



# STORMWATER MANAGEMENT PLAN (SMP)

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HND HMB LIMITED  
3 PIGEON MOUNTAIN ROAD  
HALF MOON BAY

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# 1. INTRODUCTION

This Stormwater Management Plan (SMP) has been prepared by Eighty6 Engineering to support the Resource Consent (RC) Application for a proposed subdivision at 3 Pigeon Mountain Road in Half Moon Bay Auckland.

This SMP provides a comprehensive stormwater management strategy for the development, considering the existing site conditions, receiving environment, Auckland Council regulatory requirements, NDC Schedule 4 and best practice stormwater design, including water sensitive design principles and a treatment train approach for water quality.

## 2. EXISTING SITE APPRAISAL

### 2.1 SUMMARY OF DATA SOURCES AND DATES

This section provides a summary of data sets used to prepare the SMP. The summary of data sources and the dates used are presented in Table 1.

Table 1: Summary of data sources and date used

Existing site appraisal item	Source and date of data used
Topography	- Auckland Council Geomaps, January 2025 - Topographic survey, Envivo, January 2025
Geotechnical/ soil conditions	- Geotechnical Investigation Report, Total Ground Engineering, 2022
Existing stormwater network	- Auckland Council GeoMaps – Underground Services: Stormwater, 2025 - Topographic survey, Envivo, January 2025
Existing hydrological features	- Auckland Council GeoMaps data - Auckland Council GeoMaps, Catchment and Hydrology, January 2025 - Auckland Council Unitary Plan Viewer, Unitary Plan Management Layers – Significant Ecological Areas, January 2025
Stream, river, coastal erosion	- Auckland Council GeoMaps, Catchment and Hydrology, January 2025
Flooding and flowpaths	- Auckland Council GeoMaps – Catchment and Hydrology, January 2025
Coastal Inundation	- Auckland Council GeoMaps Emergency Layer, January 2025
Ecological/ environmental areas	- Auckland Council GeoMaps, Catchment and Hydrology, January 2025 - Auckland Council Unitary Plan Viewer, Unitary Plan Management Layers – Significant Ecological Areas, January 2025
Cultural and heritage sites	- Auckland Council GeoMaps, Cultural Heritage Site
Contaminated land	- Detailed Site Investigation, Remediation Action Plan and Assessment of Environmental Effects, Focus Environmental Services Ltd, May 2021.

## 2.2 LOCATION AND GENERAL INFORMATION

The site located at 3 Pigeon Mountain Road, Half Moon Bay spans 1.4073 hectares (Figure 1). It is zoned Residential – Mixed Housing Suburban Zone under the Auckland Council Unitary Plan (AUP) and Residential – Mixed Housing Urban Zone under Auckland Council Plan Change 78 (figure2). The site information is summarised in Table 2.

It is bounded by Ara Tai to the north, Pigeon Mountain Road to the east, Compass Point Way to the south, and residential properties to the west. Currently, the site is occupied by a school comprising five buildings centrally located. The remainder of the ground coverage consists of sports grounds.

Table 2: Property information

Existing element	
Site address	3 Pigeon Mountain Road, Half Moon Bay, Auckland 2012
Legal description	LOT 1 DP212125
Current land use	School with five buildings
Current building coverage	Approximately 2826m <sup>2</sup> , area referenced from topo
Historical land use	Grassland – refer to Geotechnical report findings



Figure 1: Location Plan (source: Auckland Council GeoMap, January 2025)

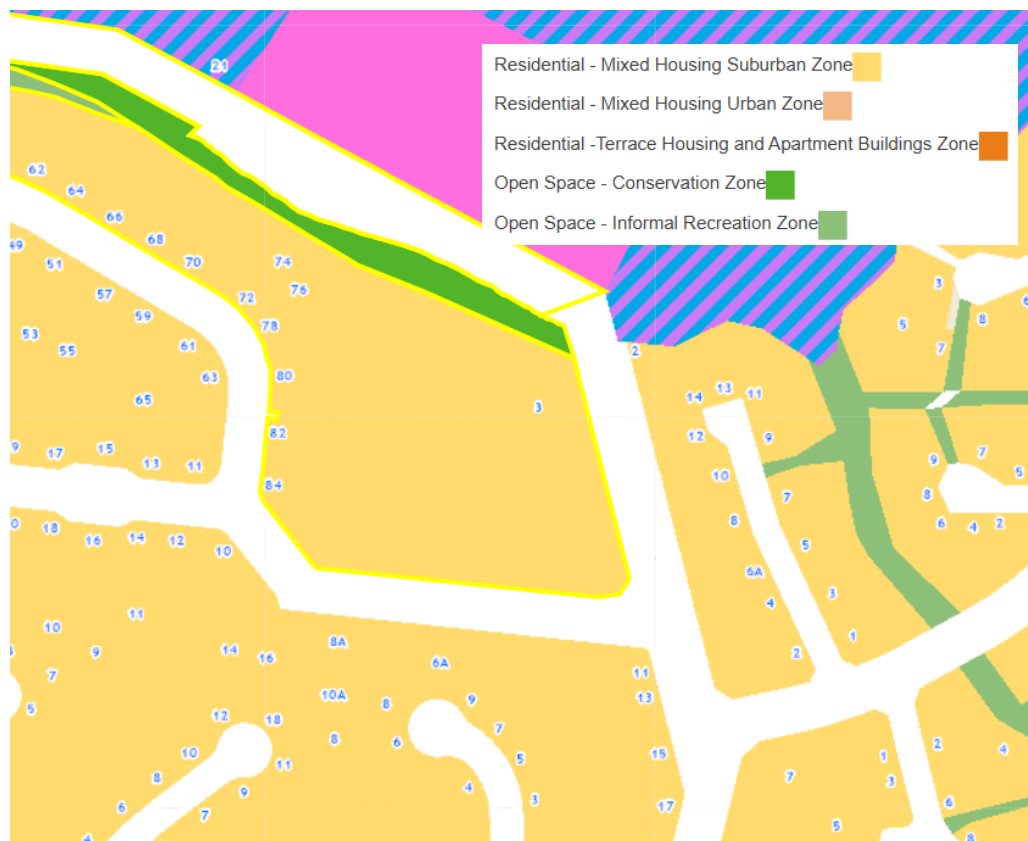


Figure 2: Location plan (source: Auckland Council Unitary Plan)

## 2.3 TOPOGRAPHY

The site topography slopes from the southwestern boundary towards the northeastern boundary, with gradients ranging from 3% in the northeastern half to 13% in the southwestern half. An existing timber pole retaining wall, ranging from 1.0m to 2.5m in height, is located on the eastern boundary. Beyond the northern boundary, the slope steepens, elevating the site approximately 3m above Pigeon Mountain Road.

For the existing contour plan and site features, refer to Appendix B: Topographic Survey.

## 2.4 GEOTECHNICAL

The geological findings from Geotechnical Investigate Report:

*Our investigations generally confirm the geology reported in the available literature. We have developed a geological cross section AA along the alignment shown in Figure 8.*

*Fill, associated with the marina reclamation, up to 4.0 m deep along the Pigeon Mountain Road boundary was encountered across the site. The composition and strength of the fill indicates that it can be considered as engineered fill.*

*AVF tuff was locally found in the southeast corner of the site (HA01, HA03 and HA04) and up to 2.5 m deep underlying the existing fill. The shear strength ranges from 100 kPa to 190+ kPa.*

*Puketoka formation, comprising stiff to very stiff silty clays and clayey silts, was encountered underlying the fill/AVF layer up to 5.0 m deep. This unit was not predicted by the geological maps. However, the engineering characteristics of the Puketoka Formation is similar to that of residually weathered ECBF.*

*The residual ECBF soils of sandy silt was only found in HA02 up to 5.0 m deep and not encountered in the rest of the investigation holes.*

*Groundwater was encountered at 3.0 and 1.0m at two boreholes during the investigation and not encountered in the rest of the boreholes.*

Further geotechnical information is appended in Appendix C: Geotechnical Report.

## 2.5 EXISTING DRAINAGE FEATURES AND STORMWATER INFRASTRUCTURE

The existing public stormwater connection for the site is via a stormwater manhole (ID 20002345285) at the north-western site boundary, which connects to a public 450mm diameter concrete stormwater pipe.

A public 225mm diameter concrete stormwater pipe adjacent to the eastern boundary serves catchpits within Pigeon Mountain Road. This pipe drains into a public 300mm diameter concrete line across Pigeon Mountain Road via a stormwater manhole (ID 2000323535).

Stormwater capacity assessment has been conducted to investigate the downstream capacity. The assessment indicates the downstream pipe capacity is sufficient to accommodate the new development and the surrounding catchment.

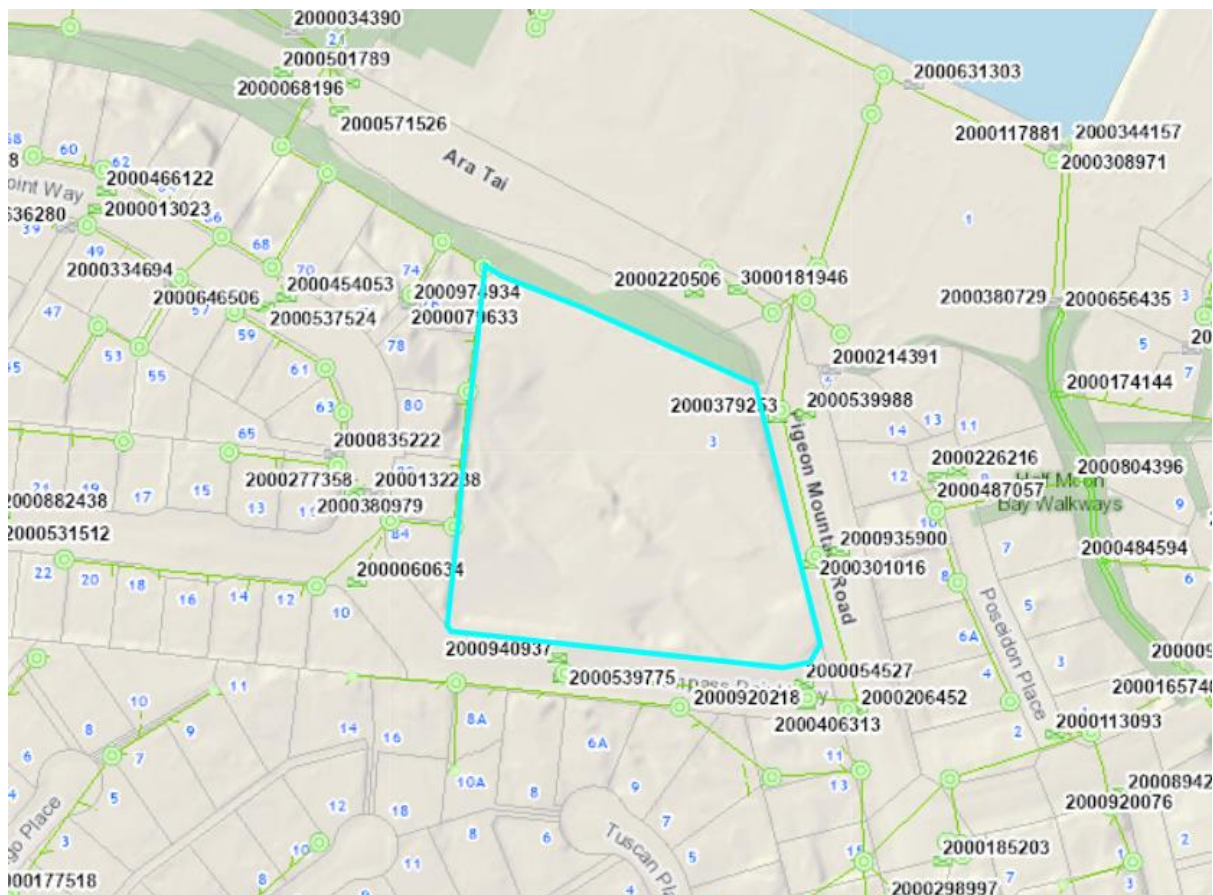


Figure 3: Existing drainage (source Auckland Council GeoMaps, 2025)

## 2.6 RECEIVING ENVIRONMENT

From the subject site, the public stormwater network collects stormwater from a number of other upstream properties. The receiving catchment environment for this network is the Tamaki Catchment.

## 2.7 EXISTING HYDROLOGICAL FEATURES

There are no natural streams, wetlands or ponds in the development area.

## 2.8 FLOODING AND FLOWPATHS

### **Flood plain and Flood Sensitive Area**

The site is not situated within the 100-year flood plain nor flood sensitive area.

### **Flowpaths**

Auckland Council GeoMaps indicate there are three minor overland flow paths originating from the site. The contributing catchment to these OLFPs is less than 1 hectare and ultimately drain into the nearby Tamaki River.

- Two minor OLFPs (Figure 4&5) exit from the northern boundary and north eastern corner of the site to Ara Tai. The contributory catchment to these OLFPs is less than 4000m<sup>2</sup>, with a peak flow rate of less than 0.2m<sup>3</sup>/s at a 3.8 degree climate change.
- One minor OLFP (Figure 6) exits from the eastern boundary and joins an OLFP running down Pigeon Mountain Road. This OLFP has a catchment area of 5334m<sup>2</sup> and a peak flow rate of 0.229m<sup>3</sup>/s at 3.8 degree climate change.

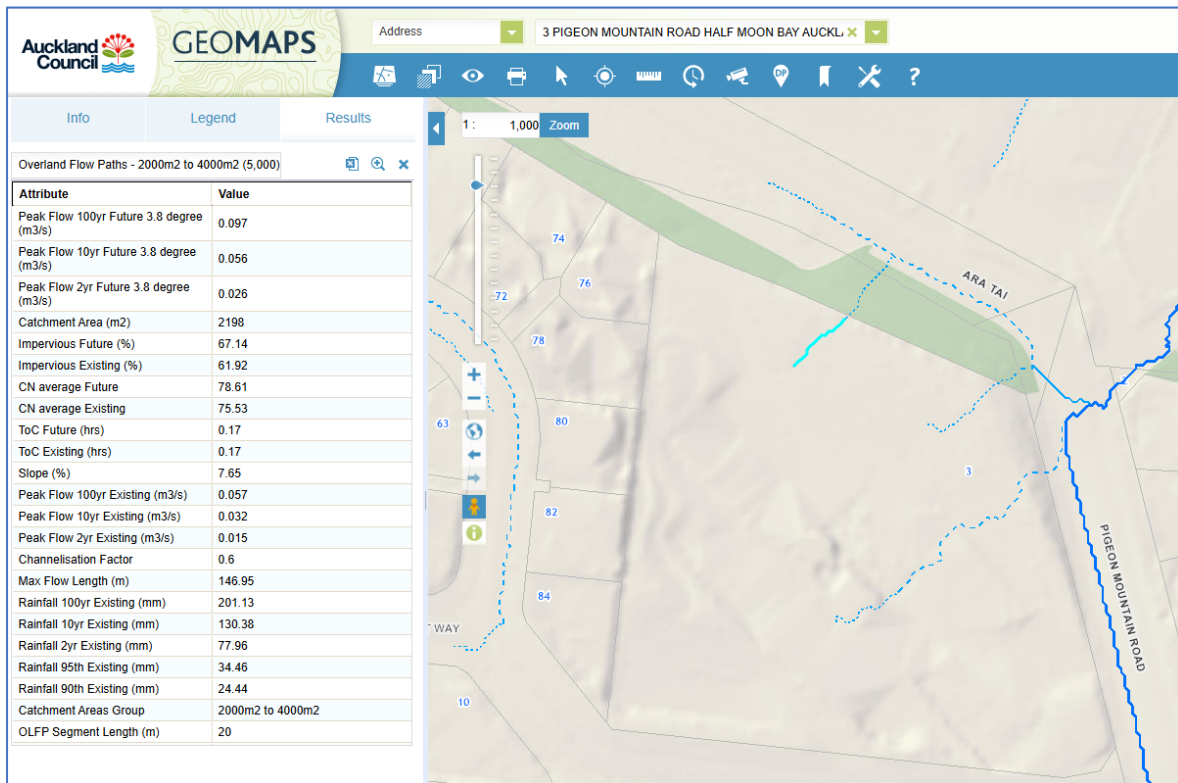


Figure 4: Minor overland flow paths exit from the northern boundary to Awa Tai (source: Auckland Council GeoMaps)

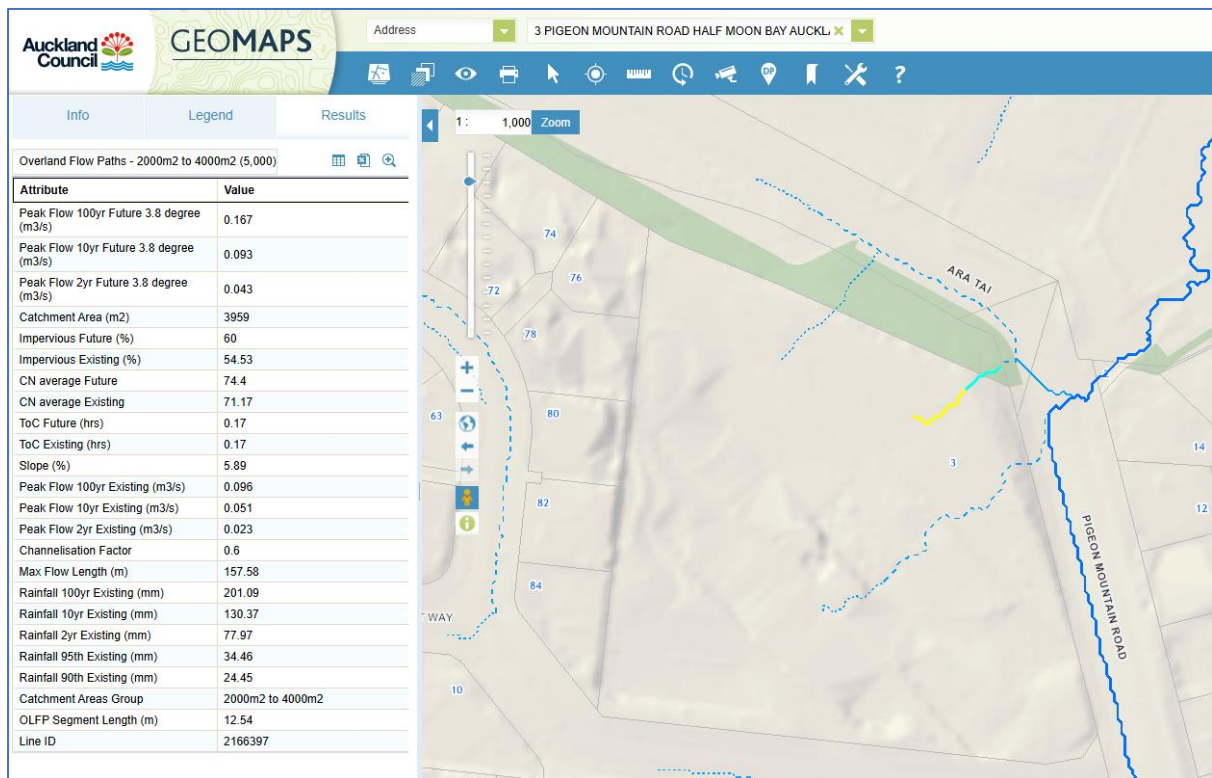


Figure 5: Minor overland flow paths exit from the north-eastern corner to Tai Awa (source: Auckland Council GeoMaps)

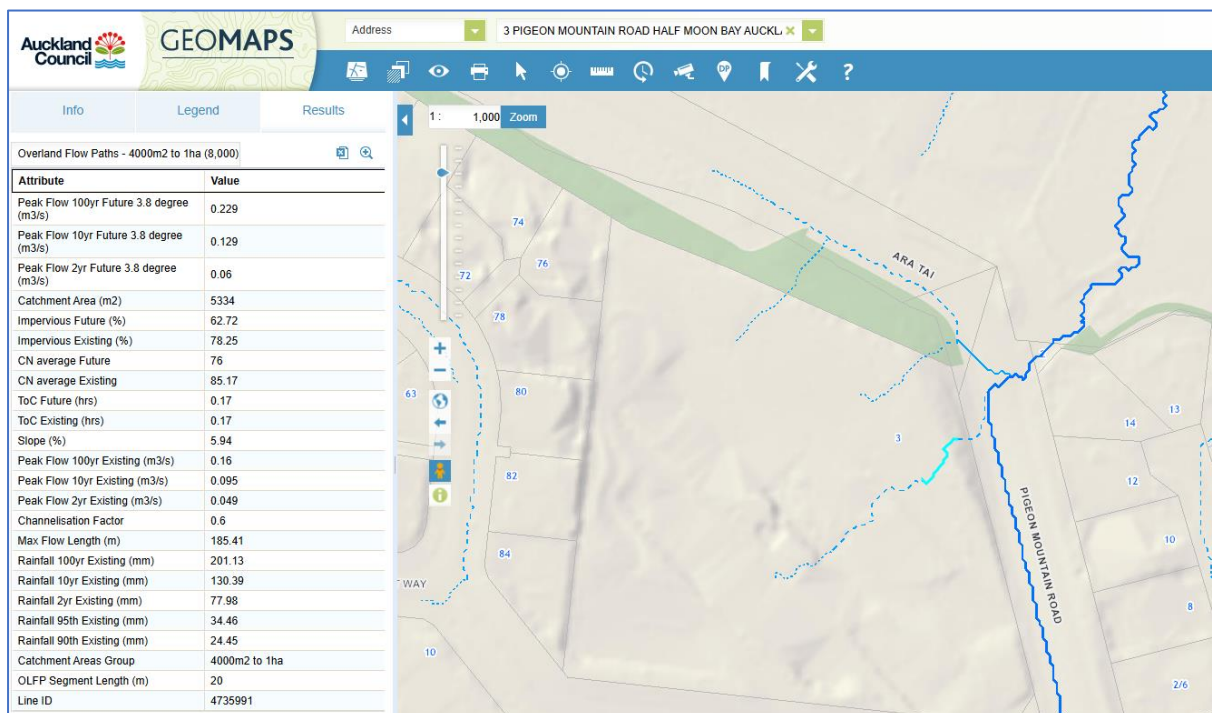


Figure 6: Minor overland flow paths exit from the eastern boundary to Pigeon Mountain Road (source: Auckland Council GeoMaps)

## 2.9 COASTAL INUNDATION

Not applicable within this SMP. Auckland Council GeoMaps indicates that the site is not subject to coastal inundation.

## 2.10 BIODIVERSITY

Auckland Council GeoMaps indicates that there is no Significant Ecological Area (SEA) located within the site.

## 2.11 CULTURAL AND HERITAGE SITES

There are no known natural heritage, historical heritage and special characters within the proposed site based on the Auckland Unitary Plan management layer, January 2025.

## 2.12 CONTAMINATED LAND

Not applicable within this SMP.

# 3. DEVELOPMENT SUMMARY AND PLANNING CONTEXT

## 3.1 REGULATORY AND DESIGN REQUIREMENTS

The relevant regulatory, technical and design guidelines for stormwater management are listed in Table 3. A summary of relevant policies (regarding stormwater management) on the listed requirements is presented in the following sections.

Table 3: Regulatory and design requirements

Requirement	Relevant regulatory / design to follow	Note
Water quality and integrated management	AUP E1	-
Discharge and Diversion	AUP E8	-
High Contaminant Generating Areas	AUP E9	-
SMAF hydrology mitigation	AUP E10	-
Natural Hazards	AUP E36	-
Auckland Council Regionwide Network Discharge Consent	NDC Schedule 4	Large Brownfield requirement
Design and Construction of Stormwater system for Land Development and Subdivision	Auckland Code of Practice for Land Development and Subdivision - Chapter 4 Stormwater Version 4 (July 2025)	
Stormwater Management Devices Design	Stormwater Management Devices in Auckland Region – Guideline Document 2017/001 (December 2017)	
Stormwater Management devices	Design Guideline Manual for Stormwater Treatment Devices – Technical Publication 10 (2003). Auckland Council. Chapter 8	Superseded by GD 01 but provide guidance for infiltration rate assumption.

Water sensitive design	Water Sensitive Design for Stormwater Guidance Document 2015/004 (2015). Auckland Council	
Rainfall depths	Guidelines for Stormwater Runoff Modelling in the Auckland Region – Technical Publication 108 (1998). Auckland Council Region	Provide guidance on rainfall depths and hydrology assessment
Pedestrian safety & vehicle safety	Auckland Transport: Engineering site Design Code – Road Drainage and Surface Water Control Version 1.2	

### Network Discharge Consent (NDC)

The NDC requirements for large brownfield developments, applicable to the proposed development and outlined in NDC Schedule 4, are illustrated in the flowchart of brownfield stormwater requirements shown below.

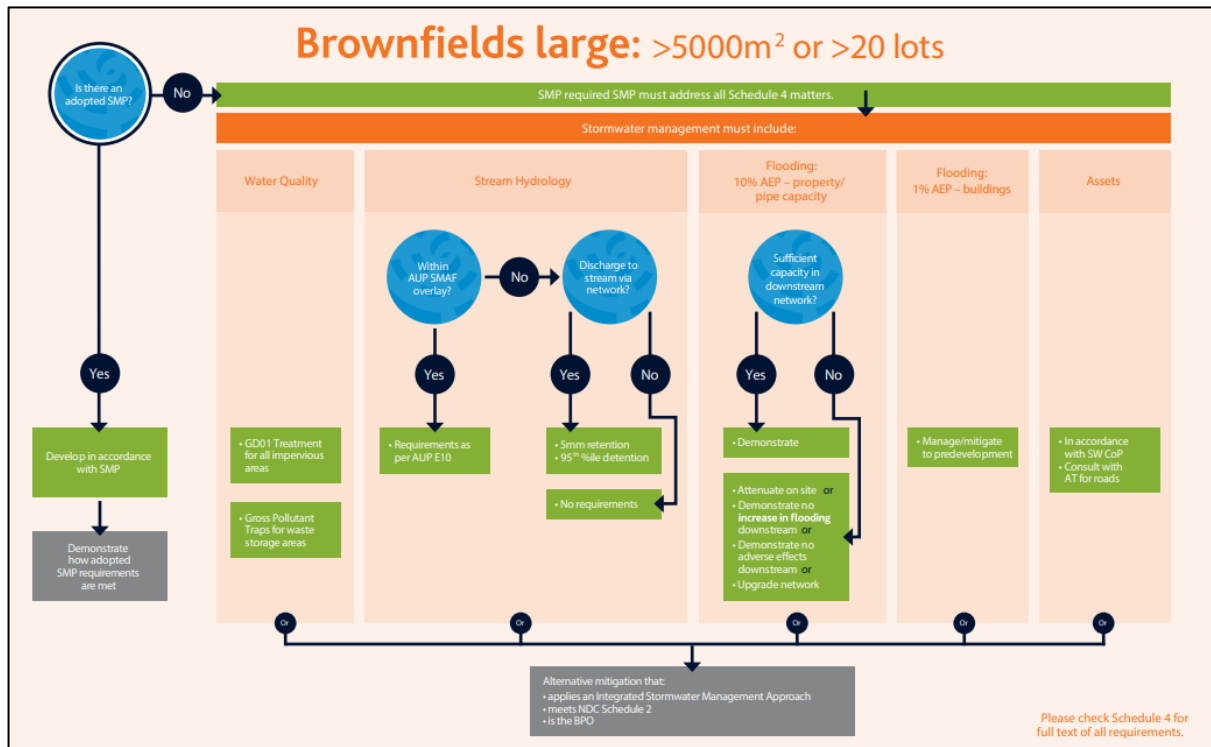


Figure 7: Flow chart for Brownfield - Large (source, NDC Schedule 4)

## 4. MANA WHENUA MATTERS

The proposed site is not within the places of significance to Mana Whenua based on the Auckland Unitary Plan management layers.

### 4.1 IDENTIFICATION AND INCORPORATION OF MANA WHENUA VALUES

Not applicable within this SMP.

## 5. STAKEHOLDER ENGAGEMENT AND CONSULTATION

A pre-application meeting was held between the project team and Auckland Council to facilitate communication regarding the previous consent, BUN60419132. This development references the documents approved under the previous consent and generally follows the same approach.

Table 4: Summary of stakeholder engagement and consultation

Stakeholders / Documents	What is the reason for interest?	What engagement has been completed?	Feedback and response
Resource Consent BUN60419132	Provide guidance on the stormwater management approach for compliance with consent conditions	Consultation and review of the stormwater management strategy to ensure alignment with consent requirements.	The stormwater approach for the development generally adheres to the approach under the previous consent.

## 6. PROPOSED DEVELOPMENT

### 6.1 GENERAL DEVELOPMENT INFORMATION

The proposed residential subdivision located in Half Moon Bay aims to transform the site into a residential community.

### 6.2 LOCATION AND AREA

Site location and general information are provided in Section 2.2.

### 6.3 PURPOSE OF DEVELOPMENT

The proposal development involves the creation of 62-lot fee simple subdivision. The development aims to transform the current site into a vibrant residential community, enhancing the local housing supply and providing modern living spaces.

### 6.4 SITE LAYOUT AND URBAN FORM

The master plan for the development, proposes a 62-lot residential subdivision of various building typologies, including standalone and duplex units. Four Jointly Owned Accessway Lots (JOAL 1-4), have been proposed to provide connectivity to Pigeon Mountain Road. The impervious area at post development is 59.7% of the total site area.

Refer to Appendix D – Development Plan prepared by SHAPE Architect.

## 6.5 EARTHWORKS

The proposed development will involve earthworks for constructing the common accessways, building platforms, and utility services. Retaining walls of various heights are proposed at the site and lot boundaries to form level building platforms, enable compliant gradients for pedestrian paths and vehicle access, and ensure slope stability factors of safety are achieved. These walls will be constructed wholly within the site.

# 7. STORMWATER MANAGEMENT

This section entails the proposed stormwater management approach. The proposed stormwater management takes a holistic approach that incorporates water sensitive design principles and environmental and community outcomes.

## 7.1 PRINCIPLES OF STORMWATER MANAGEMENT

The stormwater management principles for 3 Pigeon Mountain Road development have been developed to respond directly to the site-specific constraints, receiving environment and downstream stormwater network limitations, while achieving compliance with NDC Schedule 4 and relevant Auckland Council stormwater design guidelines.

The principles outlined below form the basis for selection Best Practicable Option (BPO) stormwater devices and defining the integrated stormwater management approached described in Section 7.2

### 7.1.1 ORIGINAL PRINCIPLES

The stormwater management approach aims to integrate urban development while optimizing land use and addressing site constraints. It considers natural systems, soil properties, and ecological protection to prevent downstream flooding. Key principles including enhancing downstream water quality, protecting natural ecosystems, incorporating community values and minimizing soil disturbance with sediment and erosion control.

The stormwater strategy emphasizes water sensitive design to manage the residential development impacts, using stormwater devices to protect water quality, and focuses on sustainable maintenance, using low contaminant materials, and multiple mitigation measures to protect the environment.

The objectives of stormwater management align with the Network Discharge Consent (NDC) to enhance water health, manage stormwater discharge, improve water quality, mitigate hydrological changes and protect natural hydrology. The management is considered on both a catchment wide and individual lot basis, focusing on water quality, flood management, water sensitive design and stream hydrology.

### 7.1.2 UPDATED PRINCIPLES

In addition to the original principles, the stormwater management for this development adopts the following site specific principles, reflecting the constraints and performance requirements unique to 3 Pigeon Mountain Road.

- Flow control: Stormwater discharges from the site shall be managed such that post development 10% AEP peak flows do not exceed pre-development levels, in recognition of confirmed condition within the downstream public stormwater network.

- Treatment train approach for water quality: Stormwater quality shall be managed using a treatment train, incorporating the following to ensure compliance with GD01 and NDC Schedule 4 treatment objectives.
  - Low contaminant generating materials at source
  - First flush capture via tanks
  - Proprietary devices for communal accessways
- Scale appropriate treatment: Water quality devices are selected based on catchment size, land use and contaminant risk, with simple source controls used for individual lots and higher order treatment applied to the communal accessways.
- Future proofing and constructability: Stormwater devices are selected to be maintainable and adaptable, allowing refinement at future house development during building consent stage without compromising overall stormwater performance outcomes demonstrated in this SMP.

## 7.2 PROPOSED STORMWATER MANAGEMENT

### 7.2.1 GENERAL

This Section of SMP presents the integrated stormwater management approach and demonstrates the BPO for the development. The proposed approach encompasses:

- Provide mitigation for the stormwater network at during 10% AEP
- Integrating treatment devices and use of inert material for water quality treatment

All future stormwater design within the subdivision shall

- Maintain the stormwater performance outcomes demonstrated in this SMP
- Not increase post development discharge beyond the limits defined in this SMP
- Be supported by updated calculations where assumptions differ from those adopted in this SMP

Stormwater management for the development is structured around two components:

- Water quality
- Peak flow mitigation (10% AEP – downstream capacity control)

A stormwater management toolbox has been developed to provide the practical options and devices for the development to meet the stormwater requirements. Various devices and combinations may be implemented based on site constraints and requirements. The summary of the stormwater devices assessed for the development is presented in Table 5, with the resulting BPO justification provided in Table 6.

Table 5: Stormwater Management Toolbox

Stormwater Devices	Typical Application	Detention – 10 year	Water quality	Notes
Pervious pavement	Carparks, accessways, footpath.	Yes	No	Generally, for Drainage area <1000m <sup>2</sup> . Suitable for a small catchment with low traffic volume driveways or carparks. Prone to clogging and therefore not suitable for high traffic areas or areas subject to acceleration/deceleration or turning.

				<ul style="list-style-type: none"> <li>- Not suitable for the high traffic load accessways</li> </ul>
Rainwater Tank	Roof area or paved area	Yes	No	<p>Various stormwater tank options in the market. Can be installed above or underground depending on the site condition.</p> <p>Detention tank is used to reduce the peak flow rate of stormwater or stream protection purposes via a controlled small diameter orifice.</p> <ul style="list-style-type: none"> <li>- Suitable for the private roof and JOALS</li> </ul>
Bioretention devices	Roofs, roads, accessways, carparks, footpaths,	Yes	Yes	<p>It can be used at multiple locations in a catchment to manage stormwater treatment, retention, and detention flow. Location of the devices determined by the available space and grade with allowances made for retention/ detention.</p> <p>It can be integrated with landscapes and planting schemes to provide biodiversity and habitat.</p> <p>Pre-treatment in structural devices trap sediments, litter, and debris to be considered as part of detailed design.</p> <p>Not suitable for slope &gt;5%.</p> <ul style="list-style-type: none"> <li>- Not suitable for the development due to space constraints and the slope across the site, generally greater than 5%</li> </ul>
Wetland	Accommodated in open spaces area	Yes	Yes	<p>Generally used for drainage area &gt;2 ha. Reduce downstream flood potential and provide water quality treatment. Minimise downstream channel erosions. Provides habitat and biodiversity, enhancing green corridors for existing riparian environments.</p> <p>Does not provide a significant retention function.</p> <p>Potential downing and vector source, not suitable for unstable slope.</p> <p>Require maintenance access.</p> <ul style="list-style-type: none"> <li>- Not suitable for the development, development area less than 2 hectares</li> </ul>
Living roof	Roof areas	No	No	<p>Minimise impermeable area by creating a pervious surface from the roof. They are designed to retain approximately 25mm rainfall events only.</p>

				<p>An additional consideration for structural support, roof pitch, maintenance accessibility etc., while implementing the living roof.</p> <p>Best applied for large roof areas, e.g. industrial or commercial uses.</p> <p>Higher construction and maintenance costs.</p> <p>Provide opportunities for biodiversity and habitat.</p> <ul style="list-style-type: none"> <li>- Not suitable as it does not meet projects' stormwater requirements</li> </ul>
Swale	Roads, accessways, carparks, footpaths, cycleways	No	Yes	<p>Provides water quality treatment only.</p> <p>Provides separation of vehicle and foot traffic, amenity and safety.</p> <p>Simple construction and maintenance.</p> <p>Potential to include infiltration through the base in suitable subsoil conditions.</p> <p>Potential to include some detention through use of check dams.</p> <p>Easily damaged, require large area, not suitable for slope &gt;8%. Not suitable on geotechnically unstable ground.</p> <ul style="list-style-type: none"> <li>- Not suitable for the development due to space constraints</li> </ul>
Proprietary Device such as Stormwater Filtration Devices	Private Roads, accessways, carparks, public roads and parking bays	No	Yes	<p>Various available products comply with the Auckland Council requirement in the market.</p> <p>Specific design to match the requirements.</p> <ul style="list-style-type: none"> <li>- Can be used as the private stormwater filtration device on JOAL for water quality treatment</li> </ul>

Table 6: BPO Justification Table

Application Area	Requirement	BPO & BPO Justification
Roof	Water Quality, Detention	<p><b><u>Inert Roof Material &amp; On-lot Stormwater Tank</u></b></p> <p>Roof runoff is managed through source control and 10-year attenuation. All buildings will utilise low contaminant (inert) roofing materials, minimising contaminant generation at source. Roof runoff is then directed to on-lot stormwater detention tanks, which capture the first flush, provide sediment settlement, and attenuate peak flow prior to discharge. This approach aligns with GD01 and the intent of NDC Schedule 4, and represents the BPO for residential roof</p>

		runoff to achieve the 10-year peak flow rate mitigation and water quality.
Private individual Impermeable Driveway with roof overhang  (Lots 13-24)	Water Quality	These are small hardstand areas serving individual dwellings only, with very low traffic volumes (1-2 vehicles per lot) and therefore low contaminant loads. Additionally, the driveways that are constructed in impermeable pavement with roof overhang, this reduces the direct rainfall contact with the driveway surface. This acts as an effective source control measures. Runoff volumes from these areas are therefore both small and infrequent, and are further managed within the sites overall stormwater system including on-lot detention and private stormwater filter within the common accessways.
Private individual Impermeable Driveway  Lots 4-9, 42-46 58-61	Water Quality	Runoff from impermeable driveway is to be collected by private field catchpits/slot drains with sumps, allowing sediment settlement prior to discharge. Combined with low traffic generation and small contributing areas, this provides an appropriate level of treatment and represents the BPO.
Private individual Permeable Driveway  (Lots 1-3, 10-12, 25-41, 52-57 and 62)	Water Quality	Driveways are constructed using permeable pavement, allowing rainfall to infiltrate into the ground. Given the low traffic volumes and permeable surfaces, the contaminant risk is low.
Impermeable Common Walkway	Water Quality	Surface runoff is directed to adjacent landscaped/green areas, where it infiltrates and is filtered prior to entering nearby catchpits. The landscaped areas act as a natural filtration system, consistent with a treatment train approach. A catchpit at the downstream end of Walkway 1 & 1-1 provides additional sediment settlement before discharge to the public stormwater network. Given the pedestrian-only use and low contaminant risk, this is the BPO.
Permeable Common Walkway	Water Quality	Runoff from permeable walkway is to be infiltrated into the ground. Given the pedestrian-only use and low contaminant risk, this is the BPO. Permeable/ no traffic loading
Common accessways/(JOALs) JOAL1,2,3,4, Walkway and carparks alongside the JOAL3	Water Quality	A proprietary filtration device (e.g. StormFilter, Jellyfish or equivalent) is proposed, providing $\geq 75\%$ TSS removal in accordance with GD01. This solution achieves the required water quality outcomes within the available footprint and therefore represents the BPO.

The stormwater management strategy for the proposed development is summarised as follows:

- Provide stormwater reticulations with capacity for the 10-year storm event
- Provide 10-year peak flow rate mitigation via rain tanks due to the deteriorated condition of the downstream public stormwater network identified by council
- Provision of water quality treatment via treatment train approach
- The use of the above devices will be further detailed in Section 0 and Section 0.

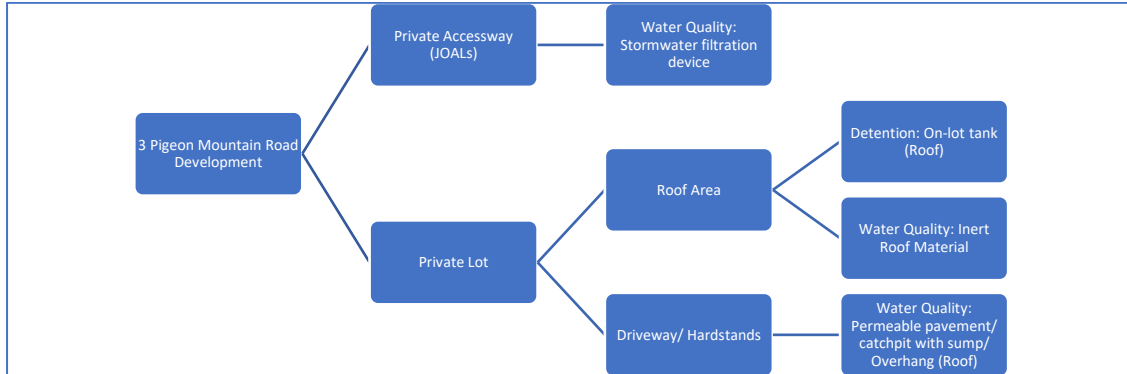


Figure 8: Stormwater Management Strategy

The proposed stormwater device for each respective area is illustrated in Figure 9, details refer to drawing FP326-460 attached.

Where alternative stormwater devices proposed at detailed building design at building consent stage, they shall achieve equal or better performance than the BPO identified in this SMP and be supported by appropriate calculations or documentations approved by Council.



Figure 9: Stormwater Device Catchment Plan

## 7.2.2 WATER QUALITY

Water quality management approach aims to manage the contaminant through treatment devices close to where contaminants are generated and minimise the discharge of contaminants. The site discharges through the stormwater network. Treatment of all impervious areas in accordance with GD01/TP10 is required under NDC Schedule 4.

A treatment train approach is adopted as the BPO for this development, combining low contaminant materials, first flush capture and primary treatment devices. This approach meets the intent of Schedule 4 by reducing contaminant loads from impervious surfaces (at source control).

The provision of water quality to the impervious area within the site:

### **Private Lot - Roof Areas**

The roof shall be constructed of inert, low-contaminant generating materials to minimise the risk of contaminant release.

*New buildings, and additions to buildings, must be constructed using cladding, roofing and spouting building materials that avoid the use of contaminant generating building products which have:*

- a. exposed surface(s) or surface coating of metallic zinc of any alloy containing greater than 10% zinc; or*
- b. exposed surface(s) or surface coating of metallic copper or any alloy containing greater than 10% copper; or*
- c. exposed treated timber surface(s) or any roof material with a copper containing or zinc-containing algaecide.*

It is recommended to install either leaf diverters on downpipes or gutter guards on guttering to minimise debris entering the tank system.

### **Private JOALs**

Runoff from the JOALs and their associated car parks and walkways will be treated using proprietary stormwater filtration devices, such as Stormfilter or Jellyfish filters, designed to achieve a minimum 75% TSS removal in accordance with TP10.

JOALs 1, 2, and 3 will be treated using a Jellyfish filter due to shallow invert levels at the proposed device location. A Stormfilter is proposed for JOAL 4.

The proposed filter locations are shown in Appendix A – Engineering Plans (FP326-400). Locations will be refined and confirmed at the building consent stage. Stormwater filter sizing, drawings, and product brochures are provided in Appendix E.

Table 7: Proposed Stormwater Treatment Device for JOALS

	Catchment	Catchment Area m <sup>2</sup>	Required Treatable Flow Rate (L/s)	Proposed Stormwater Treatment Device	Proposed Treatment Device Flow Rate (L/s)
<b>PRIVATE</b>					
PVT. Filter 1	JOAL1, JOAL 2, JOAL 3	2790.00	7.36	Jelly Fish – JF1050-1-1	7.5
PVT. Filter 2	JOAL 4	290.00	0.77	StormFilter – SF-MHPD-69-1200-T-20	1.42

### 7.2.3 STREAM HYDROLOGY

The site is not within the Stormwater Management Area (SMAF). The site is not discharging into the stream via stormwater network.

### 7.2.4 FLOODING

The site is not affected by floodplain nor in the flood sensitive area.

### 7.2.5 OVERLAND FLOWPATH AND FLOODPLAIN MANAGEMENT

The existing OLFP within the site has been covered in Section 2.8. The existing OLFPs develop within the site eventually discharge into the Pigeon Mountain Road and Ara-Tai Road.

As part of the development, the OLFP within the site will be redirected onto the JOALS and exit the site to the public Roads Ara Tai and Pigeon Mountain Road. No surface water is expected to flows into neighbouring properties. The proposed surface water flow direction and OLFP is shown in Appendix A: Engineering Plans (FP326-450) and detailed below in Figure 10.

Based on the proposed landform, the catchment of the site will be divided into several smaller catchments, with majority having an area less than 4000m<sup>2</sup>.

- Surface water from Catchments 1, 2, and 5 (each less than 4,000 m<sup>2</sup>) will discharge to Pigeon Mountain Road.
- Surface water from Catchment 3 (OLFP C), with a total contributing area of 5,130 m<sup>2</sup>, will be conveyed to Pigeon Mountain Road via a new overland flow path channel. The proposed OLFP channel is to be protected by registered easements.
- Surface water from Catchments 4, 6, and 7 (each less than 4,000 m<sup>2</sup>) will discharge to Ara Tai Road.



Figure 10: Proposed OLFP and the contributing catchment

An overland flow path analysis has been undertaken to study the water depth based on the proposed surface profiles.

The parameters used for the analysis are as follows:

- Manning's Roughness Value: 0.02 (OLFP along roadways),  
0.03 (OLFP designed and grassed channels)
- Runoff Coefficient: 0.8
- Rainfall intensity: 184.00mm/hr (converted from the rainfall depth 190mm from TP108 rainfall chart and increased by 32.7% taken into account the future climate change 3.8 degree)

It is understood to adopt the TP108 graphical method to calculate the peak flow rates. However, a more conservative approach, a rational method, is used to calculate the peak flow rate. The calculated peak flow rate for each catchment is less than  $0.5\text{m}^3/\text{s}$ .

Cross-section C has been placed at the downstream end of Catchment 3, where the overland flow path exits the site along the eastern boundary.

Cross-section D has been placed at the downstream end of Catchment 4 to assess surface water runoff. Catchment 4 has a relatively small contributing area, and the cross section is to confirm the water depth and velocity.

Civil 3D Hydraflow Express was used to calculate water depth and flow velocity at these cross-sections during the 1% AEP event. The results indicate that runoff depths at both cross-sections (C and D) are less than 100 mm, and the peak flow remains below 2m<sup>3</sup>/s. A summary of the cross-section results and their contributing catchments is provided in Table 8.

Table 8: Summary of cross section result

Cross Section	Catchment Area (ha)	Peak Flow Rate (m <sup>3</sup> /s)	Water Depth (m)	Maximum Water Level (m)
C	0.513	0.21	0.0975	7.1325
D	0.329	0.135	0.0671	8.267

The cross section analysis report refer to Appendix F: 1% AEP flood cross section analysis report.

The results have been reviewed against the proposed FFL which is discussed in Section Freeboard requirements for finished floor level.

#### Freeboard requirements for finished floor level

The minimum freeboard requirements as per the Auckland Council Code of Practice for Land Development and Subdivision is presented in Figure 11.

Post-development analysis indicates that the 100-year peak flow at cross section C is less than 2m<sup>3</sup>/s. Therefore, a minimum freeboard of 150mm above the maximum water level is recommended to be provided for the buildings adjacent to these OLFPs.

The lots affected by the OLFP associated with Cross-section C are listed in Table 9. The lowest FFL for each affected lot has been assessed against the recommended minimum FFL. All proposed FFLs exceed the minimum requirement and therefore comply with the required freeboard.

Table 9: Freeboard and FFL

Cross Section	Maximum Water Level (m)	Freeboard (m)	Minimum FFL (m)	Affected lots	Lowest FFL of the affected lot (m)
C	7.1325	0.15	7.2825	11,42	7.49

*Table 5: Freeboard requirements for the 1% AEP event flood plain and 1% AEP coastal storm inundation including 1 m sea-level rise*

Scenario	Freeboard
More Vulnerable Activities* in floodplains	<ul style="list-style-type: none"> <li>500 mm</li> </ul>
Less Vulnerable Activities* in floodplains	<ul style="list-style-type: none"> <li>300 mm</li> </ul>
Overland flow paths where flow is less than 2m <sup>3</sup> /s	<ul style="list-style-type: none"> <li>500 mm where surface water has a depth of 100 mm or more and extends from the building directly to a road or car park, other than a car park for a single dwelling</li> <li>150 mm for all other cases</li> </ul>
Overland flow paths, where flow is equal to or in excess of 2m <sup>3</sup> /s	<ul style="list-style-type: none"> <li>500 mm for More Vulnerable Activities*</li> <li>300 mm for Less Vulnerable Activities*</li> </ul>
Coastal Storm Inundation Areas (1% AEP including 1m sea-level rise)	<ul style="list-style-type: none"> <li>500 mm for dwellings and habitable rooms which are subject to wave action from the sea</li> <li>150 mm for all other cases</li> </ul>

\* As defined in the AUP

Figure 11: Freeboard requirement (Source: SW CoP)

### 7.2.6 DEVELOPING STAGING

Stormwater infrastructure will be implemented in a staged manner to ensure appropriate management of runoff throughout the development cycle.

#### Stage 1 – Public Stormwater Network

Construction of the public stormwater reticulation will be completed as part of the subdivision works to provide downstream conveyance for the development.

#### Stage 2 – Private Stormwater Treatment (JOALs)

Private stormwater filters within the JOALs will be constructed concurrently with the JOAL works. These filters will form part of the private stormwater system and shall be included under the relevant building consent.

#### Stage 3 – On-lot Stormwater Detention Tank

On-lot stormwater detention tanks shall be designed and constructed as part of each dwelling at the building consent stage. The detention tanks shall be sized in accordance to the approved SMP to ensure compliance with post-development discharge requirements.

## 7.3 HYDRAULIC CONNECTIVITY

The development will be hydraulically connected to the existing public stormwater network via a new public reticulation system. The proposed public stormwater network has been designed to convey post-development flows for the 10-year storm event under MPD scenario.

Due to deteriorated condition of the downstream stormwater network, on-site detention is required to mitigate the post-development peak flows to pre-development scenario. Peak flow

attenuation will be achieved through on-lot stormwater detention tanks in accordance with the approved Stormwater Management Plan.

Stormwater runoff from individual dwelling roofs will be collected and detained within on-lot stormwater tanks, with discharge controlled via orifice outlets to limit the 10-year peak flow rate to the target discharge specified in the SMP.

Stormwater runoff from JOALs will be collected in a catchpit, and filtered through stormwater filters located within JOALs.

Treated runoff from the JOALs and controlled discharges from on-lot tanks will connect to the public stormwater network and discharge to the existing public stormwater network.

The proposed location of the stormwater network is attached in Appendix A: Engineering Plans (FP326-400).

## 7.4 ASSET OWNERSHIP

All public stormwater infrastructure within the subject site is intended to be vested to Auckland Council upon completion of construction.

All private asset including on-lot detention tanks, private filters, private catchpits, private stormwater reticulation within the JOALs will remain private and are to be maintained by the individual lot owners or the body corporate (or equivalent arrangement) responsible for future maintenance.

Details of the proposed public and private drainage refer to Appendix A: Engineering Plans (FP326-400).

## 7.5 ONGOING MAINTENANCE REQUIREMENTS

### **On-lot Stormwater tank (Private)**

The tanks shall be installed in compliance with any geotechnical requirements and manufacturer's specifications. Maintenance on the tanks shall be conducted as per the maintenance schedule and log by the manufacturer and Council requirements.

### **Stormwater Treatment devices**

Stormwater filters shall be installed in compliance with any geotechnical requirements and manufacturer's specifications. Maintenance of the stormfilter device shall be as per maintenance scheduled and log by manufacturer and Council requirements.

## 7.6 IMPLEMENTATION OF STORMWATER NETWORK

This SMP shall be applied throughout the development.

## 7.7 DEPENDENCIES

Not applicable

## 7.8 RISKS

This section presents the identified risks to the proposed stormwater management within the proposed development and addresses how these risks could be mitigated/ managed through the design and construction stage.

What is the risk to the proposed stormwater management?	How can this be mitigated/ managed?	What other management/ mitigation could be used?	When does this risk need to be addressed?	What is the resultant level of risk?
Insufficient information of existing stormwater network in Auckland Council GeoMaps	Topographic survey and CCTV survey	N/A	During the planning and design stage	Moderate
Flooding due to OLFP	OLFP shall be maintained and keep undisturbed at all times. No surface water runoff allowed to flow into neighbouring site.	N/A	At all times	High

## 8. DEPARTURES FROM REGULATORY OR DESIGN CODES

The subject site classified as a large brownfield has previously been developed for urbanization, and the current proposal provides for more intensive land use. The stormwater management approach for the brownfield development within the subject site meets the minimum guidelines and design codes as outlined in Section 3.

## 9. CONCLUSIONS AND RECOMMENDATIONS FOR FUTURE WORK

The stormwater management plan for 3 Pigeon Mountain Road has been developed based on the relevant guideline and requirements. The proposed stormwater management strategy provides a practical approach to managing both water quality and quantity for the development. Key conclusions are:

- The development incorporates water sensitive design principles, ensuring that the effects of urbanisation on stormwater runoff are effectively managed.
- Best Practicable Options (BPOs) have been identified and integrated into the design to manage stormwater at source and within the site.
- Measures are in place to minimise contaminant discharge to the receiving environment, protecting downstream water quality.

- The proposed design provides 10% AEP peak-flow mitigation through the installation of detention rainwater tanks on each of the 62 individual lots, ensuring the allowable discharge limit to be 1.54 L/s per lot.
- Stormwater quality treatment is provided for the proposed development, including the use of private stormwater treatment devices for the JOALs.
- The primary stormwater network is designed to accommodate the 10% AEP peak flow, ensuring efficient conveyance.
- Overland flow paths (OLFPs) have been appropriately designed to remain within road carriageways, preventing adverse effects on adjoining properties.

**Recommendations for Future Work:**

- Detailed design and sizing of on-lot rainwater detention tanks should be confirmed at the building consent stage, ensuring compliance with peak flow targets for individual lots.
- Maintenance plans for proprietary treatment devices and detention tanks should be implemented to maintain long-term functionality.
- Monitoring of OLFPs post-construction is recommended to verify that flows remain contained within flow path and that no unintended impacts occur to neighbouring properties.
- Any future changes to lot layout or impervious areas should trigger a review of the SMP to ensure that stormwater management objectives continue to be met.

## 10. LIMITATIONS

This report has been prepared for the particular project described to us and its extent is limited to the scope of work agreed between the client and Eighty6 Engineering Limited.

No responsibility is accepted by Eighty6 Engineering Limited or its directors, servants, agents, staff or employees for the accuracy of information provided by third parties and/or the use of any part of this report in any other context or for any other purposes.

