co.nz |  | 22 July 2025 |
| **Status:** | Version B | | |
| **Release date:** | 22 July 2025 | | |
| **Distributed to:** | Tauranga Bay Holdings Limited<br>Buller District Council | | |

## Version History

| Status | Description | Author | Release Date |
|---|---|---|---|
| A | Consent Issue | J. Manandhar | 13 March 2023 |
| B | RFI Response | S. Ghogare | 22 July 2025 |

| Status | Description | Author | Release Date |
|---|---|---|---|

# Contents

# 1. Project Personnel

## Principal Designer

| | | | |
|---|---|---|---|
| **Name** | Jenish Manandhar | | |
| **Company** | Eliot Sinclair | | |
| **Address** | PO Box 9339, Tower Junction, Christchurch 8149 | | |
| **Telephone** | 03 379 4014 | **Email** | jm@eliotsinclair.co.nz |

## Developer

| | | | |
|---|---|---|---|
| **Name** | | | |
| **Company** | Tauranga Bay Holdings Ltd | | |
| **Address** | | | |
| **Telephone** | | **Email** | |

## Design Review

| | | | |
|---|---|---|---|
| **Name** | James Tomkinson | | |
| **Company** | Eliot Sinclair | | |
| **Address** | PO Box 9339, Tower Junction, Christchurch 8149 | | |
| **Telephone** | 03 379 4014 | **Email** | jt@eliotsinclair.co.nz |

# 2. Description of the Work

## 2.1. Introduction

Eliot Sinclair has been engaged by Tauranga Bay Holdings Limited to assist with subdivision consent application for a rural lifestyle residential development of 21 allotments, 1 reserve allotment, 1 road to vest to Buller District Council and 3 Right of Ways (ROW) in Tauranga Bay, Westport. This development is proposed within Section 41 SO 13711 (referred as "the Site").

This report addresses the stormwater drainage conceptual design for proposed development.

The following stormwater design drawings are located in **Appendix A**:

- 510322 – C1 – C400[B] – Drainage Layout Drawing Sheet 1 of 2
- 510322 – C1 – C401[B] – Drainage Layout Drawing Sheet 2 of 2
- 510322 – C1 – C402[A] – Catchment Plan
- 510322 – C1 – C410[A] – Soakage Pit Detail

## 2.2. Design Standards

The design has been carried out in accordance with the NZS 4404: 2010 Land Development and Subdivision Infrastructure.

## 2.3. Site Location & Description

The Site is located in Tauranga Bay, Westport and is bordered by Wilsons Lead Road to the north-east and Tauranga Bay Road to the north-west, and pasture area to the south.

The aerial imagery illustrating the Site boundary is shown in Figure 1 below.

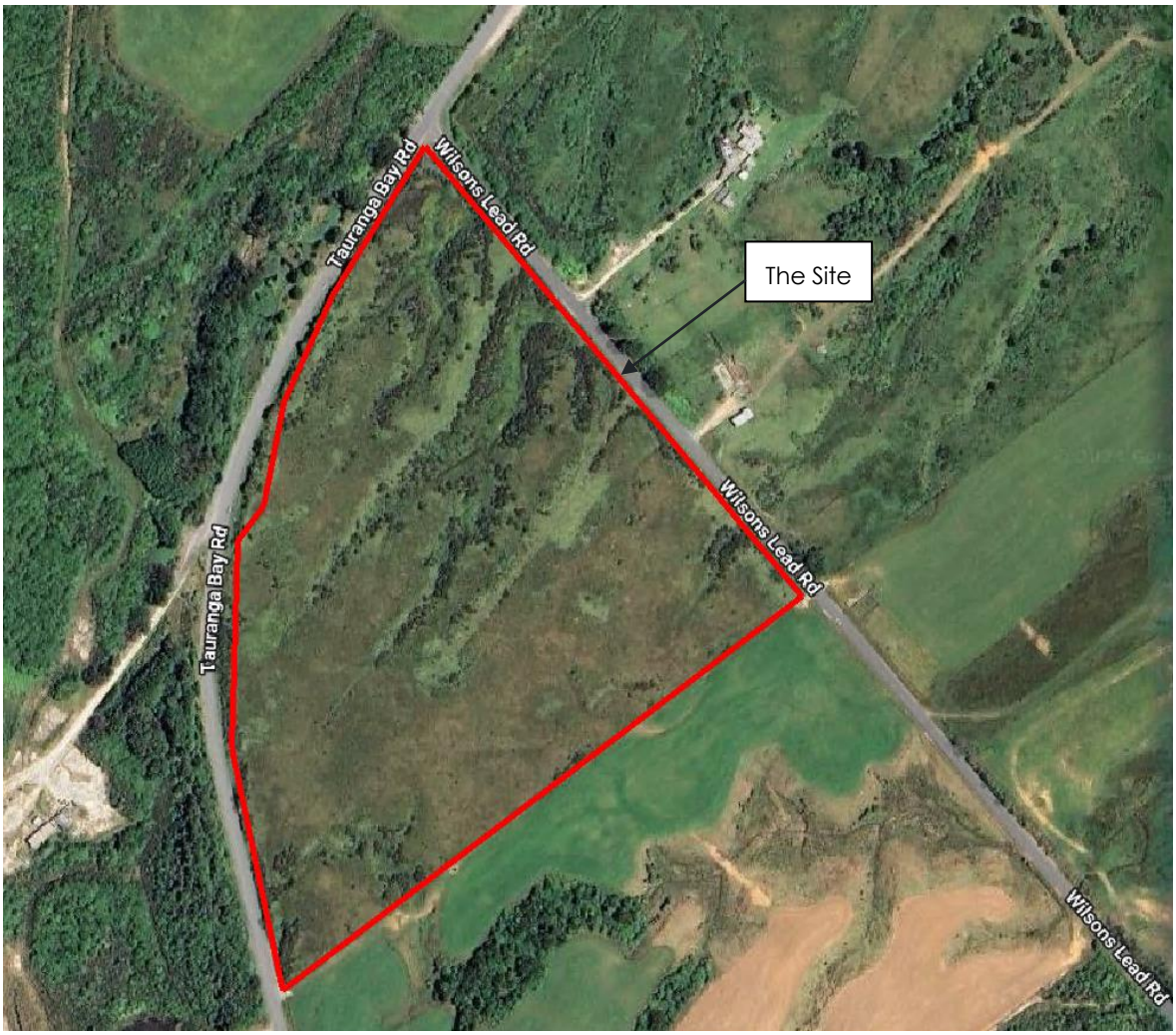


**Figure 1. Site Location**

### 2.3.1. The Pre-Development Site

The site currently in pasture with the northern portion falling from west to east and the southern portion falling towards the south. The site has two valleys 'A' and 'B' which drain from the centre of the site towards the north and through a culvert under Wilsons Lead Road near the Tauranga Bay Rd intersection. The culvert size and invert levels are unknown at this stage. A further smaller valley 'C' located in the south-east part of the development. The valleys locations are shown in Figure 2 below.

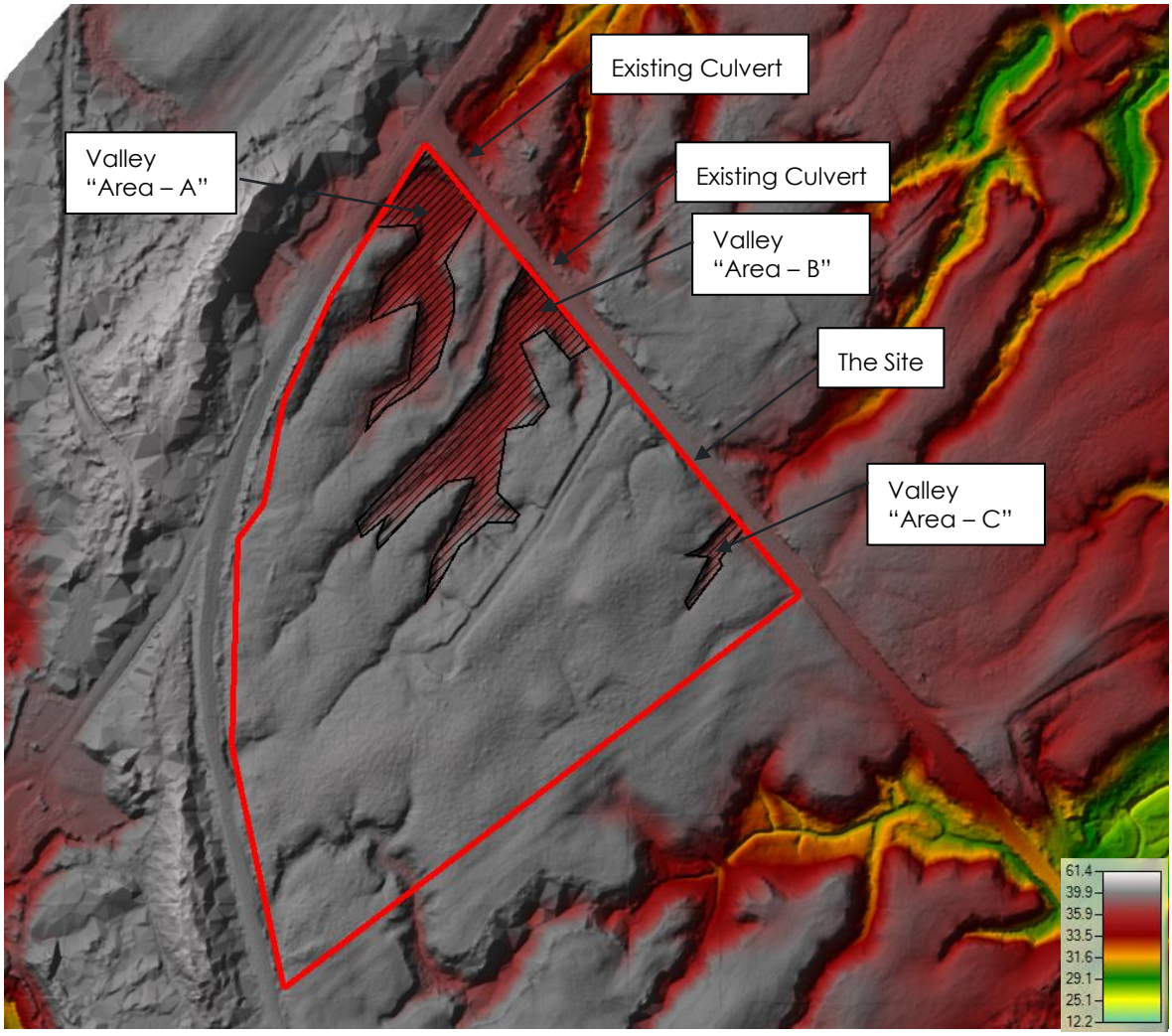


**Figure 2. Pre-development Valley Location**

### 2.3.2. The Proposed Development

The proposed development consists of a vested road located approximately central to the Site with an access off Wilsons Lead Road. It is proposed to subdivide existing lot into 21 residential lots, plus a reserve area (Lot 23) within one of the valleys within the Site. The post-development layout of the Site is shown in Figure 3 below.


**Figure 3. Post-development Site layout**

## 2.4. Concept Design

Stormwater runoff within the development will be conveyed via roadside swales before discharging to the existing valleys on site. Buller District Council have advised that the post development runoff discharging to the existing valley catchments must not exceed the pre-development runoff rates. To address this, soakage pits are proposed at each swale discharge location. These soakage pits have been designed to store and discharge the additional runoff (post-dev minus pre-dev) created by the impervious surfaces within each catchment. Like the swales, the soakage pits have been designed to manage the 1% AEP critical duration rainfall event.

Soakage pit catchments have considered all runoff from the legal road reserve (road, RoW and berms), as well as runoff from the lots. For excess lot runoff, a nominal gravel driveway area of 100m$^2$ has been assumed. Roof areas have been excluded from the swale soakage pit catchments as roof runoff will be managed via private rainwater harvesting tanks, with the overflow discharging to individual soakage pits within each lot. These will also be sized for the 1% AEP critical duration storm event

Preliminary permeability testing was undertaken on-site (2024) resulting in an average rate of 418 mm/hr (refer to **Appendix C** details). The low rate of infiltration rate has been attributed to the presence of a known iron pan layer underlying the site. It is now proposed to install the soakage systems deep enough such that the base extends beyond the iron pan layer, and into gravels.

Therefore, an infiltration rate of 1 m/hr has been assumed for design. A factor of 2 has been applied to allow for sedimentation in the soakage media over time.

Refer to **Appendix B** and **Appendix D** for the swale and soakage pit calculations, respectively.

Easements will be required through private property to drain stormwater from the greater catchment. ROW C is to discharge into valleys A and B via road crossings and recreational reserve. Valley B will require stormwater easements over Lots 4, 5, 8, 9 and 10. The ROW A is to drain via roadside swales to Valley C and require an easement over Lot 2.

Refer to **Appendix A** for Engineering drawings.

## 2.5. Reserve Area Assessment

The natural topography contains low lying areas / valleys as shown in Figure 2. These fall from the centre of the development to the north and pass under Wilsons Lead Road and Tauranga Bay Rd via existing culvert pipes. The low lying area becomes Lot 23 to be vested as reserve. Refer to Figure 4 below for catchment location details.

An assessment of catchment area A indicates this extends northwest alongside the Cement Production Zone site which then drains under Tauranga Bay Road into Valley A. The extent of catchment areas to Valley A & B are shown highlighted in Figure 4 below.

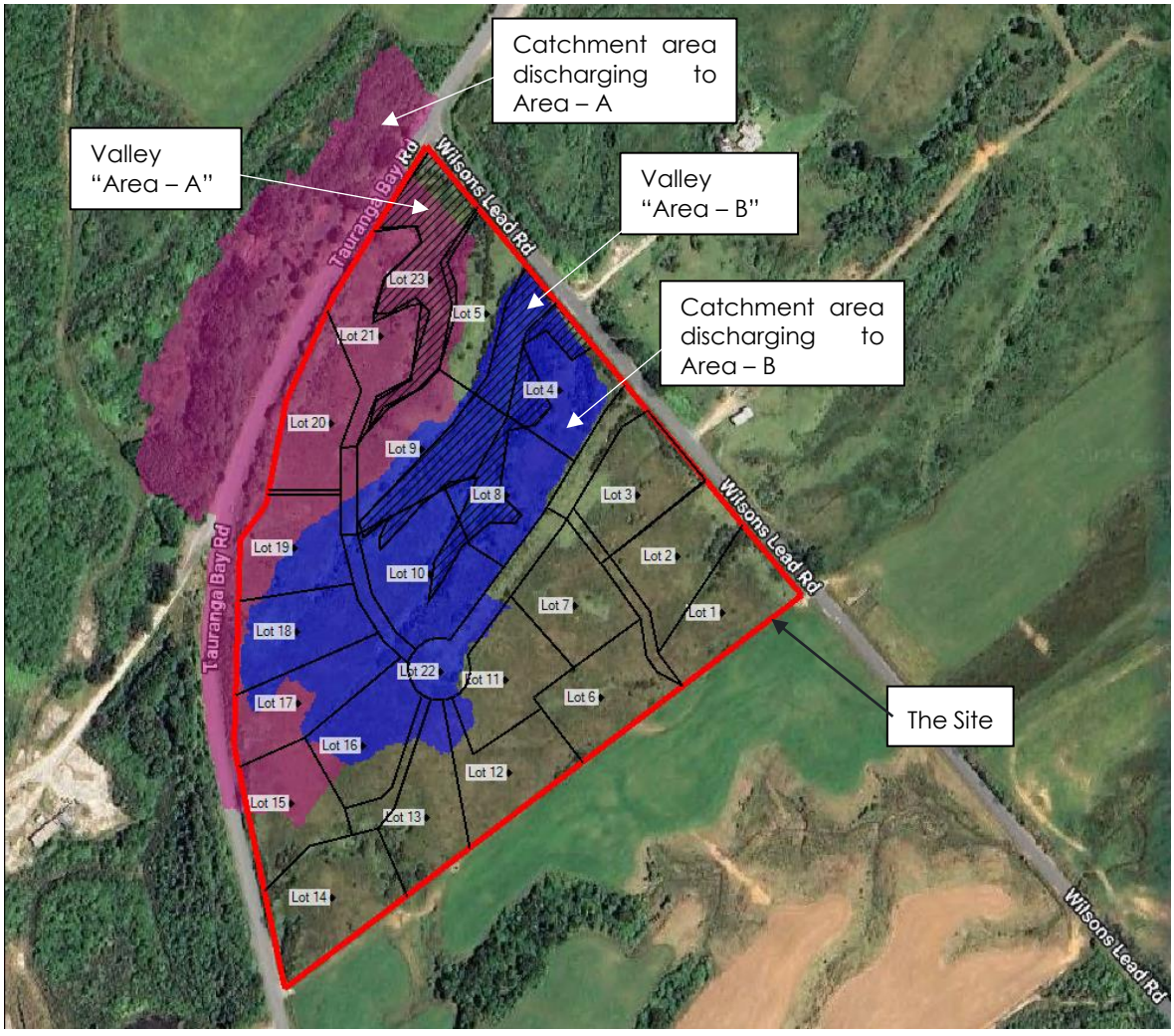


**Figure 4. Catchment areas into the valleys**

The extent of the flooding for a 1% AEP rainfall event in catchment areas A & B are shown hatched in Figure 4 above. Lots 10, 8, 4, 9 and 5 are affected within Catchment B, while Lots 5 and 21 are affected within Catchment A. It's proposed to identify suitable building platforms within these lots and set minimum platform levels 500mm above the 1% AEP flood level over Wilsons Lead and Tauranga Bay Roads.

An assessment of the current LiDAR data and Google Street view indicates that the overflow from Area-B discharges into Area-A. Though Area A drains north under Wilsons Lead Rd via culvert, our assessment assumes this to be blocked with stormwater building up to overtop the carriageway. The overflow located based on current LiDAR data indicates a level of R.L. 38.1 m on Wilsons Lead Road and R.L. 38.2 m on Tauranga Bay Road.

### 2.5.1. Floor Levels for New Buildings on flood affected lots

In accordance with NZS 4404: 2010 Land Development and Subdivision Infrastructure, Section 4.3.5.2 freeboard requirements the minimum building platform levels for the habitable dwellings (including attached garages) for Areas - A and Area - B needs to be R.L. 38.7 m to the underside of the floor slab. Refer to Figure 5 below showing the area highlighted green greater than R.L. 38.7 m. Consent notices will be required for Lots 21, 5, 9, 4, 8 and 10 to impose the minimum platform level R.L. 38.7 m.

Our assessment to date based on limited LiDAR data and would need to be validated during the subdivision detailed design to confirm road, culvert and topographical features to confirm final building platform levels.

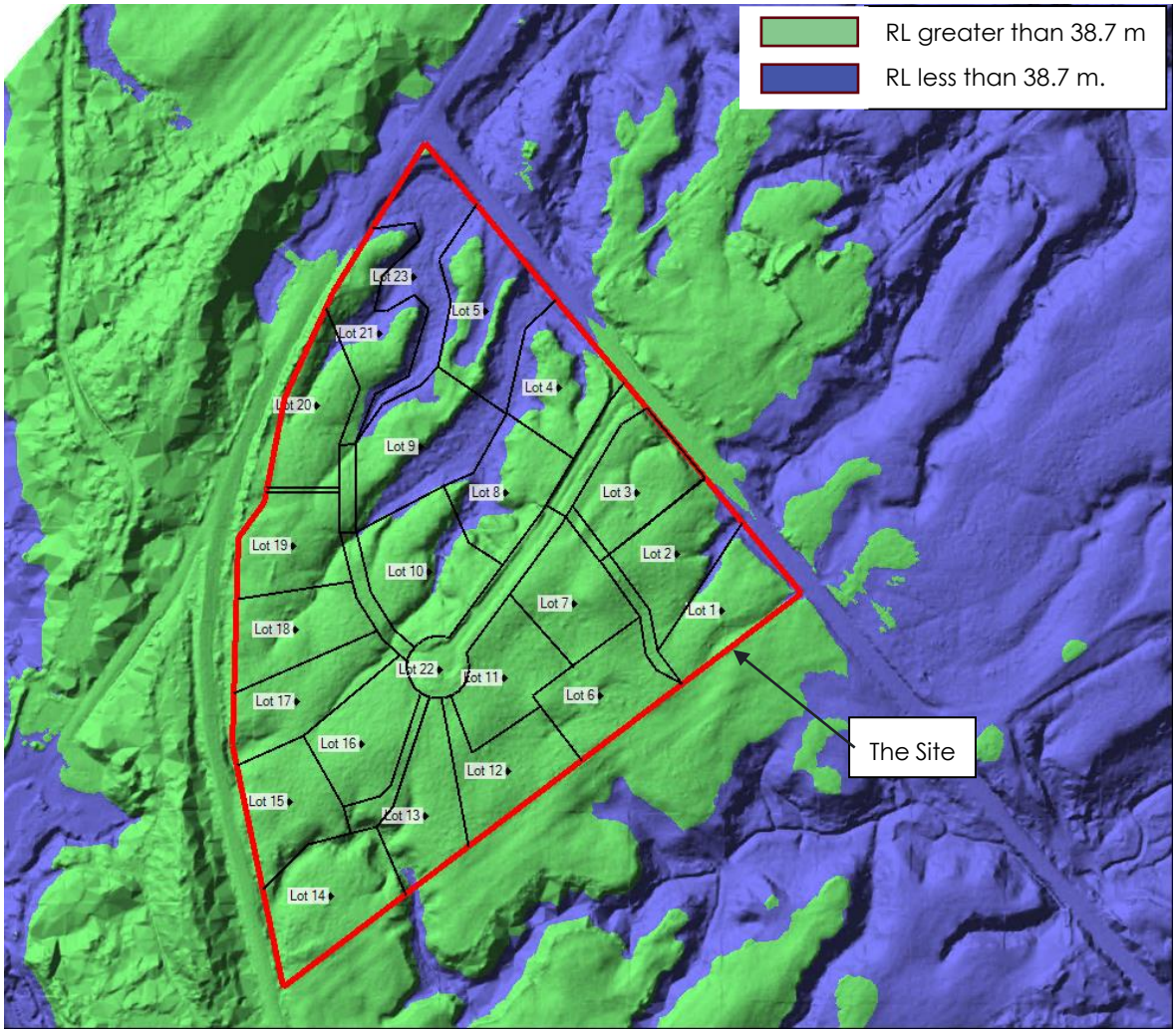


**Figure 5. Areas indicating R.L. greater than or less than 38.7 m**

As shown in Figure 5, Lot 5 is most affected by the minimum floor level requirement, therefore an assumed 400 $m^2$ building platform, as shown in Figure 6, is placed to understand the feasibility of building structure within Lot 5.

Note: Lot 5 may require to be filled to provide the area required to establish a building platform. This will need to include a wastewater treatment area that is above flood level for soakage.

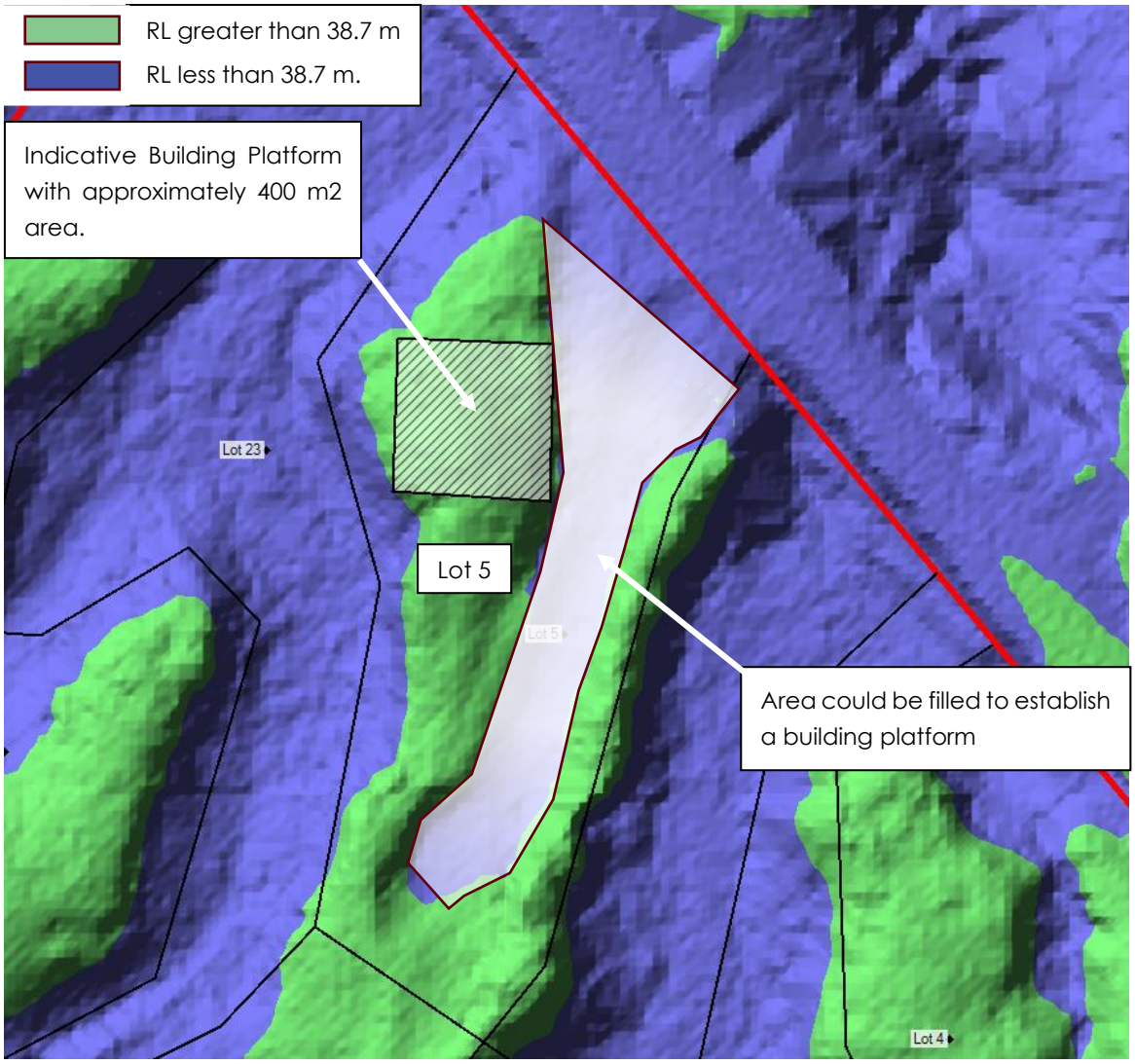


**Figure 6. Indicative building location at proposed Lot 5**

## 2.6. Environmental Management

Erosion, Sediment and Dust Management (ESDM) measures are required to mitigate environmental issues associated with earthworks activities, thereby minimising or preventing undue erosion and the risk of sediment laden stormwater discharges entering any drain or waterbody, protection of the surrounding environment from dust emissions and mitigating any other environmental issues that may arise during the construction works.

A ESDM measures will be required in accordance with the Buller District Council requirements during a detailed design stage.

# 3. Disclaimer

This report has been prepared by Eliot Sinclair & Partners Limited ("Eliot Sinclair") only for the intended purpose as a Stormwater Design Report.

The report is based on:

- LINZ West Cost LiDAR (2020-2022)
- Google Street View (accessed February 2024)
- NZS 4404: 2010 Land Development and Subdivision Infrastructure

Where data supplied by Tauranga Bay Holdings Limited or other external sources, including previous site investigation reports, have been relied upon, it has been assumed that the information is correct unless otherwise stated. No responsibility is accepted by Eliot Sinclair for incomplete or inaccurate data supplied by other parties.

Whilst every care has been taken during our investigation and interpretation of available data to ensure that the conclusions drawn, and the opinions and recommendations expressed are correct at the time of reporting, Eliot Sinclair has not performed an assessment of all possible conditions or circumstances that may exist at the site. Eliot Sinclair does not provide any warranty, either express or implied, that all conditions will conform exactly to the assessments contained in this report.

The exposure of conditions or materials that vary from those described in this report, or occurrence of additional strong seismicity, or any update to the Building Act, NZBC or MBIE's Guidance may require a review of our recommendations. Eliot Sinclair should be contacted to confirm the validity of this report should any of these occur.

This report has been prepared for the benefit of Tauranga Bay Holdings Limited and the Buller District Council for the purposes as stated above. No liability is accepted by Eliot Sinclair or any of their employees with respect to the use of this report, in whole or in part, for any other purpose or by any other party.

# Appendix A. Engineering Drawings

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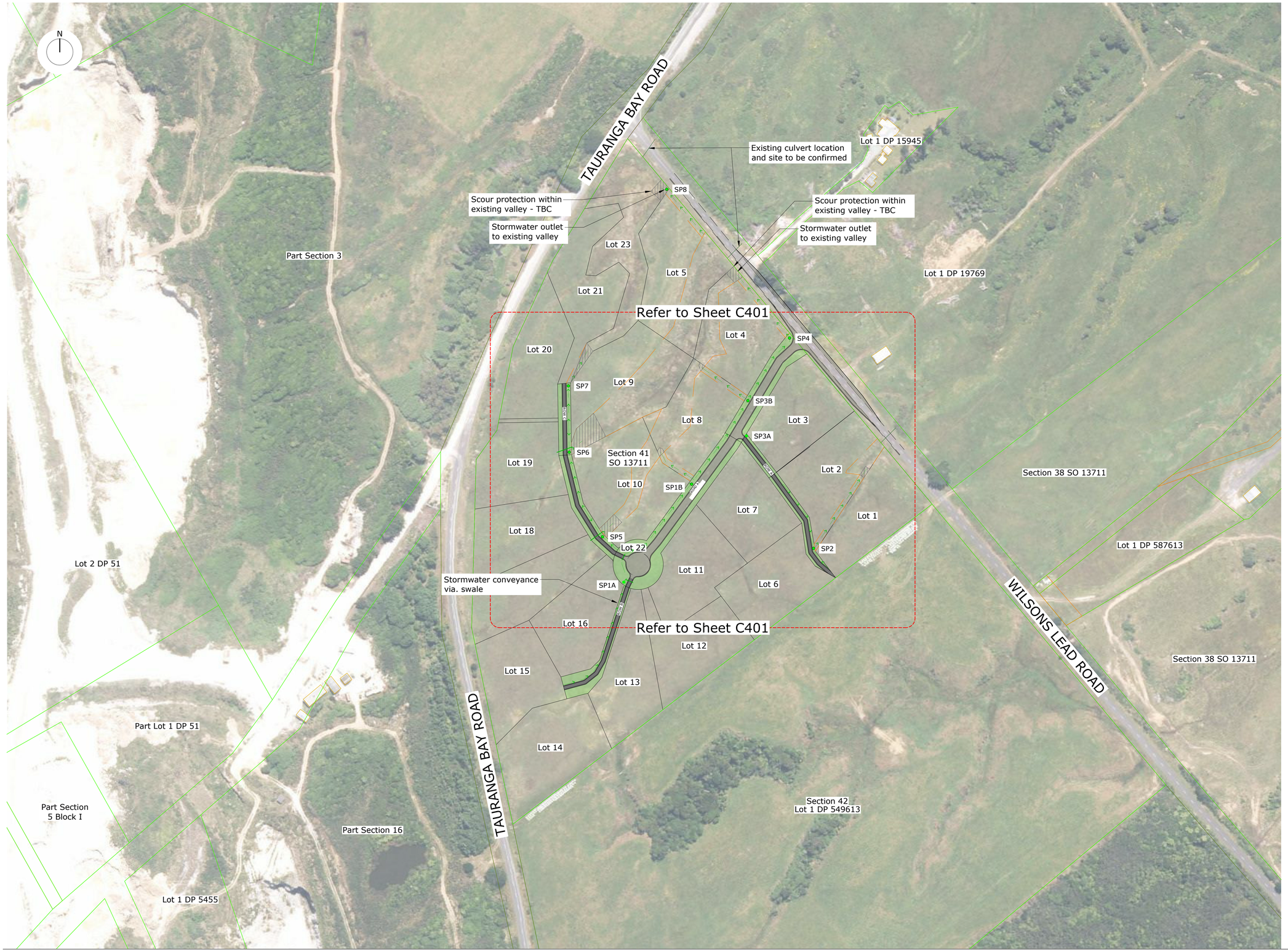


0 30m 60m 90m 120m 150m

1:1500

NOTES

1. All works to be in accordance with Project Specification and Buller District Council - District Plan where applicable.
2. Refer to Sheet C402 for preliminary soakage pit sizing.
3. on-site infiltration testing is required at the time of construction. Results must be provided to the Engineer to confirm suitablity of design. Soakage pit will be resized if required.

LEGEND:

- Existing LINZ Boundary
- Existing Building Outline
- Existing Stormwater pipe
- Proposed boundary
- Proposed stormwater easement
- Stormwater flows within swale
- Proposed Stormwater pipe
- Proposed scour protection
- Soakpit location

NOTES

1. Contractors to verify all dimensions and the location of all underground services on site prior to commencing work.
2. Unless noted otherwise, all work shall be undertaken in accordance with the NZBC and any relevant Territorial Authority Engineering Standards and Specifications as a minimum standard.



| REV. | DRAWN | DATE | NOTE |
|---|---|---|---|
| **A** | **GG** | **08.03.24** | **For Consent** |
| **B** | **SG** | **24.06.25** | **For RFI Response** |

CLIENT

**Tauranga Bay Holdings Ltd**

| | | |
|---|---|---|
| DESIGNED | | **JM** |
| DRAWN | | **GG** |
| REVIEWED | | **JT** |
| APPROVED | **14.03.24** | **SH** |
| STATUS | **FOR CONSENT** | |
| SCALE | **1:500 [A1] 1:1000 [A3]** | |

**CAPE FOULWIND DEVELOPMENT**

Section 41 SO 13711

Tauranga Bay Road, Westport

**DRAINAGE LAYOUT DRAWING**

**SHEET 1 OF 2**

| PROJECT | REV. |
|---|---|
| **510322** | **B** |
| **SET** | **SHEET** |
| **C1** | **C400** |

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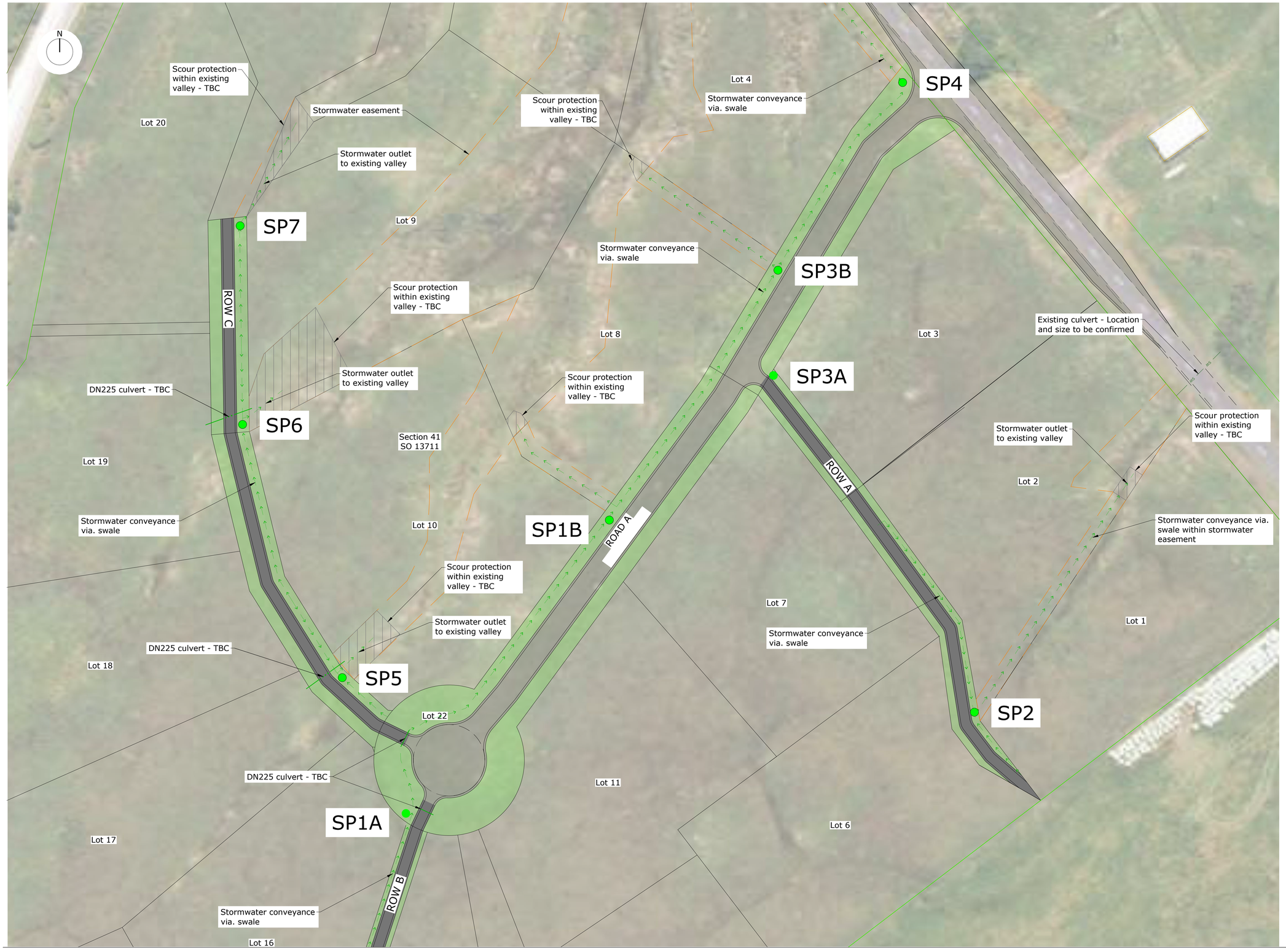
G:\Jobs\51\510322\Acad\CAD\510322-C1-C400




0 10m 20m 30m 40m 50m

1:500

NOTES

1. All works to be in accordance with Project Specification and Buller District Council - District Plan where applicable.
2. Refer to Sheet C402 for preliminary soakage pit sizing.
3. on-site infiltration testing is required at the time of construction. Results must be provided to the Engineer to confirm suitablity of design. Soakage pit will be resized if required.

LEGEND:

- Existing LINZ Boundary
- Existing Building Outline
- Existing Stormwater pipe
- Proposed boundary
- Proposed stormwater easement
- Stormwater flows within swale
- Proposed Stormwater pipe
- Proposed scour protection
- Soakpit location

NOTES

1. Contractors to verify all dimensions and the location of all underground services on site prior to commencing work.
2. Unless noted otherwise, all work shall be undertaken in accordance with the NZBC and any relevant Territorial Authority Engineering Standards and Specifications as a minimum standard.



| REV. | DRAWN | DATE | NOTE |
|---|---|---|---|
| A | GG | 08.03.24 | For Consent |
| B | SG | 24.06.25 | For RFI Response |

CLIENT

**Tauranga Bay Holdings Ltd**

| | | |
|---|---|---|
| DESIGNED | | JM |
| DRAWN | | GG |
| REVIEWED | | JT |
| APPROVED | 14.03.24 | SH |
| STATUS | | FOR CONSENT |
| SCALE | | 1:500 [A1] 1:1000 [A3] |

**CAPE FOULWIND DEVELOPMENT**
Section 41 SO 13711
Tauranga Bay Road, Westport

**DRAINAGE LAYOUT DRAWING**
**SHEET 2 OF 2**

| PROJECT | REV. |
|---|---|
| 510322 | B |
| SET | SHEET |
| C1 | C401 |

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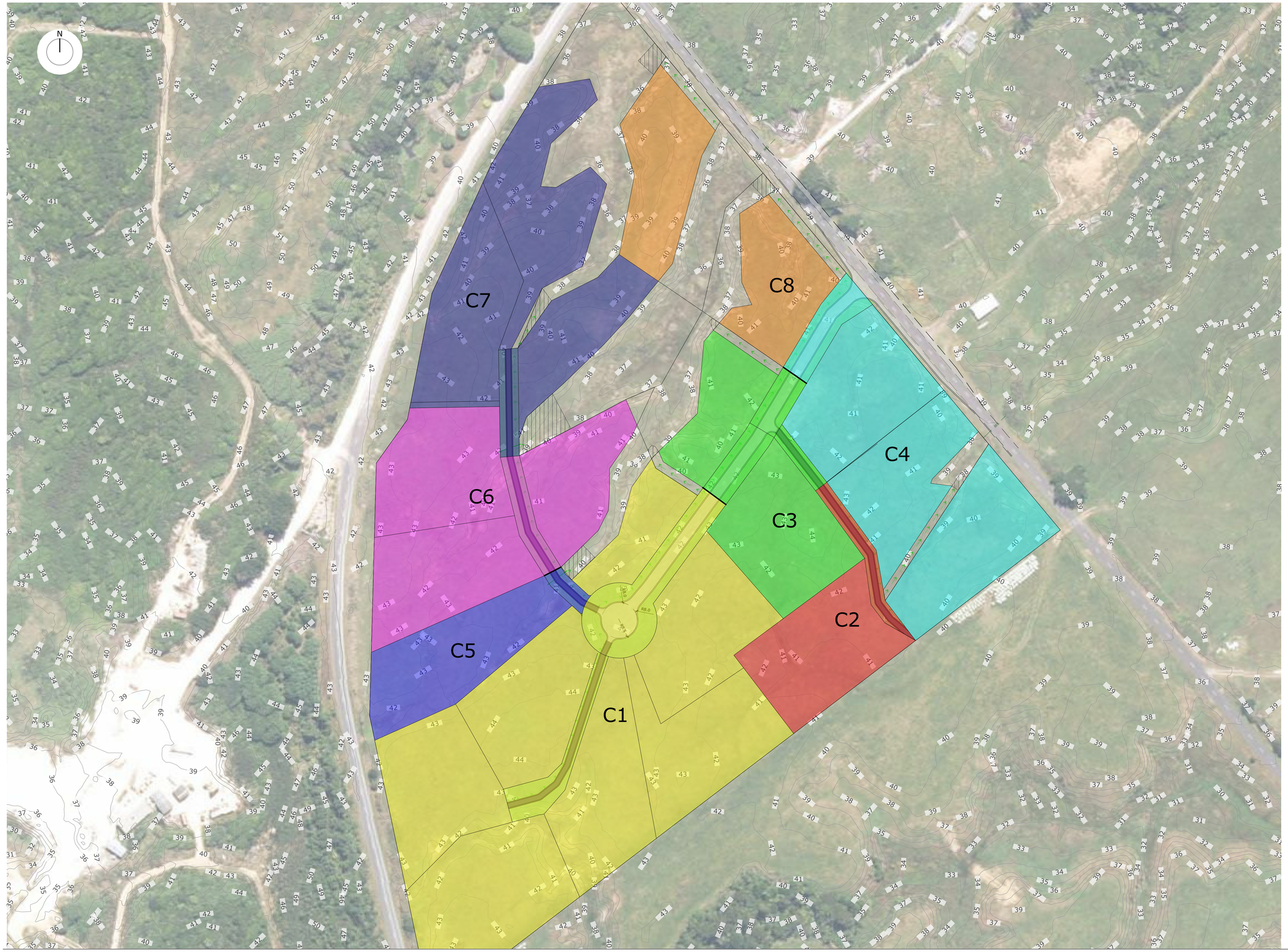


0 30m 60m 90m 120m 150m

1:1500

NOTES

1. All works to be in accordance with Project Specification and Buller District Council - District Plan where applicable.

LEGEND:

- Catchment 1
- Catchment 2
- Catchment 3
- Catchment 4
- Catchment 5
- Catchment 6
- Catchment 7
- Catchment 8

NOTES
1. Contractors to verify all dimensions and the location of all underground services on site prior to commencing work.
2. Unless noted otherwise, all work shall be undertaken in accordance with the NZBC and any relevant Territorial Authority Engineering Standards and Specifications as a minimum standard.



| REV. | DRAWN | DATE | NOTE |
|---|---|---|---|
| **A** | **SG** | **24.06.25** | **For RFI Response** |

CLIENT

**Tauranga Bay Holdings Ltd**

| | | |
|---|---|---|
| DESIGNED | | **JP** |
| DRAWN | | **SG** |
| REVIEWED | | **JT** |
| APPROVED | **19.06.25** | **RM** |
| STATUS | | **FOR CONSENT** |
| SCALE | | **1:750 [A1] 1:1500 [A3]** |

**CAPE FOULWIND DEVELOPMENT**
Section 41 SO 13711
Tauranga Bay Road, Westport

**CATCHMENT PLAN**

| PROJECT | REV. |
|---|---|
| **510322** | **A** |
| SET | SHEET |
| **C1** | **C402** |

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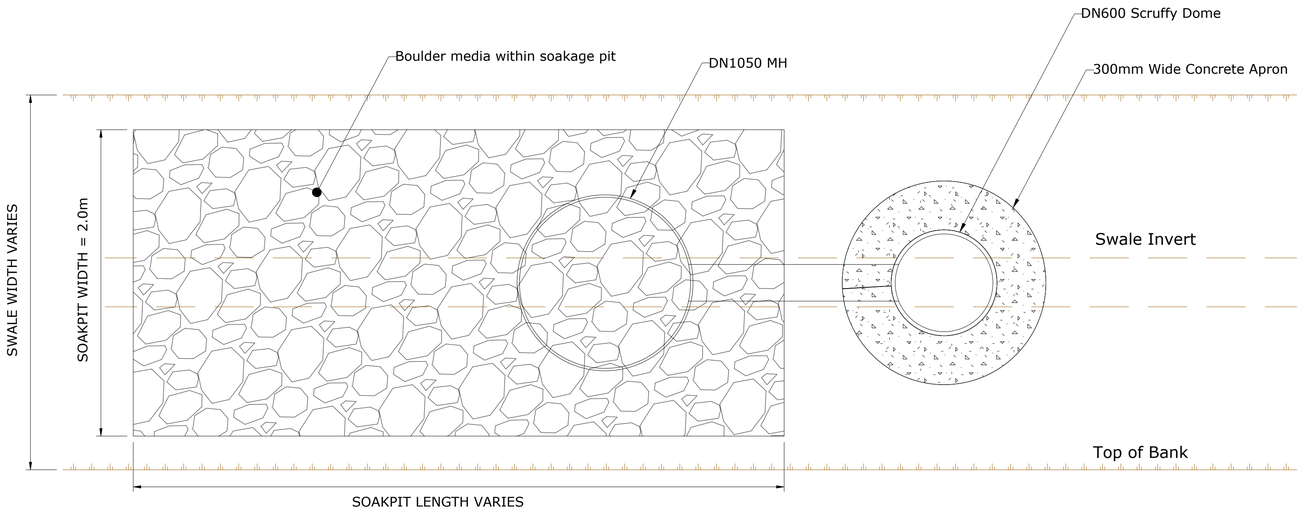


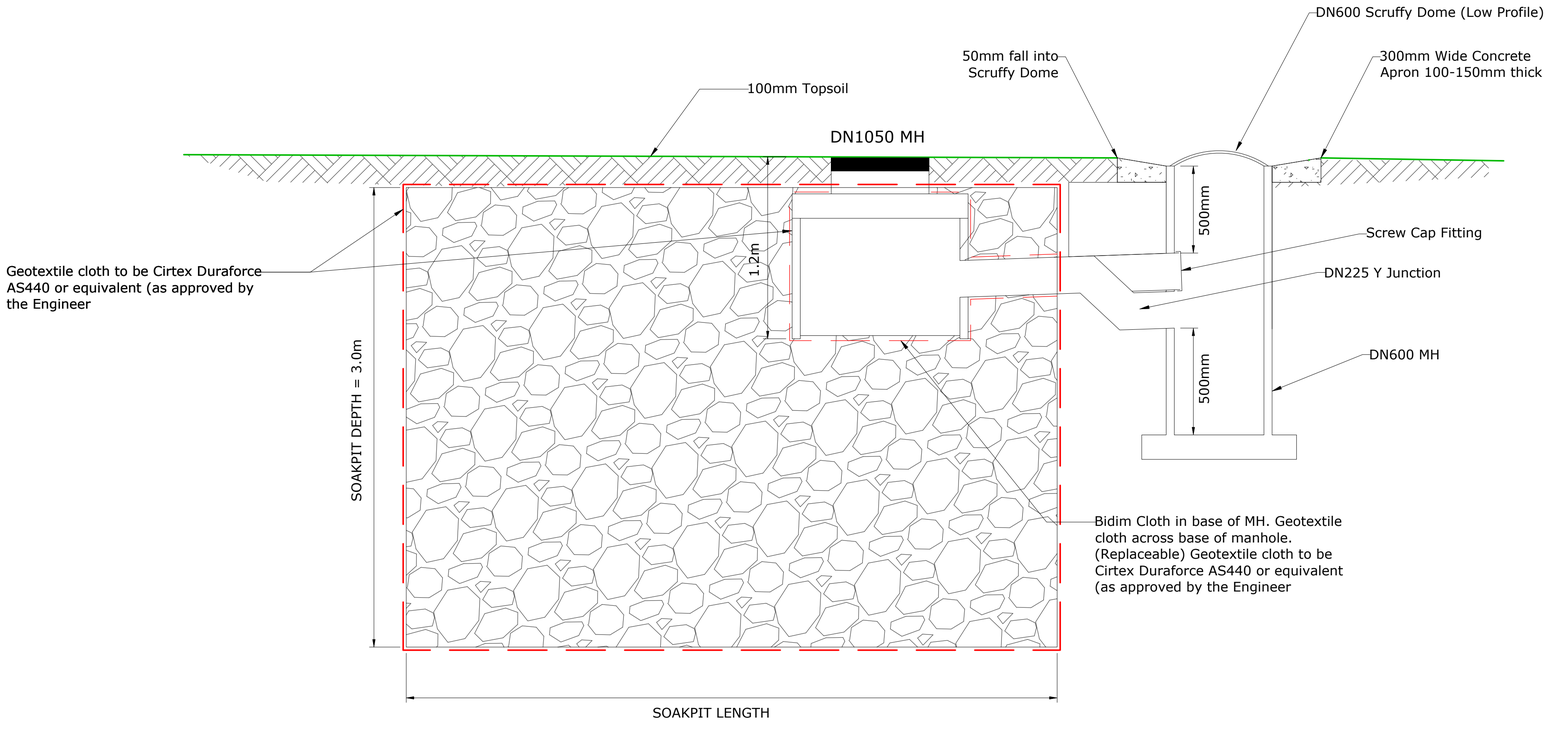


| SOAKPIT DETAILS | | | |
|---|---|---|---|
| SOAKPIT | DEPTH (m) | LENGTH (m) | WIDTH (m) |
| SOAKPIT 1 A | 3.0 | 4.85 | 2.0 |
| SOAKPIT 1 B | 3.0 | 4.85 | 2.0 |
| SOAKPIT 2 | 3.0 | 3.4 | 2.0 |
| SOAKPIT 3A | 3.0 | 3.45 | 2.0 |
| SOAKPIT 3B | 3.0 | 3.45 | 2.0 |
| SOAKPIT 4 | 3.0 | 2.5 | 2.0 |
| SOAKPIT 5 | 3.0 | 0.3* | 2.0 |
| SOAKPIT 6 | 3.0 | 0.3* | 2.0 |
| SOAKPIT 7 | 3.0 | 0** | 2.0 |
| SOAKPIT 8 | 3.0 | 0** | 2.0 |

NOTES

1. All soakage pits are designed on an assumed infiltration rate of 1 m/hr. Infiltration testing is to be carried out at the time of construction with the results provided to the Engineer. Soakage pits may be resized if desired infiltration rate is not measured.

*Depth for Soakage Pit 5 and 6 will be reassessed at detailed design stage.
**The post development runoff from Catchment 7 and 8 is less than the pre-development runoff. Therefore, no soakage pit is required. These are still shown on the plan, subject to confirmation in detailed design.

NOTES
1. Contractors to verify all dimensions and the location of all underground services on site prior to commencing work.
2. Unless noted otherwise, all work shall be undertaken in accordance with the NZBC and any relevant Territorial Authority Engineering Standards and Specifications as a minimum standard.



| REV. | DRAWN | DATE | NOTE |
|---|---|---|---|
| **A** | **SG** | **24.06.25** | **For RFI Response** |

CLIENT

**Tauranga Bay Holdings Ltd**

| | | |
|---|---|---|
| DESIGNED | | **JP** |
| DRAWN | | **SG** |
| REVIEWED | | **JP** |
| APPROVED | **18.06.25** | **RM** |
| STATUS | | **FOR CONSENT** |
| SCALE | | **AS SHOWN** |

**CAPE FOULWIND DEVELOPMENT**
Section 41 SO 13711
Tauranga Bay Road, Westport

**SOAKAGE PIT DETAILS**

| PROJECT | REV. |
|---|---|
| **510322** | **A** |
| SET | SHEET |
| **C1** | **C410** |

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# Appendix B. Swale Calculations

| | |
|---|---|
| **Project No:** | 510322 |
| **Project Name:** | Cape Foulwind |
| **Subject:** | |
| **Date:** | 12/03/2024 |
| **Designed By:** | JM |
| **Checked By:** | |

## *Swale Calculations*

**Assumptions**

1) The Rainfall was obtained from NIWA Hirds V4 Data assuming RCP6 scenario for 10 % AEP 10 minute
2) Assume Grass length for Swale treatment design is 50mm
3) Assume Grass length for Storm event design is 150mm

**Runoff Coefficient**

| | | |
|---|---|---|
| Lots | 0.25 | E1/VM1 Table 1 (Grass/lawns) |
| Road | 0.90 | Effective Runoff Coefficient (20% perv with C=0.25 & 80% impve with C=0.85) |
| Berms | 0.30 | |

**Rainfall**

| | | |
|---|---|---|
| Intensity (swale treatment) | 10 | mm/hr |
| Intensity (20% AEP 10 min) | 138 | mm/hr |
| Intensity (1% AEP 10 min) | 228 | mm/hr |

**Manning's Calculation (TP10)**

For 150 mm grass and $d < 60$ mm $n = 0.153\, d^{0.33} / (0.75 + 25s)$
$d > 60$ mm $n = 0.013\, d^{1/2} / (0.75 + 25s)$

For 50 mm grass and $d < 75$ mm $n = (0.54 - 228\, d^{2}) / (0.75 + 25s)$
$d > 75$ mm $n = 0.009 d^{1/2} / (0.75 + 25s)$

| | | | | | | | Swale Treatment | | 20% AEP Storm Event | | 1% AEP Storm Event | | Swale Sizing | | | | Swale Treatment Design (Grass Length = 50mm) | | | | | | | Swale 20% AEP Storm Event Design | | | Swale 1% AEP Storm Event Design | | | Swale Size | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Swale | Slope (decimal) | Length | Catchment | Catchment Area (m2) | Number of Lots | Modified Catchment Area | CxA | ∑CA (exc. Reserve) | Q (l/s) | ∑CA | 1 in 5 ARI Storm Q (l/s) | ∑CA | 1 in 100 yr ARI Storm Q (l/s) | Bottom Width (m) | Side Batter Z1 | Side Batter Z2 | Grass Length (mm) | Depth at Swale Treatment (m) | n | $Q_{Design}$ (L/s) | V (m/s) | V < 0.8m/s | Hydraulic Residence Time t (min) | t > 9 min | Depth at Swale Treatment (m) | n | $Q_{Design}$ (L/s) | Depth at Swale Treatment (m) | n | $Q_{Design}$ (L/s) | Freeboard | Total Depth with Freeboard | Swale Top Width (m) |
| Road Swale | 0.01 | 200 | Lots | | 0 | | 0.000 | 0.32 | 8.8 | 0.32 | 121 | 0.32 | 200 | 0.4 | 5 | 5 | 150 | 0.10 | 0.15 | 8.8 | 0.10 | OK | 32.1 | OK | 0.23 | 0.08 | 120.8 | 0.27 | 0.06 | 199.7 | 0.15 | 0.42 | 4.55 |
| | | | Road | 2400 | | | 0.216 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | Berms | 3300 | | 0 | 0.099 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ROW A Swale | 0.04 | 70 | Lots | | 0 | | 0.000 | 0.04 | 1.0 | 0.04 | 14 | 0.04 | 23 | 0.4 | 5 | 5 | 150 | 0.03 | 0.29 | 1.0 | 0.06 | OK | 20.1 | OK | 0.08 | 0.14 | 13.8 | 0.10 | 0.12 | 22.8 | 0.15 | 0.25 | 2.88 |
| | | | Road | 300 | | | 0.027 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | Berms | 300 | | 0 | 0.009 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ROW C Swale (Typical) | 0.03 | 18 | Lots | | 0 | | 0.000 | 0.03 | 0.7 | 0.03 | 10 | 0.03 | 17 | 0.4 | 5 | 5 | 150 | 0.02 | 0.35 | 0.3 | 0.03 | OK | 9.2 | OK | 0.07 | 0.23 | 4.6 | 0.08 | 0.19 | 7.6 | 0.15 | 0.23 | 2.67 |
| | | | Road | 200 | | | 0.018 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | Berms | 290 | | 0 | 0.009 | | | | | | | | | | | | | | | | | | | | | | | | | |

# Appendix C. Infiltration Test Results

# Falling Head Infiltration Test

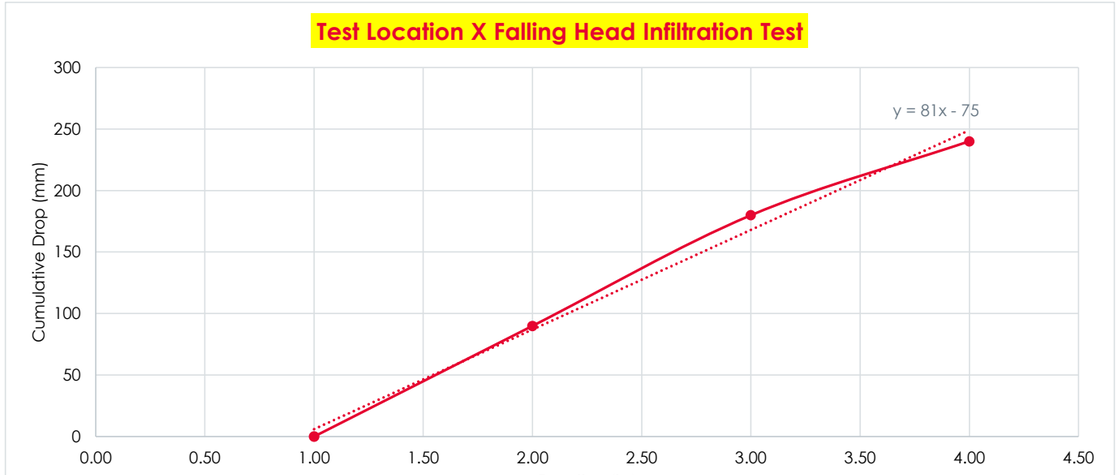
**Client Name:** Tauranga Bay Holdings Ltd
**Project Name:** Section 41 SO 13711, Tauranga Bay
**Project Number:** 510322
**Designer:** JM
**Date:** 27 February 2024

## Field Data

| Time (min) | Duration (hr) | Time Between Filling (s) | Water Level Measurement (mm) | Water Drop (mm) | Cumulative Drop (mm) |
|---|---|---|---|---|---|
| 0 | 0.00 | 0 | 640 | 0 | 0 |
| 10 | 0.17 | 600 | 550 | 90 | 90 |
| 24 | 0.40 | 840 | 460 | 90 | 180 |
| 34 | 0.57 | 600 | 400 | 60 | 240 |

## Infiltration Rate

| Parameter | Value | Unit |
|---|---|---|
| Hole Depth | 2.50 | m |
| Initial Water Depth | 0.64 | m (above bottom of hole) |
| K (infiltration rate) | 418.05 | mm/hr |
| **K** | **0.42** | **m/hour** |
| K | 10.03 | m/day |



# Appendix D. Soakpit Calculations

Project name: Tauranga Bay
Project #: 510322
Designer: SG
Date: 24/06/2025

## HIRDS RAINFALL DATA

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

| ARI | AEP | 0.17 | 0.33 | 0.5 | 1 | 2 | 6 | 12 | 24 |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 0.50 | 14.3 | 19.6 | 23.5 | 32.1 | 43.2 | 67 | 87.4 | 113.0 |
| 5 | 0.20 | 19.2 | 26.2 | 31.3 | 42.3 | 56.4 | 86.2 | 111 | 143.0 |
| 10 | 0.10 | 23.1 | 31.2 | 37.2 | 50 | 66.2 | 100 | 129 | 164.0 |
| 20 | 0.05 | 27.2 | 36.6 | 43.4 | 58 | 76.4 | 115 | 147 | 185.0 |
| 50 | 0.02 | 33.1 | 44.2 | 52.3 | 69.3 | 90.6 | 135 | 170 | 214.0 |
| 100 | 0.01 | 38 | 50.4 | 59.4 | 78.3 | 102 | 150 | 189 | 236.0 |

**Rainfall intensities (mm/hr) :: RCP8.5 for the period 2081-2100**

| ARI | AEP | 0.17 | 0.33 | 0.5 | 1 | 2 | 6 | 12 | 24 |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 0.50 | 85.5 | 58.8 | 47.1 | 32.2 | 21.6 | 11.2 | 7.28 | 4.72 |
| 5 | 0.20 | 115 | 78.5 | 62.5 | 42.3 | 28.2 | 14.4 | 9.29 | 5.95 |
| 10 | 0.10 | 138 | 93.6 | 74.4 | 50 | 33.1 | 16.7 | 10.7 | 6.84 |
| 20 | 0.05 | 163 | 110 | 86.8 | 58 | 38.2 | 19.2 | 12.2 | 7.72 |
| 50 | 0.02 | 199 | 133 | 105 | 69.3 | 45.3 | 22.4 | 14.2 | 8.9 |
| 100 | 0.01 | 228 | 151 | 119 | 78.3 | 50.9 | 25 | 15.7 | 9.82 |

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

| ARI | AEP | 10m | 20m | 30m | 1h | 2h | 6h | 12h | 24h |
|---|---|---|---|---|---|---|---|---|---|
| 1.58 | 0.633 | 12.8 | 17.7 | 21.3 | 29.2 | 39.2 | 61.1 | 79.8 | 104 |
| 2 | 0.5 | 14.3 | 19.6 | 23.5 | 32.1 | 43.2 | 67 | 87.4 | 113 |
| 5 | 0.2 | 19.2 | 26.2 | 31.3 | 42.3 | 56.4 | 86.2 | 111 | 143 |
| 10 | 0.1 | 23.1 | 31.2 | 37.2 | 50 | 66.2 | 100 | 129 | 164 |
| 20 | 0.05 | 27.2 | 36.6 | 43.4 | 58 | 76.4 | 115 | 147 | 185 |
| 30 | 0.033 | 29.7 | 39.9 | 47.2 | 62.9 | 82.6 | 124 | 157 | 198 |
| 40 | 0.025 | 31.6 | 42.3 | 50 | 66.4 | 87 | 130 | 165 | 207 |
| 50 | 0.02 | 33.1 | 44.2 | 52.3 | 69.3 | 90.6 | 135 | 170 | 214 |
| 60 | 0.017 | 34.4 | 45.8 | 54.1 | 71.6 | 93.4 | 139 | 175 | 220 |
| 80 | 0.013 | 36.4 | 48.4 | 57.1 | 75.4 | 98.2 | 145 | 183 | 228 |
| 100 | 0.01 | 38 | 50.4 | 59.4 | 78.3 | 102 | 150 | 189 | 236 |
| 250 | 0.004 | 44.8 | 59 | 69.2 | 90.5 | 117 | 170 | 213 | 263 |

Rainfall intensities **(mm/hr)** :: RCP8.5 for the period 2081-2100

| ARI | AEP | 10m | 20m | 30m | 1h | 2h | 6h | 12h | 24h |
|---|---|---|---|---|---|---|---|---|---|
| 1.58 | 0.633 | 77 | 53.1 | 42.6 | 29.2 | 19.6 | 10.2 | 6.65 | 4.35 |
| 2 | 0.5 | 85.5 | 58.8 | 47.1 | 32.2 | 21.6 | 11.2 | 7.28 | 4.72 |
| 5 | 0.2 | 115 | 78.5 | 62.5 | 42.3 | 28.2 | 14.4 | 9.29 | 5.95 |
| 10 | 0.1 | 138 | 93.6 | 74.4 | 50 | 33.1 | 16.7 | 10.7 | 6.84 |
| 20 | 0.05 | 163 | 110 | 86.8 | 58 | 38.2 | 19.2 | 12.2 | 7.72 |
| 30 | 0.033 | 178 | 120 | 94.5 | 62.9 | 41.3 | 20.6 | 13.1 | 8.24 |
| 40 | 0.025 | 189 | 127 | 100 | 66.4 | 43.5 | 21.6 | 13.7 | 8.62 |
| 50 | 0.02 | 199 | 133 | 105 | 69.3 | 45.3 | 22.4 | 14.2 | 8.9 |
| 60 | 0.017 | 206 | 137 | 108 | 71.6 | 46.7 | 23.1 | 14.6 | 9.15 |
| 80 | 0.013 | 218 | 145 | 114 | 75.4 | 49.1 | 24.2 | 15.2 | 9.52 |
| 100 | 0.01 | 228 | 151 | 119 | 78.3 | 50.9 | 25 | 15.7 | 9.82 |

| | |
|---|---|
| Project name: | Tauranga Bay |
| Project #: | 510322 |
| Designer: | SG |
| Date: | 13/06/2025 |

**Catchement Area List**

| Catchment ID | Catchmen Colour | Number of Residential Lots | (A) Total Catchment Area ($m^2$) |
|---|---|---|---|
| C1 | Yellow | 7 | 30436 |
| C2 | Red | 1 | 4695 |
| C3 | Green | 2 | 7805 |
| C4 | Cyan | 3 | 12710 |
| C5 | Blue | 1 | 4355 |
| C6 | Magenta | 3 | 11579 |
| C7 | Indigo | 3 | 11891 |
| C8 | Orange | 2 | 6464 |
| Total | | 22 | 89935 |

*Note: catchments are based off existing ground contours, and proposed road drainage. Existing valley areas are exlcuded. Refer to Catchment Plan Sheet C402*

| | |
|---|---|
| Project name: | Tauranga Bay |
| Project #: | 510322 |
| Designer: | SG |
| Date: | 24/06/2025 |

**SOAKPIT SIZING SUMMARY**

*NOTE: This table reads sizes from following calculation tabs*

| Catchment ID | Required Area ($m^2$) | Width (m) | Length (m) | Depth (m) | |
|---|---|---|---|---|---|
| C1 | 19.3 | 2.0 | 9.7 | 3.0 | |
| C2 | 6.8 | 2.0 | 3.4 | 3.0 | |
| C3 | 13.7 | 2.0 | 6.9 | 3.0 | |
| C4 | 4.9 | 2.0 | 2.5 | 3.0 | |
| C5 | 0.5 | 2.0 | 0.3 | 3.0 | * |
| C6 | 0.5 | 2.0 | 0.3 | 3.0 | * |
| C7 | 0.0 | 2.0 | 0.0 | 3.0 | **Post-dev catchment is < pre-dev |
| C8 | 0.0 | 2.0 | 0.0 | 3.0 | **Post-dev catchment is < pre-dev |

**Depth for Soakage Pit 5 and 6 will be reassessed at detailed design stage.*

***The post development runoff from Catchment 7 and 8 is less than the pre-development runoff.*

*Therefore, no soakage pit is required. These are still shown on the plan, subject to confirmation in detailed design.*

**Assumptions**

All soakpits assumed 3.0m boulder depth

No soakage tests have been carried out on site. A design rate of 1 m/hr has been assumed with 0.5 safety factor applied.

| | |
|---|---|
| Project name: | Tauranga Bay |
| Project #: | 510322 |
| Designer: | SG |
| Date: | 24/06/2025 |

| Pre-Development Runoff Discharging to Wetland | | | |
|---|---|---|---|
| **Catchments** | **Runoff Coefficients (RC)** | **(A) Area (m^2)** | **A*RC (ha)** |
| C1 | 0.3 | 30436 | 0.913 |
| Total | | 30436 | **0.913** |

| Post-Development Runoff Discharging to Wetland | | | |
|---|---|---|---|
| **Catchments** | **Runoff Coefficients (RC)** | **(A) Area (m^2)** | **A*RC (ha)** |
| Road Area | 0.85 | 1244 | 0.106 |
| Berm Area | 0.3 | 1914 | 0.057 |
| Dwelling Roof Area*1 | 0 | 1400 | 0.000 |
| Gravel Driveway Area*2 | 0.5 | 700 | 0.035 |
| Balance Lot Area (assumed pervious) | 0.3 | 25178 | 0.755 |
| Total | | 30436 | **0.954** |

**Note**: *1) Dwelling area per lot has been considered in the design = 200 m^2

Roof runoff is excluded from post-development discharge (to wetland) as it will discharge to private, onsite soakpit sized for the 1% AEP critical event

*2) Hardstand area per lot has been considered in the design = 100 m^2

| | |
|---|---|
| Post Development - Pre Development Catchment | **0.0404** |

This area is used to size soakage pit to ensure post-development discharge to wetland is <= pre-development rates

eliot sinclair

Project name: Tauranga Bay
Project #: 510322
Designer: SG
Date: 24/06/2025

COLOURED CELLS CONTAIN FORMULA

**SOAKAGE PIT CALCULATION TABLES**

| Data Entry | | Check |
|---|---|---|
| **Soakage Pit Area (m^2)** | **19.3** | Ok |
| **Flo Vault Depth** | 0.00 | |
| **Soakage Pit Rock Depth** | 3.00 | |
| **Soakage Area Gross Volume (m^3)** | 57.9 | *Total rock + void volume* |
| **Soakage Pit Water Storage Capacity (m^3)** | 22.0 | *Void capacity only* |
| **Measured Infiltration Rate (m/hr)** | 1.000 | |
| **Safey Factor** | 0.50 | |
| **Design Infiltration Rate (m/hr)** | 0.500 | |
| **Flo Vault Void Spaces** | 0.95 | *Manufacturer's literature* |
| **Soakage Pit Rock Void Spaces** | 0.38 | *Clause E1 of the Building Code* |
| **Average Voild Spaces (%)** | 0.38 | *Average of the above* |

**Rainfall Depth (mm) - HIRDS RCP8.5 for the period 2081 - 2100**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **5** | 19.20 | 31.30 | 42.30 | 56.40 | 86.20 | 111.00 | 143.00 |
| **10** | 23.10 | 37.20 | 50.00 | 66.20 | 100.00 | 129.00 | 164.00 |
| **20** | 27.20 | 43.40 | 58.00 | 76.40 | 115.00 | 147.00 | 185.00 |
| **50** | 33.10 | 52.30 | 69.30 | 90.60 | 135.00 | 170.00 | 214.00 |
| **100** | 38.00 | 59.40 | 78.30 | 102.00 | 150.00 | 189.00 | 236.00 |

**Runoff Volume (m^3)**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **5** | 7.76 | 12.65 | 17.10 | 22.80 | 34.84 | 44.87 | 57.80 |
| **10** | 9.34 | 15.04 | 20.21 | 26.76 | 40.42 | 52.14 | 66.29 |
| **20** | 10.99 | 17.54 | 23.44 | 30.88 | 46.48 | 59.42 | 74.78 |
| **50** | 13.38 | 21.14 | 28.01 | 36.62 | 54.57 | 68.71 | 86.50 |
| **100** | 15.36 | 24.01 | 31.65 | 41.23 | 60.63 | 76.39 | 95.39 |

**Volume Infiltrated During Storm Event Through Bed of Soakage Pit (m^3)**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **5** | 1.61 | 4.83 | 9.65 | 19.30 | 57.90 | 115.80 | 231.60 |
| **10** | 1.61 | 4.83 | 9.65 | 19.30 | 57.90 | 115.80 | 231.60 |
| **20** | 1.61 | 4.83 | 9.65 | 19.30 | 57.90 | 115.80 | 231.60 |
| **50** | 1.61 | 4.83 | 9.65 | 19.30 | 57.90 | 115.80 | 231.60 |
| **100** | 1.61 | 4.83 | 9.65 | 19.30 | 57.90 | 115.80 | 231.60 |

**Soakage Pit Water Storage Requirement (m^3)**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **0** | 6.15 | 7.83 | 7.45 | 3.50 | 0.00 | 0.00 | 0.00 |
| **0** | 7.73 | 10.21 | 10.56 | 7.46 | 0.00 | 0.00 | 0.00 |
| **0** | 9.39 | 12.72 | 13.79 | 11.58 | 0.00 | 0.00 | 0.00 |
| **0** | 11.77 | 16.31 | 18.36 | 17.32 | 0.00 | 0.00 | 0.00 |
| **0** | 13.75 | 19.18 | 22.00 | 21.93 | 2.73 | 0.00 | 0.00 |

**Soakage Pit Gross Volume Requirement - Total Volume of Rock and Modules (m^3)**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **5** | 16.19 | 20.60 | 19.60 | 9.20 | 0.00 | 0.00 | 0.00 |
| **10** | 20.34 | 26.87 | 27.79 | 19.63 | 0.00 | 0.00 | 0.00 |
| **20** | 24.70 | 33.47 | 36.30 | 30.48 | 0.00 | 0.00 | 0.00 |
| **50** | 30.98 | 42.93 | 48.32 | 45.58 | 0.00 | 0.00 | 0.00 |
| **100** | 36.19 | 50.49 | 57.89 | 57.71 | 7.18 | 0.00 | 0.00 |

**Does Soakage Pit Have Sufficient Capacity**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **5** | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| **10** | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| **20** | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| **50** | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| **100** | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

**Additional Soakage Pit Water Storage Volume Required**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **5** | -15.85 | -14.18 | -14.55 | -18.51 | -22.00 | -22.00 | -22.00 |
| **10** | -14.27 | -11.79 | -11.44 | -14.54 | -22.00 | -22.00 | -22.00 |
| **20** | -12.62 | -9.28 | -8.21 | -10.42 | -22.00 | -22.00 | -22.00 |
| **50** | -10.23 | -5.69 | -3.64 | -4.68 | -22.00 | -22.00 | -22.00 |
| **100** | -8.25 | -2.82 | 0.00 | -0.07 | -19.27 | -22.00 | -22.00 |

| | |
|---|---|
| Project name: | Tauranga Bay |
| Project #: | 510322 |
| Designer: | SG |
| Date: | 24/06/2025 |

| Pre-Development Discharging to Wetland | | | |
|---|---|---|---|
| **Catchments** | **Runoff Coefficients (RC)** | **(A) Area (m^2)** | **A*RC (ha)** |
| C2 | 0.3 | 4695 | 0.141 |
| Total | | 4695 | **0.141** |

| Post-Development Discharging to Wetland | | | |
|---|---|---|---|
| **Catchments** | **Runoff Coefficients (RC)** | **(A) Area (m^2)** | **A*RC (ha)** |
| Road Area | 0.85 | 330 | 0.028 |
| Berm Area | 0.3 | 331 | 0.010 |
| Dwelling Roof Area*1 | 0 | 200 | 0.000 |
| Gravel Driveway Area*2 | 0.5 | 100 | 0.005 |
| Balance Lot Area (assumes pervious) | 0.3 | 3734 | 0.112 |
| Total | | 4695 | **0.155** |

**Note**: *1) Dwelling area per lot has been considered in the design = 200 m^2

Roof runoff is excluded from post-development discharge (to wetland) as it will discharge to private, onsite soakpit sized for the 1% AEP critical event

*2) Hardstand area per lot has been considered in the design = 100 m^2

| | |
|---|---|
| Post Development - Pre Development | **0.0142** |

This area is used to size soakage pit to ensure post-development discharge to wetland is <= pre-development rates

eliot sinclair

Project name: Tauranga Bay
Project #: 510322
Designer: SG
Date: 24/06/2025

COLOURED CELLS CONTAIN FORMULA

**SOAKAGE PIT CALCULATION TABLES**

| Data Entry | | Check |
|---|---|---|
| **Soakage Pit Area (m^2)** | **6.8** | Ok |
| **Flo Vault Depth** | 0.00 | |
| **Soakage Pit Rock Depth** | 3.00 | |
| **Soakage Area Gross Volume (m^3)** | 20.4 | *Total rock + void volume* |
| **Soakage Pit Water Storage Capacity (m^3)** | 7.8 | *Void capacity only* |
| **Measured Infiltration Rate (m/hr)** | 1.000 | |
| **Safey Factor** | 0.50 | |
| **Design Infiltration Rate (m/hr)** | 0.500 | |
| **Flo Vault Void Spaces** | 0.95 | *Manufacturer's literature* |
| **Soakage Pit Rock Void Spaces** | 0.38 | *Clause E1 of the Building Code* |
| **Average Voild Spaces (%)** | 0.38 | *Average of the above* |

**Rainfall Depth (mm) - HIRDS RCP8.5 for the period 2081 - 2100**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **5** | 19.20 | 31.30 | 42.30 | 56.40 | 86.20 | 111.00 | 143.00 |
| **10** | 23.10 | 37.20 | 50.00 | 66.20 | 100.00 | 129.00 | 164.00 |
| **20** | 27.20 | 43.40 | 58.00 | 76.40 | 115.00 | 147.00 | 185.00 |
| **50** | 33.10 | 52.30 | 69.30 | 90.60 | 135.00 | 170.00 | 214.00 |
| **100** | 38.00 | 59.40 | 78.30 | 102.00 | 150.00 | 189.00 | 236.00 |

**Runoff Volume (m^3)**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **5** | 2.72 | 4.43 | 5.99 | 7.98 | 12.20 | 15.71 | 20.23 |
| **10** | 3.27 | 5.26 | 7.08 | 9.37 | 14.15 | 18.25 | 23.21 |
| **20** | 3.85 | 6.14 | 8.21 | 10.81 | 16.27 | 20.80 | 26.18 |
| **50** | 4.68 | 7.40 | 9.81 | 12.82 | 19.10 | 24.06 | 30.28 |
| **100** | 5.38 | 8.41 | 11.08 | 14.43 | 21.23 | 26.74 | 33.39 |

**Volume Infiltrated During Storm Event Through Bed of Soakage Pit (m^3)**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **5** | 0.57 | 1.70 | 3.40 | 6.80 | 20.40 | 40.80 | 81.60 |
| **10** | 0.57 | 1.70 | 3.40 | 6.80 | 20.40 | 40.80 | 81.60 |
| **20** | 0.57 | 1.70 | 3.40 | 6.80 | 20.40 | 40.80 | 81.60 |
| **50** | 0.57 | 1.70 | 3.40 | 6.80 | 20.40 | 40.80 | 81.60 |
| **100** | 0.57 | 1.70 | 3.40 | 6.80 | 20.40 | 40.80 | 81.60 |

**Soakage Pit Water Storage Requirement (m^3)**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **0** | 2.15 | 2.73 | 2.59 | 1.18 | 0.00 | 0.00 | 0.00 |
| **0** | 2.70 | 3.56 | 3.68 | 2.57 | 0.00 | 0.00 | 0.00 |
| **0** | 3.28 | 4.44 | 4.81 | 4.01 | 0.00 | 0.00 | 0.00 |
| **0** | 4.12 | 5.70 | 6.41 | 6.02 | 0.00 | 0.00 | 0.00 |
| **0** | 4.81 | 6.71 | 7.68 | 7.63 | 0.82 | 0.00 | 0.00 |

**Soakage Pit Gross Volume Requirement - Total Volume of Rock and Modules (m^3)**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **5** | 5.66 | 7.18 | 6.80 | 3.11 | 0.00 | 0.00 | 0.00 |
| **10** | 7.11 | 9.38 | 9.67 | 6.76 | 0.00 | 0.00 | 0.00 |
| **20** | 8.64 | 11.69 | 12.65 | 10.55 | 0.00 | 0.00 | 0.00 |
| **50** | 10.83 | 15.00 | 16.86 | 15.84 | 0.00 | 0.00 | 0.00 |
| **100** | 12.66 | 17.65 | 20.21 | 20.09 | 2.17 | 0.00 | 0.00 |

**Does Soakage Pit Have Sufficient Capacity**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **5** | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| **10** | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| **20** | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| **50** | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| **100** | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

**Additional Soakage Pit Water Storage Volume Required**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **5** | -5.60 | -5.02 | -5.17 | -6.57 | -7.75 | -7.75 | -7.75 |
| **10** | -5.05 | -4.19 | -4.08 | -5.18 | -7.75 | -7.75 | -7.75 |
| **20** | -4.47 | -3.31 | -2.95 | -3.74 | -7.75 | -7.75 | -7.75 |
| **50** | -3.64 | -2.05 | -1.35 | -1.73 | -7.75 | -7.75 | -7.75 |
| **100** | -2.94 | -1.05 | -0.07 | -0.12 | -6.93 | -7.75 | -7.75 |

| | |
|---|---|
| Project name: | Tauranga Bay |
| Project #: | 510322 |
| Designer: | SG |
| Date: | 24/06/2025 |

| Pre-Development Discharging to Wetland | | | |
|---|---|---|---|
| **Catchments** | **Runoff Coefficients (RC)** | **(A) Area (m^2)** | **A*RC (ha)** |
| C3 | 0.3 | 7805 | 0.234 |
| Total | | 7805 | **0.234** |

| Post-Development Discharging to Wetland | | | |
|---|---|---|---|
| **Catchments** | **Runoff Coefficients (RC)** | **(A) Area (m^2)** | **A*RC (ha)** |
| Road Area | 0.85 | 664 | 0.056 |
| Berm Area | 0.3 | 766 | 0.023 |
| Dwelling Roof Area*1 | 0 | 400 | 0.000 |
| Gravel Driveway Area*2 | 0.5 | 200 | 0.010 |
| Balance Lot Area (assumes pervious) | 0.3 | 5775 | 0.173 |
| Total | | 7805 | **0.263** |

**Note**: *1) Dwelling area per lot has been considered in the design = 200 m^2

Roof runoff is excluded from post-development discharge (to wetland) as it will discharge to private, onsite soakpit sized for the 1% AEP critical event

*2) Hardstand area per lot has been considered in the design = 100 m^2

| | |
|---|---|
| Post Development - Pre Development | **0.0285** |

This area is used to size soakage pit to ensure post-development discharge to wetland is <= pre-development rates

eliot sinclair

Project name: Tauranga Bay
Project #: 510322
Designer: SG
Date: 24/06/2025

COLOURED CELLS CONTAIN FORMULA

**SOAKAGE PIT CALCULATION TABLES**

| Data Entry | | Check |
|---|---|---|
| **Soakage Pit Area (m^2)** | **13.7** | Ok |
| **Flo Vault Depth** | 0.00 | |
| **Soakage Pit Rock Depth** | 3.00 | |
| **Soakage Area Gross Volume (m^3)** | 41.1 | *Total rock + void volume* |
| **Soakage Pit Water Storage Capacity (m^3)** | 15.6 | *Void capacity only* |
| **Measured Infiltration Rate (m/hr)** | 1.000 | |
| **Safey Factor** | 0.50 | |
| **Design Infiltration Rate (m/hr)** | 0.500 | |
| **Flo Vault Void Spaces** | 0.95 | *Manufacturer's literature* |
| **Soakage Pit Rock Void Spaces** | 0.38 | *Clause E1 of the Building Code* |
| **Average Voild Spaces (%)** | 0.38 | *Average of the above* |

**Rainfall Depth (mm) - HIRDS RCP8.5 for the period 2081 - 2100**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **5** | 19.20 | 31.30 | 42.30 | 56.40 | 86.20 | 111.00 | 143.00 |
| **10** | 23.10 | 37.20 | 50.00 | 66.20 | 100.00 | 129.00 | 164.00 |
| **20** | 27.20 | 43.40 | 58.00 | 76.40 | 115.00 | 147.00 | 185.00 |
| **50** | 33.10 | 52.30 | 69.30 | 90.60 | 135.00 | 170.00 | 214.00 |
| **100** | 38.00 | 59.40 | 78.30 | 102.00 | 150.00 | 189.00 | 236.00 |

**Runoff Volume (m^3)**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **5** | 5.48 | 8.93 | 12.06 | 16.09 | 24.58 | 31.66 | 40.78 |
| **10** | 6.59 | 10.61 | 14.26 | 18.88 | 28.52 | 36.79 | 46.77 |
| **20** | 7.76 | 12.38 | 16.54 | 21.79 | 32.80 | 41.92 | 52.76 |
| **50** | 9.44 | 14.92 | 19.76 | 25.84 | 38.50 | 48.48 | 61.03 |
| **100** | 10.84 | 16.94 | 22.33 | 29.09 | 42.78 | 53.90 | 67.31 |

**Volume Infiltrated During Storm Event Through Bed of Soakage Pit (m^3)**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **5** | 1.14 | 3.43 | 6.85 | 13.70 | 41.10 | 82.20 | 164.40 |
| **10** | 1.14 | 3.43 | 6.85 | 13.70 | 41.10 | 82.20 | 164.40 |
| **20** | 1.14 | 3.43 | 6.85 | 13.70 | 41.10 | 82.20 | 164.40 |
| **50** | 1.14 | 3.43 | 6.85 | 13.70 | 41.10 | 82.20 | 164.40 |
| **100** | 1.14 | 3.43 | 6.85 | 13.70 | 41.10 | 82.20 | 164.40 |

**Soakage Pit Water Storage Requirement (m^3)**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **0** | 4.33 | 5.50 | 5.21 | 2.39 | 0.00 | 0.00 | 0.00 |
| **0** | 5.45 | 7.18 | 7.41 | 5.18 | 0.00 | 0.00 | 0.00 |
| **0** | 6.62 | 8.95 | 9.69 | 8.09 | 0.00 | 0.00 | 0.00 |
| **0** | 8.30 | 11.49 | 12.91 | 12.14 | 0.00 | 0.00 | 0.00 |
| **0** | 9.70 | 13.52 | 15.48 | 15.39 | 1.68 | 0.00 | 0.00 |

**Soakage Pit Gross Volume Requirement - Total Volume of Rock and Modules (m^3)**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **5** | 11.41 | 14.48 | 13.72 | 6.28 | 0.00 | 0.00 | 0.00 |
| **10** | 14.33 | 18.91 | 19.50 | 13.63 | 0.00 | 0.00 | 0.00 |
| **20** | 17.41 | 23.56 | 25.50 | 21.29 | 0.00 | 0.00 | 0.00 |
| **50** | 21.84 | 30.24 | 33.99 | 31.95 | 0.00 | 0.00 | 0.00 |
| **100** | 25.52 | 35.57 | 40.74 | 40.50 | 4.42 | 0.00 | 0.00 |

**Does Soakage Pit Have Sufficient Capacity**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **5** | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| **10** | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| **20** | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| **50** | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| **100** | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

**Additional Soakage Pit Water Storage Volume Required**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **5** | -11.28 | -10.12 | -10.40 | -13.23 | -15.62 | -15.62 | -15.62 |
| **10** | -10.17 | -8.43 | -8.21 | -10.44 | -15.62 | -15.62 | -15.62 |
| **20** | -9.00 | -6.67 | -5.93 | -7.53 | -15.62 | -15.62 | -15.62 |
| **50** | -7.32 | -4.13 | -2.70 | -3.48 | -15.62 | -15.62 | -15.62 |
| **100** | -5.92 | -2.10 | -0.14 | -0.23 | -13.94 | -15.62 | -15.62 |

| | |
|---|---|
| Project name: | Tauranga Bay |
| Project #: | 510322 |
| Designer: | SG |
| Date: | 24/06/2025 |

| Pre-Development Discharging to Wetland | | | |
|---|---|---|---|
| **Catchments** | **Runoff Coefficients (RC)** | **(A) Area (m^2)** | **A*RC (ha)** |
| C4 | 0.3 | 12710 | 0.381 |
| Total | | 12710 | **0.381** |

| Post-Development Discharging to Wetland | | | |
|---|---|---|---|
| **Catchments** | **Runoff Coefficients (RC)** | **(A) Area (m^2)** | **A*RC (ha)** |
| Road Area | 0.85 | 402 | 0.034 |
| Berm Area | 0.3 | 538 | 0.016 |
| Dwelling Roof Area*1 | 0 | 600 | 0.000 |
| Gravel Driveway Area*2 | 0.5 | 300 | 0.015 |
| Balance Lot Area (assumes pervious) | 0.3 | 10870 | 0.326 |
| Total | | 12710 | **0.391** |

**Note**: *1) Dwelling area per lot has been considered in the design = 200 m^2

Roof runoff is excluded from post-development discharge (to wetland) as it will discharge to private, onsite soakpit sized for the 1% AEP critical event

*2) Hardstand area per lot has been considered in the design = 100 m^2

| | |
|---|---|
| Post Development - Pre Development | **0.0101** |

This area is used to size soakage pit to ensure post-development discharge to wetland is <= pre-development rates

eliot sinclair

Project name: Tauranga Bay
Project #: 510322
Designer: SG
Date: 24/06/2025

COLOURED CELLS CONTAIN FORMULA

**SOAKAGE PIT CALCULATION TABLES**

| Data Entry | | Check |
|---|---|---|
| **Soakage Pit Area (m^2)** | **4.9** | Ok |
| **Flo Vault Depth** | 0.00 | |
| **Soakage Pit Rock Depth** | 3.00 | |
| **Soakage Area Gross Volume (m^3)** | 14.7 | *Total rock + void volume* |
| **Soakage Pit Water Storage Capacity (m^3)** | 5.6 | *Void capacity only* |
| **Measured Infiltration Rate (m/hr)** | 1.000 | |
| **Safey Factor** | 0.50 | |
| **Design Infiltration Rate (m/hr)** | 0.500 | |
| **Flo Vault Void Spaces** | 0.95 | *Manufacturer's literature* |
| **Soakage Pit Rock Void Spaces** | 0.38 | *Clause E1 of the Building Code* |
| **Average Voild Spaces (%)** | 0.38 | *Average of the above* |

**Rainfall Depth (mm) - HIRDS RCP8.5 for the period 2081 - 2100**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **5** | 19.20 | 31.30 | 42.30 | 56.40 | 86.20 | 111.00 | 143.00 |
| **10** | 23.10 | 37.20 | 50.00 | 66.20 | 100.00 | 129.00 | 164.00 |
| **20** | 27.20 | 43.40 | 58.00 | 76.40 | 115.00 | 147.00 | 185.00 |
| **50** | 33.10 | 52.30 | 69.30 | 90.60 | 135.00 | 170.00 | 214.00 |
| **100** | 38.00 | 59.40 | 78.30 | 102.00 | 150.00 | 189.00 | 236.00 |

**Runoff Volume (m^3)**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **5** | 1.94 | 3.16 | 4.28 | 5.70 | 8.71 | 11.22 | 14.46 |
| **10** | 2.34 | 3.76 | 5.06 | 6.69 | 10.11 | 13.04 | 16.58 |
| **20** | 2.75 | 4.39 | 5.86 | 7.72 | 11.63 | 14.86 | 18.70 |
| **50** | 3.35 | 5.29 | 7.01 | 9.16 | 13.65 | 17.19 | 21.64 |
| **100** | 3.84 | 6.01 | 7.92 | 10.31 | 15.17 | 19.11 | 23.86 |

**Volume Infiltrated During Storm Event Through Bed of Soakage Pit (m^3)**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **5** | 0.41 | 1.23 | 2.45 | 4.90 | 14.70 | 29.40 | 58.80 |
| **10** | 0.41 | 1.23 | 2.45 | 4.90 | 14.70 | 29.40 | 58.80 |
| **20** | 0.41 | 1.23 | 2.45 | 4.90 | 14.70 | 29.40 | 58.80 |
| **50** | 0.41 | 1.23 | 2.45 | 4.90 | 14.70 | 29.40 | 58.80 |
| **100** | 0.41 | 1.23 | 2.45 | 4.90 | 14.70 | 29.40 | 58.80 |

**Soakage Pit Water Storage Requirement (m^3)**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **0** | 1.53 | 1.94 | 1.83 | 0.80 | 0.00 | 0.00 | 0.00 |
| **0** | 1.93 | 2.54 | 2.61 | 1.79 | 0.00 | 0.00 | 0.00 |
| **0** | 2.34 | 3.16 | 3.41 | 2.82 | 0.00 | 0.00 | 0.00 |
| **0** | 2.94 | 4.06 | 4.56 | 4.26 | 0.00 | 0.00 | 0.00 |
| **0** | 3.43 | 4.78 | 5.47 | 5.41 | 0.47 | 0.00 | 0.00 |

**Soakage Pit Gross Volume Requirement - Total Volume of Rock and Modules (m^3)**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **5** | 4.03 | 5.10 | 4.81 | 2.11 | 0.00 | 0.00 | 0.00 |
| **10** | 5.07 | 6.67 | 6.86 | 4.72 | 0.00 | 0.00 | 0.00 |
| **20** | 6.16 | 8.32 | 8.98 | 7.43 | 0.00 | 0.00 | 0.00 |
| **50** | 7.73 | 10.69 | 11.99 | 11.21 | 0.00 | 0.00 | 0.00 |
| **100** | 9.04 | 12.58 | 14.38 | 14.24 | 1.22 | 0.00 | 0.00 |

**Does Soakage Pit Have Sufficient Capacity**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **5** | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| **10** | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| **20** | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| **50** | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| **100** | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

**Additional Soakage Pit Water Storage Volume Required**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **5** | -4.05 | -3.65 | -3.76 | -4.78 | -5.59 | -5.59 | -5.59 |
| **10** | -3.66 | -3.05 | -2.98 | -3.79 | -5.59 | -5.59 | -5.59 |
| **20** | -3.24 | -2.42 | -2.17 | -2.76 | -5.59 | -5.59 | -5.59 |
| **50** | -2.65 | -1.52 | -1.03 | -1.33 | -5.59 | -5.59 | -5.59 |
| **100** | -2.15 | -0.81 | -0.12 | -0.17 | -5.12 | -5.59 | -5.59 |

| | |
|---|---|
| Project name: | Tauranga Bay |
| Project #: | 510322 |
| Designer: | SG |
| Date: | 24/06/2025 |

| Pre-Development Discharging to Wetland | | | |
|---|---|---|---|
| **Catchments** | **Runoff Coefficients (RC)** | **(A) Area (m^2)** | **A*RC (ha)** |
| C5 | 0.3 | 4355 | 0.131 |
| Total | | 4355 | **0.131** |

| Post-Development Discharging to Wetland | | | |
|---|---|---|---|
| **Catchments** | **Runoff Coefficients (RC)** | **(A) Area (m^2)** | **A*RC (ha)** |
| Road Area | 0.85 | 87 | 0.007 |
| Berm Area | 0.3 | 164 | 0.005 |
| Dwelling Roof Area*1 | 0 | 200 | 0.000 |
| Gravel Driveway Area*2 | 0.5 | 100 | 0.005 |
| Balance Lot Area (assumes pervious) | 0.3 | 3804 | 0.114 |
| Total | | 4355 | **0.131** |

**Note**: *1) Dwelling area per lot has been considered in the design = 200 m^2

Roof runoff is excluded from post-development discharge (to wetland) as it will discharge to private, onsite soakpit sized for the 1% AEP critical event

*2) Hardstand area per lot has been considered in the design = 100 m^2

| | |
|---|---|
| Post Development - Pre Development | **0.0008** |

This area is used to size soakage pit to ensure post-development discharge to wetland is <= pre-development rates

Project name: Tauranga Bay
Project #: 510322
Designer: SG
Date: 24/06/2025

COLOURED CELLS CONTAIN FORMULA

**SOAKAGE PIT CALCULATION TABLES**

| Data Entry | | Check |
|---|---|---|
| **Soakage Pit Area (m^2)** | **0.5** | Ok |
| **Flo Vault Depth** | 0.00 | |
| **Soakage Pit Rock Depth** | 3.00 | |
| **Soakage Area Gross Volume (m^3)** | 1.5 | *Total rock + void volume* |
| **Soakage Pit Water Storage Capacity (m^3)** | 0.6 | *Void capacity only* |
| **Measured Infiltration Rate (m/hr)** | 1.000 | |
| **Safey Factor** | 0.50 | |
| **Design Infiltration Rate (m/hr)** | 0.500 | |
| **Flo Vault Void Spaces** | 0.95 | *Manufacturer's literature* |
| **Soakage Pit Rock Void Spaces** | 0.38 | *Clause E1 of the Building Code* |
| **Average Voild Spaces (%)** | 0.38 | *Average of the above* |

**Rainfall Depth (mm) - HIRDS RCP8.5 for the period 2081 - 2100**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **5** | 19.20 | 31.30 | 42.30 | 56.40 | 86.20 | 111.00 | 143.00 |
| **10** | 23.10 | 37.20 | 50.00 | 66.20 | 100.00 | 129.00 | 164.00 |
| **20** | 27.20 | 43.40 | 58.00 | 76.40 | 115.00 | 147.00 | 185.00 |
| **50** | 33.10 | 52.30 | 69.30 | 90.60 | 135.00 | 170.00 | 214.00 |
| **100** | 38.00 | 59.40 | 78.30 | 102.00 | 150.00 | 189.00 | 236.00 |

**Runoff Volume (m^3)**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **5** | 0.15 | 0.25 | 0.33 | 0.44 | 0.68 | 0.87 | 1.12 |
| **10** | 0.18 | 0.29 | 0.39 | 0.52 | 0.79 | 1.01 | 1.29 |
| **20** | 0.21 | 0.34 | 0.46 | 0.60 | 0.90 | 1.15 | 1.45 |
| **50** | 0.26 | 0.41 | 0.54 | 0.71 | 1.06 | 1.33 | 1.68 |
| **100** | 0.30 | 0.47 | 0.61 | 0.80 | 1.18 | 1.48 | 1.85 |

**Volume Infiltrated During Storm Event Through Bed of Soakage Pit (m^3)**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **5** | 0.04 | 0.13 | 0.25 | 0.50 | 1.50 | 3.00 | 6.00 |
| **10** | 0.04 | 0.13 | 0.25 | 0.50 | 1.50 | 3.00 | 6.00 |
| **20** | 0.04 | 0.13 | 0.25 | 0.50 | 1.50 | 3.00 | 6.00 |
| **50** | 0.04 | 0.13 | 0.25 | 0.50 | 1.50 | 3.00 | 6.00 |
| **100** | 0.04 | 0.13 | 0.25 | 0.50 | 1.50 | 3.00 | 6.00 |

**Soakage Pit Water Storage Requirement (m^3)**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **0** | 0.11 | 0.12 | 0.08 | 0.00 | 0.00 | 0.00 | 0.00 |
| **0** | 0.14 | 0.17 | 0.14 | 0.02 | 0.00 | 0.00 | 0.00 |
| **0** | 0.17 | 0.22 | 0.21 | 0.10 | 0.00 | 0.00 | 0.00 |
| **0** | 0.22 | 0.29 | 0.29 | 0.21 | 0.00 | 0.00 | 0.00 |
| **0** | 0.26 | 0.34 | 0.36 | 0.30 | 0.00 | 0.00 | 0.00 |

**Soakage Pit Gross Volume Requirement - Total Volume of Rock and Modules (m^3)**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **5** | 0.29 | 0.32 | 0.22 | 0.00 | 0.00 | 0.00 | 0.00 |
| **10** | 0.37 | 0.44 | 0.38 | 0.05 | 0.00 | 0.00 | 0.00 |
| **20** | 0.45 | 0.57 | 0.54 | 0.26 | 0.00 | 0.00 | 0.00 |
| **50** | 0.57 | 0.75 | 0.77 | 0.56 | 0.00 | 0.00 | 0.00 |
| **100** | 0.68 | 0.90 | 0.96 | 0.79 | 0.00 | 0.00 | 0.00 |

**Does Soakage Pit Have Sufficient Capacity**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **5** | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| **10** | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| **20** | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| **50** | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| **100** | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

**Additional Soakage Pit Water Storage Volume Required**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **5** | -0.46 | -0.45 | -0.49 | -0.57 | -0.57 | -0.57 | -0.57 |
| **10** | -0.43 | -0.40 | -0.43 | -0.55 | -0.57 | -0.57 | -0.57 |
| **20** | -0.40 | -0.35 | -0.36 | -0.47 | -0.57 | -0.57 | -0.57 |
| **50** | -0.35 | -0.28 | -0.28 | -0.36 | -0.57 | -0.57 | -0.57 |
| **100** | -0.31 | -0.23 | -0.21 | -0.27 | -0.57 | -0.57 | -0.57 |

| | |
|---|---|
| Project name: | Tauranga Bay |
| Project #: | 510322 |
| Designer: | SG |
| Date: | 24/06/2025 |

| Pre-Development Discharging to Wetland | | | |
|---|---|---|---|
| **Catchments** | **Runoff Coefficients (RC)** | **(A) Area (m^2)** | **A*RC (ha)** |
| C6 | 0.3 | 11579 | 0.347 |
| Total | | 11579 | **0.347** |

| Post-Development Discharging to Wetland | | | |
|---|---|---|---|
| **Catchments** | **Runoff Coefficients (RC)** | **(A) Area (m^2)** | **A*RC (ha)** |
| Road Area | 0.85 | 230 | 0.020 |
| Berm Area | 0.3 | 428 | 0.013 |
| Dwelling Roof Area*1 | 0 | 600 | 0.000 |
| Gravel Driveway Area*2 | 0.5 | 300 | 0.015 |
| Balance Lot Area (assumes pervious) | 0.3 | 10021 | 0.301 |
| Total | | 11579 | **0.348** |

**Note**: *1) Dwelling area per lot has been considered in the design = 200 m^2

Roof runoff is excluded from post-development discharge (to wetland) as it will discharge to private, onsite soakpit sized for the 1% AEP critical event

*2) Hardstand area per lot has been considered in the design = 100 m^2

| | |
|---|---|
| Post Development - Pre Development | **0.0006** |

This area is used to size soakage pit to ensure post-development discharge to wetland is <= pre-development rates

eliot sinclair

Project name: Tauranga Bay
Project #: 510322
Designer: SG
Date: 24/06/2025

COLOURED CELLS CONTAIN FORMULA

**SOAKAGE PIT CALCULATION TABLES**

| Data Entry | | Check |
|---|---|---|
| **Soakage Pit Area (m^2)** | **0.5** | Ok |
| **Flo Vault Depth** | 0.00 | |
| **Soakage Pit Rock Depth** | 3.00 | |
| **Soakage Area Gross Volume (m^3)** | 1.5 | *Total rock + void volume* |
| **Soakage Pit Water Storage Capacity (m^3)** | 0.6 | *Void capacity only* |
| **Measured Infiltration Rate (m/hr)** | 1.000 | |
| **Safey Factor** | 0.50 | |
| **Design Infiltration Rate (m/hr)** | 0.500 | |
| **Flo Vault Void Spaces** | 0.95 | *Manufacturer's literature* |
| **Soakage Pit Rock Void Spaces** | 0.38 | *Clause E1 of the Building Code* |
| **Average Voild Spaces (%)** | 0.38 | *Average of the above* |

**Rainfall Depth (mm) - HIRDS RCP8.5 for the period 2081 - 2100**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **5** | 19.20 | 31.30 | 42.30 | 56.40 | 86.20 | 111.00 | 143.00 |
| **10** | 23.10 | 37.20 | 50.00 | 66.20 | 100.00 | 129.00 | 164.00 |
| **20** | 27.20 | 43.40 | 58.00 | 76.40 | 115.00 | 147.00 | 185.00 |
| **50** | 33.10 | 52.30 | 69.30 | 90.60 | 135.00 | 170.00 | 214.00 |
| **100** | 38.00 | 59.40 | 78.30 | 102.00 | 150.00 | 189.00 | 236.00 |

**Runoff Volume (m^3)**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **5** | 0.12 | 0.20 | 0.27 | 0.37 | 0.56 | 0.72 | 0.93 |
| **10** | 0.15 | 0.24 | 0.32 | 0.43 | 0.65 | 0.84 | 1.07 |
| **20** | 0.18 | 0.28 | 0.38 | 0.50 | 0.75 | 0.96 | 1.20 |
| **50** | 0.22 | 0.34 | 0.45 | 0.59 | 0.88 | 1.10 | 1.39 |
| **100** | 0.25 | 0.39 | 0.51 | 0.66 | 0.97 | 1.23 | 1.53 |

**Volume Infiltrated During Storm Event Through Bed of Soakage Pit (m^3)**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **5** | 0.04 | 0.13 | 0.25 | 0.50 | 1.50 | 3.00 | 6.00 |
| **10** | 0.04 | 0.13 | 0.25 | 0.50 | 1.50 | 3.00 | 6.00 |
| **20** | 0.04 | 0.13 | 0.25 | 0.50 | 1.50 | 3.00 | 6.00 |
| **50** | 0.04 | 0.13 | 0.25 | 0.50 | 1.50 | 3.00 | 6.00 |
| **100** | 0.04 | 0.13 | 0.25 | 0.50 | 1.50 | 3.00 | 6.00 |

**Soakage Pit Water Storage Requirement (m^3)**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **0** | 0.08 | 0.08 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 |
| **0** | 0.11 | 0.12 | 0.07 | 0.00 | 0.00 | 0.00 | 0.00 |
| **0** | 0.14 | 0.16 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 |
| **0** | 0.17 | 0.21 | 0.20 | 0.09 | 0.00 | 0.00 | 0.00 |
| **0** | 0.21 | 0.26 | 0.26 | 0.16 | 0.00 | 0.00 | 0.00 |

**Soakage Pit Gross Volume Requirement - Total Volume of Rock and Modules (m^3)**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **5** | 0.22 | 0.21 | 0.07 | 0.00 | 0.00 | 0.00 | 0.00 |
| **10** | 0.29 | 0.31 | 0.20 | 0.00 | 0.00 | 0.00 | 0.00 |
| **20** | 0.36 | 0.41 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 |
| **50** | 0.46 | 0.57 | 0.53 | 0.23 | 0.00 | 0.00 | 0.00 |
| **100** | 0.54 | 0.69 | 0.68 | 0.43 | 0.00 | 0.00 | 0.00 |

**Does Soakage Pit Have Sufficient Capacity**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **5** | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| **10** | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| **20** | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| **50** | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| **100** | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

**Additional Soakage Pit Water Storage Volume Required**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **5** | -0.49 | -0.49 | -0.55 | -0.57 | -0.57 | -0.57 | -0.57 |
| **10** | -0.46 | -0.45 | -0.50 | -0.57 | -0.57 | -0.57 | -0.57 |
| **20** | -0.43 | -0.41 | -0.44 | -0.57 | -0.57 | -0.57 | -0.57 |
| **50** | -0.40 | -0.36 | -0.37 | -0.48 | -0.57 | -0.57 | -0.57 |
| **100** | -0.36 | -0.31 | -0.31 | -0.41 | -0.57 | -0.57 | -0.57 |

| | |
|---|---|
| Project name: | Tauranga Bay |
| Project #: | 510322 |
| Designer: | SG |
| Date: | 24/06/2025 |

| Pre-Development Discharging to Wetland | | | |
|---|---|---|---|
| **Catchments** | **Runoff Coefficients (RC)** | **(A) Area (m^2)** | **A*RC (ha)** |
| C7 | 0.3 | 11891 | 0.357 |
| Total | | 11891 | **0.357** |

| Post-Development Discharging to Wetland | | | |
|---|---|---|---|
| **Catchments** | **Runoff Coefficients (RC)** | **(A) Area (m^2)** | **A*RC (ha)** |
| Road Area | 0.85 | 200 | 0.017 |
| Berm Area | 0.3 | 382 | 0.011 |
| Dwelling Roof Area*1 | 0 | 600 | 0.000 |
| Gravel Driveway Area*2 | 0.5 | 300 | 0.015 |
| Balance Lot Area (assumes pervious) | 0.3 | 10409 | 0.312 |
| Total | | 11891 | **0.356** |

**Note**: *1) Dwelling area per lot has been considered in the design = 200 m^2

Roof runoff is excluded from post-development discharge (to wetland) as it will discharge to private, onsite soakpit sized for the 1% AEP critical event

*2) Hardstand area per lot has been considered in the design = 100 m^2

| | |
|---|---|
| Post Development - Pre Development | **0.0000** |

This area is used to size soakage pit to ensure post-development discharge to wetland is <= pre-development rates

eliot sinclair

Project name: Tauranga Bay
Project #: 510322
Designer: SG
Date: 24/06/2025

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**SOAKAGE PIT CALCULATION TABLES**

| Data Entry | | Check |
|---|---|---|
| **Soakage Pit Area (m^2)** | **0.0** | Ok |
| **Flo Vault Depth** | 0.00 | |
| **Soakage Pit Rock Depth** | 3.00 | |
| **Soakage Area Gross Volume (m^3)** | 0.0 | *Total rock + void volume* |
| **Soakage Pit Water Storage Capacity (m^3)** | 0.0 | *Void capacity only* |
| **Measured Infiltration Rate (m/hr)** | 1.000 | |
| **Safey Factor** | 0.50 | |
| **Design Infiltration Rate (m/hr)** | 0.500 | |
| **Flo Vault Void Spaces** | 0.95 | *Manufacturer's literature* |
| **Soakage Pit Rock Void Spaces** | 0.38 | *Clause E1 of the Building Code* |
| **Average Voild Spaces (%)** | 0.38 | *Average of the above* |

**Rainfall Depth (mm) - HIRDS RCP8.5 for the period 2081 - 2100**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **5** | 19.20 | 31.30 | 42.30 | 56.40 | 86.20 | 111.00 | 143.00 |
| **10** | 23.10 | 37.20 | 50.00 | 66.20 | 100.00 | 129.00 | 164.00 |
| **20** | 27.20 | 43.40 | 58.00 | 76.40 | 115.00 | 147.00 | 185.00 |
| **50** | 33.10 | 52.30 | 69.30 | 90.60 | 135.00 | 170.00 | 214.00 |
| **100** | 38.00 | 59.40 | 78.30 | 102.00 | 150.00 | 189.00 | 236.00 |

**Runoff Volume (m^3)**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **5** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **10** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **20** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **50** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **100** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

**Volume Infiltrated During Storm Event Through Bed of Soakage Pit (m^3)**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **5** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **10** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **20** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **50** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **100** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

**Soakage Pit Water Storage Requirement (m^3)**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **0** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **0** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **0** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **0** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **0** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

**Soakage Pit Gross Volume Requirement - Total Volume of Rock and Modules (m^3)**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **5** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **10** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **20** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **50** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **100** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

**Does Soakage Pit Have Sufficient Capacity**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **5** | No | No | No | No | No | No | No |
| **10** | No | No | No | No | No | No | No |
| **20** | No | No | No | No | No | No | No |
| **50** | No | No | No | No | No | No | No |
| **100** | No | No | No | No | No | No | No |

**Additional Soakage Pit Water Storage Volume Required**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **5** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **10** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **20** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **50** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **100** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | |
|---|---|
| Project name: | Tauranga Bay |
| Project #: | 510322 |
| Designer: | SG |
| Date: | 24/06/2025 |

| Pre-Development Discharging to Wetland | | | |
|---|---|---|---|
| **Catchments** | **Runoff Coefficients (RC)** | **(A) Area (m^2)** | **A*RC (ha)** |
| C8 | 0.3 | 6464 | 0.194 |
| Total | | 6464 | **0.194** |

| Post-Development Discharging to Wetland | | | |
|---|---|---|---|
| **Catchments** | **Runoff Coefficients (RC)** | **(A) Area (m^2)** | **A*RC (ha)** |
| Road Area | 0.85 | 0 | 0.000 |
| Berm Area | 0.3 | 0 | 0.000 |
| Dwelling Roof Area*1 | 0 | 400 | 0.000 |
| Gravel Driveway Area*2 | 0.5 | 200 | 0.010 |
| Balance Lot Area (assumes pervious) | 0.3 | 5864 | 0.176 |
| Total | | 6464 | **0.186** |

**Note**: *1) Dwelling area per lot has been considered in the design = 200 m^2

Roof runoff is excluded from post-development discharge (to wetland) as it will discharge to private, onsite soakpit sized for the 1% AEP critical event

*2) Hardstand area per lot has been considered in the design = 100 m^2

| | |
|---|---|
| Post Development - Pre Development | **0.0000** |

This area is used to size soakage pit to ensure post-development discharge to wetland is <= pre-development rates

eliot sinclair

Project name: Tauranga Bay
Project #: 510322
Designer: SG
Date: 24/06/2025

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**SOAKAGE PIT CALCULATION TABLES**

| Data Entry | | Check |
|---|---|---|
| **Soakage Pit Area (m^2)** | **0.0** | Ok |
| **Flo Vault Depth** | 0.00 | |
| **Soakage Pit Rock Depth** | 3.00 | |
| **Soakage Area Gross Volume (m^3)** | 0.0 | *Total rock + void volume* |
| **Soakage Pit Water Storage Capacity (m^3)** | 0.0 | *Void capacity only* |
| **Measured Infiltration Rate (m/hr)** | 1.000 | |
| **Safey Factor** | 0.50 | |
| **Design Infiltration Rate (m/hr)** | 0.500 | |
| **Flo Vault Void Spaces** | 0.95 | *Manufacturer's literature* |
| **Soakage Pit Rock Void Spaces** | 0.38 | *Clause E1 of the Building Code* |
| **Average Voild Spaces (%)** | 0.38 | *Average of the above* |

**Rainfall Depth (mm) - HIRDS RCP8.5 for the period 2081 - 2100**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **5** | 19.20 | 31.30 | 42.30 | 56.40 | 86.20 | 111.00 | 143.00 |
| **10** | 23.10 | 37.20 | 50.00 | 66.20 | 100.00 | 129.00 | 164.00 |
| **20** | 27.20 | 43.40 | 58.00 | 76.40 | 115.00 | 147.00 | 185.00 |
| **50** | 33.10 | 52.30 | 69.30 | 90.60 | 135.00 | 170.00 | 214.00 |
| **100** | 38.00 | 59.40 | 78.30 | 102.00 | 150.00 | 189.00 | 236.00 |

**Runoff Volume (m^3)**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **5** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **10** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **20** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **50** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **100** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

**Volume Infiltrated During Storm Event Through Bed of Soakage Pit (m^3)**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **5** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **10** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **20** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **50** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **100** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

**Soakage Pit Water Storage Requirement (m^3)**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **0** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **0** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **0** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **0** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **0** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

**Soakage Pit Gross Volume Requirement - Total Volume of Rock and Modules (m^3)**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **5** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **10** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **20** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **50** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **100** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

**Does Soakage Pit Have Sufficient Capacity**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **5** | No | No | No | No | No | No | No |
| **10** | No | No | No | No | No | No | No |
| **20** | No | No | No | No | No | No | No |
| **50** | No | No | No | No | No | No | No |
| **100** | No | No | No | No | No | No | No |

**Additional Soakage Pit Water Storage Volume Required**

| AEP/Duration | 0.17 | 0.50 | 1.00 | 2.00 | 6.00 | 12.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| **5** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **10** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **20** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **50** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **100** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |