WALKER ENGINEERING CONSULTANTS

22 September 2025 **WEC Project Reference: 24106**

Hugh Johnstone
142 Konini Road,
Titirangi, Auckland 0604

Attention: Hugh Johnstone

**Stormwater Drawing & Construction Review Memorandum for 142 Konini Road, Titirangi**

## 1.0 Introduction

Walker Engineering Consultants Limited (WEC) has been engaged by Hugh Johnstone to prepare a Stormwater Drawing & Construction Review Memorandum in support of the proposed residential development at 142 Konini Road, Titirangi, Auckland 0604. The development involves alterations to a two-story building, extension of the existing structure, and construction of a new garage, pool, and pool house. WEC previously carried out a detailed stormwater and geotechnical report for the site.

This letter confirms that WEC has reviewed the latest drawings and compared them to the original stormwater design intent. The attached Technitrades Architecture drawings illustrate the 100% detailed design layout of the works. The plan demonstrates that the general site layout and stormwater specifications are consistent with the recommendations in WEC's Stormwater Design Report dated the 4th November 2024 (Ref: 24106). This review should be read in conjunction with WEC's reports and engineering drawings.

Additionally, WEC has recently reviewed the site construction as part of a Certificate of Acceptance application. A site inspection was carried out by a Chartered Professional Engineer to assess the current stormwater runoff conditions. This letter report provides commentary on temporary flow management during construction and the state of the constructed stormwater elements. It is noted that the site is currently on hold, and all remaining stormwater items will be reviewed during standard construction monitoring observations.

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Walker Engineering Consultants Ltd
1/133 Bayswater Avenue, Bayswater
Auckland, 0622

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## 2.0 Drawing Reviews

Please refer to Table 1, which outlines a detailed review of the latest drawings compared to the most important relevant stormwater recommendations.

**Table 1: Reviews of Latest Drawing Layouts compared to Stormwater Recommendations**

| Design Component | Stormwater Recommendation | Outcome |
|---|---|---|
| Roof & Impermeable Areas | Increased impermeable areas to be managed with stormwater detention tanks to reduce flows to below pre-development levels. | The latest drawings show impermeable areas consistent with the original stormwater assessment report. **Acceptable.** |
| Downpipe Positions | Position downpipes to split flows between the two detention tanks. | Drawings show new downpipes connected to the correct detention tanks: two downpipes to the lower tank and two downpipes to the higher tank. **Acceptable.** |
| Stormwater Tanks & Orifice Size | Provide 2 × 5000 L detention tanks (south/higher side and north/lower side of property). | 2 × 5000 L detention tanks are specified in the correct positions. **Acceptable.** |
| Tank Outlets | Provide a 20 mm diameter orifice 100 mm minimum above the tank base to control discharge. Provide a 100 mm diameter overflow at the tank top with a spreader pipe and rip-rap on geotextile. | Latest drawings show tanks in correct positions. Overflow outlets discharge onto rip-rap at the driveway, directing runoff to the stormwater system. Inlets and outlets are consistent with design intent. **Acceptable.** |
| Natural Overland Flow Path | Maintain natural overland flow path for permeable areas; vegetation away from new impermeable areas to be retained. Demolished existing building areas are to be replaced with vegetation/shrubs. | New drawings indicate flow paths consistent with pre-development conditions. Vegetation/shrubs/native plants are to be planted in front of the newly constructed retaining walls as well as in the areas where existing structures have been removed. **Acceptable.** |
| Subsoil Pipes Behind Walls | Provide subsoil drains behind retaining walls with outlets to the stormwater system, ensuring discharge is away from neighbouring properties. | The latest drawings show subsoil pipe positions and outlet locations that are directed away from neighbouring properties. Once permanent works are complete, exit subsoil flows will be minimal due to the minimal catchment areas. **Acceptable.** |
| Note: The drawing and report set relevant to these reviews are the RC Drawings 3368-RC-01 to 02, WEC's Stormwater Report and Engineering Drawing Sheet SW02. | | |

## 3.0 Engineering Site Visit and Observations

A site inspection was carried out on the 10th September 2025 by Peter Walker, Chartered Professional Engineer, to review the existing stormwater runoff conditions. The inspection was prompted by concerns raised by neighbouring property owners regarding additional runoff resulting from the partial construction works.

Key observations from the site visit include:

- **Front of Property (North Side):** The area for the proposed garage has been excavated and filled with gravel. A timber retaining wall has been constructed around this location.
- **Rear of Property (South Side):** Foundations for the proposed pool, pool shed, and deck have been constructed. A Certificate of Application is being processed for all of the current constructed works, as a building consent is not yet in place.
- **Construction Areas:** The majority of exposed areas comprise bare or compacted subgrade. These areas have remained in this condition for several months over a heavy rain season while awaiting consent. Photographs relevant to stormwater considerations are attached in Appendix B.
- **Subsoil Outlet:** A post-construction observation report (November 2024) noted that the subsoil outlet behind the timber retaining walls was to be repositioned. There was no evidence that this had occurred during the September site visit. The Contractor has been notified that the subsoil outlet must be redirected away from 5 Konini Road to assist with temporary stormwater management.
- **Temporary Runoff Risk:** The exposed foundation and platform areas create significant unvegetated ground, which substantially reduces infiltration capacity and increases surface runoff during rainfall events. In such conditions, compacted subgrade soils behave similarly to impervious surfaces, with typical runoff coefficients in the range of **0.7 – 0.9**, compared with approximately **0.3** for vegetated areas. This higher runoff potential not only increases peak flow rates but also elevates the risk of localised erosion, sediment transport, and uncontrolled discharges to neighbouring properties. As detention tanks and permanent stormwater systems are not yet installed, interim measures—including subsoil drainage, planting, and erosion and sediment controls—are critical to managing both the volume and quality of stormwater during the construction phase.
- **Overlay of Existing and Proposed Plans:** The existing site plan has been overlaid with the proposed development layout on Sheet SK10 (Appendix A). This illustrates how the stormwater management system integrates with the proposed changes, highlighting the extent of impervious surfaces, retaining structures, and new drainage outlets. Such overlays are critical for comparing pre and post-development hydrological conditions and for verifying compliance with the design intent.
- **Replanting of Shed Removal Areas:** Areas where the existing pool shed and ancillary shed have been removed remain exposed and unvegetated. Without stabilisation, these surfaces act as compacted subgrade with high runoff coefficients (C = 0.7–0.9), leading to increased runoff and a higher risk of sediment mobilisation. Re-planting with dense vegetation or groundcover will restore infiltration capacity (C ≈ 0.3), reduce peak runoff, and provide erosion control, particularly given the influence of upslope contributing flows.
- **Erosion and Sediment Control Measures:** Not all temporary erosion and sediment control measures specified on the drawings have been implemented. In particular, a temporary bund is required at the southern boundary (Sheet ESC) to intercept and redirect overland flow away from the neighbouring property at 5 Konini Road. The absence of this measure presents a risk of uncontrolled runoff during storm events, potentially resulting in localised runoff, erosion, and neighbour complaints.

- **Vegetated Areas:** Outside of the proposed development footprint and demolished shed zones, the property remains densely vegetated. These vegetated areas provide significant stormwater benefits, including interception of rainfall, enhanced infiltration, reduced runoff coefficients, and natural slope stabilisation. Maintaining these areas undisturbed during construction is essential to offset the temporary increase in runoff from the exposed construction zones.

## 4.0 Temporary Stormwater Management Recommendations

During the construction period, the following temporary stormwater management measures are required to minimise runoff and protect neighbouring properties:

1. **Subsoil Drainage:** All subsoil drains behind retaining walls must be installed so that discharge is directed away from neighbouring properties and into the existing stormwater network.

2. **Vegetation:** Dense planting of shrubs, native species, or similar vegetation must be established in areas where existing buildings have been removed and where no future construction is proposed. This will assist in controlling temporary runoff and stabilising exposed soil.

3. **Erosion and Sediment Control:** All erosion and sediment control measures as detailed in the engineering drawings must be implemented and maintained for the duration of the construction works.

## 5.0 Remediated Works Required

On the 21st September 2025, photographs of the remediated subsoil outlet near the proposed garage area were redirected away from 5 Konini Road, as shown in Appendix D. This action provides interim management of runoff from the gravelled garage area and will also support long-term stormwater control once the permanent system is complete.

The following other remediation actions are required immediately:

1. Install temporary erosion and sediment control measures, including the bund on the southern boundary as shown on Sheet ESC. Provide photographic evidence to the Engineer once complete.
2. Plant dense vegetation in areas where buildings have been removed and no future works are proposed, and also adjacent to the retaining walls. Provide photographic evidence to the Engineer once complete. The photographs will be attached in Appendix D of the report to illustrate that the measures are in place.

The following works will be required once consent is granted:

3. Install detention tanks and outlets in accordance with the specifications.
4. Construct riprap outlet protection as detailed on the drawings and specifications.

## 6.0 Conclusions

Walker Engineering Consultants Limited (WEC) has reviewed the latest drawings for the proposed development and conducted an on-site assessment of the temporary construction conditions. The latest drawings for the proposed stormwater systems are consistent with the design intent. If constructed as per the designs and verified through engineering construction monitoring, the stormwater runoff from the completed development is expected to be less than the pre-development runoff.

A site visit was carried out to assess temporary stormwater management measures and ensure that runoff does not affect neighbouring properties during the construction phase. It was found that temporary controls, as outlined in Sections 4 and 5 of this report, need to be implemented promptly. The Contractor and Owner are responsible for putting these measures in place and awaiting further consent approvals before proceeding with the remaining construction works.

The subsoil outlet near the garage has already been repositioned, resolving temporary runoff issues in that area. If all temporary measures are installed correctly, temporary runoff can be effectively managed. Once the permanent works, including detention tanks and subsoil drainage, are completed, overall stormwater management will be significantly improved compared to the original existing dwelling.

## 7.0 Report Limitations

This report and recommendations have been prepared by Walker Engineering Consultants Limited to complete the agreed scope as outlined above. The recommendations in this report do not supersede the recommendations of other engineering reports and shall be considered in conjunction with all other information available for the site. It is assumed that the samples undertaken during the investigations is representative of the site. There may be special conditions pertaining to this site which have not been disclosed by the investigation nor considered in this report. This investigation was limited by time and economic constraints, and the conclusions and recommendations presented are based on interpretation from discrete sample locations, available evidence, and reasonable judgment. Should you be in any doubt as to the recommendations of this report, and if the soils and site conditions are found to differ from observations and assumptions, it is essential that you discuss these issues with Walker Engineering Consultants prior to proceeding with any work based on this report.

## 8.0 Applicability

This report has been prepared for the benefit of the contractually engaged client with respect to the particular brief given to us, and it may not be relied upon in other contexts or for any other purpose without our prior review and agreement. Third parties should obtain independent advice for their own situations. No responsibility or liability is accepted by Walker Engineering Consultants Limited to any third party that may use or rely on the whole or any part of the content of this document.

If you require any further professional services or have any queries, please contact us.

Report prepared by:

.....

Peter Walker
**Director - Chartered Professional Engineer**
CPEng, CMEngNZ, IntPE, B.Eng(Civil)(Hons), M.EngNZ (Civil/Geotech) (1st Hons)

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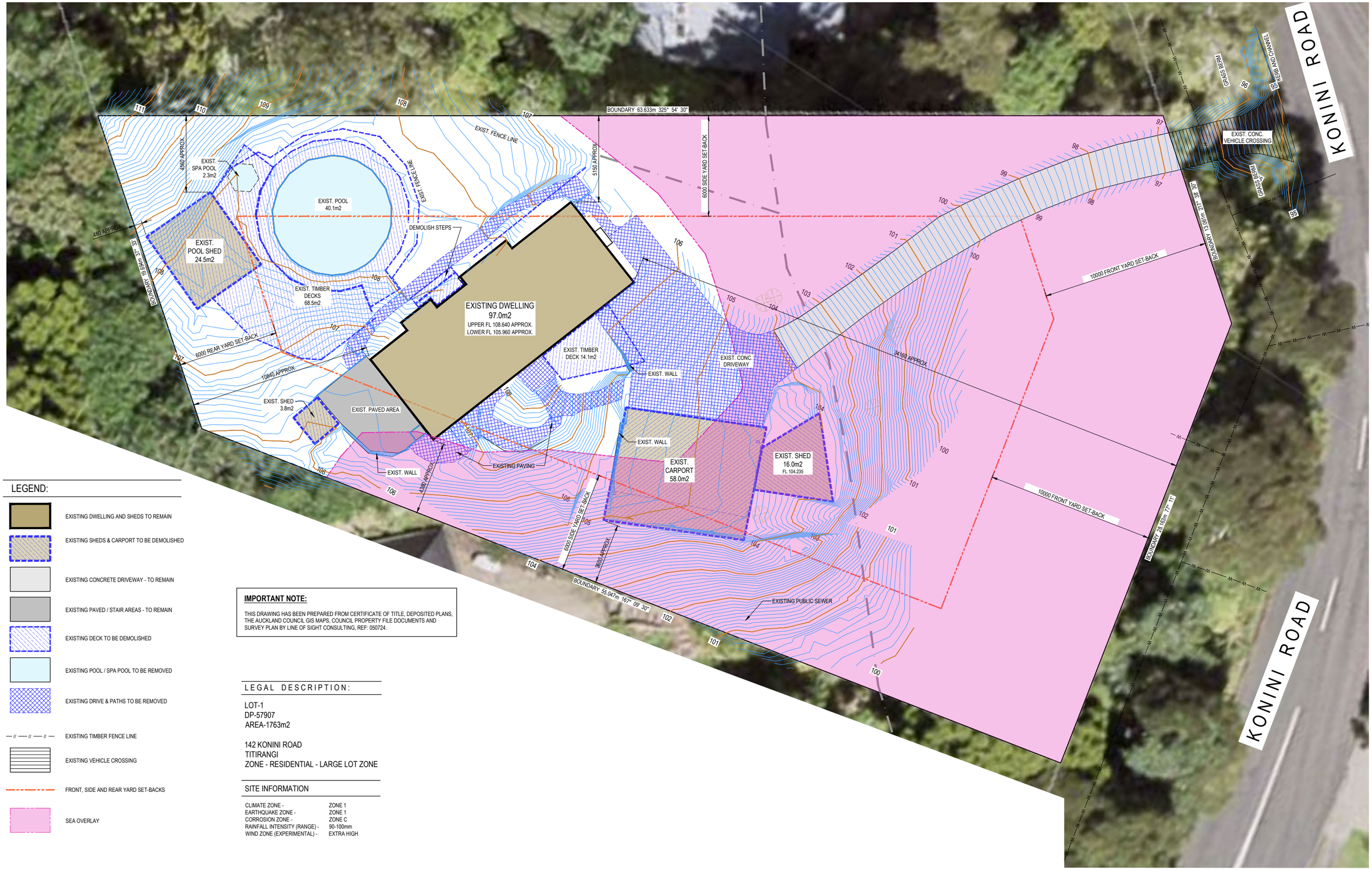
**Attachments:**

- Appendix A – Selected Drawings
- Appendix B – Photos
- Appendix C – Post Construction Observation Report
- Appendix D– Photographs illustrating rectified works
- Appendix E – Stormwater Report

## Appendix A

- **Selected Drawings**




LEGEND:

- EXISTING DWELLING AND SHEDS TO REMAIN
- EXISTING SHEDS & CARPORT TO BE DEMOLISHED
- EXISTING CONCRETE DRIVEWAY - TO REMAIN
- EXISTING PAVED / STAIR AREAS - TO REMAIN
- EXISTING DECK TO BE DEMOLISHED
- EXISTING POOL / SPA POOL TO BE REMOVED
- EXISTING DRIVE & PATHS TO BE REMOVED
- EXISTING TIMBER FENCE LINE
- EXISTING VEHICLE CROSSING
- FRONT, SIDE AND REAR YARD SET-BACKS
- SEA OVERLAY

**IMPORTANT NOTE:**

THIS DRAWING HAS BEEN PREPARED FROM CERTIFICATE OF TITLE, DEPOSITED PLANS, THE AUCKLAND COUNCIL GIS MAPS, COUNCIL PROPERTY FILE DOCUMENTS AND SURVEY PLAN BY LINE OF SIGHT CONSULTING, REF: 050724.

## LEGAL DESCRIPTION:

LOT-1
DP-57907
AREA-1763m2

142 KONINI ROAD
TITIRANGI
ZONE - RESIDENTIAL - LARGE LOT ZONE

## SITE INFORMATION

| | |
|---|---|
| CLIMATE ZONE - | ZONE 1 |
| EARTHQUAKE ZONE - | ZONE 1 |
| CORROSION ZONE - | ZONE C |
| RAINFALL INTENSITY (RANGE) - | 90-100mm |
| WIND ZONE (EXPERIMENTAL) - | EXTRA HIGH |

TECHNITRADES ARCHITECTURE
12 Ben Lomond Crescent, Pakuranga, Auckland 2010
Phone (09) 5767166 | design@technitrades.co.nz

| REV. | DESCRIPTION | BY | DATE |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| B | PUBLIC WASTE WATER LINE LOCATION CORRECTED | MK | 10-04-25 |
| A | RC APPLICATION | MK | 10-12-24 |

| | |
|---|---|
| A1 Scale. | 1:100 |
| A3 Scale. | 1:200 |
| Designed. | L.MEIKLEJOHN |
| Drawn. | B.MILLWARD |
| A1 Plot Scale. | 1 : 1 |
| A3 Plot Scale. | 1 : 2 |

NOTES.

DO NOT SCALE.
DIMENSIONS IN MILLIMETERS UNLESS NOTED OTHERWISE.
IF IN DOUBT ON ANY ISSUE SEEK VERIFICATION PRIOR TO PROCEEDING.
READ THESE DRAWINGS IN CONJUNCTION WITH ALL OTHER CONSULTANTS DRAWINGS AND SPECIFICATIONS.



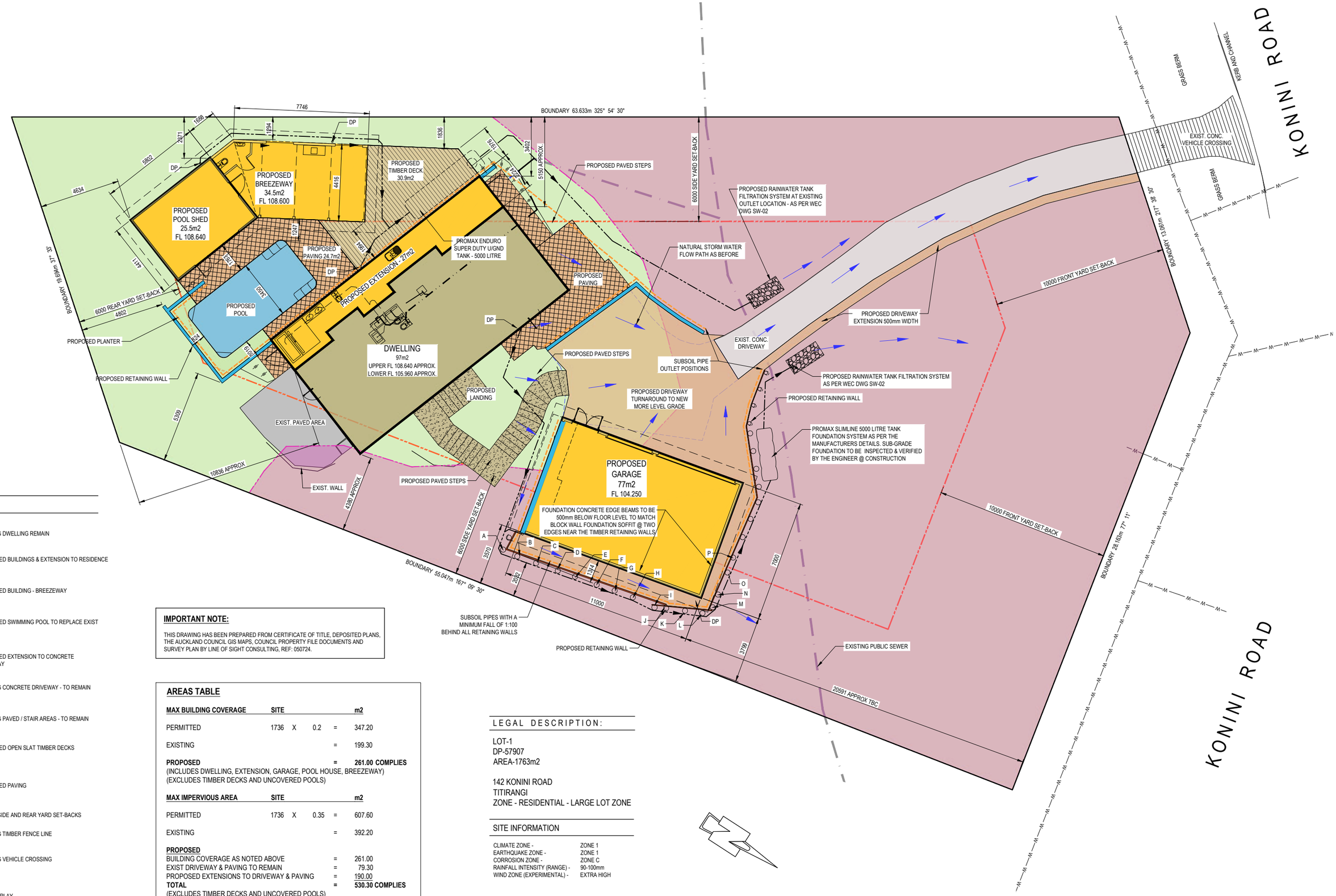
Client Reference No.
.

Project Title.
# JOHNSTONE HOUSE
PROPOSED RESIDENTIAL ALTERATIONS
142 Konini Road, Titirangi, Auckland 0604

Drawing Title.
Existing Site Plan

Drawing No.
. 3368-RC-01

Rev: B




LEGEND:

- EXISTING DWELLING REMAIN
- PROPOSED BUILDINGS & EXTENSION TO RESIDENCE
- PROPOSED BUILDING - BREEZEWAY
- PROPOSED SWIMMING POOL TO REPLACE EXIST
- PROPOSED EXTENSION TO CONCRETE DRIVEWAY
- EXISTING CONCRETE DRIVEWAY - TO REMAIN
- EXISTING PAVED / STAIR AREAS - TO REMAIN
- PROPOSED OPEN SLAT TIMBER DECKS
- PROPOSED PAVING
- FRONT, SIDE AND REAR YARD SET-BACKS
- EXISTING TIMBER FENCE LINE
- EXISTING VEHICLE CROSSING
- SEA OVERLAY
- OVERLAND FLOW PATHVERLAY

**IMPORTANT NOTE:**

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**AREAS TABLE**

| MAX BUILDING COVERAGE | SITE | | | m2 |
|---|---|---|---|---|
| PERMITTED | 1736 X | 0.2 | = | 347.20 |
| EXISTING | | | = | 199.30 |
| **PROPOSED** (INCLUDES DWELLING, EXTENSION, GARAGE, POOL HOUSE, BREEZEWAY) (EXCLUDES TIMBER DECKS AND UNCOVERED POOLS) | | | = | **261.00 COMPLIES** |

| MAX IMPERVIOUS AREA | SITE | | | m2 |
|---|---|---|---|---|
| PERMITTED | 1736 X | 0.35 | = | 607.60 |
| EXISTING | | | = | 392.20 |
| **PROPOSED** | | | | |
| BUILDING COVERAGE AS NOTED ABOVE | | | = | 261.00 |
| EXIST DRIVEWAY & PAVING TO REMAIN | | | = | 79.30 |
| PROPOSED EXTENSIONS TO DRIVEWAY & PAVING | | | = | 190.00 |
| **TOTAL** (EXCLUDES TIMBER DECKS AND UNCOVERED POOLS) | | | = | **530.30 COMPLIES** |

LEGAL DESCRIPTION:

LOT-1
DP-57907
AREA-1763m2

142 KONINI ROAD
TITIRANGI
ZONE - RESIDENTIAL - LARGE LOT ZONE

SITE INFORMATION

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| RAINFALL INTENSITY (RANGE) - | 90-100mm |
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TECHNITRADES ARCHITECTURE
12 Ben Lomond Crescent, Pakuranga, Auckland 2010
Phone (09) 5767166 | design@technitrades.co.nz

| REV. | DESCRIPTION | BY | DATE |
|---|---|---|---|
| C | GARAGE WATER TANK RELOCATED, ASSOCIATED RETAINING ADDED | MK | 18-09-25 |
| B | GARAGE & POOLHOUSE MINOR SHIFT, FRONT STAIRS REVISED, SIDE STAIRS DELETED, AREAS TABLE MINOR ADJUSTMENT | MK | 10-04-25 |
| A | RC APPLICATION | MK | 10-12-24 |

| | |
|---|---|
| A1 Scale. | 1:100 |
| A3 Scale. | 1:200 |
| Designed. | L.MEIKLEJOHN |
| Drawn. | B.MILLWARD |
| A1 Plot Scale. | 1 : 1 |
| A3 Plot Scale. | 1 : 2 |

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Client Reference No.
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Project Title.
# JOHNSTONE HOUSE
PROPOSED RESIDENTIAL ALTERATIONS
142 Konini Road, Titirangi, Auckland 0604

Drawing Title.
Proposed Site Plan

Drawing No.
. 3368-RC-02

Rev: C

# SITE PLAN – OVERLAY OF EXISTING AND PROPOSED CONDITIONS ILLUSTRATING STORMWATER MANAGEMENT

Removed existing pool shed area to be landscaped with dense native plants, shrubs or similar vegetation

Removed existing shed area to be landscaped with dense native plants, shrubs or similar vegetation

Subsoil pipe T exit to be maintained with native plants, shrubs or similar vegetation.

Area in front of new wall to be landscaped with native plants, shrubs or similar vegetation

KONINI ROAD

KONINI ROAD

LEGEND:

- EXISTING DWELLING REMAIN
- PROPOSED BUILDINGS & EXTENSION TO RESIDENCE
- PROPOSED BUILDING - BREEZEWAY
- PROPOSED SWIMMING POOL TO REPLACE EXIST
- PROPOSED EXTENSION TO CONCRETE DRIVEWAY
- EXISTING CONCRETE DRIVEWAY - TO REMAIN
- EXISTING PAVED / STAIR AREAS - TO REMAIN
- PROPOSED OPEN SLAT TIMBER DECKS
- PROPOSED PAVING
- FRONT, SIDE AND REAR YARD SET-BACKS
- EXISTING TIMBER FENCE LINE
- EXISTING VEHICLE CROSSING
- SEA OVERLAY
- OVERLAND FLOW PATHVERLAY

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**AREAS TABLE**

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| EXISTING | | | = | 199.30 |
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| EARTHQUAKE ZONE - | ZONE 1 |
| CORROSION ZONE - | ZONE C |
| RAINFALL INTENSITY (RANGE) - | 90-100mm |
| WIND ZONE (EXPERIMENTAL) - | EXTRA HIGH |

REFERENCE: SHEET SK10 - WALKER ENGINEERING

TECHNITRADES ARCHITECTURE
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Phone (09) 5767166 | design@technitrades.co.nz

| | | | | | |
|---|---|---|---|---|---|
| C | GARAGE WATER TANK RELOCATED, ASSOCIATED RETAINING ADDED | MK | 18-09-25 | Drawn. | B.MILLWARD |
| B | GARAGE & POOLHOUSE MINOR SHIFT, FRONT STAIRS REVISED, SIDE STAIRS DELETED, AREAS TABLE MINOR ADJUSTMENT | MK | 10-04-25 | | |
| A | RC APPLICATION | MK | 10-12-24 | A1 Plot Scale. | 1 : 1 |
| REV. | DESCRIPTION | BY | DATE | A3 Plot Scale. | 1 : 2 |

| | |
|---|---|
| A1 Scale. | 1:100 |
| A3 Scale. | 1:200 |
| Designed. | L.MEIKLEJOHN |

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Client Reference No.
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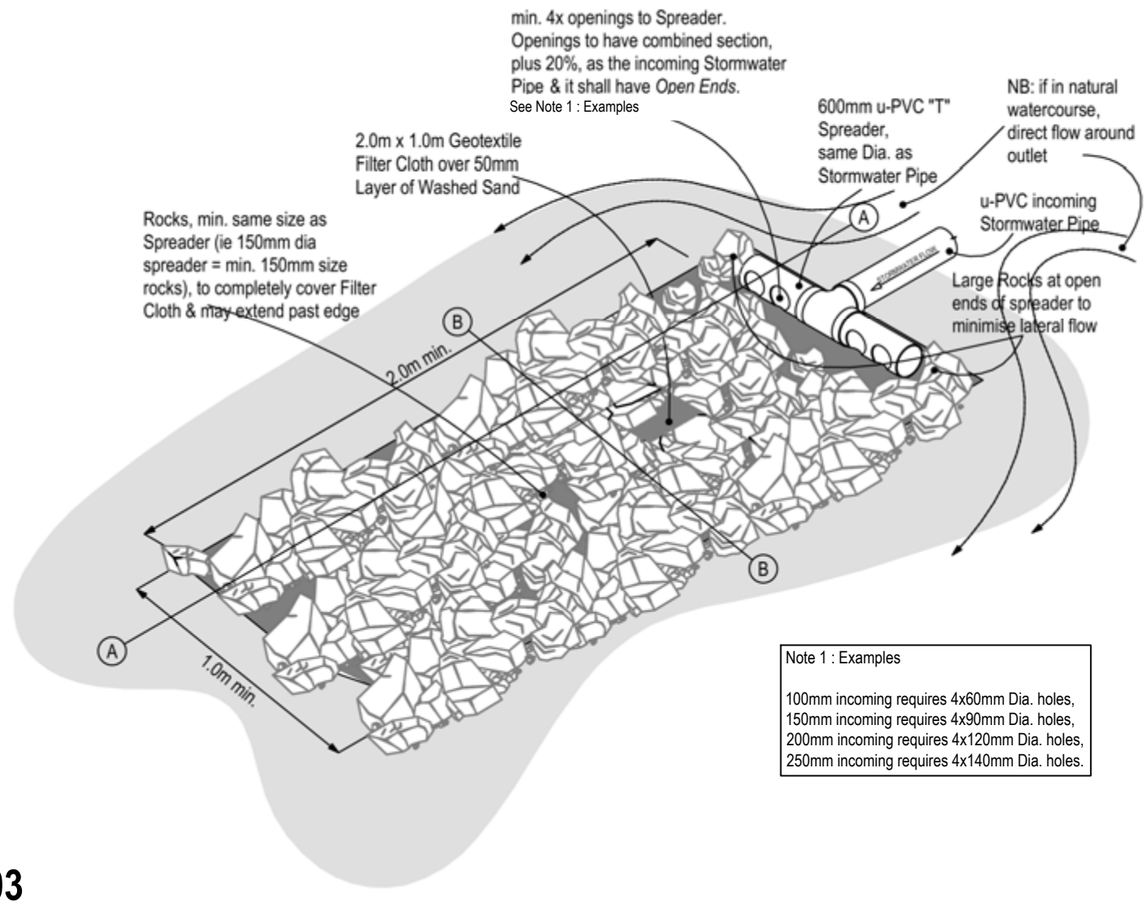
Project Title.
JOHNSTONE HOUSE
PROPOSED RESIDENTIAL ALTERATIONS
142 Konini Road, Titirangi, Auckland 0604

Drawing Title.
Proposed Site Plan

Drawing No.
3368-RC-02

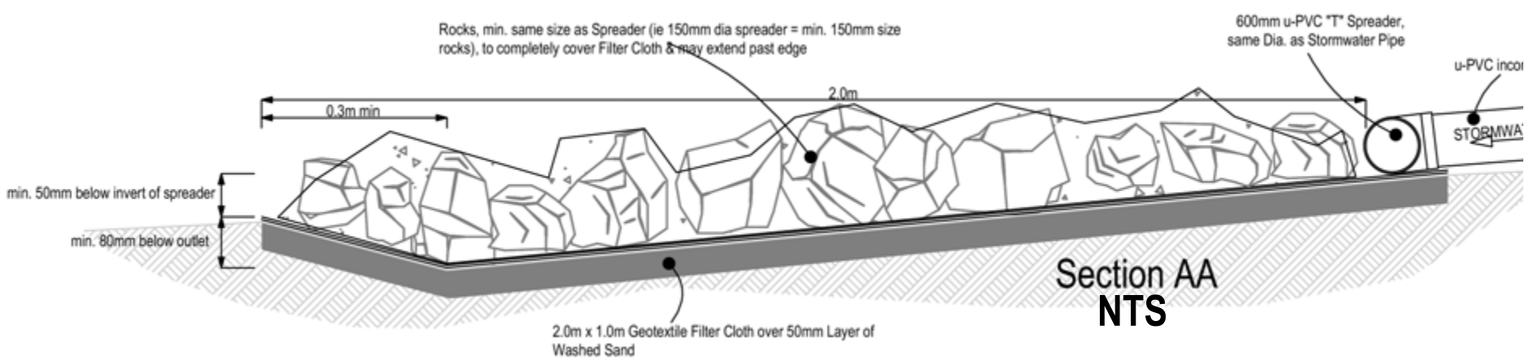
Rev:
C



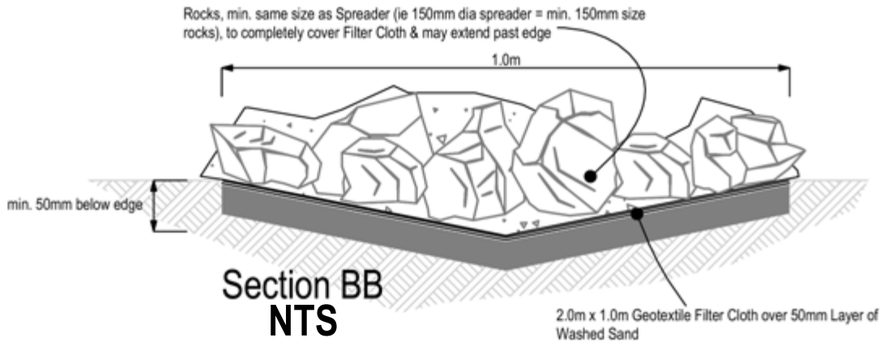

Note 1 : Examples

100mm incoming requires 4x60mm Dia. holes,
150mm incoming requires 4x90mm Dia. holes,
200mm incoming requires 4x120mm Dia. holes,
250mm incoming requires 4x140mm Dia. holes.

## 03 NTS




Section AA
NTS




Section BB
NTS

| | | | | | |
|---|---|---|---|---|---|
| Surveyed: | LOSC | | | | |
| Designed: | PW | | | | |
| Drawn: | JLB | 01 | FOR CONSENT | PW | NOVEMBER 2024 |
| Checked: | PW | Rev | Revision Details | Approved by | Date |



WALKER ENGINEERING CONSULTANTS

Walker Engineering
Consultants Limited

Phone: 022 534 4973
Email: peter@walkereng.co.nz
Website: www.walkereng.co.nz

Client:
HUGH JOHNSTONE

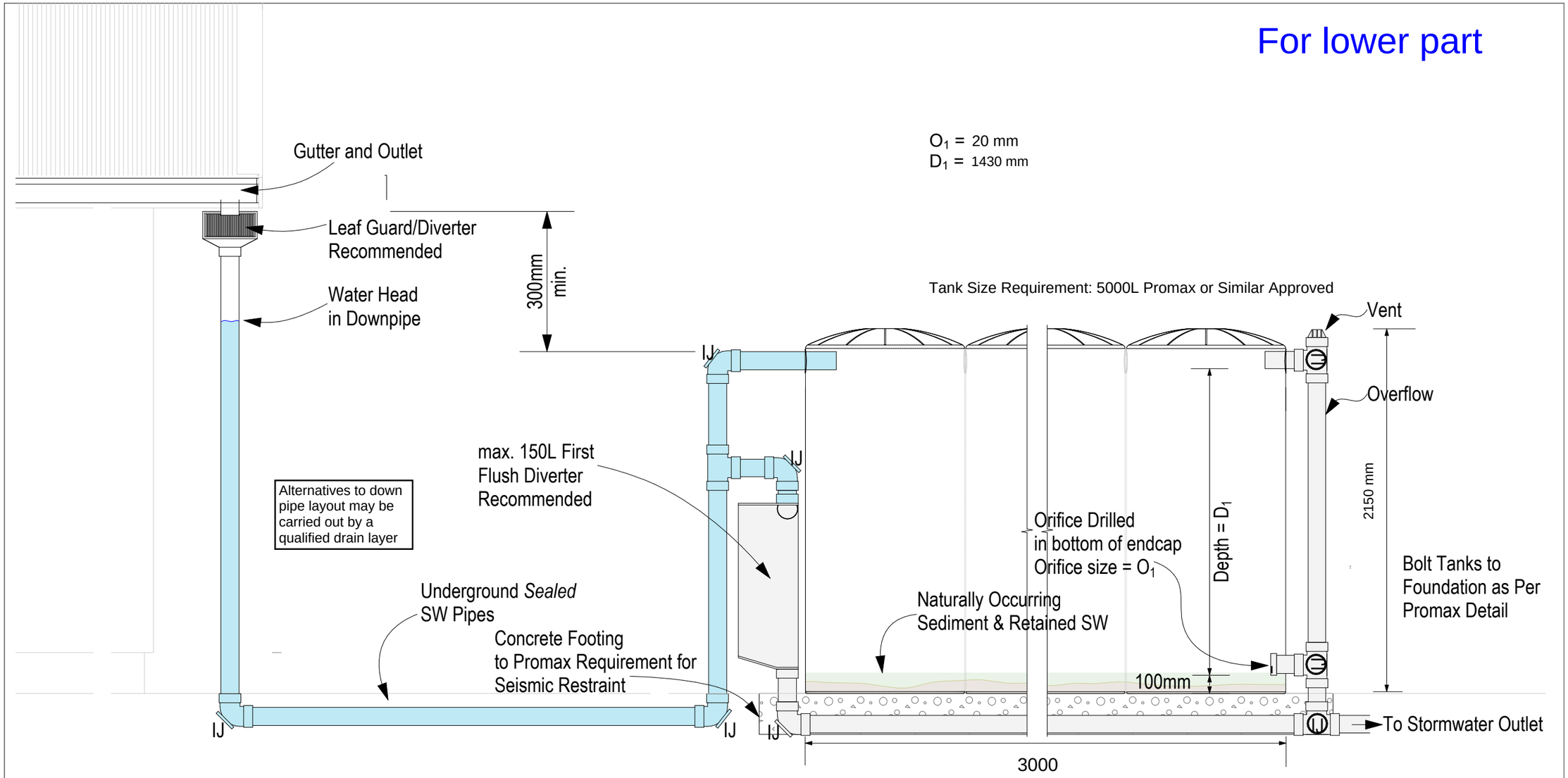
JOHNSTONE CONSTRUCTION

Project Title:
HUGH JOHNSTONE 142
KONINI ROAD, AUCKLAND -
SED

Sheet Title:
RAIN-WATER TANK FILTRATION
SYSTEM

| Job #: | Scale (A3 Original): | |
|---|---|---|
| 24106 | As Shown | |
| Client Drawing #: | Sheet #: SW02 | Rev No: 01 |

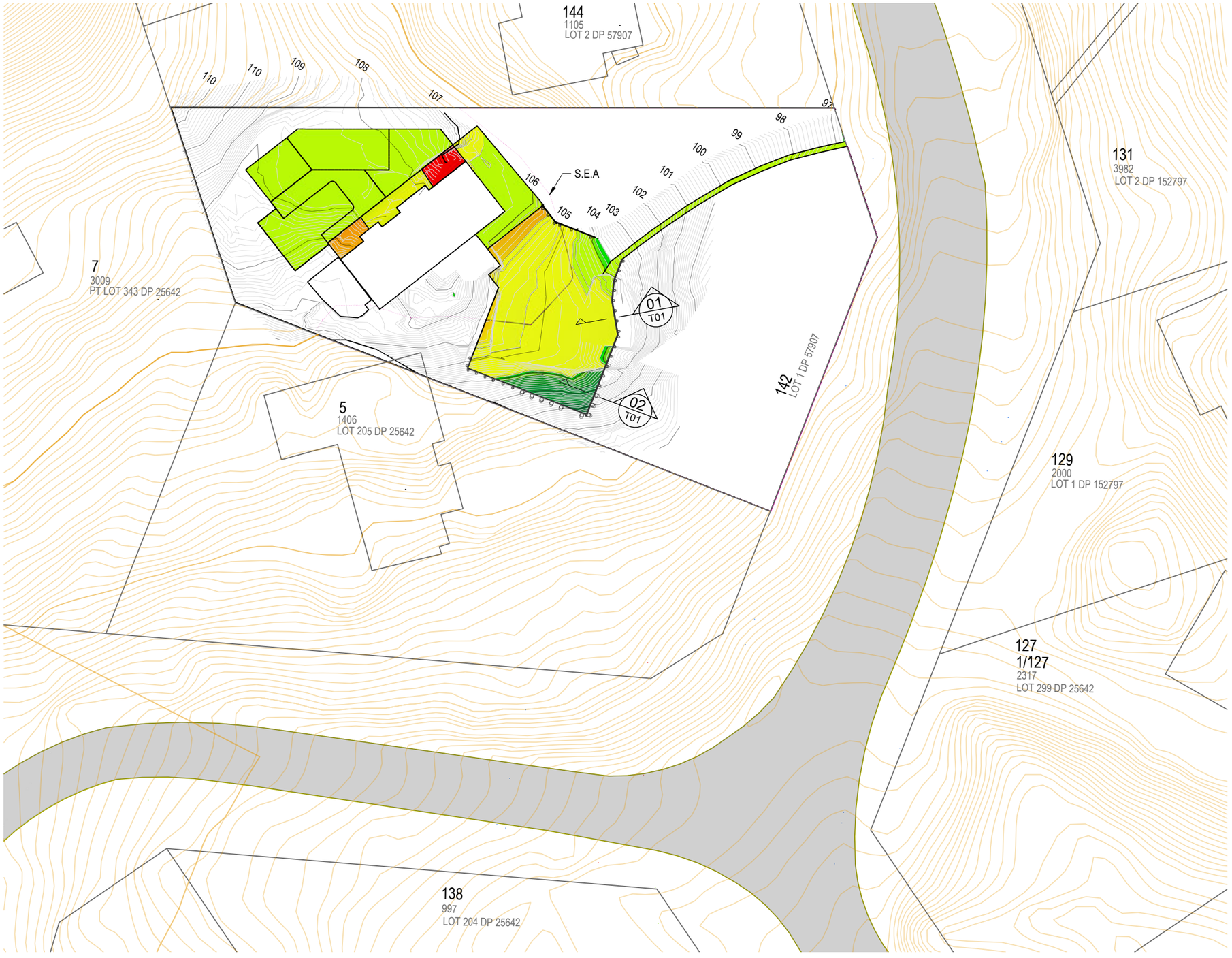
For lower part




TYPICAL ATTENUATION (RETENTION) RAIN WATER TANK SETUP

**E1 - SW Attenuation & Connection 1/2**

Sheet: SK2




ESTIMATED EARTHWORKS VOLUMES:

1. Total:

Cut = ± 230.0m ³
Fill = ± 35.4m³

2. Within the SEA & Outside of the Existing driveway formation:

Cut = ± 37.72m ³
Fill = ± 35.4m³

3.Within SEA & Existing driveway formation:

Cut = ± 40.4m ³
Fill = ± 0.0m³

4. Outside of SEA (Strategic Environmental Assessment):

Cut = ± 151.8m ³
Fill = ± 0.0m³

DEPTH RANGE KEY

| Lower | to | Upper_Value | Colour |
|---|---|---|---|
| -2.0 | to | -1.5 m | |
| -1.5 | to | -1.0 m | |
| -1.0 | to | -0.5 m | |
| -0.5 | to | -0.25 m | |
| 0.0 | | | |
| 0.0 | to | +0.25 m | |
| +.25 | to | +0.5 m | |
| +0.5 | to | +1.0 m | |
| +1.0 | to | +1.5 m | |
| +1.5 | to | +2.0 m | |
| +2.0 | to | +2.5 m | |
| +2.5 | to | +3.0 m | |
| +3.0 | to | +3.5 m | |

ISO - **EARTHWORKS PLAN**
Scale 1:250

| | | | | | |
|---|---|---|---|---|---|
| Surveyed: | LOSC | | | | |
| Designed: | PW | | | | |
| Drawn: | JLB | 01 | FOR CONSENT | PW | NOVEMBER 2024 |
| Checked: | PW | Rev | Revision Details | Approved by | Date |



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Client: HUGH JOHNSTONE

JOHNSTONE CONSTRUCTION

Project Title: HUGH JOHNSTONE 142 KONINI ROAD, AUCKLAND - SED

Sheet Title: SITE EARTHWORKS PLAN

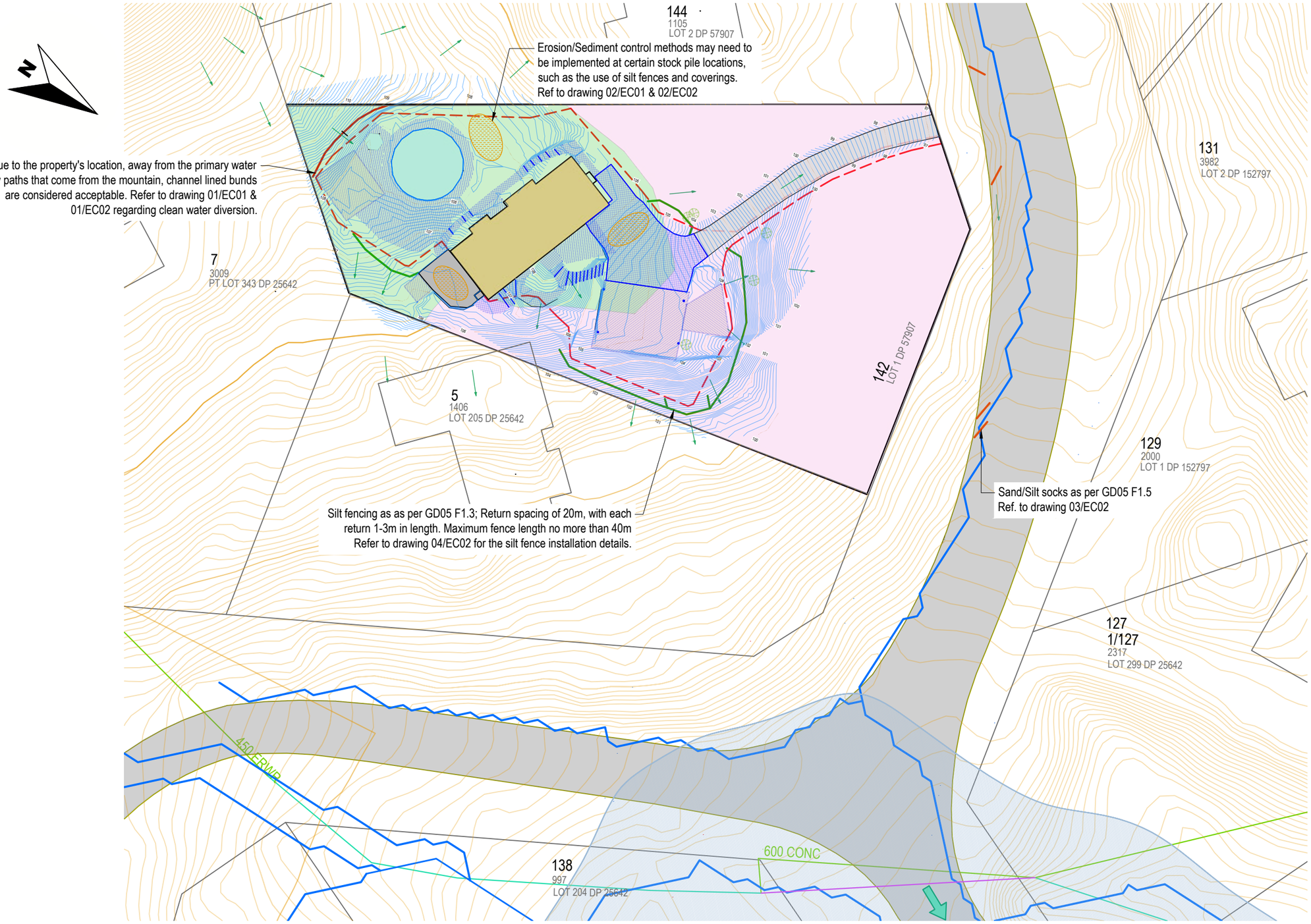
Job #: 24106

Scale (A3 Original): As Shown

Client Drawing #:

Sheet #: ISO

Rev No: 01




Map Key:

- : Overland flow paths
- : Stormwater pipelines
- : Stormwater catchments
- : Indicative contours outside of 142 Konini Rd at 0.25m intervals
- : Indicative 105m contour line outside of 142 Konini Rd
- : Indicative slope direction arrow
- : Culvert
- : Open Watercourse
- : Flood plain
- : Direction to nearest stormwater catchments

*Data and information presented herein have been sourced from Auckland Geomaps. Users are advised to verify the accuracy of this information independently.*

ESC (Erosion and Sediment Control) Key:

All references are made to sections within the "GD05 Erosion Sediment Control Guide for Land Disturbing Activities in the Auckland Region"

- : Approximate extent of earthworks
- : Proposed Stockpile locations
- : Silt fence (F1.3)
- : Clean water diversion bund's (E2.1)
- : Sand/Silt Socks - May be placed in series (F1.5)

Exposed soils to be covered with crushed aggregate/mulch as described in GF05 E3.0

Erosion control - all silt control measures shall be installed in accordance with GD05 and placed prior to commencement of earthworks. Such measures shall be subject to further additions and alterations, where considered necessary, as directed by the project manager or relevant council, during the progression of works. It is advised to contact the local council prior to commencement of earthworks, after installation of erosion and sediment control devices to ensure they have been installed to the satisfaction of the applicable council.

Refer to drawings EC01-EC02 for general sediment control details

ESC - **EROSION & SEDIMENT CONTROL FOR EXISTING SITE: PLAN**

Scale 1:400

| | | | | | |
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| Surveyed: | LOSC | | | | |
| Designed: | PW | | | | |
| Drawn: | JLB | 01 | FOR CONSENT | PW | NOVEMBER 2024 |
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Client: HUGH JOHNSTONE

JOHNSTONE CONSTRUCTION

Project Title: HUGH JOHNSTONE 142 KONINI ROAD, AUCKLAND - SED

Sheet Title: EROSION AND SEDIMENT CONTROL PLANS

| Job #: | Scale (A3 Original): | |
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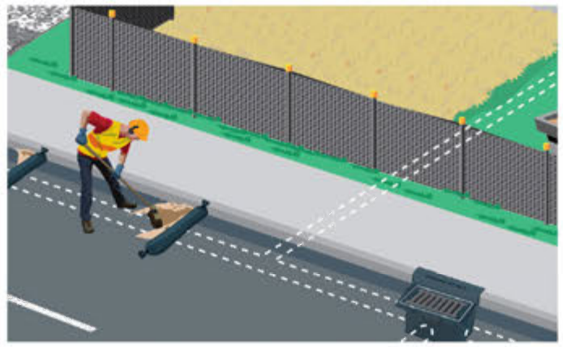
| 24106 | As Shown | |
| Client Drawing #: | Sheet #: | Rev No: |
| | ESC | 01 |



How?
- Retain as much vegetation cover as possible.
- Do your work in stages.
- Use mulch, hay, pea straw or other material to cover exposed areas.
- Keep a berm of grass around the outside of the site to keep hold of water and allow another layer of filtration.
- Revegetate exposed areas as rapidly as possible.

Why?
- Uncovered areas can be easily eroded.
- The less soil that is exposed, the less that can be washed away.

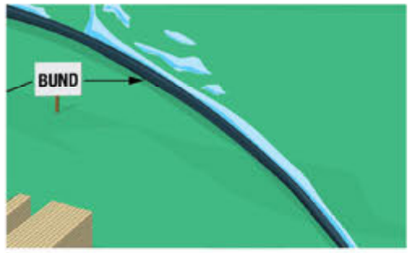
**01** **Minimize Exposed Areas** Sediment and erosion control guideline **NTS**

How?
- Cover stockpiles with mulch, straw or a tarpaulin as soon as practicable to prevent soil loss.
- Soil and other materials should be stockpiled away from kerbs and areas where run-off may enter the stormwater system or drains.
- Use a silt fence around a stockpile or on the downhill side of the stockpile to contain sediment.
- Avoid locating a stockpile in a low-lying area which may form part of the natural drainage pattern of the site.

Why?
- Exposing soil stockpiles to rainfall can result in surface run-off.
- Uncovered soil can be blown off the site.

Maintenance
- Check after each rainfall event.

**02** **Manage Stockpiles** Sediment and erosion control guideline **NTS**

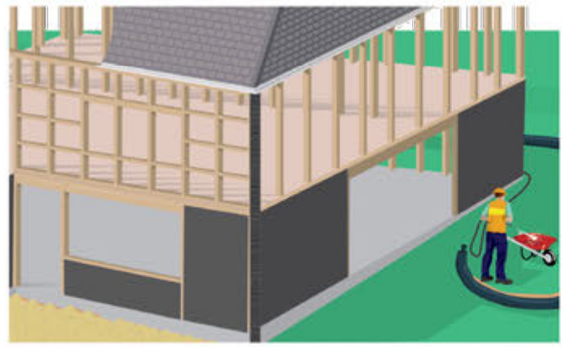



How?
- Create a diversion channel or contour drain above the earthworks on the site so clean water does not enter the work area.
- Ensure sediment-laden water from the works area is channelled to an appropriate area where it can be retained onsite.

Why?
- Left unmanaged, dirty water will contaminate clean water and increase the amount of treatment control devices required to prevent sediment leaving the site.
- Divert clean rainwater away from your exposed worksite to prevent it from dislodging sediment.
- Prevent diverted water from adversely affecting neighbouring properties or public areas.

Maintenance
- Ensure diversion channels and bunds have not been eroded by rainfall.
- Remove accumulated sediment from retention area.

**03** **Clean Water Diversion** Sediment and erosion control guideline **NTS**

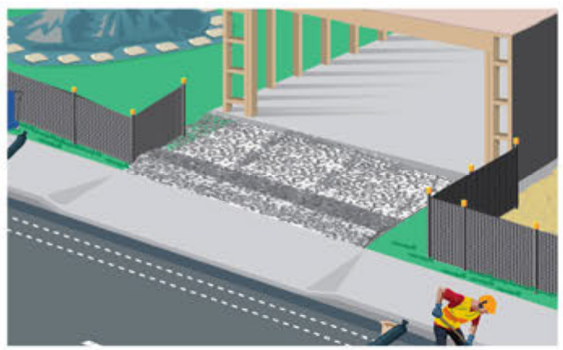


How?
- Use temporary downpipes once you have installed your roof and gutters.
- Alternatively, non-erosive, temporary ground cover shall be placed under downpipes to prevent splash erosion and divert water to turfed areas on the site.

Why?
- Installing drainage early enables you to remove clean water from your site – keeping clean water clean.
- Reduces the amount of water requiring treatment.

Maintenance
- Regularly check that the temporary downpipes are securely fastened before and after rainfall events.

**04** **Connection to Stormwater System** Sediment and erosion control guideline **NTS**



How?
- A minimum entranceway should:
  - have a 150mm thick layer of 65-100mm aggregate
  - be long enough for your site with "wings " (to allow for vehicles cutting corners)
  - be 4m minimum width, with 1.5m wide "wings " on either side to cater for larger delivery vehicles
- Use large washed aggregate.
- Do not use materials such as sand, crushed concrete or asphalt to make your entranceway as they are not effective.

Why?
- A stabilised entrance way will enable vehicles to be kept off exposed soil and clay.
- A stabilised entrance way is required to prevent vehicles tracking mud and clay onto the road (which is a common source of complaints to Council).
- Soil and contaminants can be washed directly off your site onto the road making it slippery and dangerous. They can then enter the stormwater system by rain or create a dust nuisance in dry weather.

Maintenance
- Inspect weekly and after each rainfall event.
- Maintain the stabilised driveway to prevent sediment from leaving the construction site.
- Remove sediments from sealed pavements by sweeping. Do not use a water truck to wash the road as this will wash any sediment into the stormwater system.
- Soil or other aggregate material should be swept back onto the site and not onto the road.

**05** **Stabilise Construction Entranceway** Sediment and erosion control guideline **NTS**

| | | | | | |
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| Surveyed: | LOSC | | | | |
| Designed: | PW | | | | |
| Drawn: | JLB | 01 | FOR CONSENT | PW | NOVEMBER 2024 |
| Checked: | PW | Rev | Revision Details | Approved by | Date |



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Client: HUGH JOHNSTONE

JOHNSTONE CONSTRUCTION

Project Title: HUGH JOHNSTONE 142 KONINI ROAD, AUCKLAND - SED

Sheet Title: GENERAL SEDIMENT CONTROL SHEET 01

Job #: 24106

Scale (A3 Original): As Shown

Client Drawing #:

Sheet #: EC01

Rev No: 01

8/16/2024 8:38 AM

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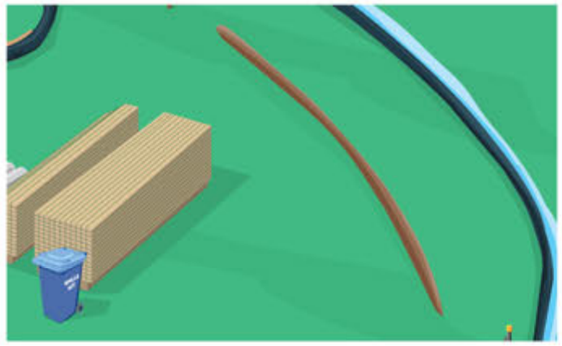


How?

- Construct a compacted earth bund around the outer edges of your site.
- Construct a bund through compacting clay or topsoil and cover them with geotextile cloth.

Why?

- Earth bunds will divert clean rainwater from the exposed works and provide a barrier for the retention of dirty water allowing sediment to settle out.

Maintenance

- Earth bunds need to be checked regularly throughout the build to ensure they are still providing an effective barrier.
- Soil needs to be recompacted to provide an effective barrier should damage occur.

**01** **Earth Bunds Retain Soil and Prevent Run-off** NTS
Sediment and erosion control guideline


- Regularly check and systematically carry out audits to ensure the controls onsite are maintained to the appropriate standard.
- Be ready to alter your site controls as the site or conditions change.
- Create a checklist to ensure all appropriate measures are in place on the site.
- Continue to educate staff and share ideas on how to maintain sediment and erosion controls on your site.
- Work as a team to get it right and take pride in doing your part in protecting our environment and region.

**02** **Manage Stockpiles** NTS
Sediment and erosion control guideline


How?

When installing catchpit controls:

- Protection measures should be installed before works start.
- Ensure the filter cloth covers the extent of the grate and the inlet at the back.
- Install a series of sand socks in the kerb and channel before the catchpit to intercept the stormwater – this will slow the velocity of the water allowing more sediment to settle out of the water.
- Remember to remove the filter cloth after you have completed your project.

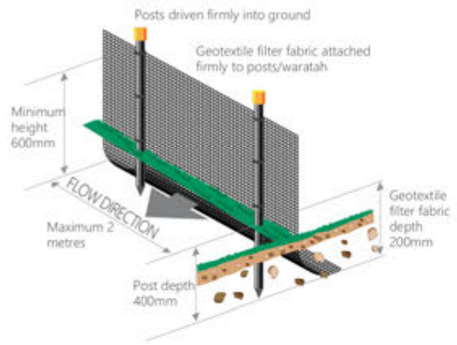
Why?

- Catchpit/drain protection measures are placed within or around stormwater inlets to intercept sediment-laden run-off before it enters the Council 's stormwater system .
- Drain or catchpit protection should only be considered as your secondary protection and is designed to assist your primary site controls such as a bund or silt fence.

Maintenance

- Ensure that your catchpit protection remains effective by checking it once a week and following large rain events.

**03** **Drain/Catchpit Protection** NTS
Sediment and erosion control guideline




How?

- Correct installation of a silt fence is critical to its performance. To be effective a silt fence needs to:
  - be installed in a trench 200mm deep by 100mm wide.
  - have waratahs or posts hammer-staked at least 400mm deep on the downhill side of the fabric, no more than 2m apart.
  - be 600mm high above the ground, with an additional 200mm of cloth below ground in the trench.
  - have each end of the fence return up the slope by roughly 2m to prevent water going around the edges.
  - be anchored by backfilling the trench and placing soil on top of the fabric.
  - it is recommended that woven 100-micron geotextile cloth is used.
  - weedmat and other materials (including tarpaulins) do not work properly as silt fences and should not be used.

Why?

- A silt fence is a temporary barrier used to intercept dirty water and retain sediment on site.
- A silt fence is installed around the downhill side of your site to contain sediment – to ensure that when rainfall events occur, muddy water stays behind the fence.
- Silt fences should be used for containing stockpiles of earth or other areas of disturbed soil or clay on your site.

Maintenance

- Inspect silt fences at least once a week and after a rain event. Fences should also be checked for wind damage.
- Remove accumulated sediment to a secure area when it reaches 50% of the fabric height. This will reduce pressure and allow for adequate sediment storage.
- Check the integrity of the fence to confirm effectiveness - replace or reinstate where required.
- A silt fence should remain in place until the site is stabilised or the exposed area is less than 100m ².
- Where water ponds behind the fence, extra support should be provided.

**04** **Silt Fences** NTS
Sediment and erosion control guideline

| | | | | | |
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| Surveyed: | LOSC | | | | |
| Designed: | PW | | | | |
| Drawn: | JLB | 01 | FOR CONSENT | PW | NOVEMBER 2024 |
| Checked: | PW | Rev | Revision Details | Approved by | Date |



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JOHNSTONE CONSTRUCTION

Project Title: HUGH JOHNSTONE 142 KONINI ROAD, AUCKLAND - SED

Sheet Title: GENERAL SEDIMENT CONTROL SHEET 02

Job #: 24106

Scale (A3 Original): As Shown

Client Drawing #:

Sheet #: EC02

Rev No: 01

## Appendix B

- **Photographs**

**Photos taken by Peter from Walker Engineering Consultants on the 10th September 2025:**

Picture 1: Current driveway gravel area (2)

Picture 2: Current driveway gravel area


Picture 3: Current Gravel Carpark

Picture 4: Decking area (2)

Picture 5: Decking area

Picture 6: High tank orifice size

Picture 7: Higher Tank in Place but not backfilled

Picture 8: Higher tank orifice size which is to be verified by contractor to ensure 20mm diamater orifice.

Picture 9: Higher tank stormwater overflow area

Picture 10: Lower Overflow area

Picture 11: Lower Tank not yet in place

Picture 12: Timber retaining wall by garage (2)

Picture 13: Timber retaining wall by garage

Picture 14: Vegetation on southeast (2)

Picture 15: Vegetation on southeast

Picture 16: Vegetation on south

## Appendix C

- **Post Construction Observation Report**

WALKER ENGINEERING CONSULTANTS

**142 Konini Road, Extensions – Post Construction Observation Report**
**Timber Retaining Wall Post Holes**

**Date: 26/11/2024** **Time: 2:45 pm – 3:30 pm** **Job No: 24106**

**Involved:** Peter Walker (Walker Engineering– Chartered Professional Structural & Geotechnical Engineer)
Hugh Johnstone (Johnstone Construction) - Present
Daniel Zhuang (Walker Engineering– Structural Engineer)- Present

| ITEM | DESCRIPTION/STATUS | ACTION BY |
|---|---|---|
| 1. | **Purpose of visit/Type of inspection being observed:**<br>a) Physical inspections of the site are required to verify design assumptions and materials used for the proposed dwelling alterations. Walker Engineering Consultants (WEC) have been engaged to complete post construction observations of the structural and geotechnical engineering aspects.<br>b) Hugh Johnstone is the owner and client. Walker Engineering Consultants completed the designs of the various dwelling components. Hugh Johnstone is the main contractor completing the construction of the concrete foundations, timber members, piles, and retaining walls.<br>c) This inspection was conducted to review the augured timber poles of the retaining wall at the garage location. The inspected items include borehole depth, spacing, embedment, and the verifications of the design assumptions regarding retaining wall front slope (As per Figure A and B). In summary, construction is as per the design drawings. Relevant designs drawings are Sheet T01, T02, by WEC and Drawing No.3368 – BC – 01 by TechniTrades. | Noted |

| TIMBER RETAINING WALL AT GARAGE | | | | | | |
|---|---|---|---|---|---|---|
| Timber Pole Retaining Wall Type (See Plan Drawings) | Wall Type 1 | | | | | |
| Retained Height H2 (mm) | 2600 | 2400 | 2000 | 1600 | 1200 | 800 |
| Pole diameter SED (mm) | 325 | 300 | 275 | 225 | 175 | 150 |
| Pole spacing SP (mm) | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 |
| *Estimated depth to "good ground" to be verified during construction G (mm) | 0 | 0 | 0 | 0 | 0 | 0 |
| Embedment Depth L (mm) | 4800 | 4400 | 3800 | 3000 | 2300 | 1600 |
| Maximum retained height H2+G=H (mm) | 2600 | 2400 | 2000 | 1600 | 1200 | 800 |
| Total Pole Length H+L (mm) | 7400 | 6800 | 5800 | 4600 | 3500 | 2400 |
| Timber lagging thickness (mm) | *See Note 1 | | | 50 | 50 | 50 |
| Minimum concrete diameter if applicable (mm) | 600 | 600 | 600 | 450 | 450 | 350 |
| Minimum design front slope | 1:3 | 1:3 | 1:3 | 1:3 | 1:3 | 1:3 |
| Maximum design back slope S (ratio) | 1:10 | 1:10 | 1:10 | 1:10 | 1:10 | 1:10 |
| Design surcharge (kpa), Static Load | 5kpa | 5kpa | 5kpa | 5kpa | 5kpa | 5kpa |

*Figure A: Retaining Wall Specification*

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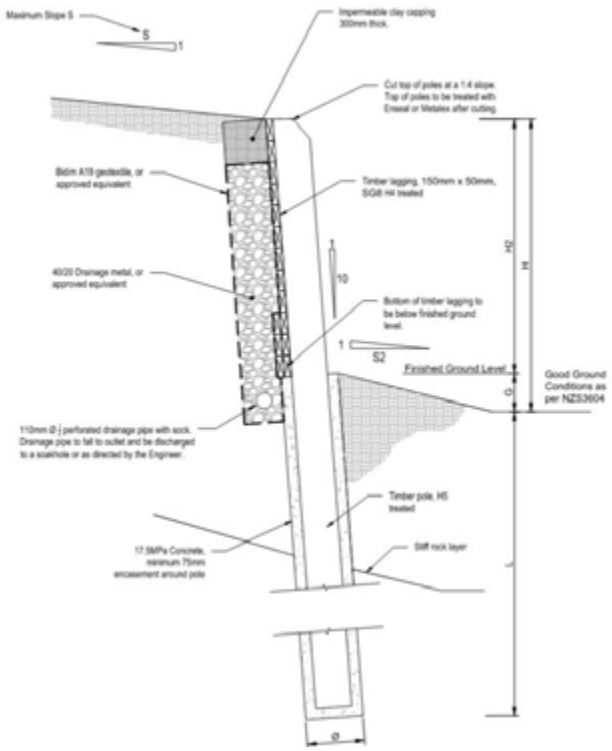
Auckland, 1021

| ITEM | DESCRIPTION/STATUS | ACTION BY |
|---|---|---|
| |  <br>*Figure B: Retaining Wall Detail* | |
| **2.** | **Outcome/Observations:**<br>a) The front slopes of the retaining walls on the northern side were as per the design intent and within the specification on the drawing. It was discussed that the retaining heights needed to be reviewed after backfilling was completed due to it being challenging to review during augering the poles. The later reviews are required to assess net retaining heights and the front slope criteria. The pole specifications for this area were 300SED poles within 600mm dia holes founded 4m deep into the ground and at a spacing of 1200mm. A review must be completed after the backfill and before the top concrete foundation is poured.<br>b) On site reviews of the augered holes were done, and the borehole diameters and spacings were in accordance with the drawings as per Figures A, and B. | Noted |
| **3.** | **Instructions/discussions with Contractor:** (incl. Actions required, requests)<br>a) As per item 2a), detailed reviews are required on site before pouring the concrete. Consent to be in place before carrying out further works. | Contractor |

| ITEM | DESCRIPTION/STATUS | ACTION BY |
|---|---|---|
| **4.** | **Details of Changes identified and follow-up work:**<br>a) Future Engineering Inspection Requirements as per Engineering New Zealand's CM2 requirements, which cover the following aspects:<br>1. Completed inspections for drainage, lagging boards and balustrade.<br>2. Detailed review of fill prior to pouring concrete driveway and any foundations.<br>3. Review of all specific engineering items prior to closing up.<br><br>b) As discussed, a building consent is required prior to undertaking construction in order to enable issuance of formal site inspection reports referencing a valid Building Consent (BC) number.<br><br>This report is limited to **post-construction observations** only and does not constitute approval, certification, or sign-off of compliance under the Building Act or NZ Building Code. We are unable to provide a PS4 for work that is not consented. Based on our observations, the constructed work aligns with the relevant design drawings and appears to align with the NZ Building Code; however, final compliance is subject to council approval through the Building Consent or Certificate of Acceptance process. | Contractor |
| **5.** | **Other Items: (**incl. QA documentation by Contractor, sketches by Contractor)<br><br>a) PS3 has been provided by the contractors, and the following quality info also need to be provided:<br>1) Proof of backfill tests behind the retaining wall. | Contractor |

Prepared and Reviewed by:

.....

Daniel Zhuang
**Structural Engineer**

MEngNZ, B. Eng(Civil)(Hons), M.Engst (Civil) (1st Hons)

Approved and Reviewed by:

.....

Peter Walker
**Director – Chartered Structural & Geotechnical Engineer**
CPEng, CMEngNZ, IntPE, B.Eng(Civil)(Hons), M.EngNZ (Civil/Geotech) (1st Hons)

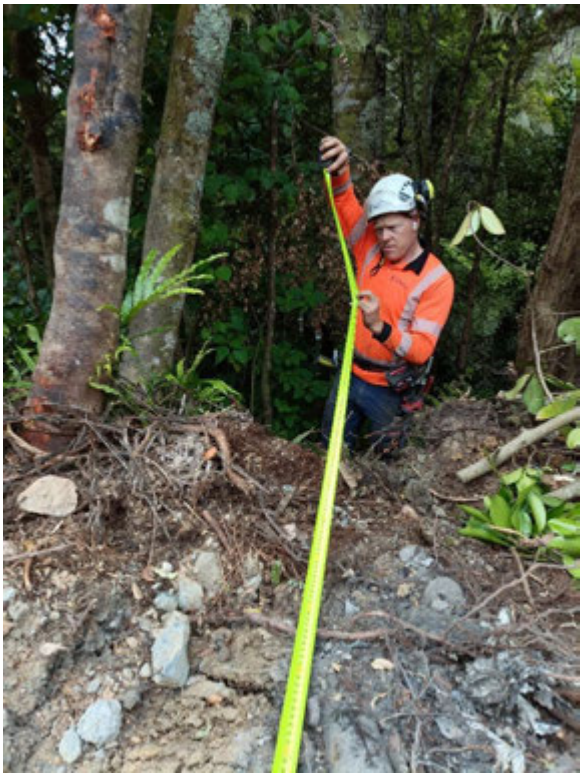
**PHOTOS**

Picture 1: IMG20241126145550

Picture 2: IMG20241126145640

Picture 3: IMG20241126145643

Picture 4: IMG20241126145657



Picture 5: IMG20241126145741

Picture 6: IMG20241126145812

Picture 7: IMG20241126145818

Picture 8: IMG20241126145834

Picture 9: IMG20241126145851

Picture 10: IMG20241126145934

Picture 11: IMG20241126145936

Picture 12: IMG20241126145951

Picture 13: IMG20241126145954

Picture 14: IMG20241126150016

Picture 15: IMG20241126150110

Picture 16: IMG20241126150223

Picture 17: IMG20241126150312

Picture 18: IMG20241126150337

## Appendix D

- **Photographs illustrating rectified works**

**Photos taken by Hugh from Johnstone Construction on the 21st of September 2025:**

Item Resolved:  Subsoil Outlet Position for Timber Retaining Wall

Picture 17: 1 Subsoil Outlet Exposed

Picture 18: 2 Subsoil Outlet Connected

Picture 19: 3 Subsoil pipe extensions into dense vegetation (2)

Picture 20: 3 Subsoil pipe extensions into dense vegetation (3)

Picture 21: 3 Subsoil pipe extensions into dense vegetation

Picture 22: 4 Subsoil exit into dense bush (2)

Picture 23: 4 Subsoil exit into dense bush

## Appendix E

- **Stormwater Report**

WALKER ENGINEERING CONSULTANTS

4 November 2024 **WECL Project Reference: 24106**

Hugh Johnstone
142 Konini Road,
Titirangi, Auckland 0604

Attention: Hugh Johnstone

**Stormwater Design Report for Proposed Alteration and Addition at 142 Konini Road, Titirangi**

## 1. Introduction

Walker Engineering Consultants Limited (WECL) has been engaged by Hugh Johnstone to prepare a Stormwater Design Report to support the proposed residential development at 142 Konini Road, Titirangi, Auckland 0604. The proposed development entails the alteration of a 2-story building and extending the existing structure while adding a new garage, pool, and pool house. This stormwater report covers the site's building works, as shown in the architectural plans.

This assessment demonstrates the pre-development versus post-development areas relating to the change on the property and the difference in stormwater runoffs between the results. The assessment demonstrates how attenuation tanks can be installed to ensure that there will be no negative off-site or downstream stormwater effects as a result of the new structures and the associated increase in impermeable areas on the site. The design recommendations provided in this report are given to ensure that the proposed development is compliant with the local council's requirements.

The report provides an explanation of the design philosophy, the site's features, the existing information, the proposed systems, and how they apply to the designs. Producer Statements PS1 can be found in Appendix A. The drawings providing the layouts and specifications are illustrated in Appendix B. Detailed calculations & reports are included in Appendix C.

## 2. Site Description

The site currently includes an existing dwelling with decks, footpaths, driveways, pools, carports, and sheds (Refer to Figure 2). There existing dwelling has existing storm water systems that links up with the public storm water networks. There has been no signs of flooding in the area and this is due to the property being on a hill with natural slopes down into various surrounding storm water systems. Surrounding existing storm water systems can be found on the council's map information.

The current system collects the surrounding overland and impermeable area water runoffs, which include existing roof areas, footpaths, driveways, decking, and surrounding grass areas.

Currently, the site slopes down from the south to the north. The difference in ground height between each end of the property is about 12000mm maximum in some areas, making the gradient about 1:5.5 (18%).

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*Figure 1: Existing site and Public Pipe*

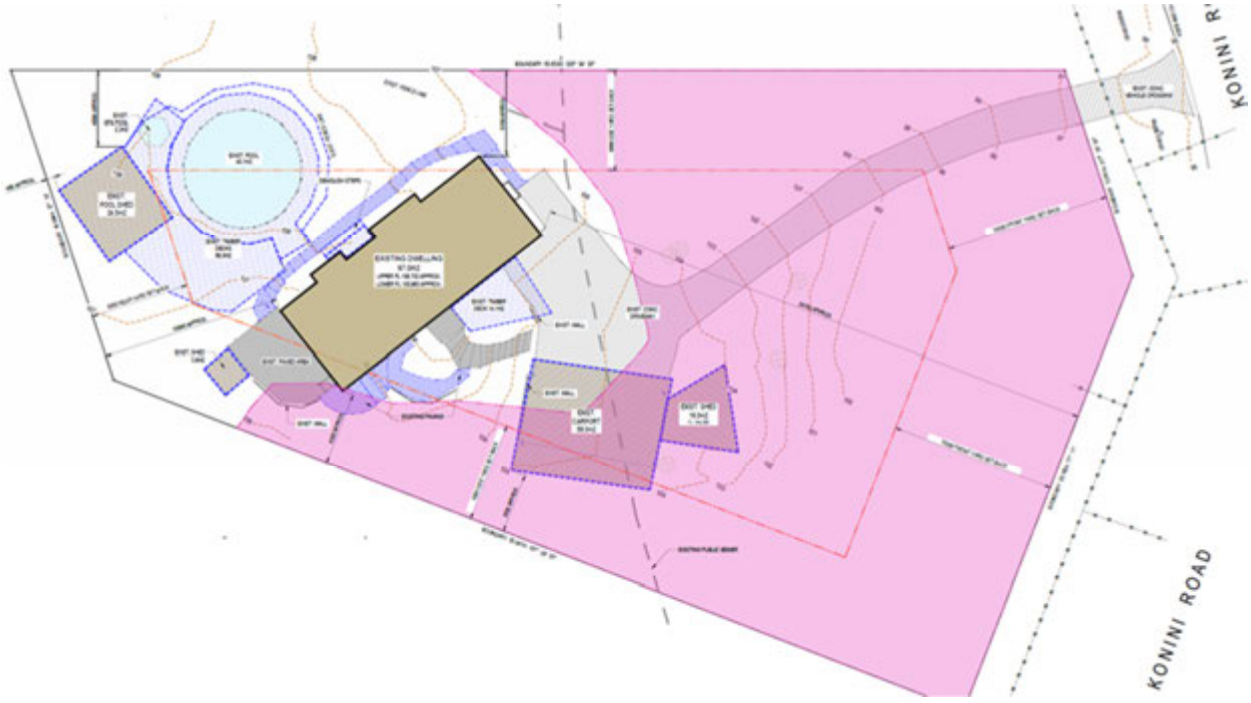


*Figure 2: Existing Dwelling*


*Figure 3: Concept Drawing of the Proposed New Dwelling*

## 3. The Proposal

The proposed dwelling extension concept is shown in Figure 3. Figure 2 illustrates the current existing structures on the site. A new pool house and new pool, which includes a decking area, is proposed on the southern side of the existing building. The proposed new pool is to replace an existing pool. A new garage is proposed to replace the existing carport and storeroom and is located on the northern side of the existing dwelling. It is proposed that the new and existing roof be discharged to the attenuation tank and piped toward the closest outlets to manage the increase in roof areas. The existing driveway will be similar to before but slightly increased in width. The runoff from the increase in width has been compensated in the storm water design philosophy due to the entire existing roof area being now included in the detention tank designs thus reducing overall runoff on the site.

The assessments of the proposed layouts have been completed, making use of well-known engineering principles and methods and New Zealand's codes and standards. Design calculations have been completed to demonstrate compliance, as shown in the appendices. The assessments have been designed to the following Standards and Recommendations:

**Table 1: Design Standards and Reference**

| Item | Reference |
|---|---|
| Stormwater Assessments: | -E1/VM1 Verification Method<br>-Stormwater Management Guidelines for the Auckland Region<br>-NIWA, HIRDS New Zealand Data Base<br>-Proprietary Product Information of Storage System |
| Computer Programs to aid in assessments: | -In-House Microsoft Excel or Smath Studio spreadsheets |
| Other design best practices deemed suitable to complement the above standards. | |

This assessment was prepared based on the following sources of information:

- Technitrades Architecture: Drawing Layouts and site plan, October 2024 (drawing ref: 3368-RC-01, 3368-RC-02)
- Auckland Council – GIS Mapping Service.

The project entails various onsite conditions, such as the ground and extent of gradients.

## 4. Stormwater Runoff Reviews

A review of pre-development versus post-development stormwater runoff was completed for the site, considering the existing features. Detailed design calculations are shown in Appendix C. Given that the site has a significant height drop, the site was divided into a higher part and a lower part, as per Figure 4 (the purple line indicates the boundary between the two parts). A storm water review was conducted for both areas to ensure the tank sizes and specifications were appropriate to minimize overall discharge flows into the existing storm water networks. Tables 2, 2A, 3 and 3A summarise the assessment philosophy. The assessment assumes the following:

1. Site's Runoff Values as per NIWA + 20% to allow for climate change (a common approach used by engineering practitioners).
2. Niwa water rainfall depths of **17.1mm** for 10 minutes AEP and **40.3mm** for 1 hour 10% AEP.
3. Further considerations have been completed as per the attached detailed calculations.

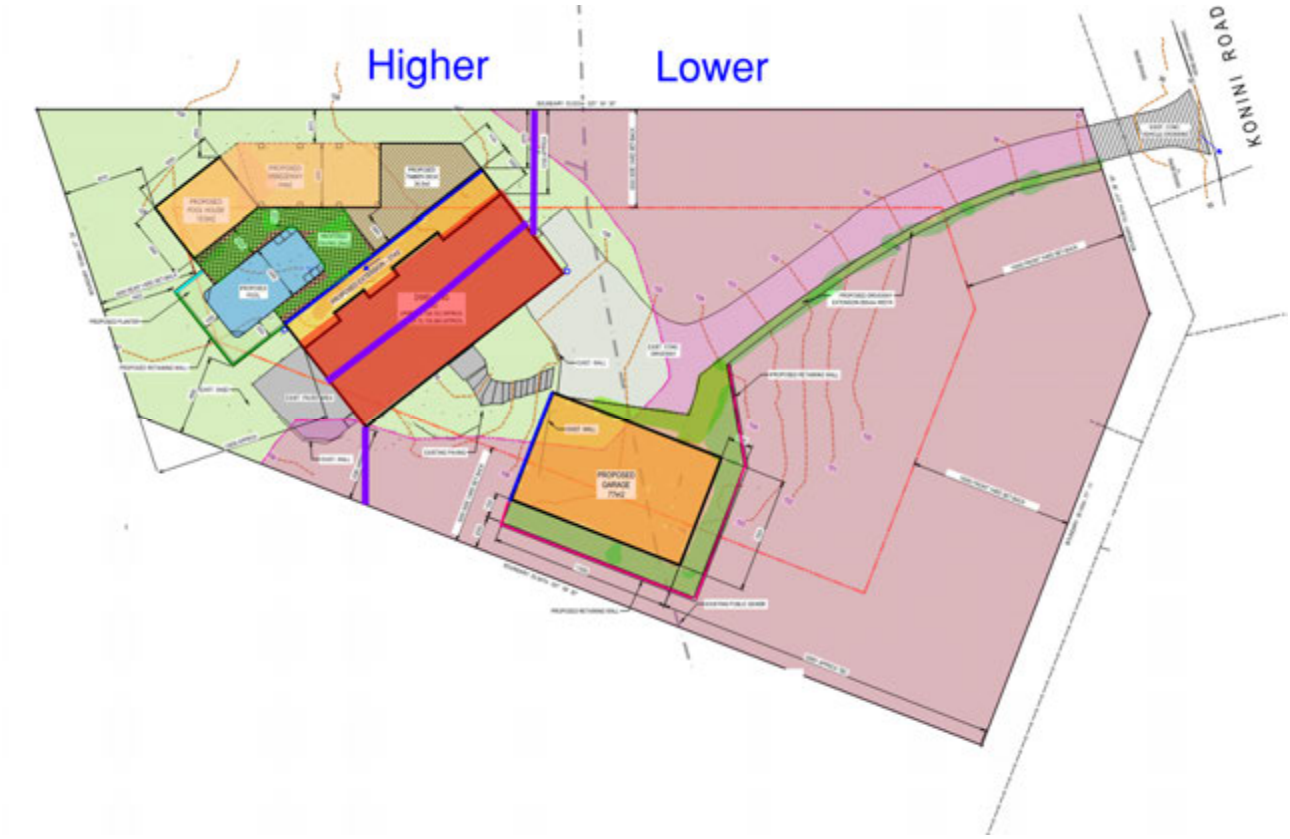


*Figure 4: Site Divided into Two parts*

**Table 2: Schedule of Pre-development and Post development areas (Higher Part)**

| Site Coverage Areas | Pre-Development Area (m2) | Post Development Area (m2) |
|---|---|---|
| Dwelling | 72 | 116 |
| Pavements | 36 | 48 |
| Pervious | 357 | 320 |
| Total Site Area: | 465 | 465 |
| *Note: Values are approximate based on the information provided* | | |

**Table 2A: Schedule of Pre-development and Post development areas (Lower Part)**

| Site Coverage Areas | Pre-Development Area (m2) | Post Development Area (m2) |
|---|---|---|
| Dwelling | 127 | 139 |
| Pavements | 147 | 215 |
| Pervious | 759 | 679 |
| Total Site Area: | 1033 | 1033 |
| *Note: Values are approximate based on the information provided* | | |

**Table 2B: Summary of Pre-development and Postdevelopment Areas – Impermeable Area Specific**

| Site Coverage Areas | Pre-Development Impermable Area not assigned to Tanks (m2) | Post Development Impermable Area (m2) | Assigned Impermable Area to Tanks (m2) | Post Development Impermable Area not Assigned to Tanks (m2) |
|---|---|---|---|---|
| Higher | 108 | 164 | 145 | 19 |
| Lower | 274 | 354 | 139 | 215 |
| Totals: | 382 | 518 | 284 | 234 |
| *Note: Values are approximate based on the information provided* | | | | |

**Table 3: Peak Discharge Summary Calculations for Pre & Post-Development (Higher) – Tank Impermeable Areas**

| Pre-development:<br>Peak Flow Rate for a 10min, 10% AEP Event (l/s) | Post – development + Tank<br>Peak Flow Rate for 10min – 60min, 10% AEP Event (l/s) |
|---|---|
| 1.24 | 1.08 |

**Table 3A: Peak Discharge Summary Calculations for Pre & Post Development (Lower) – Tank Impermeable Areas**

| Pre-development:<br>Peak Flow Rate for a 10min, 10% AEP Event (l/s) | Post – development + Tank<br>Peak Flow Rate for 10min – 60min, 10% AEP Event (l/s) |
|---|---|
| 1.19 | 1.05 |

In summary, the post-development volume runoff discharge was initially found to be more than the pre-development stormwater due to the addition of the impermeable roof area. However, an attenuation stormwater tank has been specified to ensure post-development is below pre-development runoffs and to ensure the tank can withstand high rainfall runoffs. The approach ensures that there is some consideration for secondary flows and extreme events. An overflow piping system will be required on site from the tank to a nearby outlet to tie into the public systems. A qualified drain layer will be required to finalize the overflow connections to the public systems.

## 5. Storm Water Attenuation Assessments and Reviews

The following was found through completing the reviews:

1. Due to the soil possibly not being appropriate for a soakage pit, an attenuation tank was recommended to ensure that post-development discharge equals or is less than pre-development discharge.

2. The attenuation tank will ensure the council's requirements is followed to mitigate measures of poorly drained soils. The tank volume must be sized for a minimum of 10 minutes, with a 10% AEP rainfall event for the site. The tank has been sized to consider a 1hr duration, 10% AEP rainfall event, and is thus considered appropriate.

3. It is noted that the post-development discharge is more than the pre-development discharge without the installation of an attenuation tank. Therefore, two **5000L** attenuation tanks have been specified to increase the stormwater capacity of the lot and reduce heavy flow into the existing stormwater network. One will be installed in the higher part of the existing site below the dwelling, and the other will be installed near the driveway of the lower part of the site. The approach significantly improves the stormwater capacity for the site and the public stormwater system and ensures that post-development discharge is less than the pre-development discharges, according to the council guidelines.

4. As per Table 2B's summary results, the tanks have considered the difference in post- and pre-development impermeable areas and some existing impermeable areas to significantly reduce the overall post-development impermeable area on the site compared to what existed. Refer to columns 2 versus 5 in Table 2B outlining the removal of >150m2 impermeable areas from the existing stormwater system and into the tanks to reduce flow rates and increase detention tank storage. This results in the requirement for two tanks to ensure a conservative stormwater system is specified for the new and existing site.

5. The tank size has been designed based on a runoff coefficient of 0.9. The design parameters used for the calculations are based on a maximum storage depth of 1504mm for the tank below the dwelling and 1430mm for the tank near the driveway. With the proposed tank sizes, the orifice diameter is 20mm for both tanks. At the largest storage volume and highest water head, the maximum flow will be 1.08L/s. The flow rates are low and typical for detention tanks. Attached in Appendix B is a diagram showing the calculated dimensions and configuration. It is assumed that the remainder of the details will be confirmed on-site with the tank installer.

6. As a safe and conservative measure, calculations have been completed to demonstrate that the tank can withstand the 10min duration and 1hr duration, 10% AEP rainfall volumes from the entire new roof for the proposed dwelling. The primary flow due to the 10-year storm event to the existing stormwater network will be much less than that of pre-development. In addition, the tank sizing will ensure that post-development runoffs from a 100-year storm event will be less than the pre-development 100-year storm event. Secondary flows from the driveway and grass areas and larger storm events will naturally flow into the existing public stormwater network.

7. The assessment demonstrates that two **5m3** tanks discharging through **20mm** orifice outlets provide the necessary attenuation to mitigate any downstream or off-site effects in both primary and secondary storm events.

## 6. Recommendations and Conclusions

Walker Engineering Consultants Limited (WECL) completed a review of the proposed stormwater systems for the proposed development at 142 Konini Road, Titirangi, Auckland 0604. Two attenuation tanks have been specified to reduce the discharge from the site to a peak rate less than that of the pre-development scenario. The design enables the proposed development to meet the stormwater requirements for the site by mitigating the flow from the 10-year and 100-year storm event generated from the developed site in accordance with the council's requirements, specifically:

The attenuation tanks were designed to mitigate stormwater peak flow rate from the post-development back to well below the pre-development level.

Installation of the proposed two **5000L** Promax (or similar) attenuation tanks for the proposed dwelling, which shall receive runoff from the proposed dwelling and garage, has been designed to meet the mitigation requirements. The following is noted:

a. The tanks shall have **20mm** diameter orifice outlets at the base set 100mm min above the base of the tank or as per the manufacturer's details.
b. The tanks shall have a 100mm diameter sealed piped overflow installed at the top of the tanks to direct overflow to the council stormwater reticulation system through the proposed connection.
c. Other combinations of storage attention tanks and orifice sizes may also be suitable, provided that the peak discharge rate can be demonstrated to be equivalent. For alternatives, a detailed design of the stormwater disposal solution must be presented as part of the subsequent building consent, and any variation from what is described in this report shall be prepared and/or reviewed by a suitably qualified stormwater designer.

Operation and maintenance of the tank is to be done in accordance with the manufacturer's requirements (Refer to Appendix B). A registered drain layer is to install the tank and associated drainage in accordance with the manufacturer's standards and requirements.

## 7. Applicability

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

If you require any further professional services or have any queries, please contact us.

**Quality Control:**

Prepared and Reviewed by:

.....

Daniel Zhuang

**Structural & Civil Engineer**

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**Date:** 4 November 2024
**E: daniel@walkereng.co.nz**

Approved and Reviewed by:

.....

Peter Walker

**Director – Chartered Civil Structural & Geotechnical Engineer**

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**Attachments:**

- Appendix A – PS1, Certificate of design work
- Appendix B – Drawings and Engineering Specifications
- Appendix C – Design calculations
- Appendix D – Drawings and information provided by the client

## Appendix A

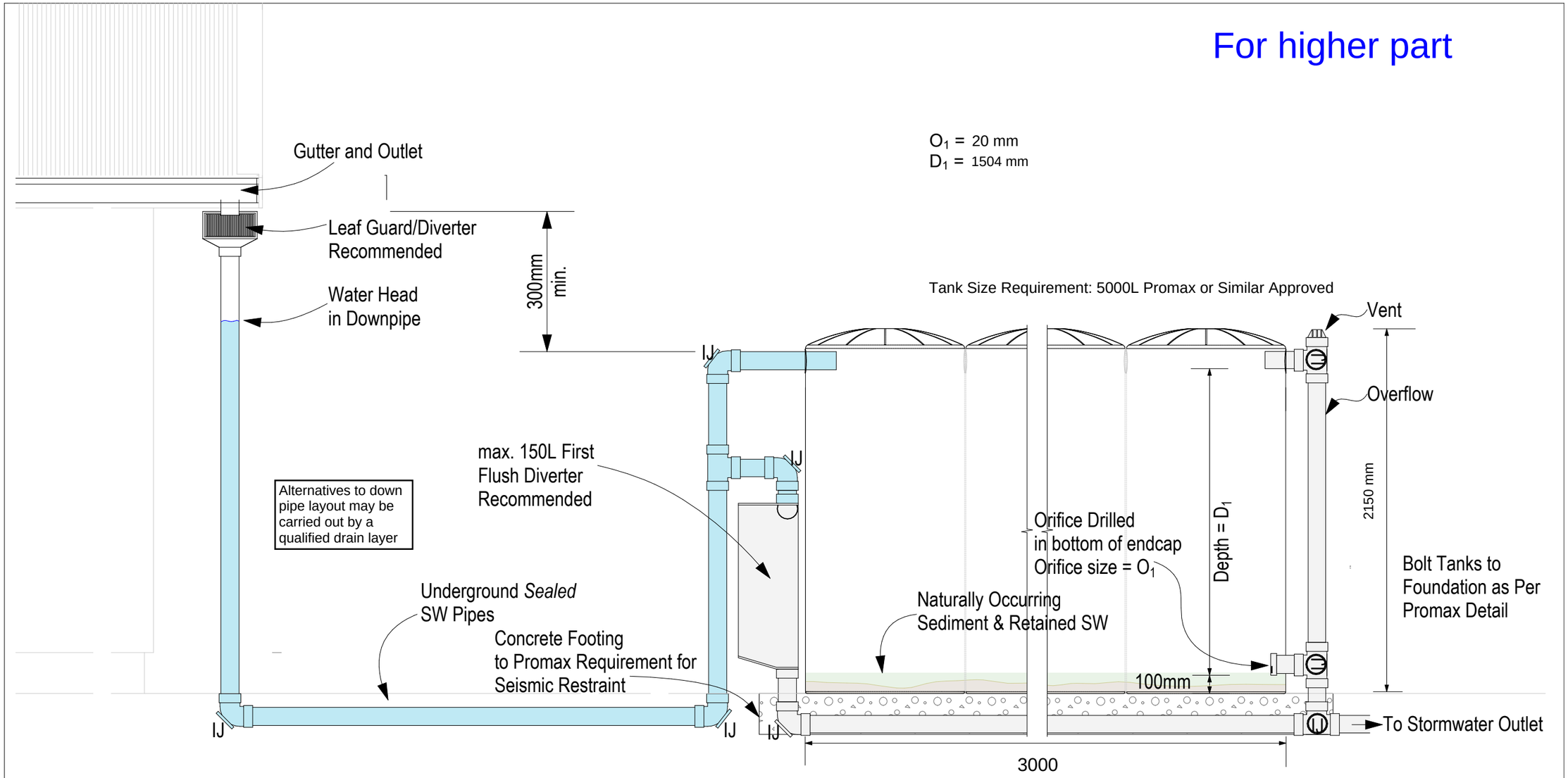
- **PS1, Certificate of design work**
  **(Note: If the document is not embedded in the report, refer to separate PDF files)**

## Appendix B

- **Drawings and Engineering Specifications**
  **(Note: If the document is not embedded in the report, refer to separate PDF files**

| Specification Contents: | Item: |
|---|---|
| Site specific Drawing Detail – Orifice, Tank Specifications | 1 |
| Site specific Drawing Detail –Tank Foundation Specifications | 2 |
| Tank Product Specification | 3 |
| Operation and Maintenance Schedule | 4 |
| Seismic Foundation Specification | 5 |

For higher part

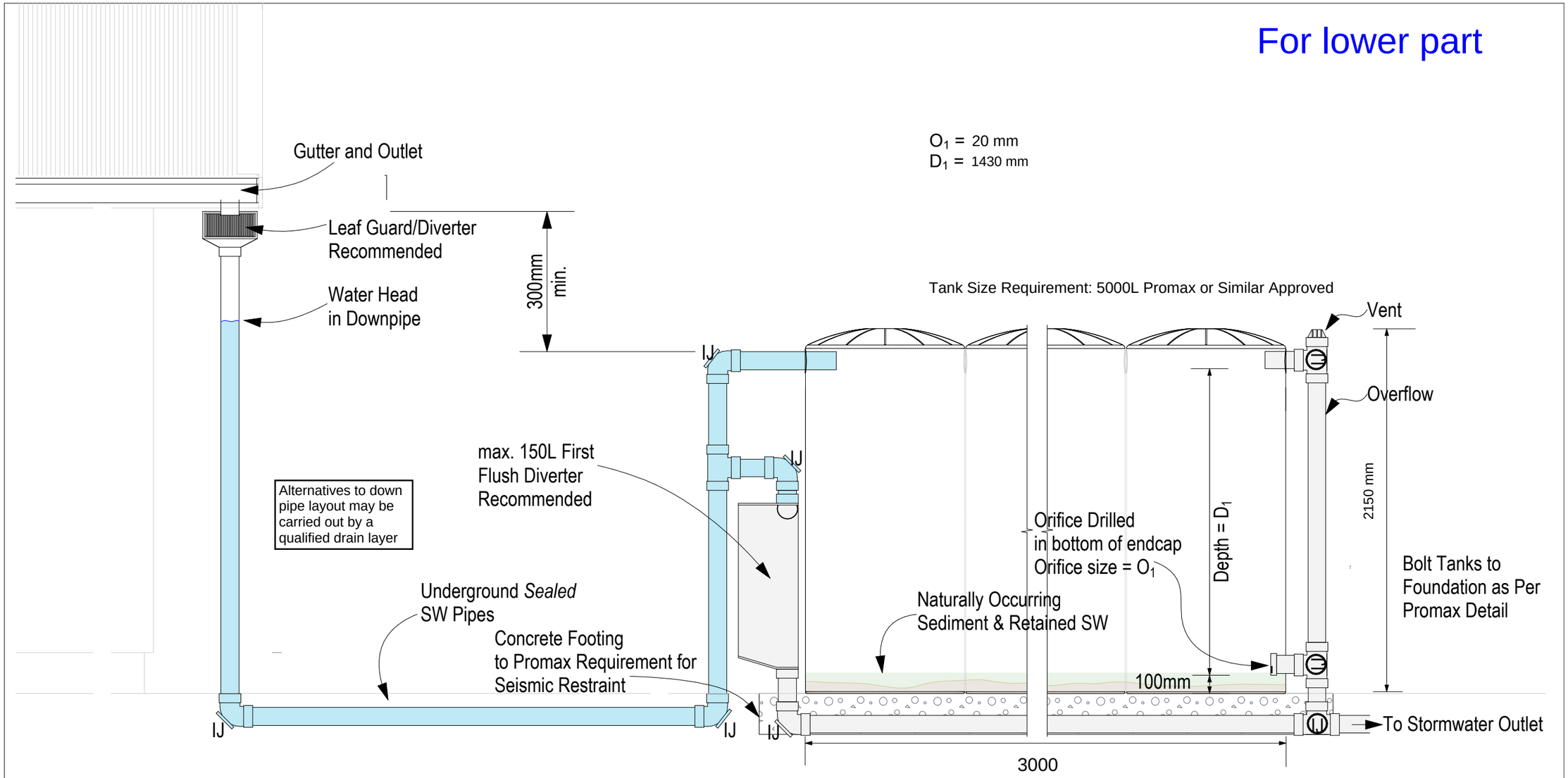



TYPICAL ATTENUATION (RETENTION) RAIN WATER TANK SETUP

**E1 - SW Attenuation & Connection 1/2**

Sheet: SK1

For lower part




TYPICAL ATTENUATION (RETENTION) RAIN WATER TANK SETUP

**E1 - SW Attenuation & Connection 1/2**

Sheet: SK2

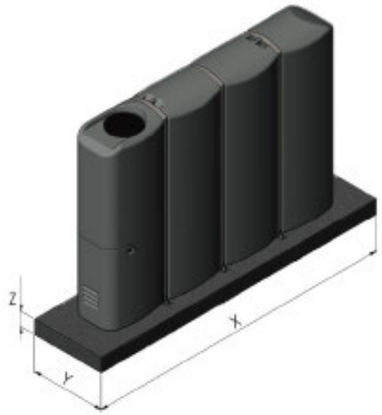
# Slimline Installation to meet Seismic Specification (0.39 CDT)

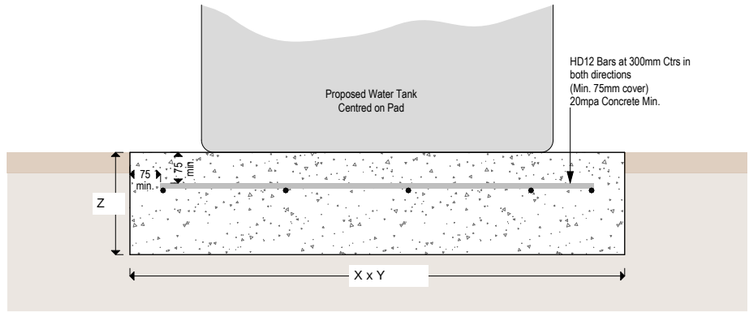
Promax
LIQUID MANAGEMENT SOLUTIONS

## 1. Concrete base

- Concrete must be 20 MPA or higher.
- Reinforced with HD12 bars @ 300mm Centres, 75mm cover.

| CAPCITY | X | Y | Z |
|---|---|---|---|
| 1000L | 2250mm | 610mm | 150mm |
| 2000L | 2250mm | 870mm | 150mm |
| 3000L | 3000mm | 870mm | 250mm |
| 5000L | 3000mm | 1210mm | 250mm |

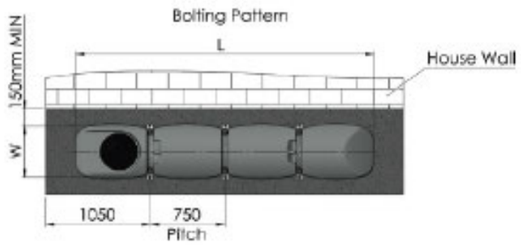



02 PAD SECTION 1:15

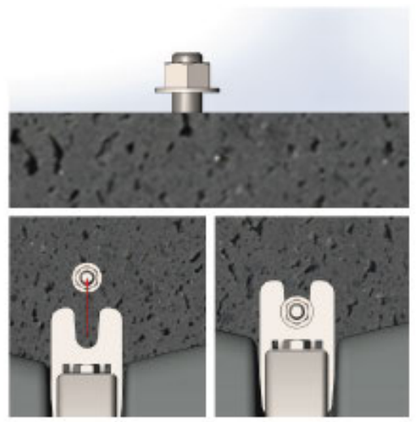
## 2. Marking

- Mark out the bolting pattern for the Slimline tank onto the concrete pad.
- Allow minimum 150mm between tank and house wall or fence.
- 1000L : W = 320mm
- 2000L : W = 520mm
- 3000L : W = 520mm
- 5000L : W = 860mm




## 2. Bolting

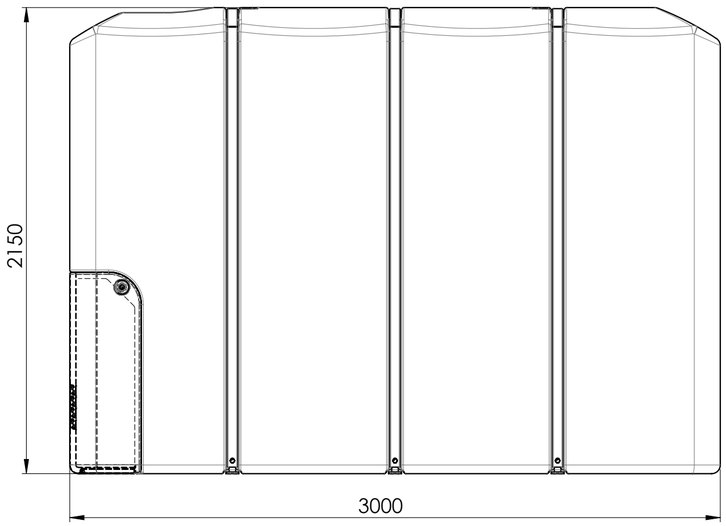
- Drill the 3 x 18mm holes in concrete for Spatec bolts closest to house/fence.
- Insert 12mm Spatec bolts and thread on the nut allowing approximately 12mm between the concrete and the underside of the nut.
- Position Slimline tank on the concrete pad and push the tank sideways towards the house wall/fence until the Slimline tank feet are held captive by these nuts.
- Now drill the remaining three bolts on the outside of the Slimline tank, insert and tighten the nuts on the feet of the tank.

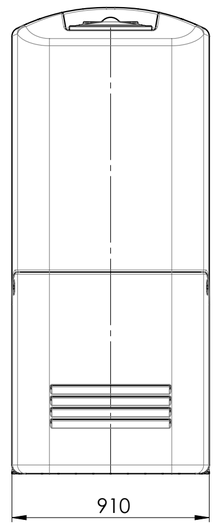


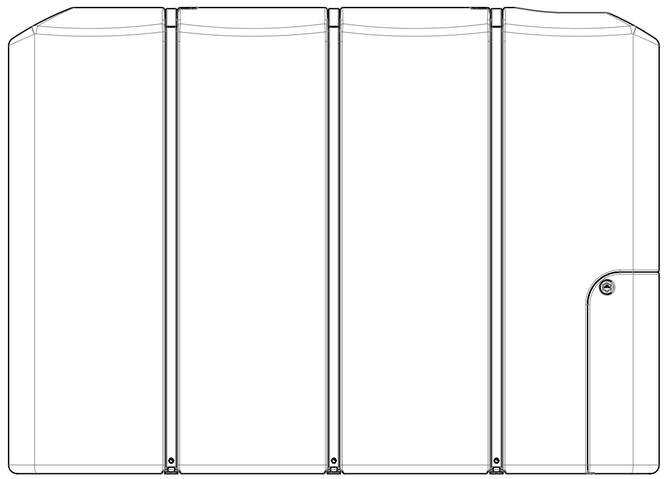
**E1 - SW Attenuation & Connection 2/2**

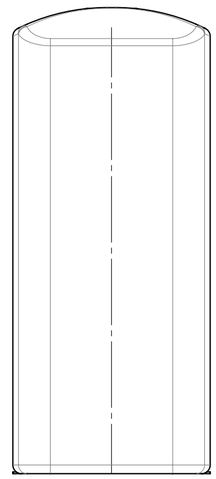
Sheet: SK3

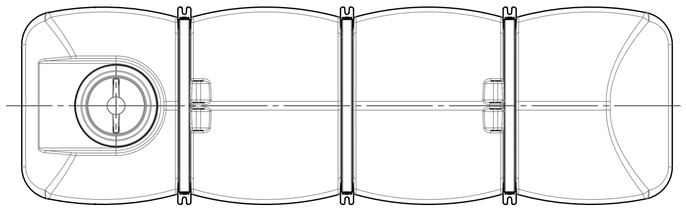
| Job Customer: | Title: | Ref: |
|---|---|---|







| FITTINGS LAYOUT TABLE | | | PARTS LIST | | |
|---|---|---|---|---|---|
| NOZZLE No | PE SIZE | DESCRIPTION | Part NO. | Name | Q-ty |
| N1 | | | | | |
| N2 | | | | | |
| N3 | | | | | |
| N4 | | | | | |
| N5 | | | | | |
| N6 | | | | | |

NOTES:

| DATE | CLIENT APPROVAL SIGNATURE |
|---|---|
| | |

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MILLIMETERS
SURFACE FINISH:
TOLERANCES:
LINEAR:
ANGULAR:

FINISH:

DEBURR AND BREAK SHARP EDGES

DO NOT SCALE DRAWING

REVISION

promax ENGINEERED PLASTICS

| | NAME | SIGNATURE | DATE |
|---|---|---|---|
| DRAWN | | | |
| CHK'D | | | |
| APPV'D | | | |
| MFG | | | |
| Q.A | | | |

MATERIAL:

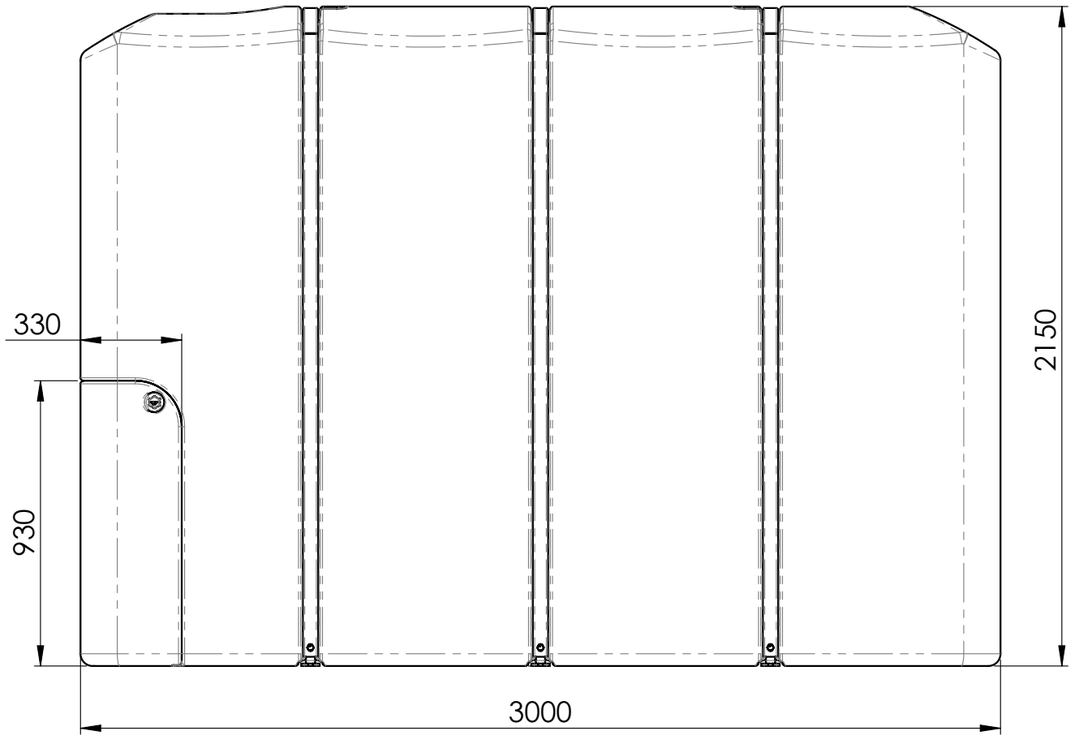
TITLE:
SLIMLINE TANK 5000L
NOZZLES LAYOUT

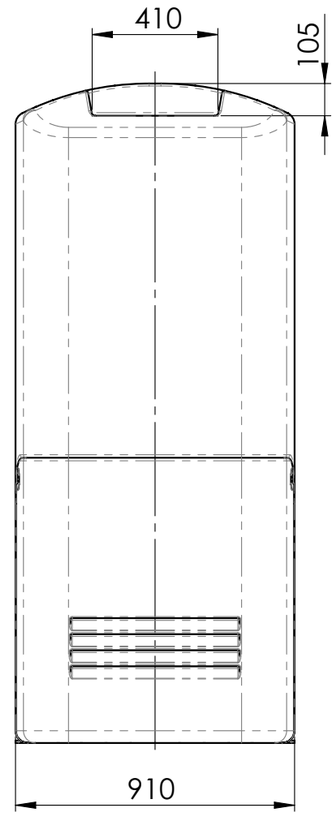
DWG NO.
SL1005000

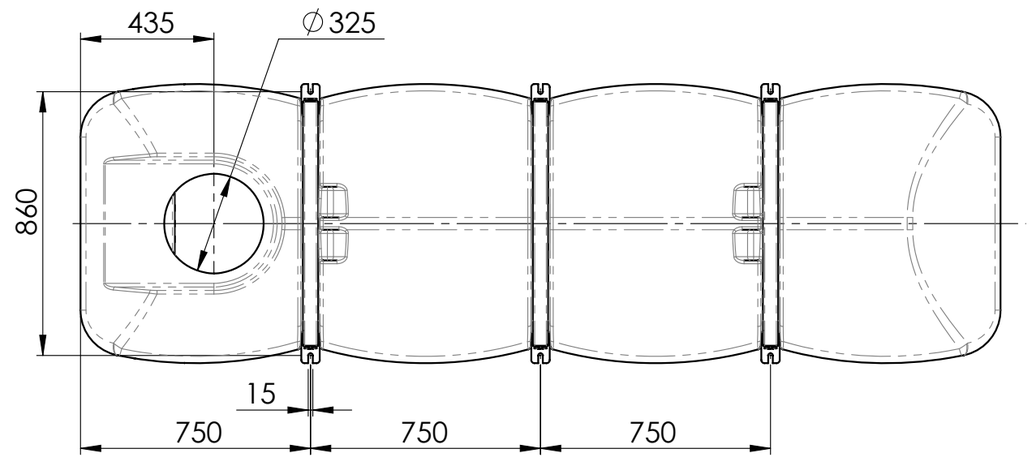
A2

SCALE:1:20

SHEET 1 OF 1

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|---|---|---|---|---|---|---|---|
| UNLESS OTHERWISE SPECIFIED:<br>DIMENSIONS ARE IN MILLIMETERS<br>SURFACE FINISH:<br>TOLERANCES:<br>LINEAR:<br>ANGULAR: | FINISH: | | | | | DEBUR AND BREAK SHARP EDGES | DO NOT SCALE DRAWING | REVISION |
| | NAME | SIGNATURE | DATE | | | | TITLE: SLIMLINE TANK 5000 LTR | |
| DRAWN | | | | | | | | |
| CHK'D | | | | | | | | |
| APPV'D | | | | | | | | |
| MFG | | | | | | | | |
| Q.A | | | | MATERIAL: ASSEMBLY | | | DWG NO. SL1005000 | A3 |
| | | | | WEIGHT: 252 | | | SCALE:1:20 | SHEET 1 OF 1 |

promax ENGINEERED PLASTICS

# OPERATION AND MAINTENANCE GUIDES

Promax
LIQUID MANAGEMENT SOLUTIONS

| | |
|---|---|
| **O&M For:** | **SL1005000** |
| **Date:** | July 2022 |
| **Code:** | SL1005000 |
| **Description:** | Promax Slimline Tank 5,000 Ltr |
| **Product Warranty:** | 5 years |

## SPECIFICATIONS

| | Length (mm) | Width (mm) | Height (mm) | Weight (kg) | Manhole Dia (mm) |
|---|---|---|---|---|---|
| | 3000 | 910 | 2150 | 260 | 350 |
| **Standard** | Includes 1x 25mm outlets<br>Complies with:<br>•AS/NZS 4020: Products in contact with drinking water.<br>•AS/NZS 2070: Plastics material for food contact use. | | | | |
| **Uses** | • Water Storage<br>• Retention/Detention Stormwater Management | | | | |
| **Statement** | In line with today's focus on Ecologically Sustained Development, Green Building Initiatives and 5 Star Ratings, Promax is committed to supplying quality Liquid Storage and Handling Solutions.<br>Promax Plastics confirms that if these tanks are installed according to Good Management practices set out in the Promax Installation Guides, they will perform as stated throughout their intended life. | | | | |

## MAINTENANCE

| Description | Action | Frequency |
|---|---|---|
| Tank Stability | Tank must remain level, foundation must not become eroded | Monthly |
| Tank Lid | Remains securely fitted | Bi-Monthly |
| Inlet/Outlet Fitting | Remains securely fitted with no leakage | Bi-Monthly |
| Pump | Check Pump, if fitted, for inlet screen blockages | Bi-Monthly |
| Sediment Build Up | Remains lower than base outlet – if outlet flow becomes restricted remove sediment with vacuum truck. Re-attach tank lid securely. | Half yearly or as necessary |

**Please note: Entry into this tank is at owners risk.**

**Authorised By:**
Promax Engineered Plastics Limited
PO Box 749, Kerikeri 0245, New Zealand
T: 0800 77 66 29
E: sales@promaxplastics.co.nz

promaxplastics.co.nz

# OPERATION AND MAINTENANCE GUIDES

Promax
LIQUID MANAGEMENT SOLUTIONS

**Responsibility:** The owner/s are responsible for maintenance of the tank.

**Post Storm Inspection:** Following a storm event it is recommended that a full tank inspection is carried out, please refer the maintenance section for guidelines on this.

**Debris removal programme:** If debris is identified in either a regular maintenance check or post storm inspection it is recommended that this is removed by a professional stormwater maintenance provider.

## MAINTENANCE RECORDS

| Date | Comments | Completed |
|---|---|---|
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promaxplastics.co.nz

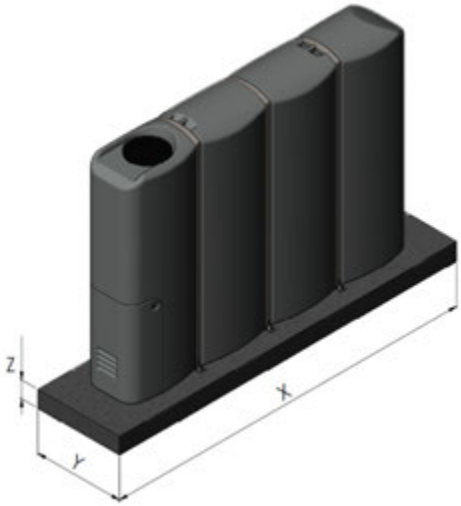
# Slimline Installation to meet Seismic Specification (0.39 CDT)

Promax
LIQUID MANAGEMENT SOLUTIONS

## 1. Concrete base

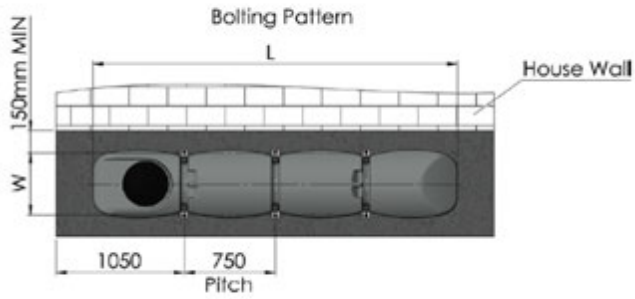
- Concrete must be 20 MPA or higher.
- Reinforced with HD12 bars @ 300mm Centres, 75mm cover.

| CAPCITY | X | Y | Z |
|---|---|---|---|
| 1000L | 2250mm | 610mm | 150mm |
| 2000L | 2250mm | 870mm | 150mm |
| 3000L | 3000mm | 870mm | 250mm |
| 5000L | 3000mm | 1210mm | 250mm |



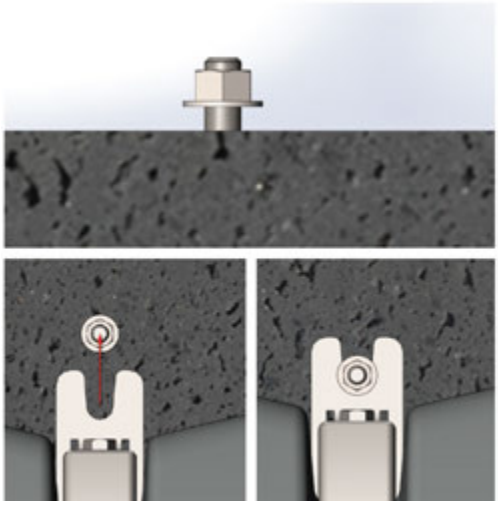

## 2. Marking

- Mark out the bolting pattern for the Slimline tank onto the concrete pad.
- Allow minimum 150mm between tank and house wall or fence.
- 1000L : W = 320mm
- 2000L : W = 520mm
- 3000L : W = 520mm
- 5000L : W = 860mm




## 2. Bolting

- Drill the 3 x 18mm holes in concrete for Spatec bolts closest to house/fence.
- Insert 12mm Spatec bolts and thread on the nut allowing approximately 12mm between the concrete and the underside of the nut.
- Position Slimline tank on the concrete pad and push the tank sideways towards the house wall/fence until the Slimline tank feet are held captive by these nuts.
- Now drill the remaining three bolts on the outside of the Slimline tank, insert and tighten the nuts on the feet of the tank.



**Contact our team:**
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E: sales@promax.co.nz

WALKER ENGINEERING CONSULTANTS

## APPENDIX C : DESIGN CALCULATIONS

| Design Calculation Contents: | Pages: |
|---|---|
| Design Report | 0 |
| PS1 and Certificates | A |
| 01 Detention Tank and Orifice Sizing Calculations | 1 |
| Pre-Development and Post Development Site Plan Markup | 2 |

**Quality Control:**

Prepared and Reviewed by:

.....


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**Date:** 4 November 2024

**E: daniel@walkereng.co.nz**


Approved and Reviewed by:

.....


Peter Walker

**Director – Chartered Civil Structural & Geotechnical Engineer**

CPEng, CMEngNZ, IntPE, B.Eng(Civil)(Hons), M.EngNZ (Civil/Geotech) (1st Hons)

**M: +64 (0) 22 534 4973**

**W: www.walkereng.co.nz**

**DETENTION TANK CALCULATOR** Rev Date: **7-Jun-16** HIRDS V3 figures **26-Jul-10** Calculated: **31-Oct-24**

**For Upper part**

**NOTES** This calculator assumes a **non-constant** rate of rainfall, as shown in the light blue cells calculated from the HIRDS figures in the grey coloured cells below plus an allowance for climate change if applicable. The rainfall is graphed below. The runoff is routed through the detention tank which has a restricted outlet.

**METHOD** Click on cell C14 and select a site with the drop-down arrow.
Enter the variables into the green cells. **NOTE**: Roof area can be ~25% greater than floor area.

**RESULTS** The values in **red** are the maximum tank volume, depth, and outflow rate. Compare the maximum outflow rate with the undeveloped flow rate **bold** figure in Yellow box below.

**NB** Ensure the spreadsheet calculation iteration is set to **'on'**. (Tools, Options, Calculation, Iteration) (Undeveloped flow rate uses current rainfall intensity, ie no climate change allowance)

**NB** If outlet diameter is set too large, outflow will exceed inflow. Purple cells will appear, **Undo, or re-enter smaller outlet diameter.**

**Provided outflow rate does not exceed the undeveloped rate, this may be OK**

For higher part

| **Enter values in green cells** | | |
|---|---|---|
| Select location > | | |
| Catchment area **Ca** | 145.0 | $m^2$ |
| Runoff coefficient **C** | 0.9 | |
| Tank base width **D** | 0.91 | m |
| Outlet diameter **d** | 20 | mm |
| Climate change all. | 20 | % |
| 10yr/1hr rainfall depth | 40.3 | mm |
| 10yr/10min rainfall depth | 17.1 | mm |

Project ID or Location: 142 Konini Rd / New Roof (higher part)

Tank base area **Ba**: 2.73 $m^2$ = Rectangular base 0.02 m = 0.00031 $m^2$ (**Oa**) (Orifice area)

Council Requirements

Niwa/HIRDS values (conservative as climate % increase as well)

TANK SIZES: See table below graphs

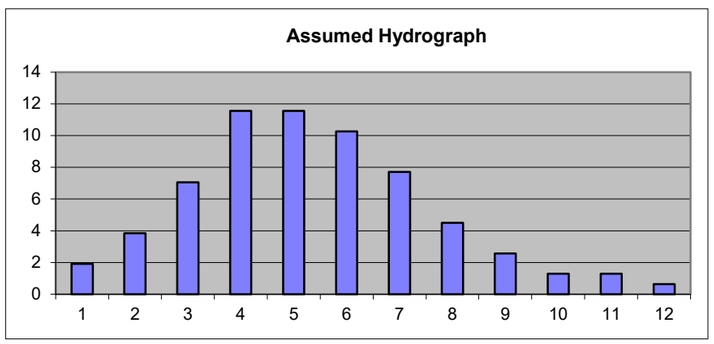
| **Orifice flow formula** |
|---|
| Q = k*(2gh)^0.5*A |
| k = 0.62 |
| k*(2g)^0.5 = 2.75 |
| Q = (h)^0.5*2.75*A |

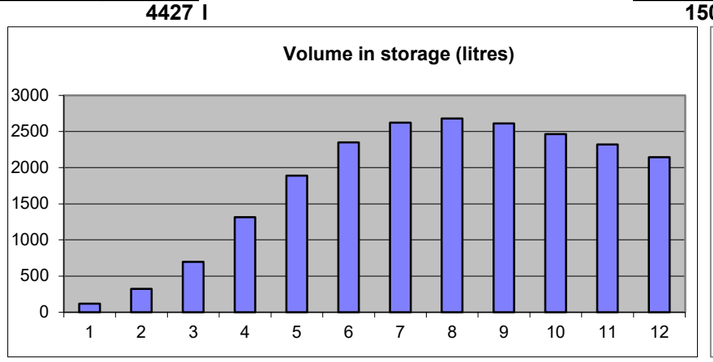
Undeveloped runoff (no climate change): C = 0.30 Average

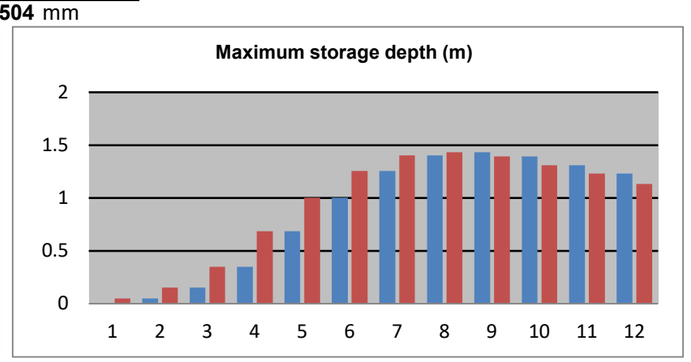
Peak 10min event: **1.24** (l/s)

| **HIRDS V3.0 Rainfall** | | |
|---|---|---|
| **Location** | **10yr/1hr** | **10yr/10min** |
| Paeroa WTP | 35.5 | 14.8 |
| Paeroa STP | 34.5 | 14.4 |
| Waihi WTP | 50.7 | 19.7 |
| Waihi STP | 47.9 | 18.9 |
| Whiritoa | 52.3 | 18.2 |
| K'hake | 39.6 | 15.6 |
| Ngatea | 39.9 | 15.5 |
| Kaihere | 40.3 | 15.7 |
| Kaiaua | 37.4 | 15.2 |
| Maratoto | 50 | 19.0 |
| Whanga | 55.9 | 19.0 |
| (Incl std errors) | | |

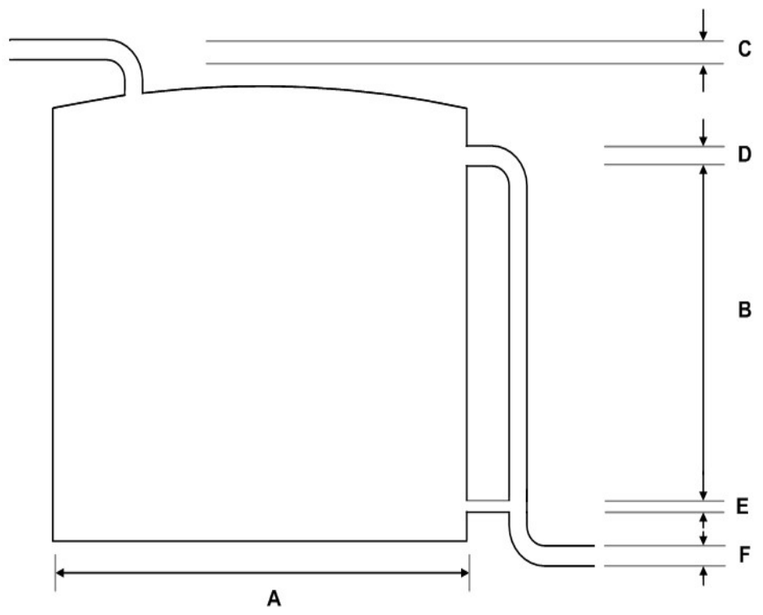
| Time (min) **Ts** | 60 min RF Distribution | Rainfall (mm) | + Global warming **Ri** | Inflow Volume (litres) **Vi** | Rate (l/s) **Ir** | Volume in tank (litres) **Vt** | Depth at start (m) **Ds** | Depth in (m) **Di** | Average depth (m) **Da** | Depth out (m) **Do** | Depth at end (m) **De** | Outflow Rate (l/s) **Or** | Volume (litres) **Vo** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 3% | 1.2 | 1.5 | 189 | 0.63 | 189 | 0.00 | 0.07 | 0.03 | 0.02 | 0.05 | 0.16 | 48 | 1 |
| 10 | 6% | 2.4 | 2.9 | 379 | 1.26 | 520 | 0.05 | 0.14 | 0.12 | 0.03 | 0.16 | 0.30 | 90 | 2 |
| 15 | 11% | 4.4 | 5.3 | 694 | 2.31 | 1,124 | 0.16 | 0.25 | 0.28 | 0.05 | 0.36 | 0.46 | 138 | 3 |
| 20 | 18% | 7.3 | 8.7 | 1,136 | 3.79 | 2,122 | 0.36 | 0.42 | 0.57 | 0.07 | 0.71 | 0.65 | 196 | 4 |
| 25 | 18% | 7.3 | 8.7 | 1,136 | 3.79 | 3,062 | 0.71 | 0.42 | 0.91 | 0.09 | 1.03 | 0.83 | 248 | 5 |
| 30 | 16% | 6.4 | 7.7 | 1,010 | 3.37 | 3,824 | 1.03 | 0.37 | 1.22 | 0.10 | 1.30 | 0.95 | 286 | 6 |
| 35 | 12% | 4.8 | 5.8 | 757 | 2.52 | 4,296 | 1.30 | 0.28 | 1.43 | 0.11 | 1.46 | 1.03 | 310 | 7 |
| 40 | 7% | 2.8 | 3.4 | 442 | 1.47 | **4,427** | 1.46 | 0.16 | 1.54 | 0.12 | **1.50** | 1.07 | 322 | 8 |
| 45 | 4% | 1.6 | 1.9 | 252 | 0.84 | 4,358 | 1.50 | 0.09 | 1.55 | 0.12 | 1.48 | **1.08** | 323 | 9 |
| 50 | 2% | 0.8 | 1.0 | 126 | 0.42 | 4,161 | 1.48 | 0.05 | 1.50 | 0.12 | 1.41 | 1.06 | 318 | 10 |
| 55 | 2% | 0.8 | 1.0 | 126 | 0.42 | 3,970 | 1.41 | 0.05 | 1.43 | 0.11 | 1.34 | 1.03 | 310 | 11 |
| 60 | 1% | 0.4 | 0.5 | 63 | 0.21 | 3,723 | 1.34 | 0.02 | 1.35 | 0.11 | 1.25 | 1.00 | 301 | 12 |
| | **100%** | | | | | | | | | | | | | |
| **Total** | | **40.3** | **48.4** | **6,311** | | | | | | | | | | |
| **Maximum** | | | | | **3.79** | **4,427** l | | | | | | **1.50** | **1.08** l/s | Smaller than Undeveloped Runoff. OKAY |
| | | | | | | **4427** l | | | | | | | **1504** mm | |



## STORMWATER DETENTION TANK CONFIGURATION

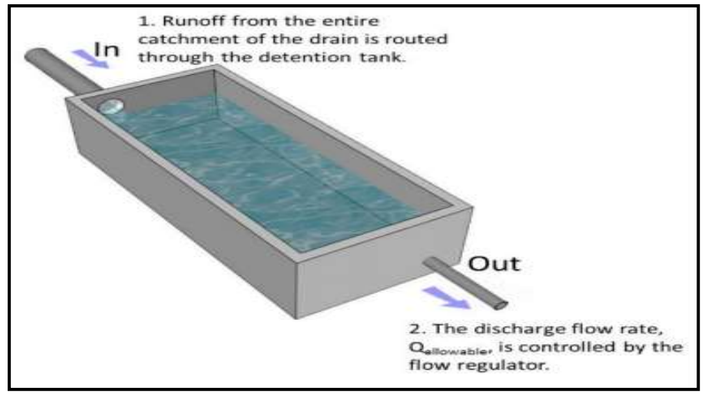


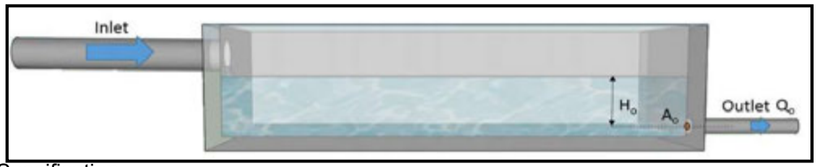

### DETENTION TANK CONFIGURATION

| | | | |
|---|---|---|---|
| **Site** | **142 Konini Rd** | | |
| **Tank diameter/width** | **A** | **910** | **mm** |
| **Max Storage depth** | **B** | **1,504** | **mm** |
| **Max Volume required** | | **4,427** | **litres** |
| **Inlet (via leaf trap)** | **C** | **90** | **mm** |
| **Overflow** | **D** | **90** | **mm** |
| **Orifice** | **E** | **20** | **mm** |
| **Outlet to soakage/kerb** | **F** | **90** | **mm** |

| | | | |
|---|---|---|---|
| Inflow vol = | Rainfall increment x Catchment area x C | Vi = | Ri x Ca x C |
| Vol in tank = | Inflow vol + Previous vol - outflow vol | Vt = | Vt + Vi - Vo |
| Depth at start = | Previous depth at end | Ds = | De |
| Depth in = | Inflo vol / base area | Di = | Vi / Ba |
| Average depth = | Depth at start + (Depth in / 2) | Da = | Ds + Di / 2 |
| Depth out = | Outflow Vol / base area | Do = | Vo / Ba |
| Depth at end = | Depth at start + Depth in - Depth out | De = | Ds + Di - Do |
| Outflow rate = | SQR(Average depth) x Const x orifice area | Or = | SQR(Da) x 2.75 x Oa |
| Outflow Vol = | Outflow rate x time step | Vo = | Or x Ts |

**NOTE:** Depth at end > Depth at start prior to Max depth, then Depth at end < Depth at start




Review if Rectangular/Circular Specification

Specify on drawings/design documentation

Ensure specification is above this value

Specify on drawings/design documentation

**DETENTION TANK CALCULATOR** Rev Date: **7-Jun-16** HIRDS V3 figures **26-Jul-10** Calculated: **31-Oct-24**

**For lower part**

**NOTES** This calculator assumes a **non-constant** rate of rainfall, as shown in the light blue cells calculated from the HIRDS figures in the grey coloured cells below plus an allowance for climate change if applicable. The rainfall is graphed below. The runoff is routed through the detention tank which has a restricted outlet.

For lower part

**METHOD** Click on cell C14 and select a site with the drop-down arrow.
Enter the variables into the green cells. **NOTE**: Roof area can be ~25% greater than floor area.

**RESULTS** The values in **red** are the maximum tank volume, depth, and outflow rate. Compare the maximum outflow rate with the undeveloped flow rate **bold** figure in Yellow box below.

**NB** Ensure the spreadsheet calculation iteration is set to **'on'**. (Tools, Options, Calculation, Iteration) (Undeveloped flow rate uses current rainfall intensity, ie no climate change allowance)

**NB** If outlet diameter is set too large, outflow will exceed inflow. Purple cells will appear, **Undo, or re-enter smaller outlet diameter.**

**Provided outflow rate does not exceed the undeveloped rate, this may be OK**

| **Enter values in green cells** | | | | | | |
|---|---|---|---|---|---|---|
| Select location > | | | | | | |
| Catchment area **Ca** | 139.0 | $m^2$ | | | | |
| Runoff coefficient **C** | 0.9 | | | | | |
| Tank base width **D** | 0.91 | m | | | | |
| Outlet diameter **d** | 20 | mm | = | 0.02 m | = | 0.00031 $m^2$ (**Oa**) |
| Climate change all. | 20 | % | | Council Requirements | | (Orifice area) |
| 10yr/1hr rainfall depth | 40.3 | mm | | | | |
| 10yr/10min rainfall depth | 17.1 | mm | | | | |

| Project ID or Location |
|---|
| 142 Konini Rd |
| New Roof (lower part) |
| Tank base area **Ba** |
| 2.73 $m^2$ Rectangular base |

TANK SIZES: See table below graphs

| **Orifice flow formula** |
|---|
| Q = k*(2gh)^0.5*A |
| k = 0.62 |
| k*(2g)^0.5 = 2.75 |
| Q = (h)^0.5*2.75*A |

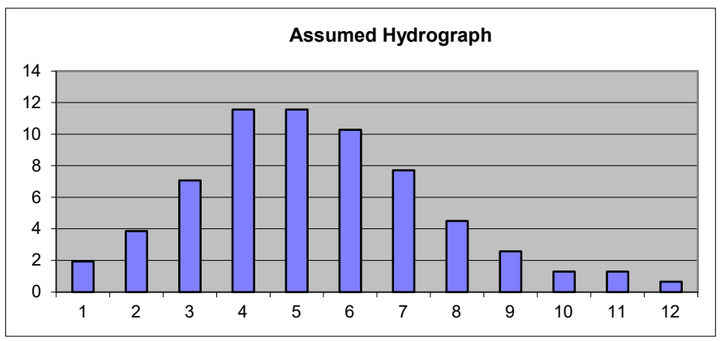
| Undeveloped runoff (no climate change) | | |
|---|---|---|
| C = | 0.30 | Average |
| Peak 10min event | | |
| **1.19** (l/s) | | |

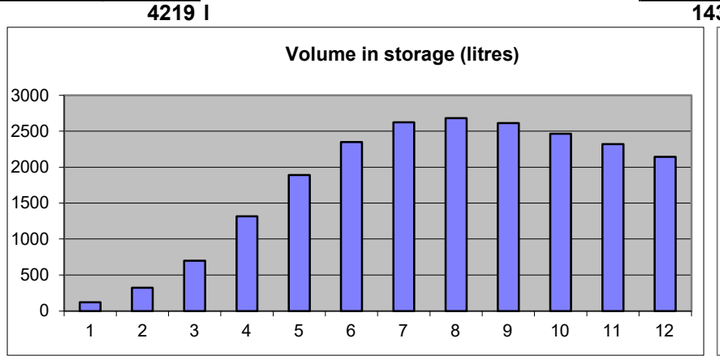
| **HIRDS V3.0 Rainfall** | | |
|---|---|---|
| **Location** | **10yr/1hr** | **10yr/10min** |
| Paeroa WTP | 35.5 | 14.8 |
| Paeroa STP | 34.5 | 14.4 |
| Waihi WTP | 50.7 | 19.7 |
| Waihi STP | 47.9 | 18.9 |
| Whiritoa | 52.3 | 18.2 |
| K'hake | 39.6 | 15.6 |
| Ngatea | 39.9 | 15.5 |
| Kaihere | 40.3 | 15.7 |
| Kaiaua | 37.4 | 15.2 |
| Maratoto | 50 | 19.0 |
| Whanga | 55.9 | 19.0 |
| (Incl std errors) | | |

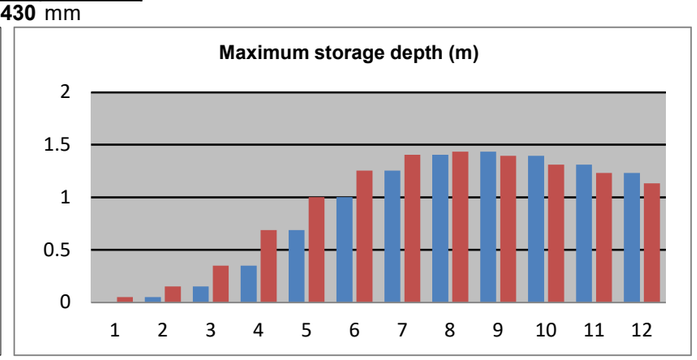
Niwa/HIRDS values (conservative as climate % increase as well)

| Time (min) | 60 min RF Distribution | Rainfall (mm) | + Global warming | Inflow Volume (litres) | Inflow Rate (l/s) | Volume in tank (litres) | Depth at start (m) | Depth in (m) | Average depth (m) | Depth out (m) | Depth at end (m) | Outflow Rate (l/s) | Outflow Volume (litres) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Ts** | | | **Ri** | **Vi** | **Ir** | **Vt** | **Ds** | **Di** | **Da** | **Do** | **De** | **Or** | **Vo** |
| 5 | 3% | 1.2 | 1.5 | 181 | 0.60 | 181 | 0.00 | 0.07 | 0.03 | 0.02 | 0.05 | 0.16 | 47 | 1 |
| 10 | 6% | 2.4 | 2.9 | 363 | 1.21 | 497 | 0.05 | 0.13 | 0.12 | 0.03 | 0.15 | 0.29 | 88 | 2 |
| 15 | 11% | 4.4 | 5.3 | 665 | 2.22 | 1,075 | 0.15 | 0.24 | 0.27 | 0.05 | 0.34 | 0.45 | 135 | 3 |
| 20 | 18% | 7.3 | 8.7 | 1,089 | 3.63 | 2,028 | 0.34 | 0.40 | 0.54 | 0.07 | 0.67 | 0.64 | 191 | 4 |
| 25 | 18% | 7.3 | 8.7 | 1,089 | 3.63 | 2,926 | 0.67 | 0.40 | 0.87 | 0.09 | 0.98 | 0.81 | 242 | 5 |
| 30 | 16% | 6.4 | 7.7 | 968 | 3.23 | 3,652 | 0.98 | 0.35 | 1.16 | 0.10 | 1.24 | 0.93 | 279 | 6 |
| 35 | 12% | 4.8 | 5.8 | 726 | 2.42 | 4,099 | 1.24 | 0.27 | 1.37 | 0.11 | 1.39 | 1.01 | 303 | 7 |
| 40 | 7% | 2.8 | 3.4 | 423 | 1.41 | **4,219** | 1.39 | 0.16 | 1.47 | 0.12 | **1.43** | 1.05 | 314 | 8 |
| 45 | 4% | 1.6 | 1.9 | 242 | 0.81 | 4,147 | 1.43 | 0.09 | 1.47 | 0.12 | 1.40 | **1.05** | 315 | 9 |
| 50 | 2% | 0.8 | 1.0 | 121 | 0.40 | 3,953 | 1.40 | 0.04 | 1.43 | 0.11 | 1.33 | 1.03 | 310 | 10 |
| 55 | 2% | 0.8 | 1.0 | 121 | 0.40 | 3,765 | 1.33 | 0.04 | 1.36 | 0.11 | 1.27 | 1.01 | 302 | 11 |
| 60 | 1% | 0.4 | 0.5 | 60 | 0.20 | 3,524 | 1.27 | 0.02 | 1.28 | 0.11 | 1.18 | 0.98 | 293 | 12 |
| | **100%** | | | | | | | | | | | | | |
| **Total** | | **40.3** | **48.4** | **6,050** | | | | | | | | | | |
| **Maximum** | | | | | **3.63** | **4,219** l | | | | | | **1.43** | **1.05** l/s | |
| | | | | | | **4219** l | | | | | | **1430** mm | | |

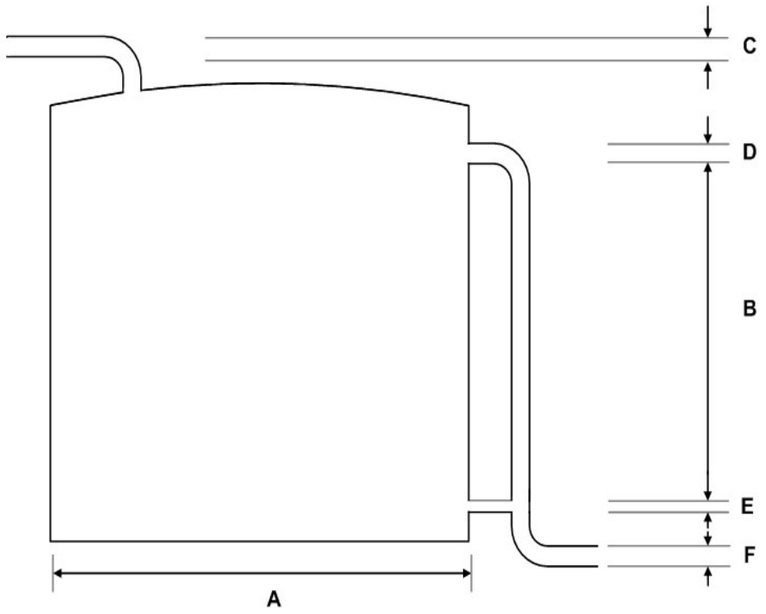
Smaller than Undeveloped Runoff. OKAY



## STORMWATER DETENTION TANK CONFIGURATION

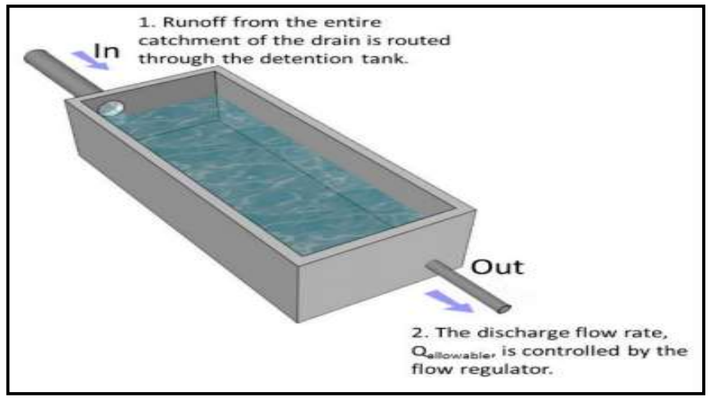



### DETENTION TANK CONFIGURATION

| Site | | 142 Konini Rd | |
|---|---|---|---|
| Tank diameter/width | A | 910 | mm |
| Max Storage depth | B | 1,430 | mm |
| Max Volume required | | 4,219 | litres |
| Inlet (via leaf trap) | C | 90 | mm |
| Overflow | D | 90 | mm |
| Orifice | E | 20 | mm |
| Outlet to soakage/kerb | F | 90 | mm |

| | | |
|---|---|---|
| Inflow vol = | Rainfall increment x Catchment area x C | Vi = Ri x Ca x C |
| Vol in tank = | Inflow vol + Previous vol - outflow vol | Vt = Vt + Vi - Vo |
| Depth at start = | Previous depth at end | Ds = De |
| Depth in = | Inflo vol / base area | Di = Vi / Ba |
| Average depth = | Depth at start + (Depth in / 2) | Da = Ds + Di / 2 |
| Depth out = | Outflow Vol / base area | Do = Vo / Ba |
| Depth at end = | Depth at start + Depth in - Depth out | De = Ds + Di - Do |
| Outflow rate = | SQR(Average depth) x Const x orifice area | Or = SQR(Da) x 2.75 x Oa |
| Outflow Vol = | Outflow rate x time step | Vo = Or x Ts |

**NOTE:** Depth at end > Depth at start prior to Max depth, then Depth at end < Depth at start





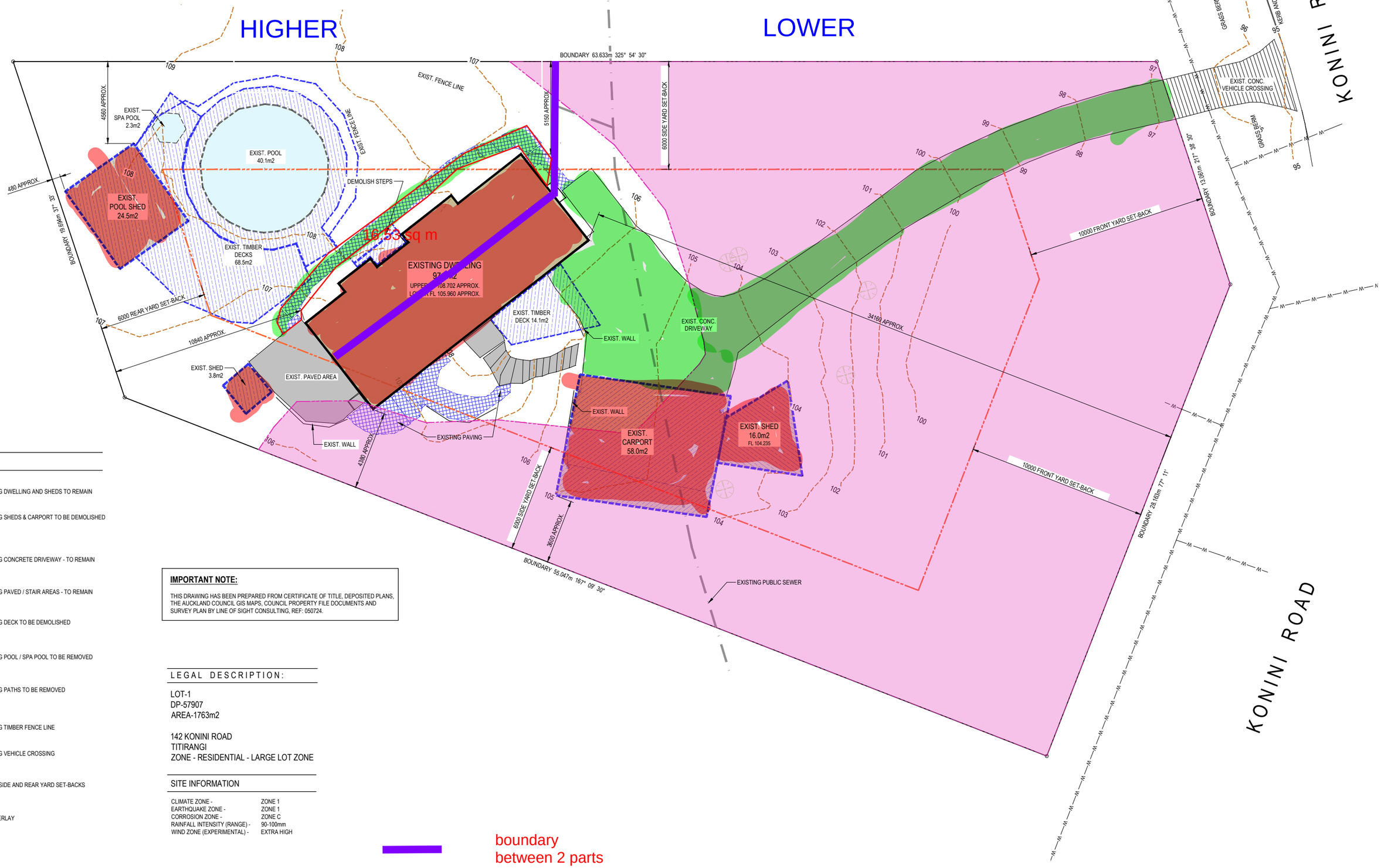
Review if Rectangular/Circular Specification

Specify on drawings/design documentation

Ensure specification is above this value

Specify on drawings/design documentation

# Storm Water Area Engineer Reviews - Existing Site




LEGEND:

- EXISTING DWELLING AND SHEDS TO REMAIN
- EXISTING SHEDS & CARPORT TO BE DEMOLISHED
- EXISTING CONCRETE DRIVEWAY - TO REMAIN
- EXISTING PAVED / STAIR AREAS - TO REMAIN
- EXISTING DECK TO BE DEMOLISHED
- EXISTING POOL / SPA POOL TO BE REMOVED
- EXISTING PATHS TO BE REMOVED
- EXISTING TIMBER FENCE LINE
- EXISTING VEHICLE CROSSING
- FRONT, SIDE AND REAR YARD SET-BACKS
- SEA OVERLAY

**IMPORTANT NOTE:**

THIS DRAWING HAS BEEN PREPARED FROM CERTIFICATE OF TITLE, DEPOSITED PLANS, THE AUCKLAND COUNCIL GIS MAPS, COUNCIL PROPERTY FILE DOCUMENTS AND SURVEY PLAN BY LINE OF SIGHT CONSULTING, REF: 050724.

## LEGAL DESCRIPTION:

LOT-1
DP-57907
AREA-1763m2

142 KONINI ROAD
TITIRANGI
ZONE - RESIDENTIAL - LARGE LOT ZONE

## SITE INFORMATION

| | |
|---|---|
| CLIMATE ZONE - | ZONE 1 |
| EARTHQUAKE ZONE - | ZONE 1 |
| CORROSION ZONE - | ZONE C |
| RAINFALL INTENSITY (RANGE) - | 90-100mm |
| WIND ZONE (EXPERIMENTAL) - | EXTRA HIGH |

boundary
between 2 parts

TECHNITRADES ARCHITECTURE
12 Ben Lomond Crescent, Pakuranga, Auckland 2010
Phone (09) 5767166 | design@technitrades.co.nz

| REV. | DESCRIPTION | BY | DATE |
|---|---|---|---|
| P1 | FOR COMMENT | MK | 04-10-24 |

| | |
|---|---|
| A1 Scale. | 1:100 |
| A3 Scale. | 1:200 |
| Designed. | L.MEIKLEJOHN |
| Drawn. | B.MILLWARD |
| A1 Plot Scale. | 1 : 1 |
| A3 Plot Scale. | 1 : 2 |

NOTES.

DO NOT SCALE.
DIMENSIONS IN MILLIMETERS UNLESS NOTED OTHERWISE.
IF IN DOUBT ON ANY ISSUE SEEK VERIFICATION PRIOR TO PROCEEDING.
READ THESE DRAWINGS IN CONJUNCTION WITH ALL OTHER CONSULTANTS DRAWINGS AND SPECIFICATIONS.



Client Reference No.
.

Project Title.
JOHNSTONE HOUSE
PROPOSED RESIDENTIAL ALTERATIONS
142 Konini Road, Titirangi, Auckland 0604

Drawing Title.
Existing Site Plan

Drawing No.
3368-RC-01

Rev:
P1

Higher part post development impermeable area for new tanks:
Total Roof connected to tank: 19.5 + 34 + (97+27)*(2/4 ) = 116m^2
Allowances for roof extensions or pavement connections: 29m^2
Total : 145m^2

Existing Site Considerations which Existing Storm water System Caters for:

Existing Roof previously connected to existing system not connected to tank: 97m^2 now connected to tank
Existing Shed, Existing Carport, Shed Demolished: 25 + 58 + 16 = 99m^2.
New paving around pool as part of existing system: 29m^2.
New paving due to driveway width increase as part of existing system: 13m^2.
New paving around lower garage as part of existing system: 52m^2.
Total accommodated by Existing System : 27 + 13 + 52 = 92m^2 < (97 + 99 ) = 196m^2 Roof Area now connected to tanks OKAY.
Total accommodated by Existing System : 92m^2 < 196m^2 (>100m^2 contingency compared to before to improve stormwater system) OKAY.

Lower part post development for new tanks:
Total Roof: 77 + (97+27)*(2/4 ) =139m^2

# Higher

# Lower

[Storm Water New versus Existing Area Engineer Reviews]

New Downpipe to connect to upper tank
outlet via existing or new system, connection refer to WEC drawing sheet SW04
New Downpipe
5000L Promax Tank
outlet via existing system, connection refer to WEC drawing sheet SW04
5000L tank position or similar approved
New Down pipe to connect to tank
283 sq m
PROPOSED BREEZEWAY 34m2
PROPOSED TIMBER DECK 26.5m2
PROPOSED POOL HOUSE 19.5m2
PROPOSED PAVING 29m2
PROPOSED POOL
PROPOSED EXTENSION - 27m2
DWELLING
PROPOSED GARAGE 77m2
PROPOSED PLANTER
PROPOSED RETAINING WALL
EXIST. SHED
EXIST. PAVED AREA
EXIST. WALL
EXISTING PAVING
EXIST. CONC. DRIVEWAY
PROPOSED DRIVEWAY EXTENSION 500mm WIDTH
PROPOSED RETAINING WALL
EXISTING PUBLIC SEWER
EXIST. CONC. VEHICLE CROSSING
KERB CHANNEL
GRASS BERM
KONINI ROAD
BOUNDARY 63.633m 325° 54' 30"
BOUNDARY 18.69m 37° 35"
BOUNDARY 13.69m 217° 36' 30"
BOUNDARY 28.165m 77° 11'
BOUNDARY 55.047m 167° 09' 30"
6000 REAR YARD SET-BACK
6000 SIDE YARD SET-BACK
10000 FRONT YARD SET-BACK
10836 APPROX
20991 APPROX TBC
5150 APPROX.

LEGEND:

- EXISTING DWELLING REMAIN
- PROPOSED BUILDINGS & EXTENSION TO RESIDENCE
- PROPOSED BUILDING - BREEZEWAY
- PROPOSED SWIMMING POOL TO REPLACE EXIST
- PROPOSED EXTENSION TO CONCRETE DRIVEWAY
- EXISTING CONCRETE DRIVEWAY - TO REMAIN
- EXISTING PAVED / STAIR AREAS - TO REMAIN
- PROPOSED OPEN SLAT TIMBER DECKS
- PROPOSED OPEN SLAT TIMBER DECKS
- FRONT, SIDE AND REAR YARD SET-BACKS
- EXISTING TIMBER FENCE LINE
- EXISTING VEHICLE CROSSING
- SEA OVERLAY

**IMPORTANT NOTE:**

THIS DRAWING HAS BEEN PREPARED FROM CERTIFICATE OF TITLE, DEPOSITED PLANS, THE AUCKLAND COUNCIL GIS MAPS, COUNCIL PROPERTY FILE DOCUMENTS AND SURVEY PLAN BY LINE OF SIGHT CONSULTING, REF: 050724.

**AREAS TABLE**

| MAX BUILDING COVERAGE | SITE | | | | m2 |
|---|---|---|---|---|---|
| PERMITTED | 1736 | X | 0.2 | = | 347.20 |
| EXISTING | | | | = | 199.30 |
| **PROPOSED** (INCLUDES DWELLING, EXTENSION, GARAGE, POOL HOUSE, BREEZEWAY) (EXCLUDES TIMBER DECKS AND UNCOVERED POOLS) | | | | = | **254.50 COMPLIES** |

| MAX IMPERVIOUS AREA | SITE | | | | m2 |
|---|---|---|---|---|---|
| PERMITTED | 1736 | X | 0.35 | = | 607.60 |
| EXISTING | | | | = | 392.20 |
| **PROPOSED** | | | | | |
| BUILDING COVERAGE AS NOTED ABOVE | | | | = | 254.50 |
| EXIST DRIVEWAY & PAVING | | | | = | 163.20 |
| PROPOSED EXTENSIONS TO DRIVEWAY & PAVING | | | | = | 92.50 |
| **TOTAL** (EXCLUDES TIMBER DECKS AND UNCOVERED POOLS) | | | | = | **510.20 COMPLIES** |

LEGAL DESCRIPTION:

LOT-1
DP-57907
AREA-1763m2

142 KONINI ROAD
TITIRANGI
ZONE - RESIDENTIAL - LARGE LOT ZONE

SITE INFORMATION

| | |
|---|---|
| CLIMATE ZONE - | ZONE 1 |
| EARTHQUAKE ZONE - | ZONE 1 |
| CORROSION ZONE - | ZONE C |
| RAINFALL INTENSITY (RANGE) - | 90-100mm |
| WIND ZONE (EXPERIMENTAL) - | EXTRA HIGH |

existing roof that is being replaced now connected to detention tank that was previously connected to existing stormwater. Area :

new concrete area not connected to detention tank but compensated by existing areas connected. Area:

new driveway connected to detention tank

boundary between 2 parts

TECHNITRADES ARCHITECTURE
12 Ben Lomond Crescent, Pakuranga, Auckland 2010
Phone (09) 5767166 | design@technitrades.co.nz

| REV. | DESCRIPTION | BY | DATE |
|---|---|---|---|
| P1 | FOR COMMENT | MK | 04-10-24 |

| | |
|---|---|
| A1 Scale. | 1:100 |
| A3 Scale. | 1:200 |
| Designed. | L.MEIKLEJOHN |
| Drawn. | B.MILLWARD |
| A1 Plot Scale. | 1 : 1 |
| A3 Plot Scale. | 1 : 2 |

NOTES.
DO NOT SCALE.
DIMENSIONS IN MILLIMETERS UNLESS NOTED OTHERWISE.
IF IN DOUBT ON ANY ISSUE SEEK VERIFICATION PRIOR TO PROCEEDING.
READ THESE DRAWINGS IN CONJUNCTION WITH ALL OTHER CONSULTANTS DRAWINGS AND SPECIFICATIONS.



Client Reference No.
.

Project Title.
JOHNSTONE HOUSE
PROPOSED RESIDENTIAL ALTERATIONS
142 Konini Road, Titirangi, Auckland 0604

Drawing Title.
Proposed Site Plan

Drawing No.
. 3368-RC-02

Rev: P1

## Appendix D

- **Refer to separate drawings and information provided by the client**
  **(Note: If the document is not embedded in the report, refer to separate PDF files)**