AUSTINO BLOCKS 1 AND 2 INVESTIGATIONS – 84, 88, 90 AND 100 HOBSONVILLE RD

Stormwater Management Plan

Austino New Zealand Limited

DOCUMENT CONTROL RECORD

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APPENDICES

1.0 INTRODUCTION

1.1 PURPOSE

This Stormwater Management Plan (**SMP**) was prepared to support the Hobsonville Grove Private Plan Change (**PPC**). This SMP was prepared with the view to be finalised and adopted into the Regionwide Stormwater Network Discharge Consent (**NDC**) at the notification phase.

The purpose of this SMP is to provide guidance to the applicant and to Auckland Council on the preferred method to manage stormwater as a result of urbanisation.

The proposed plan change consists of two precincts, Precinct 1 Light Industrial and Precinct 2 residential located in the existing Whenuapai Future Urban Zone (**FUZ**).

This SMP is intended to:

- Support Precinct 1 (Light industrial) and Precinct 2 (Terrace Housing and Mixed-Use Urban) Plan Change Application;
- Provide guidance for stormwater management future development of the site.

1.2 HOBSONVILLE GROVE PLAN CHANGE AREA OVERVIEW

The Hobsonville Grove Plan Change Area is located in the Whenuapai area of West Auckland, between the Upper Harbour Motorway (SH18) in the north and Hobsonville Road in the south. It consists of a total of five land parcels as illustrated in Figure 1.

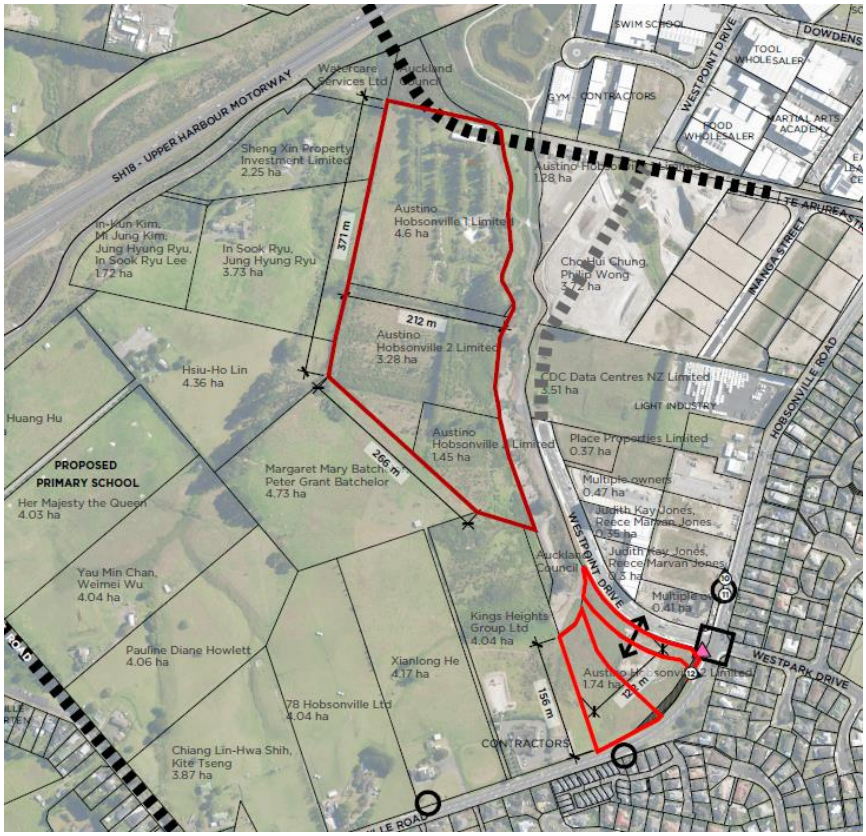


FIGURE 1. GENERAL PLAN OF THE HOBSONVILLE GROVE PLAN CHANGE AREA

The two precincts are proposed to cover three land use zones (as defined in the Auckland Unitary Plan): Light Industry and Terrace Housing and Apartment Buildings (**THAB**) (southern portion of Precinct 2) and Mixed Housing Urban (northern portion of Precinct 2). The indicative layout is shown below in Figure 2.

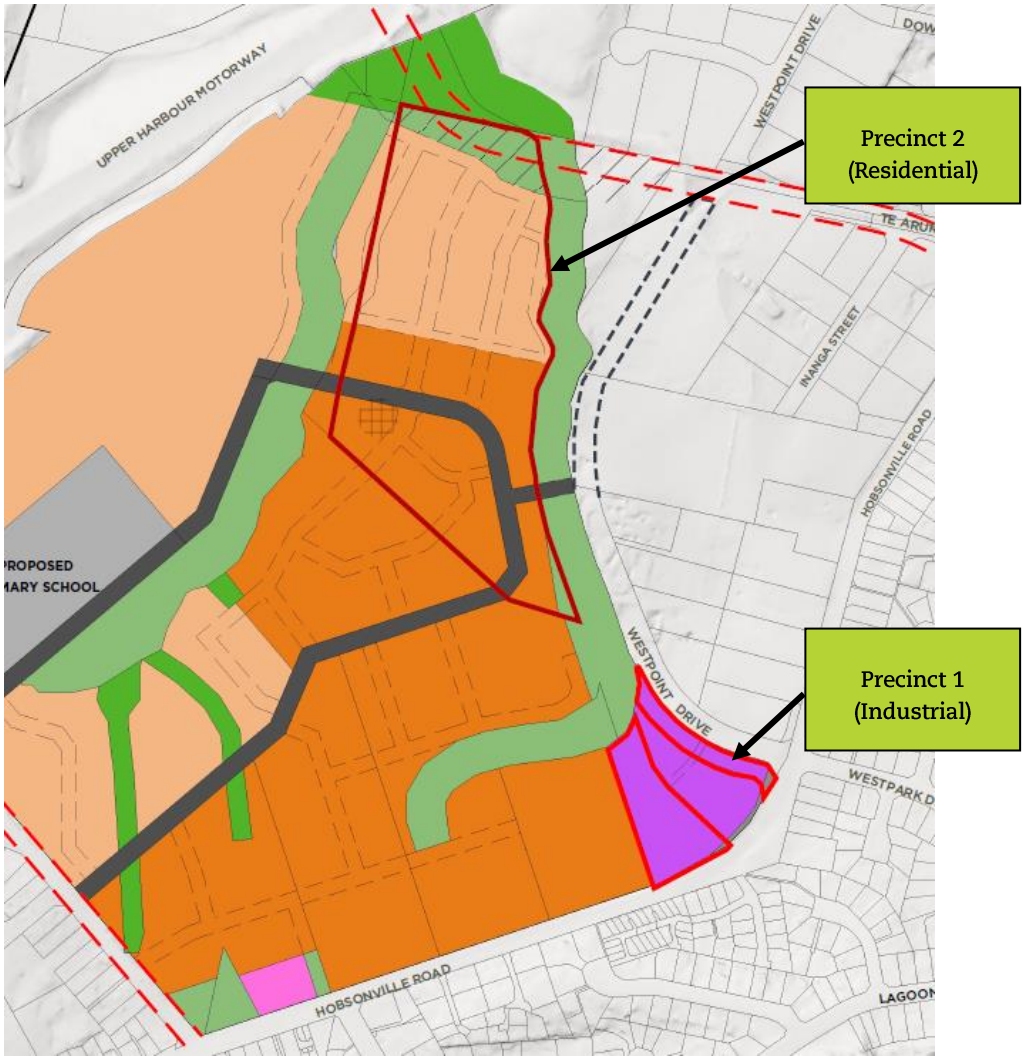


FIGURE 2. PROPOSED HOBSONVILLE GROVE PLAN CHANGE PRECINCT AREAS

As this is an early plan change application, there is no specific information around the development itself (e.g., lot layouts, development type, road layouts, etc) and so the plan change application seeks to legalise the land use activity from Future Urban Zone to the uses stated above.

2.0 EXISTING SITE APPRAISAL

Summary Points:

- Site is drained to the Waiarohia Stream via two permanent streams, Trig Stream forming the western boundary and Rawiri Stream forming the eastern boundary of Precinct 2.
- Natural slopes across the site exceed 9% in places which will impact the applicability of water sensitive design for stormwater management.
- Geotechnical information indicates that the site is underlain by alluvial subsoils which could provide an opportunity to optimise retention through infiltration to meet SMAF hydrology requirements.
- Precinct 2 is a natural promontory with little to no overland flows entering the precinct other than those generated within the plan change boundaries.
- The site is not subject to the 100-year floodplain (including MPD scenario and 3.8 degrees climate change)
- Proposed Supporting Growth / Auckland Transport Road extension designation (Project W4) is located within the northern area of Precinct 2. With no available design or delivery information available for this project it is not clear whether there will be impacts on the potential stormwater management for Precinct 2.

2.1 LOCATION OF PLAN CHANGE AND GENERAL INFORMATION

The proposed development sits within the upper reaches of the Whenuapai stormwater catchment (Figure 3). Hobsonville Road forms the upper catchment boundary. The proposed development area is approximately 9.3 ha.

The site boundary of the proposed precinct plan that is covered in this SMP is shown below in Figure 4.

FIGURE 3. WHENUAPAI STORMWATER CATCHMENT (SOURCE: AUCKLAND COUNCIL GEOMAPS).

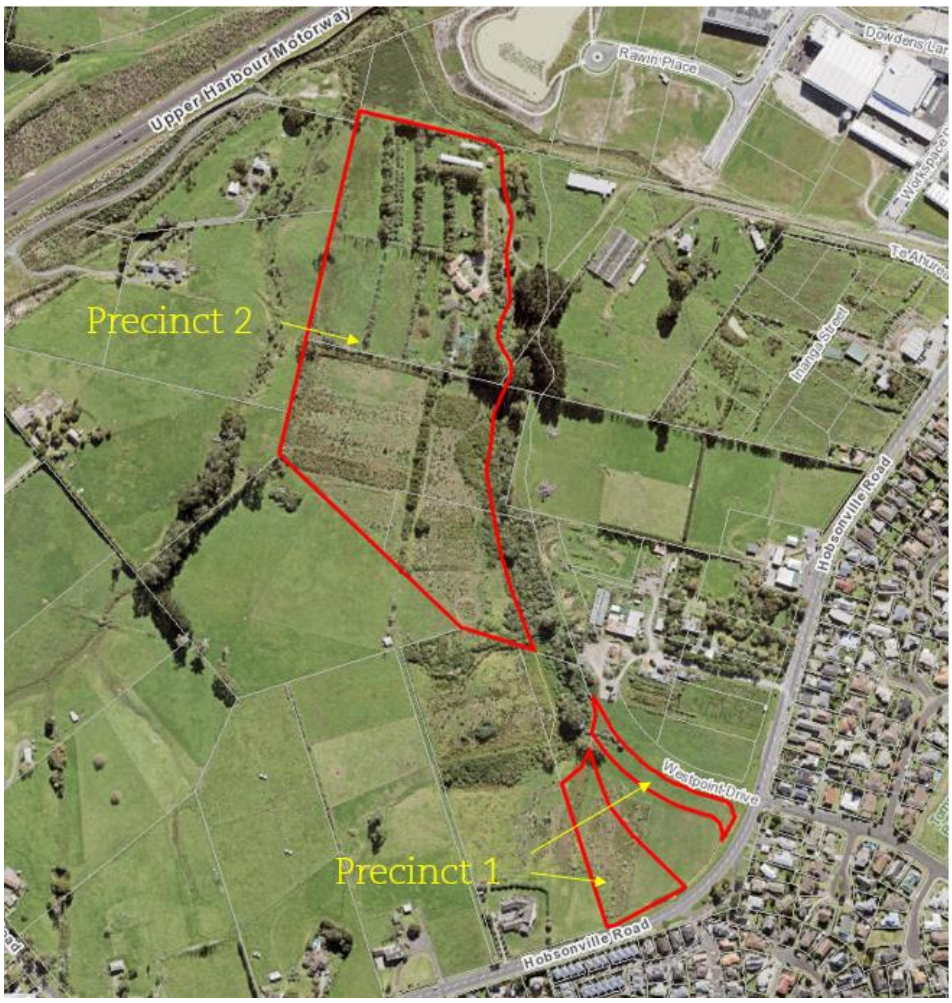


FIGURE 4. APPROXIMATE PRECINCT BOUNDARY (SOURCE: GEOMAPS)

The development site addresses, and legal description are provided in Table 1.

Table 1. Existing Site Elements	
EXISTING SITE ELEMENT	
SITE ADDRESS	**Precinct 1 Future Residential Zone:** • 100 Hobsonville Road Hobsonville 0618 (5.8896 ha) • Westpoint Drive Hobsonville 0618 (3.2820 ha) • Westpoint Drive Hobsonville 0618 (1.4542 ha) **Precinct 2 Proposed Light Industrial Zone:** • 84 Hobsonville Road Hobsonville 0618 (0.5756 ha) • Portion of Hobsonville Road Hobsonville 0618 (1.7477 ha)

Table 1. Existing Site Elements	
EXISTING SITE ELEMENT	
	
LEGAL DESCRIPTION	**Precinct 1 Future Residential Zone:** • SECT 1 SO 511858, SECT 3 SO 511858 • SEC 1 SO 490597 • SEC 6 SO 490597 **Precinct 2 Light Industrial Zone:** • SECT 2 SO 509537, SECT 4 SO 511858, SECT 5 SO 511858 • Portion of SECT 1 SO 509537
CURRENT UNITARY PLAN ZONING	Precinct 1: Business - Light Industry Zone Future Urban Zone Precinct 2: Future Urban Zone

2.2 SUMMARY OF DATA SOURCES USED

Table 2: Summary of Data Sources	
EXISTING SITE APPRAISAL ITEM	**SOURCE OF DATE AND DATA USED**
TOPOGRAPHY	Auckland Council GeoMaps Viewer (November 2023)

Table 2: Summary of Data Sources	
EXISTING SITE APPRAISAL ITEM	**SOURCE OF DATE AND DATA USED**
GEOTECHNICAL / SOIL CONDITIONS	Rawiri North Addendum to Waiarohia Integrated Catchment Management Plan (ICMP), Auckland Council (April 2015) Auckland Council GeoMaps Viewer (November 2023) 100 Hobsonville Road, Geotechnical Assessment Report, CMW Geosciences (November 2023)
EXISTING DRAINAGE FEATURES	Auckland Council GeoMaps Viewer (November 2023) Rawiri North Addendum to Waiarohia Integrated Catchment Management Plan (ICMP), Auckland Council (April 2015) Waiarohia Culverts Modelling Report, URS (August 2012) Rawiri North Stormwater Wetland Design Report, Woods (November 2013)
RECEIVING ENVIRONMENT	Rawiri Stream Ecological and Landscape Enhancement Plan, Morphum (December 2015) Austino Properties Hobsonville Rd, Watercourse and Vegetation Assessments, Bioresearches (March 2019) Auckland Council GeoMaps Viewer (November 2023)
FLOODING AND FLOW PATHS	Auckland Council GeoMaps Viewer (November 2023) Whenuapai RFHA Model Update Memo, Auckland Council (September 2023) Data received from Healthy Waters Catchment Planning Team December 2023
COASTAL INUNDATION	Auckland Council GeoMaps Viewer (November 2023)
CULTURAL AND HERITAGE SITES	100 Hobsonville Rd: archaeological assessment, CFG Heritage (April 2019)
CONTAMINATED LAND	Detailed Site Investigation and Site Management Plan, Geosciences (March 2019)

2.3 TOPOGRAPHY

The Precinct 1 area is characterised by rolling to steep topography. Precinct's 1 ridgeline follows Hobsonville Road while its lowest elevation is approximately 43 mRL (Auckland Vertical Datum 1946), see Figure 5.

Precinct 2 area is characterised by rolling to steep topography, well defined stream extents and steep to extreme stream embankments. A ridgeline is roughly defined through the middle of the site with a small headland located to the south of the area. Figure 5 below shows the existing topography of the site.

FIGURE 5. EXISTING SITE CONTOURS (SOURCE: GEOMAPS)

The lowest point of the Plan Change area is approximately 22 mRL (Auckland Vertical Datum 1946).

A slope analysis was undertaken using 2016 LiDAR data to provide input in the design considerations required for Water Sensitive Design applications. Figure 6 shows that the western portion of Precinct 1 is steep with much of the area having a slope gradient more than 9%. As anticipated, the channelised watercourses of the Rawiri and Trig stream banks return significantly steeper gradients ranging from 9% to 15% plus.

It should be noted that Westpoint Drive was constructed post 2016 and as such the contours of this road and how it has integrated into the surrounding topography is not captured in the current 2016 LiDAR data set. The analysis indicates a steep escarpment cutting through Precinct 2, with slopes in excess of 25%. It is likely that significant earthworks will be required in the area to facilitate building platforms associated with industrial facilities.

Site slope will have impacts on the selection, feasibility, and implementation of water sensitive design stormwater management devices.

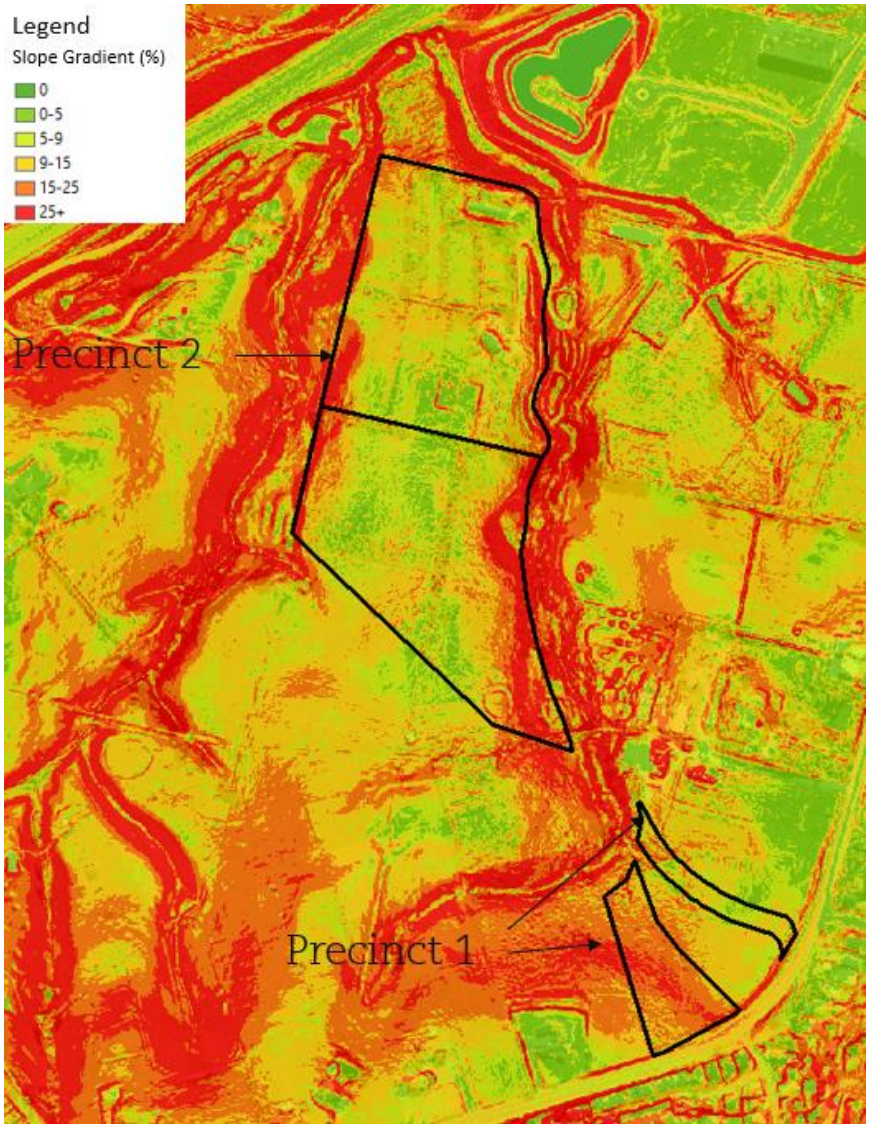


FIGURE 6: DEVELOPMENT SITE SLOPE GRADIENTS (SOURCE: GEOMAPS)

2.4 GEOTECHNICAL

A geotechnical assessment was prepared by CMW Geosciences in 2023 for the PPC area, see Appendix 1. The CMW Geosciences 2023 report found that both Precincts 1 and 2 have ground conditions comprising of Tauranga Group Alluvium. The landform is predominantly underlain with stiff to very stiff, slightly to moderately plastic, clayey silts, and silty clays. General soil coverages in the PPC area are shown below in Figure 7.

The CMW Geosciences 2023 hazard assessment found that the PPC area is generally suitable for creating stable building platforms and infrastructure, having acceptable levels of post-development residual risk from natural hazards. In addition, the report

found that development around the margins of Precinct 2 may require earthworks and drainage to provide improved stability.

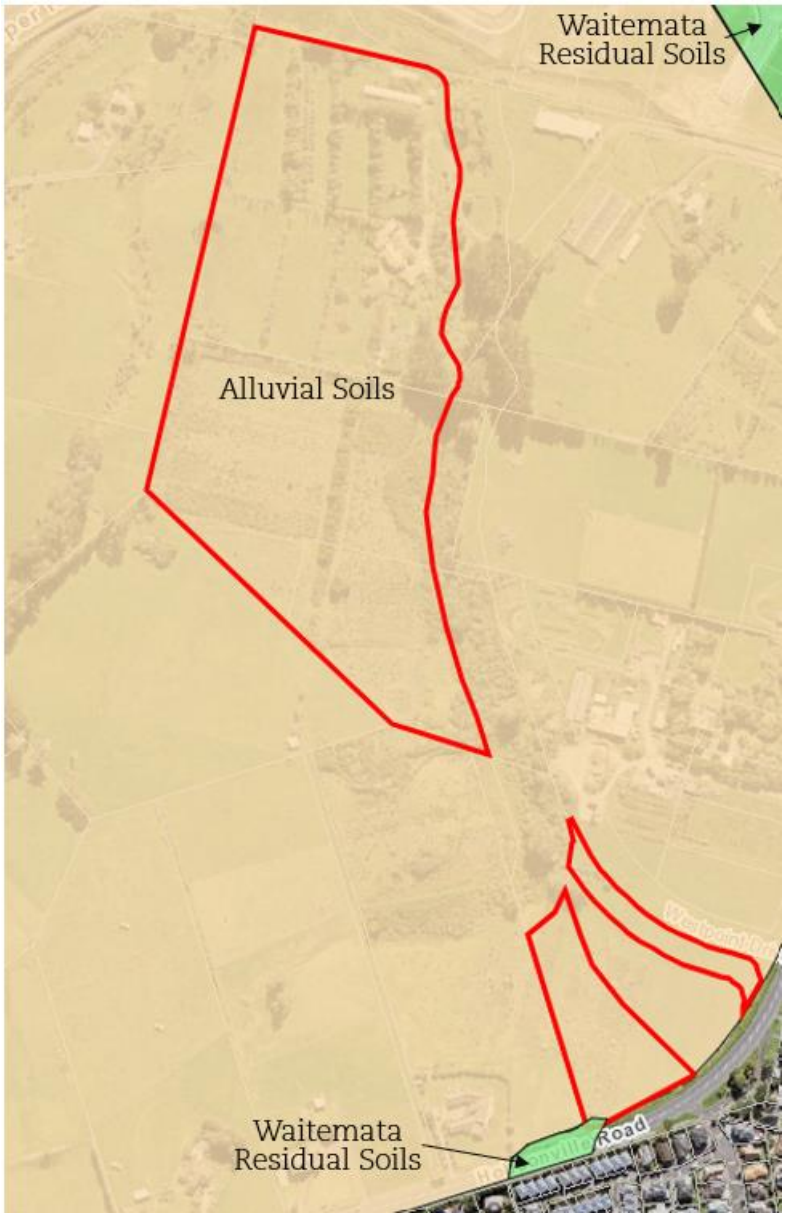


FIGURE 7. RAWIRI NORTH SOILS & GEOLOGY RELATIVE TO THE SITE BOUNDARY (SOURCE: RAWIRI NORTH ADDENDUM TO WAIAROHIA ICMP)

2.5 EXISTING DRAINAGE FEATURES

2.5.1 NATURAL DRAINAGE FEATURES

The Plan Change area is drained by two streams, listed from west to east: the Trig Stream and the Rawiri Stream. The Trig Stream and Rawiri Stream both discharge into the Waiarohia Stream a short distance downstream of the site. These watercourses are shown in Figure 8.

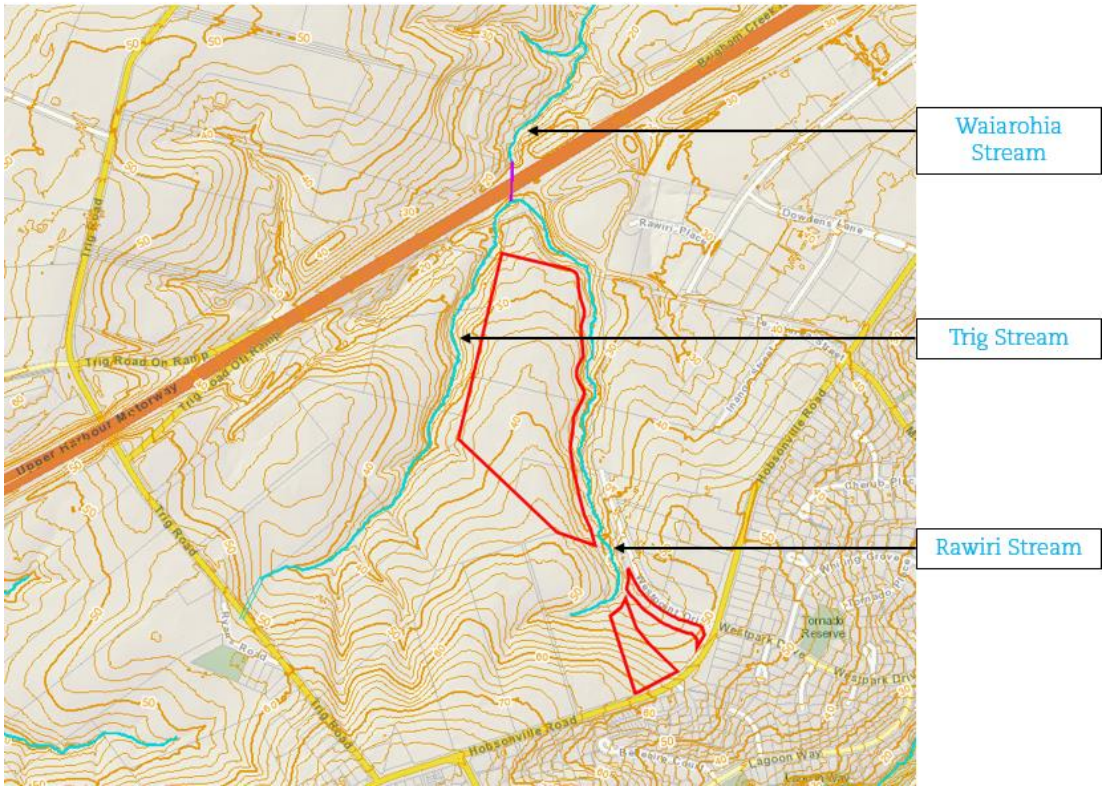


FIGURE 8. LOCAL STREAM NETWORK (SOURCE: GEOMAPS).

The drainage catchment of both the Trig and Rawiri streams are relatively small with Hobsonville Road and Trig Road forming the upper catchment boundaries. The Trig and Rawiri stream catchment areas are approximately 39.7 ha and 61.4 ha respectively.

Precinct 1 discharges its runoff to the Rawiri Stream. Precinct 2 is a promontory and naturally discharges runoff to both the Rawiri and Trig Stream. Indicative drainage of Precinct 1 and 2 is shown in Figure 9.

The Rawiri Stream and Trig Stream are both tributaries of the Waiarohia Stream which flows into the Waitematā Harbour approximately 2 km downstream of the site.

FIGURE 9. EXISTING SITE CONTOURS & DRAINAGE (SOURCE: GEOMAPS).

2.5.2 STREAM MANAGEMENT AREA D1 AND WETLAND 5 (CONSTRUCTED AS PART OF PLAN CHANGE 12)

The Addendum to Waiarohia Integrated Catchment Management Plan (ICMP) was prepared for Rawiri North Catchment in response to development in the area. The ICMP is a non-statutory document that provides a framework for managing stormwater at a strategic and operational levels in the Rawiri North area.

The Addendum to the Waiarohia ICMP defines Subcatchment D1, shown in Figure 10 as a Stream Management Area (approximately 10 ha). The intention of this Stream management Area is to promote retention and enhance stream flows post development. Approximately 29% of Precinct 1 is within this Stream Management Area. Precinct 2 is not located within Subcatchment D1. In the Subcatchment D1 area, biofiltration deceives within lots are recommended, with discharges directed to the stream to maintain base flows.

As part of the Plan Change 12, Wetland 5 located on Rawiri Place (Figure 10), was constructed to mitigate runoff from a catchment of approx. 49 ha and discharges to the Rawiri Stream downstream of the PPC area. Wetland 5 has been designed to accommodate the following from Subcatchment D1:

- Provide Extended Detention Volume as stated in TP10 (Release of first 34.5mm of runoff over 24 hours);
- Attenuate the runoff generated in up to the 50%, 10%, and 1% AEP storm events.

This indicates that a portion of Precinct 1 can covey its secondary systems runoff to Wetland 5.

Earthworks plans have not been prepared as part of the Hobsonville Grove Plan change submission. Due to the uncertainty of Precinct 1 final layout and the effect of the construction of Westpoint Drive on the existing topography the viability of conveying this portion of Precinct 1 secondary system runoff to Wetland 5 can only be reviewed during the design process.

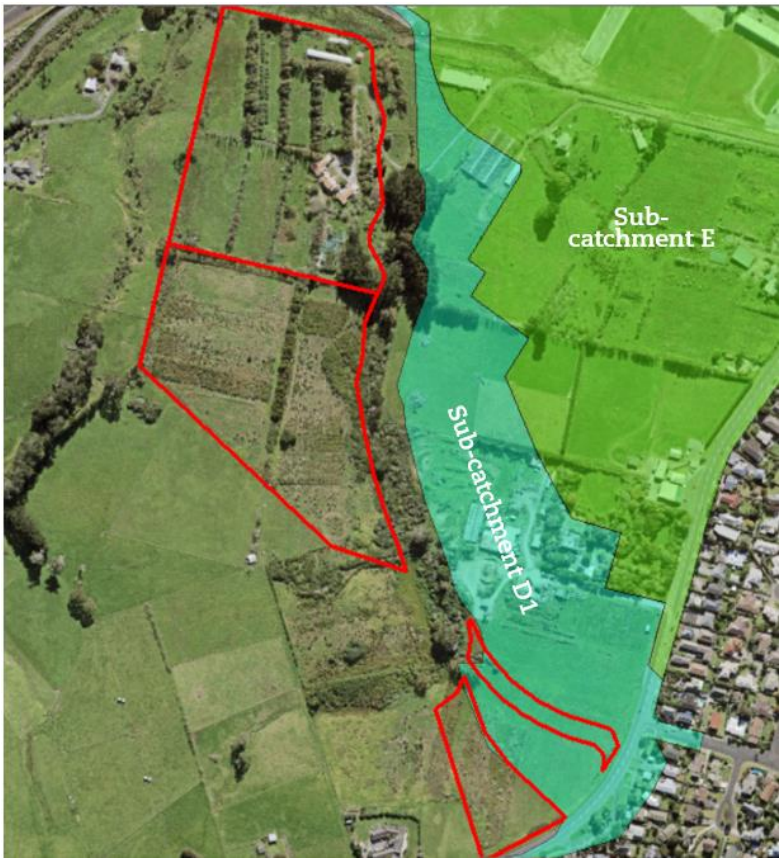


FIGURE 10. STREAM MANAGEMENT AREA SUBCATCHMENT D1 LOCATION PLAN

2.5.3 PUBLIC STORMWATER INFRASTRUCTURE

Except for localised road drainage of Westpoint Drive, there is no other public stormwater infrastructure located within either Precinct of the Plan change area.

The Trig and Rawiri Streams discharge beneath the Upper Harbour Motorway via an arrangement of three Waka Kotahi culverts. The Trig Stream utilises twin 2,100 mm culverts to discharge flows beneath the Motorway and the Rawiri Stream is drained by a single 1,950 culvert.

Investigation undertaken by Woods in 2013 found through field inspections that due to Culverts C2, C3 and D proximity and lack of defined delineation between the Trig and Rawiri Streams it is likely catchment runoff from higher rainfall events will utilise all

three culverts and result in local ponding at the inlet. The culvert arrangement and mapped watercourses shown on GeoMaps are presented in Figure 11.

The Rawiri, Trig, and Waiarohia streams discharge to the north under the Upper Harbour Motorway via twin culverts C2, C3 and D.

- Twin culverts C2 and C3, located at the confluence of the Trig Stream and the Waiarohia Stream. Both culverts C2 and C3 have a diameter of 2,100 mm;
- Culvert D, located at the confluence of the Rawiri Stream and the Waiarohia Stream. Culver D has a diameter of 1,950 mm.

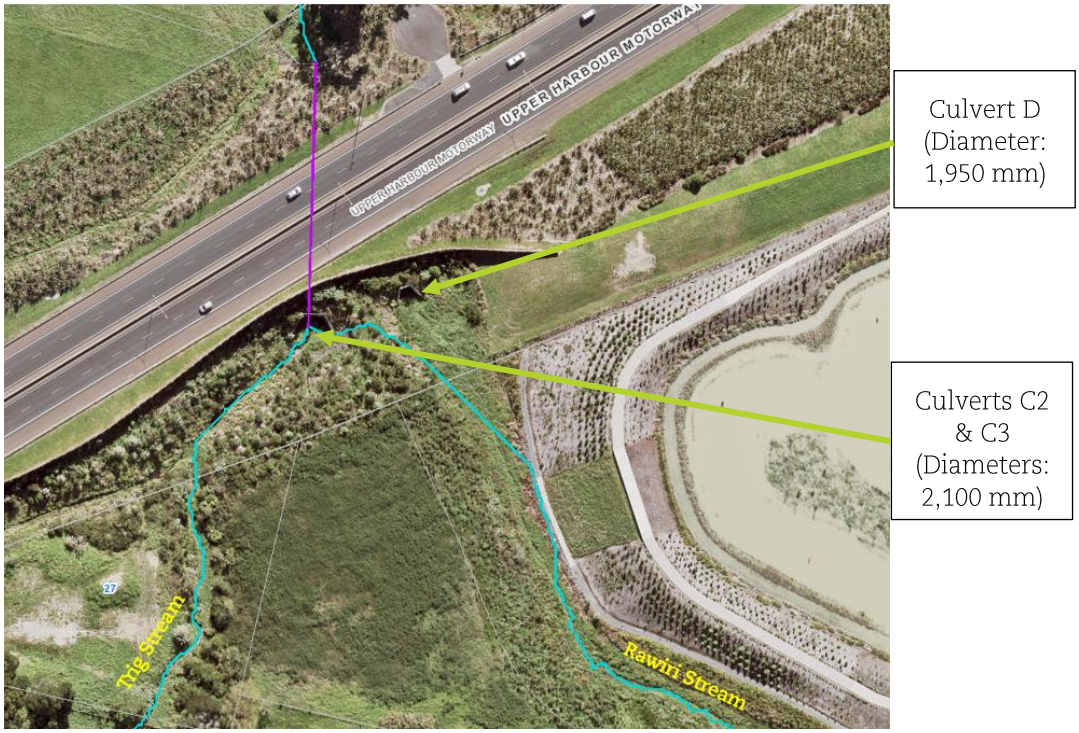


FIGURE 11. LOCATION OF UPPER HARBOUR MOTORWAY CULVERTS AND WETLAND 5 (SOURCE: GEOMAPS)

Table 3 summarises the 2012 URS assessment of the culverts.

Table 3. Summary of URS 2012 Culvert Assessment (Replicated from: URS 2012 Modelling Report)

PARAMETER	CULVERT C2	CULVERT C3	CULVERT D
Length (m)	69.80	69.90	66.50
Diameter (mm)	2100	2100	1950
Surcharge in 1% AEP event?	Yes	Yes	Yes
Flooding issue?	No	No	No

The results suggest that currently the culverts have capacity to convey runoff without flooding of the Upper Harbour Motorway from the assumed land use scenario in the 1% AEP event.

HG have modelled the PPC and associated downstream culvert, refer to Section 2.7.3 for this analysis.

2.6 THE RECEIVING ENVIRONMENT

Bioresearches undertook an Assessment of Ecological effects for 84, 90 & 100 Hobsonville Road prepared in July 2024 (see Appendix 2). This report concluded the following:

- No freshwater watercourses are situated within the boundaries of proposed Precinct 1, see Figure 12.
- No indicated overland flow paths within proposed Precinct 2 met the criteria for intermittent or permanent streams.
- There are no natural inland wetlands present within the boundaries of proposed Precinct 2, see Figure 12.

The Rawiri Stream is located outside the eastern boundary of the site. It drains in a general northerly direction, and confluences with the Trig Stream outside the northern boundary of the site, whereafter it drains underneath SH18. Given its catchment of approximately 60 ha and the characteristics of the assessed reach, this stream was classified as a permanent stream. The Rawiri stream does retain some ecological values and due to the native fish habitat, which this stream provides, it is considered of moderate ecological value.

The Trig Stream, with an associated wetland, was verified outside the northwestern boundary of Precinct 2. Flowing in a general northerly direction, the stream confluences with the Rawiri Stream on the northern boundary of the site. The general characteristics of the stream, alongside the large catchment size (approximately 35 ha), infer a permanent stream classification. Similar to the Rawiri Stream, the lower reach of the Trig Stream does have native fish habitat and is currently considered of moderate ecological value. Despite the presence of overhanging vegetation and deep pools within the upper reach, which may provide favourable habitat for fish, the limited shading and passage obstructions are likely to restrict habitat suitability. This, alongside the prevalence of exotic low quality riparian vegetation, suggest an overall ecological value of low for the upper reach.

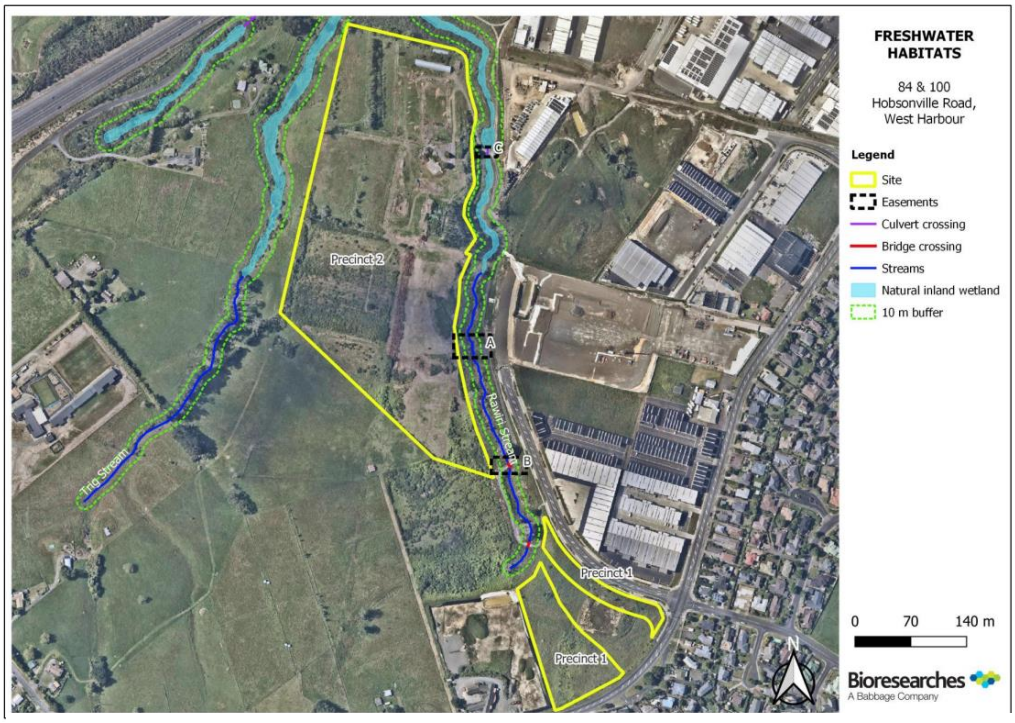


FIGURE 12. BIORESEARCHES FRESHWATER HABITATS SURROUNDING THE SITE.

Runoff from the PPC area will be discharged to the Rawiri or Trig streams. The PPC area will not discharge stormwater to a Significant Ecological Area (SEA) as defined in Schedule 4 of the Auckland Unitary Plan OP.

The Rawiri and Trig Stream which drain the PPC area are tributaries of the Waiarohia stream. A Significant Ecological Area as defined in Schedule 3 of the Auckland Unitary Plan Operative (AUP OP) was identified in the Waiarohia Inlet (see Figure 13). The terrestrial area located in the Waiarohia Inlet is characterised by:

- Threat Status and Rarity
- Stepping-Stones, Migration pathways and Buffers

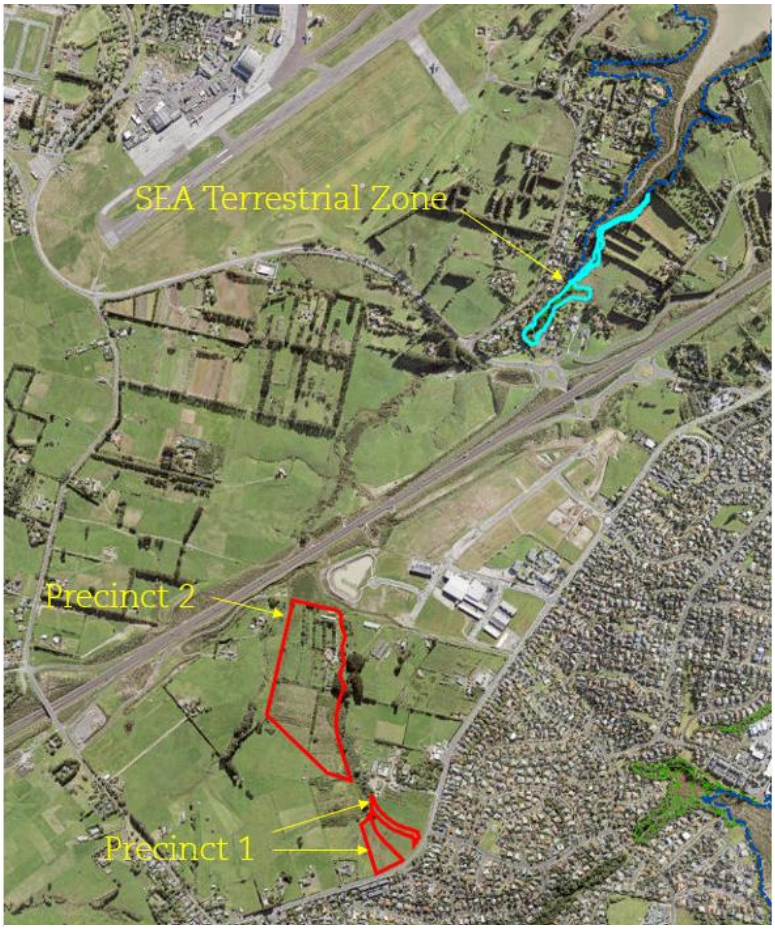


FIGURE 13. DOWNSTREAM SEA TERRESTRIAL ZONE (SOURCE: GEOMAPS)

2.6.1 HYDROLOGY MITIGATION REQUIREMENTS AND EROSION ASSESSMENT

The development of the PPC will increase the impervious areas of the site and generate larger runoff volumes discharging into the receiving environment.

To assess the extent of the potential impact of the development on the receiving environment an erosion assessment was done at multiple cross sections located along the Trig and Rawiri streams. The assessment was done using a tool developed by Healthy Waters. The assessment compared the risk of erosion due to the shear stress in the pre and post development scenarios. The locations in which the stream erosion was assessed are shown in Figure 14 below.

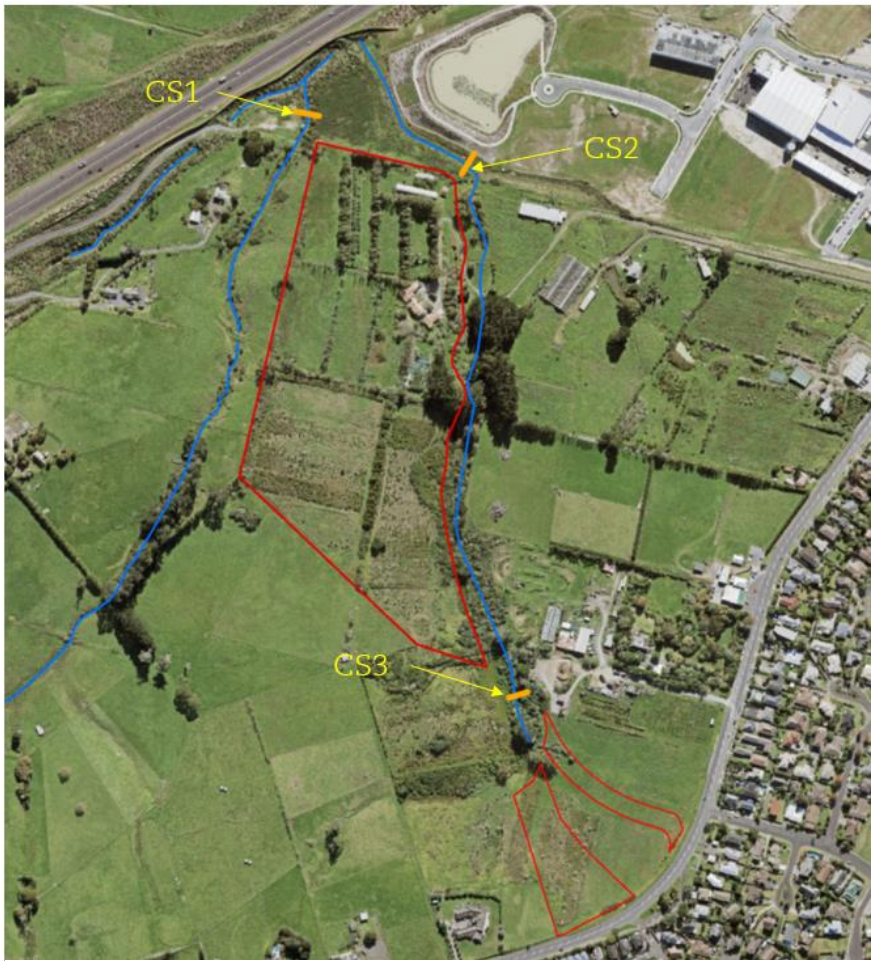


FIGURE 14. CROSS SECTIONS MODELLED FOR THE STREAM EROSION ASSESSMENT

The key assumptions that were used to conduct the analysis are summarised below.

- In the post development scenario, Precincts 1 and 2 were modelled at 90% and 70% impervious respectively as per the Land Use Zone impervious guidance set out in the AUP OP.
- The development catchment area draining to the modelled cross sections (see Figure 14) was determined using the existing topography. The existing topography was based off 2016 LINZ LiDAR data sets.
- The catchment area, existing and future time of concentration and existing imperviousness draining into the modelled cross sections were obtained from Auckland Councils GeoMaps.
- The channel geometry of the modelled cross sections was obtained from 2016 LINZ LiDAR data sets.
- The tool uses TP108 SCS method rainfall with climate change factors applied in accordance with the Auckland Council Stormwater Code of Practice v4 (For Consultation).

- Without site specific geotechnical parameters, a critical shear stress of 20 (N/m2) was recommended by Auckland Council. Auckland Council's Technical Report for Cohesive Sediment in Auckland Streams TR 2009/038 suggests "using the medium critical shear stress (approximately 33 Pa)" if specific parameters are not developed for a stream. The critical shear stress of 20 N/m2 is assumed to be conservative at this stage of design. Further erosion assessment at Resource Consent stage will confirm the validity of this assumption. The erosion threshold zones used in the analysis are shown below in Table 4.

TABLE 4. EROSION THRESHOLD ZONES

THRESHOLD	EXCESS SHEAR	DESCRIPTION
Green	<1.0	Indicates no erosion predicted to occur
Yellow	>1.0 and <2.0	Indicates the potential for some erosion of the channel
Orange	>2.0 and <10.0	Indicates the potential for channel to be mobile (likely active erosion)
Red	>10.0	Indicates potential rapid rates of erosion and incision of channel

The 2.3-year ARI event represent the mean annual flood (MAF) flow which is a critical event when considering stream erosion. The results of the assessment for the MAF event considering 3.8 degrees of climate change are presented below in Figure 15.

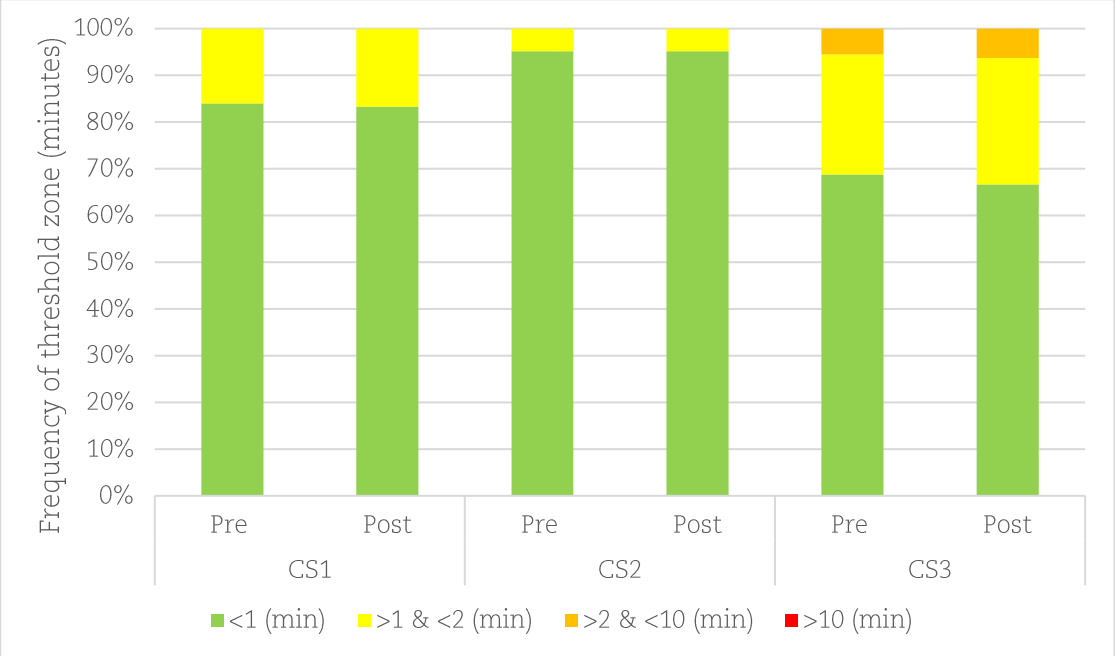


FIGURE 15. EROSION THRESHOLD EXCEEDANCE – 2.3 YEAR ARI 24 HOUR RAINFALL EVENT WITH 3.8 DEGREES OF CLIMATE CHANGE.

The change in erosion potential due to the development of the PPC is shown to be minimal. As defined in Table 4 there only appears to be some erosion of the channel,

when the shear stress exceeds 1, yet this always remains below 2 for cross section 1 and 2.

The modelled cross sections use 2016 LiDAR data sets. Between 2020 and 2022, the riparian yard along the Rawiri Stream has undergone revegetation with native vegetation as part of the industrial development situated along Westpoint Drive. It is uncertain whether as part of the revegetation bank stabilisation works were undertaken. The 2016 LINZ LiDAR data may not be accurate representation of the stream banks in this area.

For the greater events including 10-year and 100-year ARI with 3.8 degrees the shear stress never exceeds 10 at any time for any cross sections. The assessment shows that at the modelled cross sections in the Trig and Rawiri streams the overall erosion risk in the streams are low.

To assess the effect of Stormwater management area control – Flow 1 (SMAF 1) hydrology mitigation (the minimum regulatory stream hydrology mitigation requirement) in these locations, a high level modified 2.3-year ARI runoff hydrograph was considered in the erosion assessment. The hydrograph was created by subtracting the difference in the 95th percentile 24-hour storm volume between the pre and post development scenarios in the PPC area. This difference hydrograph was then subtracted from the post development 2.3-year ARI runoff hydrograph to form the modified post development 2.3-year hydrograph. An example modified 2.3 ARI event hydrograph is shown below.

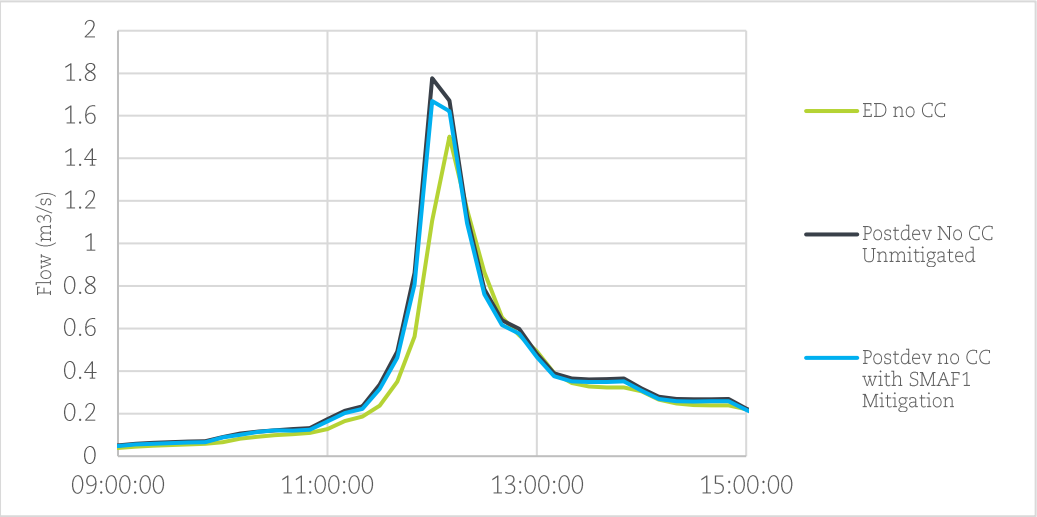


FIGURE 16. MODIFIED HYDROGRAPH FOR EXISTING AND POST DEVELOPMENT DRAINING INTO CS1 IN THE 2.3 YEAR ARI EVENT.

To assess the effect of SMAF 1 Mitigation on stream erosion in the 2.3-year ARI event, the modified hydrograph methodology was applied to each cross section. The erosion threshold result for this analysis is summarised below in Figure 17.

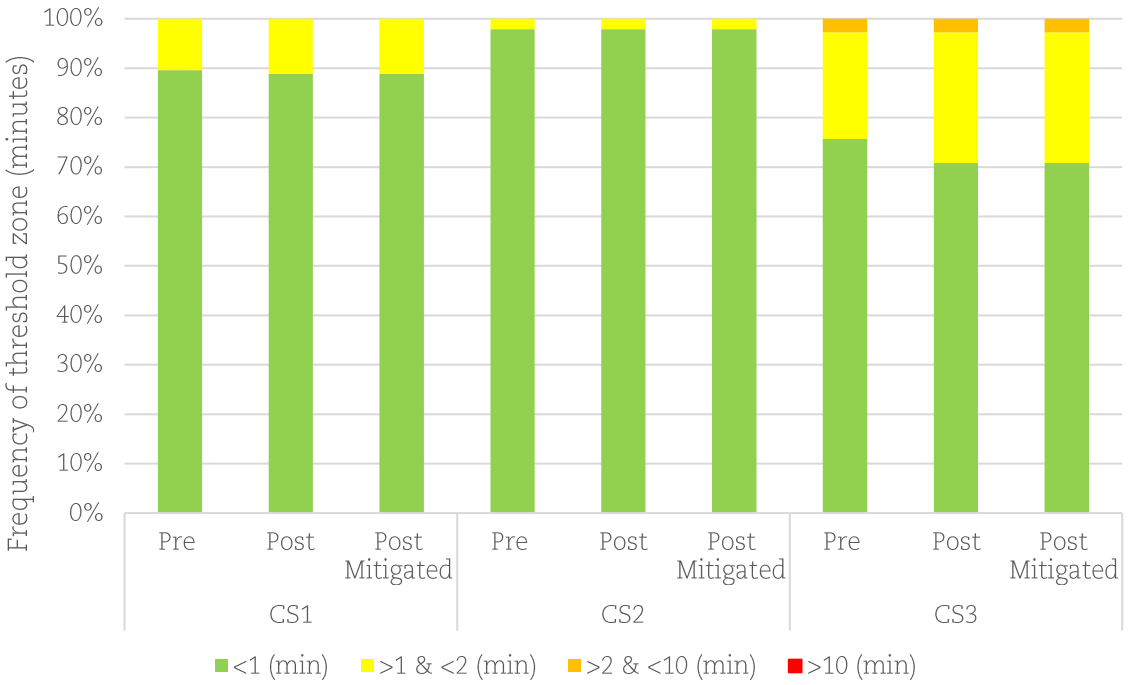


FIGURE 17. EROSION THRESHOLD EXCEEDANCE – 2.3 YEAR ARI 24 HOUR RAINFALL EVENT WITH NO CLIMATE CHANGE AND SMAF 1 MITIGATION.

SMAF hydrology mitigation targets the smaller 95th -percentile rainfall events to help reduce the hydrological changes due to the development of the PPC area. SMAF mitigation aims to manage runoff concentrated at the discharge points (for the 95th percentile rainfall event as below). The effectiveness of SMAF 1 hydrology mitigation on larger events (e.g. 2.3-year ARI MAF flow) is shown to be limited. However, the assessment has shown that as a result of development, the increased risk of stream erosion on the Trig and Rawiri streams (located outside of the PPC extent) is minimal and the existing erosion potential is small. The application of SMAF 1 hydrology mitigation is appropriate at this stage.

A stream assessment was undertaken to understand the condition of the Rawiri and Trig streams due to development. A critical bank shear stress of 20 N/m2 was used (refer to 2.6.1) in the assessment with the absence of site-specific geotechnical information. The assessment found that in its existing condition, the only stream that was indicated to be susceptible to some erosion of the channel was CS3. The results show that there is minimal change in stream erosion risk between the pre and post development scenarios. Further erosion assessments of the Trig and Rawiri streams should be undertaken during the Resource Consent stage to support this high-level erosion risk assessment. This should include stream surveys to determine the area's most susceptible to erosion. The following measures are recommended to protect the receiving and reduce erosion potential.

- Treatment of all impervious surfaces to reduce the sediment load to the streams.
- Outlet structure setback from the stream with riprap protection with the use of green outfall structures where possible. The Trig and Rawiri streams are not located in the PPC area, and the outlet locations will have a minimum of 10 m setback from the streams.

2.7 FLOODPLAINS AND FLOWPATHS

2.7.1 FLOODPLAINS

A Whenuapai Catchment Rapid Flood Hazard Assessment (RFHA) was completed in 2020 by WaterRes. Critical model parameters include:

- Flood plains were established based on a 1% AEP MPD plus 3.8 degrees of climate change rainfall event.
- Imperviousness of future Urban Zones was conservatively assumed to be 80%.
- A rain on grid methodology was used to establish flows through the catchment and floodplains.
- There is limited representation of culverts and bridge structures in the model which can result in significant over and underestimates in flood levels in some locations, particularly where blockage of infrastructure is not a consideration.

The published GeoMaps floodplains indicate that the Plan Change area is outside of the 100-year floodplain (assuming MPD and 3.8 degrees climate change). Flood plains are contained within the heavily channelised stream sections, with a local wider floodplain at the culvert inlets adjacent to the Upper Harbour Motorway. The floodplain is illustrated in Figure 18.

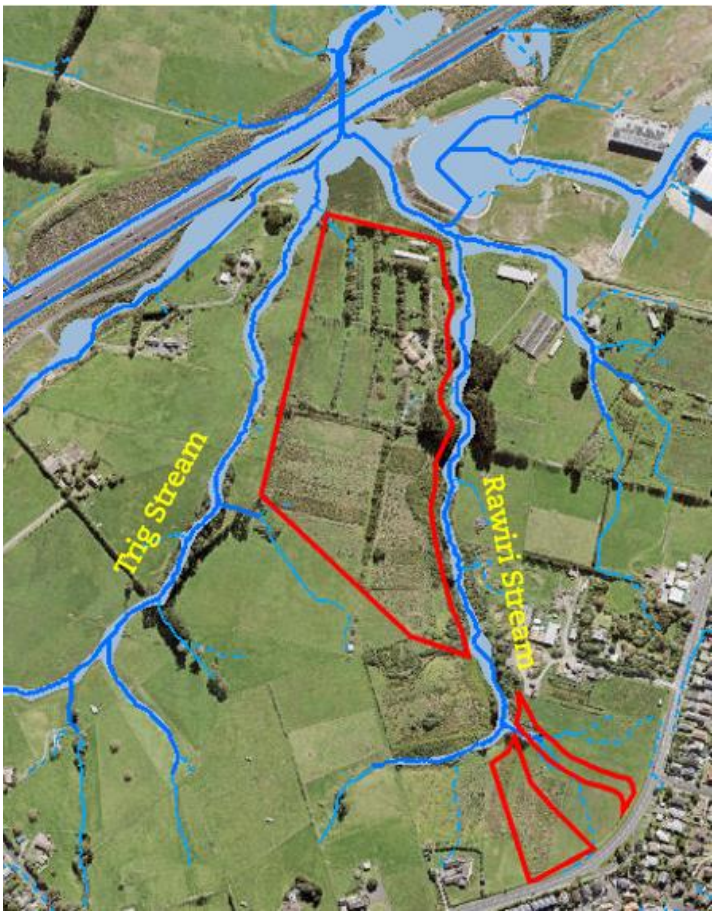


FIGURE 18. EXTENT OF FLOOD PLAINS ON THE DEVELOPMENT SITE AND SURROUNDING AREAS (SOURCE: GEOMAPS)

2.7.2 OVERLAND FLOWPATHS

The Overland Flowpath (**OLFP**) on GeoMaps in the Plan Change area utilise 2016 LiDAR data. A number of OLFP's enter Precinct 1 (84 Hobsonville Road); however, Westpoint Drive was constructed post 2016 and this construction together with tying into Hobsonville Road has resulted in the Hobsonville Road flowpaths being intercepted and conveyed to Wetland 5 via Westpoint Drive.

Precinct 2 has two OLFP's that meet the AUP OP definition (contributing catchment more than 4000 m2). These OLFP's are located in the north and south-western corners of the PPC, as illustrated below in Figure 19.

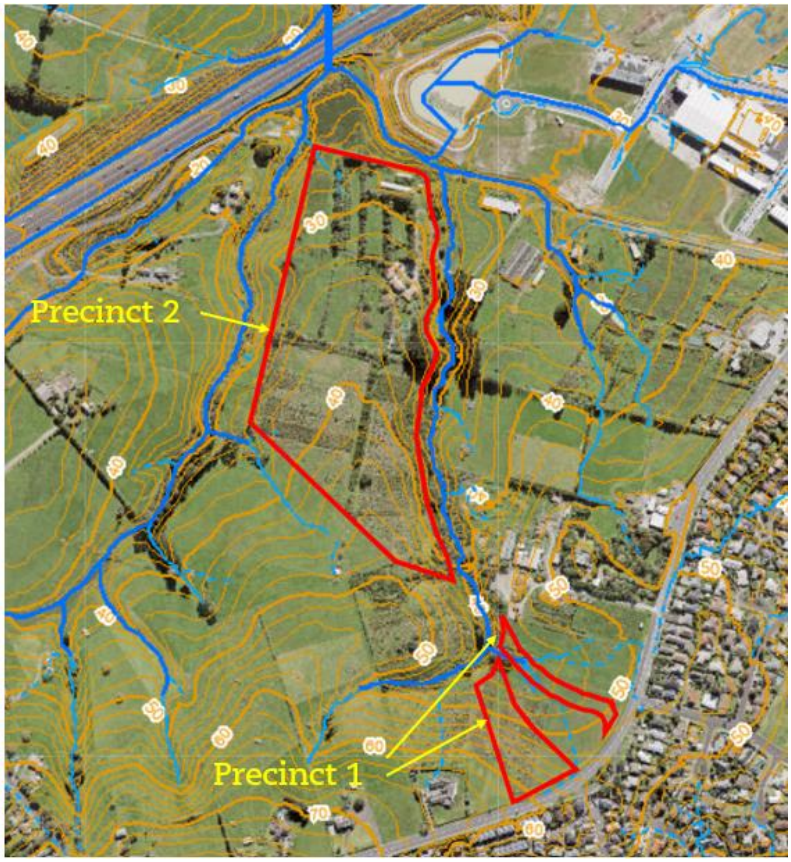


FIGURE 19. OVERLAND FLOWPATHS AND STREAMS (SOURCE: GEOMAPS)

2.7.3 FLOOD MODELLING FOR THE HOBSONVILLE GROVE PPC

Hydraulic modelling of the Whenuapai Catchment (Waiarohia Inlet) was conducted to support the PPC application. Flood modelling of the Hobsonville Grove PPC has been completed to assess potential downstream impacts in response to development across the Hobsonville Grove PPC.

The Upper Harbour Motorway and properties at 27 Trig Road, 161 and 162 Brigham Creek Road were identified as being vulnerable to downstream flooding. A 2D Infoworks ICM rain on grid model was built to assess the downstream effects of the proposed PPC in the 10% and 1% AEP events. The modelled 2D Boundary is shown below in Figure 20.

FIGURE 20. WHENUAPAI CATCHMENT, SITE LOCATION, AND MODEL BOUNDARY (SOURCE: AUCKLAND COUNCILS GEOMAPS VIEWER, 2024 AND HG ARC GIS MAP).

As shown in Figure 20, land outside of the 2D boundary does not drain into the Waiarohia inlet and was considered inappropriate to model. The modelled scenarios for the Hobsonville Grove PPC application are shown in Table 5 below.

To assess the impact of the Hobsonville Grove PPC, the modelled post development scenarios represent the change in land use and associated imperviousness from the PPC only. Outside of the PPC area, the existing levels of imperviousness were modelled. The modelled post development scenarios do not incorporate any form of mitigation in the PPC.

TABLE 5 MODELLED SCENARIOS

DEVELOPMENT SCENARIO	RAINFALL EVENT	CLIAMTE CHANGE	COMMENT
ED	10-year	Nil	Today's flood risk
	10-year	2.1°	Future flood risk assuming no development.
	100-year	Nil	Today's flood risk
	100-year	3.8°	Future flood risk assuming no development.
PPC at MPD, elsewhere ED	10-year	Nil	Potential flood impact of the development under existing climate
	10-year	2.1°	Potential flood impact of the development under future climate
	100-year	Nil	Potential flood impact of the development under existing climate
	100-year	3.8°	Potential flood impact of the development under future climate

**Note: ED: Existing Development, MPD: Maximum Probable Development*

Model Assumptions and Exclusions

The key Assumptions for the model build are summarised below.

- The Te Tupu Ngatahi Spedding Road designation do not impact the landform of the catchment, flows or volume discharging to the Upper Harbour Motorway.
    - There is currently no design or confirmed timeline for delivery of the Spedding Road Extension. Vertical alignments are currently only at the concept stage. With limited information on the final alignment and stormwater management approach for Spedding Road designation, it cannot be represented in the model.
- The downstream boundary condition is formed by the tidal level at the Waiarohia Inlet. A tidal level of 1.39 m RL was used for the existing climate change scenario scenario. This was based on the Auckland Stormwater Flood modelling specification (2011). For the 3.8-degree climate change scenario a future tidal level of 2.89 m RL was used. This future tidal level aligns with the Auckland Council RFHA model build which presents published floodplains.
- The ground surface was modelled from LiDAR data obtained from LINZ (2016 – 2018). Earthworks that have been conducted after 2016 (Plan Change 12) are not captured with this dataset.
- It was assumed, for all modelled scenarios, that Plan Change 12 has been fully developed, and its maximum allowable imperviousness (90%) has been reached, as set out in the Auckland Unitary Plan

- The culverts under the Upper Harbour Motorway are represented in the 1D/2D model. The culvert design information (e.g. diameter, inverts, etc) was obtained from the URS modelling report, produced in August 2012, refer to Appendix 3. The following culverts are represented in the 2D model:
    - D, C2, C3, B, E, H, I, J, K as identified in the URS report (2012), refer to Appendix 3.
- Major constructed ponds / wetlands in the Waiarohia Inlet Catchment were represented as filled depressions in the model. The location of the filled basins represented in the model are shown in the Flood Modelling Assessment Report, Appendix 6.
    - The design performance of the constructed wetlands and ponds are unlikely to be designed to meet the current design standards and climate change requirements. Therefore, assuming that these are filled depressions in the model will allow for a worst-case scenario to be identified.
- The Waiarohia Stream channel was burnt into the LiDAR at Brigham Creek Road bridge (located directly to the west of 162 Brigham Creek Road). In this area the 1% AEP floodplain is extensive, and it was assumed that the bridge has a small impact on the conveyance capacity of the stream.
- All hydraulic model simulations use TP108 SCS method rainfall with climate change factors applied in accordance with the Auckland Council Stormwater Code of Practice v4 (For Consultation).
- For further detail and assumptions of the model build refer to the Stormwater Modelling Flood Assessment Report in Appendix 6.

Modelling Results

Upper Harbour Motorway

The water level and flows at the Upper Harbour Motorway culverts (C2, C3 and D, see Figure 11) was assessed to determine the impact of the development of the PPC on the downstream hydraulic constraint.

At the culverts, Table 6 below summarises the peak water level, pipe full capacity, downstream flow and velocity for the modelled scenarios. The crest level of the Upper Harbour Motorway at the location of these culverts was obtained from LINZ 2016 LiDAR data sets.

TABLE 6. MODELLING RESULTS FOR UPPER HARBOUR MOTORWAY CULVERTS.

CULVERT	LAND USE AND CLIMATE CHANGE SCENARIO	UPPPER HARBOUR MOTORWAY CREST LEVEL AT CULVERT (MRL)	MAXIMUM FLOOD LEVEL UPSTREAM (MRL)	PIPE FULL CAPACITY (M3/S)	DOWNSTREAM FLOW (M3/S)	DOWNSTREAM VELOCITY (M/S)
C2	Pre-development 10-year (2.1°CC)	20.6	17.13	18.33	5.79	1.60

	Post-development 10-year (2.1°CC)		17.20	18.33	6.14	1.70
	Predevelopment 100-year (3.8°CC)		19.72	18.33	17.08	4.67
	Post development 100-year (3.8°CC)		19.80	18.33	17.28	4.73
C3	Pre-development 10-year (2.1°CC)	20.6	17.09	18.43	5.45	1.51
	Post-development 10-year (2.1°CC)		17.016	18.43	5.85	1.62
	Predevelopment 100-year (3.8°CC)		19.69	18.43	17.03	4.66
	Post development 100-year (3.8°CC)		19.76	18.43	17.24	4.72
D	Pre-development 10-year (2.1°CC)	20.50	18.97	24.55	9.49	3.04
	Post-development 10-year (2.1°CC)		19.01	24.55	9.64	3.09
	Predevelopment 100-year (3.8°CC)		19.79	24.55	12.11	3.84
	Post development 100-year (3.8°CC)		19.86	24.55	12.32	3.90

In the 1% AEP event with 3.8 degrees of climate change, with the development of the PPC, the Upper Harbour Motorway is not overtopped. In this scenario, at Culvert D, which has the lowest crest level there is approximately 640 mm of freeboard.

Figures 21 & 22 show the flood level difference at the culverts between the existing and developed PPC scenarios for 1% AEP no CC and 1% AEP 3.8° CC storm events scenarios.

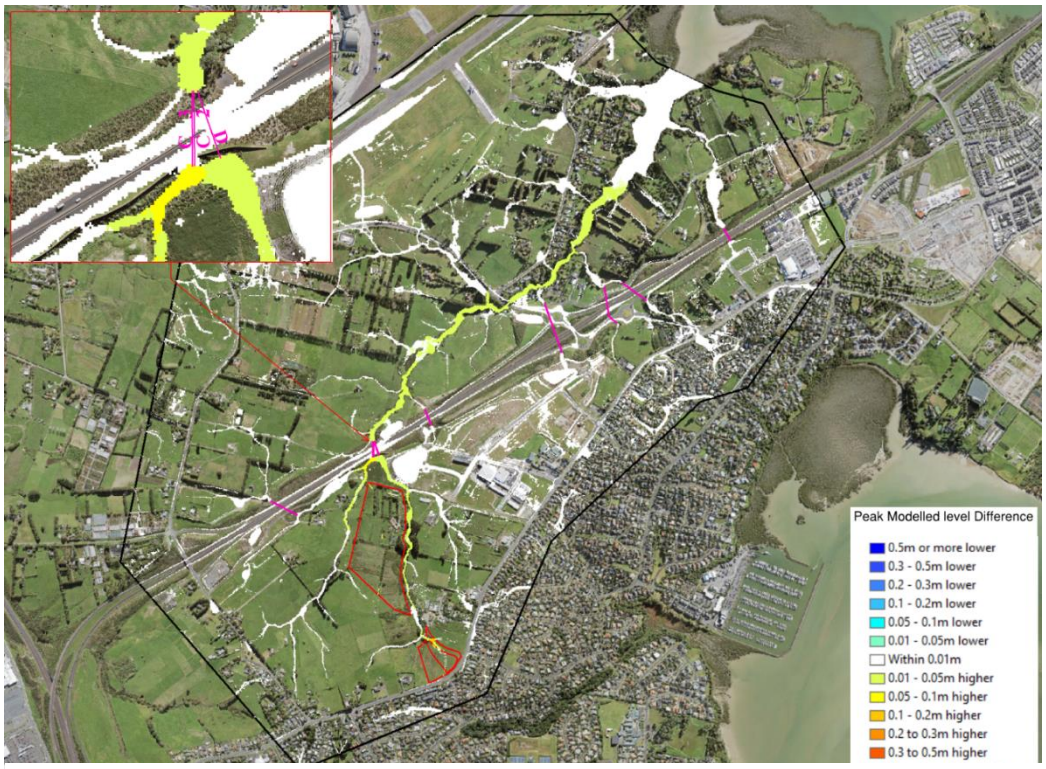


FIGURE 22. FLOOD LEVEL DIFFERENCE AT CULVERTS IN 1% AEP WITH NO CC.

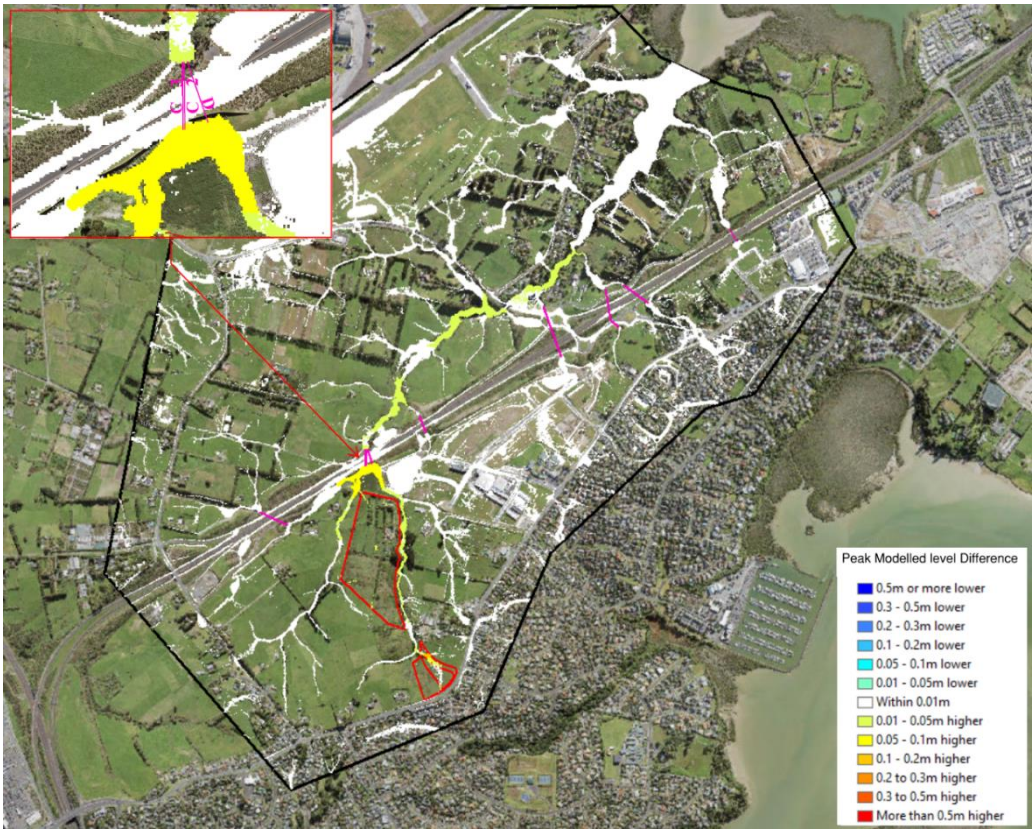


FIGURE 21. FLOOD LEVEL DIFFERENCE AT CULVERTS IN 1% AEP WITH 3.8 DEGREES OF CC.

Downstream properties

The properties downstream of the PPC area, that were identified as being at risk of flooding, are shown in Figure 23.

FIGURE 23. PROPERTIES IDENTIFIED AS BEING AT RISK OF FLOODING.

No buildings have been identified at 27 Trig Road, a property owned by Watercare with no infrastructure within its boundaries. This property is located immediately adjacent to Trig Stream and directly upstream of the Upper Harbour Motorway.

A Watercare pump station is situated at 161 Brigham Creek Road, while 162 Brigham Creek Road is a private residence. Both properties are adjacent to the Waiarohia Stream.

To understand the impact of the development of the PPC, the flood hazard for these properties was determined as the peak water level and flood depth. Figures 24 and 25 illustrate flood level differences between the existing and the development of the PPC scenarios at the identified properties in the 1% AEP event with 3.8 degrees of climate change.

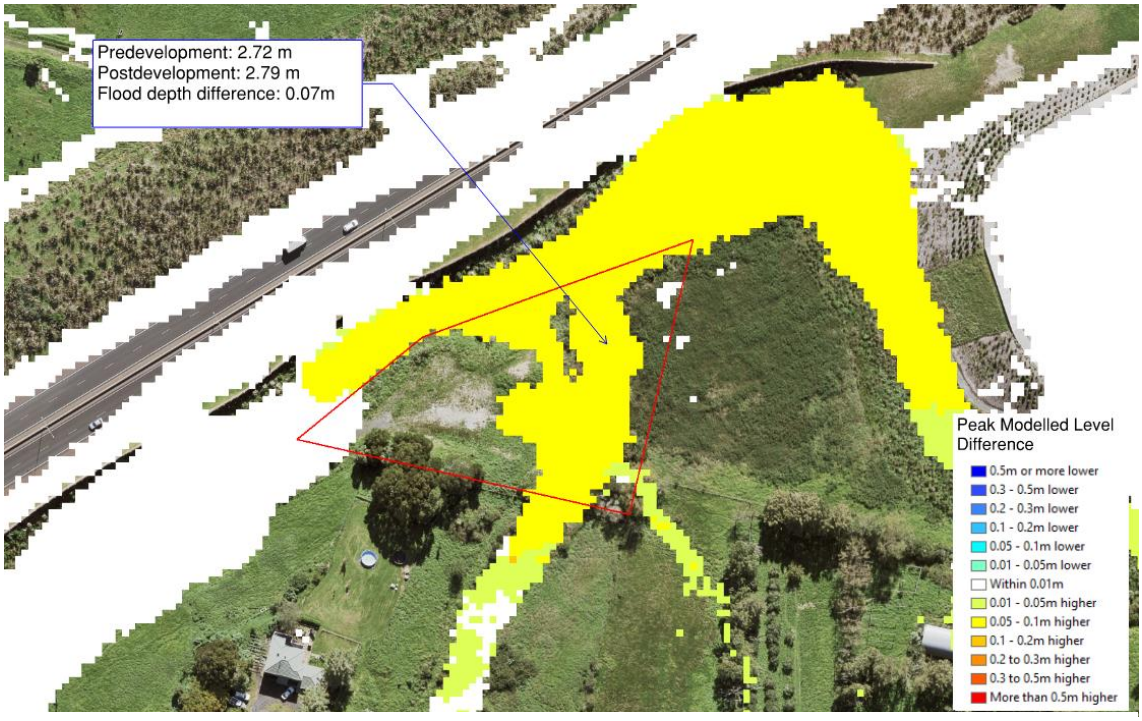


FIGURE 24. FLOOD DEPTH DIFFERENCE AT 27 TRIG ROAD IN THE 1% AEP 3.8º (CC).

FIGURE 25. FLOOD DEPTH DIFFERENCE AT 161 & 162 BRIGHAM CREEK ROAD IN THE 1% AEP 3.8º (CC).

Table 7 compares the maximum flood depth and flood level at 27 Trig Road, 161 Brigham Creek Road, and 162 Brigham Creek Road in all the modelled scenarios.

TABLE 7. MODELLED FLOOD DEPTHS AT IDENTIFIED PROPERTIES.

ADDRESS	RAINFALL EVENT AND CLIMATE CHANGE (CC)	FLOOD DEPTH PRE-DEVELOPMENT (M)	FLOOD DEPTH POST-DEVELOPMENT (M)	FLOOD DEPTH DIFFERENCE(M)
27 Trig Road	10-year (No CC)	0.86	0.89	0.03
	10-year (2.1°CC)	1.01	1.04	0.03
	100-year (No CC)	1.35	1.39	0.04
	100-year (3.8°CC)	2.72	2.79	0.07
161 Brigham Creek Road (Pump station)	10-year (No CC)	0.20	0.20	0.00
	10-year (2.1°CC)	0.22	0.22	0.00
	100-year (No CC)	0.24	0.24	0.00
	100-year (3.8°CC)	0.30	0.31	0.01
162 Brigham Creek Road	10-year (No CC)	0.06	0.06	0.00
	10-year (2.1°CC)	0.07	0.07	0.00
	100-year (No CC)	0.08	0.08	0.00
	100-year (3.8°CC)	0.52	0.52	0.00

This table shows that with the development of the PPC the water level increase at the building footprints of 161 Brigham Creek Road and 162 Brigham Creek Road was between 0 and 10mm. In the centre of the Trig Stream at 27 Trig Road, development of the PPC increased the water level by 70mm in the 1% AEP event with 3.8 degrees of climate change. However, no buildings or habitable floors are located within this property boundary.

HG have undertaken further modelling of the culverts to assess the impact of blockage of public assets. All culverts beneath the Upper Harbour Motorway were modelled with blockage scenarios as per the Stormwater Code of Practice v3. The assessment demonstrates that the development does not impact the motorway functionality under the blockage scenario.The detailed modelling report and the flood hazard maps are found in Appendix 6 and 7 respectively. These maps present the flood depth, water level difference, and the flood extents for the modelled scenarios.

Modelling of the Hobsonville Grove PPC area in isolation indicates that development of the PPC area without mitigation of the 10% and 1% AEP event can occur without any negative impacts on the floodplain extents downstream.

2.8 COASTAL INUNDATION

The Plan Change area will not be impacted by coastal inundation.

2.9 CULTURAL AND HERITAGE SITES

There were no cultural or heritage sites identified on Geomaps in the Plan change area. An archaeological assessment was prepared by CFG Heritage (see Appendix 4) and no

significant cultural or heritage sites were identified in the CFG analysis. However, it was recommended by CFG Heritage that:

- an authority to destroy, damage or modify any unrecorded sites that may be discovered during earthworks on Sections 1 and 3 SO 509537, Sections 1, 4 and 8 SO 490597, and Sections 1, 3 and 6 SO 511858 be applied for from Heritage New Zealand Pouhere Taonga (HNZPT) under Section 45 of the Heritage New Zealand Pouhere Taonga Act 2014;
    - note that this is a legal requirement;
    - no authority should be applied for without consultation with the appropriate tangata whenua authorities; evidence of consultation, and views expressed, will be required by HNZPT, and will be considered when deciding about the granting of the authority
    - note that the application process may take 20–40 working days from the date of acceptance, and following issue there is a period of 15 working days during which earthworks cannot commence to allow for appeals to the Environment Court;
- in the event of koiwi (human remains) being uncovered during any future construction, work should cease immediately and mana whenua should be contacted so that suitable arrangements can be made;
- since archaeological survey cannot always detect sites of traditional significance to Maori, or wahi tapu, the appropriate tangata whenua authorities should be consulted regarding the possible existence of such sites, and the recommendations in this report.

2.10 CONTAMINATED LAND

A detailed site investigation of the land was undertaken by Geosciences Ltd (see Appendix 1) to address the requirements of the National Environmental Standards for Assessing and Managing Contaminants. The area investigated in the Geoscience report is shown below in Figure 26.

FIGURE 26. GEOTECHNICAL CONTAMINATED LAND STUDY EXTENT (SOURCE: GEOSCIENCES)

Based on their finding the proposed subdivision, change in land use and development is highly unlikely to result in any risk to human health or the environment. No samples exceeded the AUP (OP) permitted soil acceptance criteria of Chapter E.30, the contaminated land provision of the AUP (OP) are not considered relevant to the majority of the piece of land.

A disposal field was identified in the Geosciences analysis. They reported that the removal of the effluent disposal field found on site is likely to be considered a controlled activity under Chapter E.30.

3.0 PLANNING CONTEXT

Summary Points:

- The plan change is considered to be Greenfield development in accordance with Schedule 4 of the Auckland Council Regionwide Stormwater Network Discharge Consent.
- The development areas are located within the Auckland Council Led Plan Change 5 boundaries, which had a Stormwater Management Plan Associated with it. Due to this Plan Change being withdrawn by Auckland Council, stormwater management has been determined to meet the regionwide NDC.

3.1 SUMMARY OF THE EXISTING SITUATION

The Hobsonville Grove Plan Change area is located within an area of the Whenuapai stormwater catchment that has seen a high degree of planning activity in the past decade. This piecemeal approach has resulted in a number of stormwater discharge consents covering portions of the Totara Creek and Waiarohia Stream catchments. In addition to the fragmented consents in the area, each consent requires differing standards of stormwater management to be applied.

Discussions with Healthy Waters have confirmed that stormwater management for this plan change area will need to meet Schedules 2 and 4 of the Regionwide stormwater Network Discharge Consent (NDC).

3.2 HOBSONVILLE CORRIDOR PRECINCT, PLAN CHANGE 12 (PRIVATE PLAN CHANGE)

The Hobsonville Corridor Precinct, Plan Change 12 (PC12) became operative in September 2019 and covers the industrial land located to the east of Westpoint Drive. The western boundary of PC12 includes part of the proposed Hobsonville Grove Plan Change Precinct 1 (industrial area).

3.3 WHENUAPAI PLAN CHANGE 5 (AUCKLAND COUNCIL)

In 2017 Auckland Council publicly notified Whenuapai Plan Change 5 (**PC5**) to provide a holistic residential structure planning for the Future Urban Zone bounded by Trig Road, Hobsonville Road, Hobsonville Grove Precinct and the Upper Harbour Motorway. The area covered in PC5 included the proposed Hobsonville Grove Plan Change land. In 2021 this plan change was withdrawn resulting in a total absence of any structure planning related to this area.

In the initial supporting documents submitted with the PC5 application, the Whenuapai 3 Precinct: Stormwater Management Plan set out the preferred stormwater management for development within the area. This promoted:

- Integrated stormwater management to protect and enhance the degraded receiving environments, whilst facilitating high and medium density development (AUP:OP Policies E1.3(8) and (10)).
- Application of Water Sensitive Design principles as set out in Auckland Council's Guidance Document 2015/004 'Water Sensitive Design for Stormwater (GD04)'.
- Avoid creating new flood risks and taking the opportunity to reduce existing flood impacts.

- Retain and protect intermittent and permanent streams (AUP:OP 7.3.2(4)) and include appropriate riparian planting margins on permanent streams.
- Utilise at-source or close to source water quality management, particularly for High Contaminant Generating Activities (AUP:OP E9).
- Application of structural (engineered stormwater management applications) and non-structural (restrictions of activities, minimising earthworks, fish passage provisions and protection) to manage the effects of stormwater runoff.

More information on the Whenuapai Precinct 3 Stormwater Management Plan can be found at the following website Plan Change 5 Whenuapai 3 Precinct Stormwater Management Plan 2017 (aucklandcouncil.govt.nz).

As the PC5 application has been withdrawn, the status of the Whenuapai 3 Precinct: Stormwater Management Plan has no regulatory status; however, this does provide guidance on the stormwater management that was considered appropriate to Auckland Council in 2017.

3.4 AUCKLAND COUNCIL REGIONWIDE STORMWATER NETWORK DISCHARGE CONSENT

In October 2019 Auckland Council was granted a regionwide stormwater network discharge consent (NDC) covering the urban and Future Urban areas of the region. This consent sets out stormwater management requirements for developments to enable connection into the public stormwater network and enable vesting of public stormwater infrastructure.

The requirements for stormwater management are set out in Schedule 4 of the NDC. Because the proposed Hobsonville Grove Plan Change is a Future Urban Zone in the AUP:OP, there is no live urban land use identified: the Plan Change is considered to be Greenfield development.

Figure 27 below provides a flow chart identifying the stormwater management requirements that must be addressed in the plan change application.

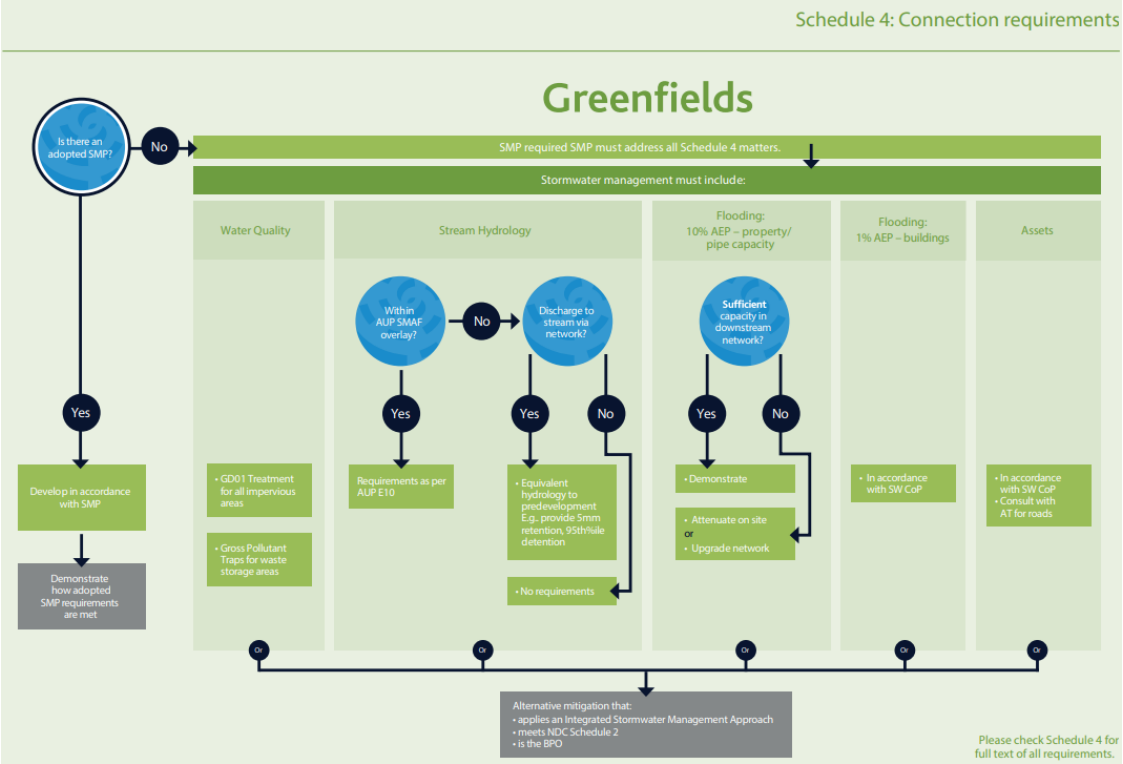


FIGURE 27. SCHEDULE 4 OF THE AUCKLAND COUNCIL NDC FOR GREENFIELD DEVELOPMENT

Harrison Grierson prepared an SMP (100 Hobsonville Road Stormwater Management Plan, February 2019) for the wider development of 100 Hobsonville Road; however, this document precedes the granting of the Auckland Council NDC and the stormwater management proposed does not align with Schedule 4. Instead, it pulled in stormwater elements from PC5, PC12 and the wider Waiarohia NDC to present principles of stormwater management.

As there is no adopted SMP covering the Hobsonville Grove Plan Change Area, one must be prepared to support the plan change application and identify how the following management requirements will be achieved:

- Water Quality Management,
- Stream Hydrology,
- Flooding for the 10% AEP and 1% AEP design rainfall events, and
- Public assets to be created as part of the plan change development.

Whilst Schedule 4 sets out minimum performance standards for each of the stormwater elements, there is an option for an application to propose alternative stormwater management, provided that it can be demonstrated to apply an integrated stormwater management approach, meets Schedule 2 of the NDC, and is the Best Practicable Option (**BPO**).

The process of defining the BPO will need to include assessments on the impacts of each option e.g., contaminant load modelling to identify potential risk to the receiving environment (for example from contaminants or flooding, etc), whole of life costs associated with each option, and justification of why an alternative level of stormwater management is considered appropriate. This will need to be included in any preliminary discussions with potential public device owners.

Although in the absence of master planning/structure planning for a plan change area it may be difficult to demonstrate total compliance with Schedule 4 of the NDC, the SMP should set out the preferred stormwater management option based on the available data with guidance on future investigations required through the consenting process to confirm the applicability of the option.

The SMP is not set in stone, but once adopted becomes the Healthy Waters preferred method of stormwater management for the plan change area. It can be varied at any time, provided there is sufficient supporting information to justify an alteration, through Auckland Council's Regulatory Manager's approval.

Failure to be able to provide sufficient information to identify the preferred stormwater management solution may result in private stormwater discharge consents being required (E8 of the AUP:OP) and potential issues with vesting assets to Auckland Council.

3.4.1 REQUIREMENTS OF SCHEDULE 4 NDC

Table 8 below summarises how the the requirements of Schedule 4 of the NDC.

Table 8. Requirements for Schedule 4 of the NDC

STORMWATER MANAGEMENT REQUIREMENTS	DESIGN APPROACH
Water Quality Treatment	• Treatment of all impervious areas by a water quality device designed in accordance with GD01 for the relevant contaminants. • Gross pollutant Traps for waste storage areas
Stream Hydrology	• Provide retention (volume reduction) of a minimum of 5mm runoff depth for all impervious areas; and • Provide detention (temporary storage) with a draindown period of 24 hours for the difference between the pre-development (grassed state) and post development runoff volumes from the 95th percentile, 24-hour rainfall event minus the retention volume for all impervious areas.
Flooding 10% AEP	• Ensure that there is sufficient capacity within the pipe network downstream of the connection point to cater for the stormwater runoff with development in a 10% AEP event including incorporating flows from contributing catchments at maximum probable development.
Flooding 1% AEP Buildings	• Develop to Stormwater Code of Practice. • Develop in accordance with SMP.

4.0 MANA WHENUA: TE AO MAORI AND MATAURANGA

Te Kawerau Iwi Tiaki Trust has prepared a Cultural Impact Assessment **(CIA)** for the proposed Hobsonville Grove Plan Te Kawerau Iwi Tiaki Trust Change in August 2024 (see Appendix 5). The purpose of this CIA report is to provide the client and relevant statutory agencies with documentation of Te Kawerau ā Maki's cultural values, interests, and associations with the project area and its natural resources, and the potential impacts of the proposed project activities on these. This impact assessment also provides recommendations as to how to avoid, remedy or mitigate any potential cultural effects that arise from the project.

For the CIA the following report were provided by Austino to Te Kawerau Iwi Tiaki Trust.

- Assessment of Environmental Effects by Harrison Grierson (April 2024)
- Stormwater Management Plan (Block 2) by Harrison Grierson (December 2023)
- Ecology Report by Bioresearches (March 2024)
- Archaeology Report (Block 2) by CFG Heritage (April 2019)
- Civil Infrastructure Report (Block 1) by Harrison Grierson (April 2024)
- Civil Infrastructure Report (Block 2) Harrison Grierson (April 2024)

The key values of Te Kawerau Iwi Tiaki Trust have been identified in the CIA and are summarised below.

- Rangatiratanga
- Whānaungatanga
- Wairuatanga
- Manakitanga
- Kaitiakitangata

The proposed mitigations/offsets identified in the CIA are outlined in Table 3 (below). Ongoing engagement with Te Kawerau ā Maki in terms of plan change drafting as well as subsequent consenting and monitoring are required. The recommendations made in the CIA for the plan change area are summarised below.

TABLE 9. TE KAWERAU IWI TIAKI TRUST RECOMMENDATIONS AND OUTCOME ALIGNMENT.

NUMBER	RECOMMENDATIONS	TKAM STRATEGIC VALUE ALIGNMENT
1	Te Kawerau ā Maki do not oppose the proposal provided that the mitigations discussed are incorporated – we desire notice of the outcome of the application and the final consent conditions	Mana Motuhake, Kaitiakitanga
2	The adoption of a combination of on-site detention/retention tanks, tree pits/rain gardens, vegetated swales, proprietary devices or other methods such as to develop a secondary or tertiary (three-step) stormwater treatment process for the development	Kaitiakitanga

3	Preserve as far as practicable the productive capacity or mauri of the soil by achieving a cut-fill balance. We recommend that topsoil (or any clean soil) in order of preference be re-used on site, be re-used in the local area, be re-used or disposed of within Te Kawerau ā Maki rohe (Northern half of Auckland region). We also recommend avoiding winter earthworks.	Kaitiakitanga
4	Work with us on ecologically sensitive design that incorporates our tikanga, including eco-sourced restoration planting, a 100% native plant commitment (with native fruiting and flowering plants and shrubs) as the default, stock exclusion, habitat enhancement, fish passages, a recommended 'cat free' covenant and a 'new residence kaitiakitanga pack' should be developed to provide guidance for residents around weeds and pests	Kaitiakitanga, Mātauranga
5	Work with us on water sensitive design that incorporates our tikanga, noting the importance of not mixing waters and soil and plant filtration, stormwater recycling, not building within natural flood plains, only undertaking earthworks in dry months, and giving effect to Mana ō te Wai, and including elements such as riparian planting buffers. Particularly in regards to the road bridge link and wastewater extension.	Kaitiakitanga, Mātauranga
6	That a native fauna management plan be prepared to address the construction and long-term protection of native birds, bats, lizards and freshwater species	Kaitiakitanga
7	If archaeological material is encountered obtain a HNZPTA authority and include TKaM in cultural monitoring – any cultural material found on site should be reinterred into the Site	Mana Motuhake, Mātauranga Māori, Kaitiakitanga
8	Work with Te Kawerau ā Maki on incorporating our wāhi tohu and history into the development through things like street naming, park/reserve naming and interp	Mana Motuhake, Mātauranga Māori, Kaitiakitanga
9	Te Kawerau ā Maki are afforded the opportunity (and resourced) to undertake a site visit during the construction phase to examine controls	Kaitiakitanga
10	Opportunity for cultural ceremonies (e.g. sod-turning) should be provided at the expense of the Client	Kaitiakitanga
11	Given this is a plan change we require engagement on the formulation of any precinct provisions or introductory text	
12	We have identified that Waiarohia ō Ngariki is a site of significance that should be scheduled – the plan change should either adopt the scheduling of the length of the awa that adjoins a boundary, or support a future Council-initiated plan change to do so	

The proposed stormwater management is discussed in Section 7.0. Stormwater Management devices and measures have been proposed to communally manage runoff from roads, public areas and private lots including bioretention devices to provide treatment simultaneously with hydrology mitigation. An option to implement re-use rainwater tanks coupled with inert building materials adds an additional layer of resilience and protection to the receiving. This approach has the benefits of removing contaminants from being deposited in the receiving

environment, reducing mains water consumption, protecting the streams within the site and improving the resilience of the public network. Landscape design can create bioretention devices with an amenity value for the development. Native species will be prioritised for the vegetation of the raingardens to protect the area and enhance the cultural value.

The proposed management will improve the current sedimentation run-off from land. All impervious surfaces of the development will be treated by a GD01 compliant device. The development will avoid building within the floodplain and incorporate water-sensitive design principles as outlined in Auckland Council's GD04 were incorporated into the design approach for the SMP.

Austino New Zealand Limited is committed to working alongside Te Kawerau Iwi Tiaki Trust, for a development that upholds their cultural values.

5.0 STAKEHOLDER ENGAGEMENT AND CONSULTATION

5.1 MANA WHENUA

As part of a previous 10 lot industrial subdivision application at 88-90 Hobsonville Rd, Austino consulted directly with mana whenua. In November 2022, all iwi were contacted again to request engagement regarding the Proposed Plan Change. At that time there were no responses or responses stating that they did not have resources to engage.

More recently, a specific request relating to engagement on this Private Plan Change application was sent to those iwi identified through the Auckland Council Mana Whenua search as having an interest in the site:

- Ngāti Manuhiri
- Ngāti Maru
- Ngāti Pāoa Iwi Trust
- Ngāti Pāoa Trust Board
- Ngāti Te Ata
- Ngāti Whātua o Kaipara
- Ngāti Whātua Ōrākei
- Te Ākitai Waiohua
- Te Kawerau ā Maki
- Te Rūnanga o Ngāti Whātua

Initial correspondence was sent on 14 March 2023 and 11 December 2023. To date there has been no feedback on the plan change apart from the CIA prepared by Te Kawerau ā Maki.

5.2 AUCKLAND COUNCIL

Pre-application meetings have taken place with Auckland Council in March 2022, July 2022, December 2022, April 2023 and 4 March 2024.

Draft technical assessments were submitted to Council on 20 December 2023. The Applicant's experts have reviewed the comments received from Council specialists and taken them into consideration in the redrafting and updating of their technical reports.

5.3 AUCKLAND TRANSPORT AND TE TUPU NGĀTAHI SUPPORTING GROWTH

A meeting was held with Auckland Transport and Supporting Growth in October 2022.

A further meeting was held on 4 March 2024, to discuss their review of the initial traffic assessment for the PPC.

5.4 WATERCARE

On 2 August 2024, a meeting was held with Lars Fog, an Engineer from Watercare to provide initial information about the Plan Change and to discuss the Watercare sites at 27 Trig Road and 161 Brigham Creek Road. Mr Fog advised that the plan for 27 Trig Road involves construction of a deep shaft connecting to the Northern Interceptor which is planned to be a pipe 20m deep under the motorway. A 3 year construction period is planned, up to 2028. Mr Fog advised that Watercare are aware of the flood plains identified at the site and that any development should not make this situation worse/ raise flood levels.

The Watercare site at 161 Brigham Creek Road has an existing pump station which is operational. Mr Fog again advised that Watercare would review any development to confirm that it does not make any flood plain/risk situation worse/ raise flood levels.

We understand that that Watercare will become a submitter to the proposed plan change.

5.5 NEIGHBOURING LAND OWNERS

Austino has been in regular contact with neighbouring landowners over the past 4 years and wrote to the following owners in May 2023 to advise them of the proposed private plan change and to welcome consultation: 80, 82A, 92D, 1/100 Hobsonville Road and 17, 23 and 25 Trig Road. To date only a letter of support from the owners of 1/100 Hobsonville Road has been received.

6.0 PROPOSED DEVELOPMENT

Summary Points:

- Land uses for this plan change are based on those from the Auckland Council Whenuapai Structure Plan and the Master Planning completed for Plan Change 5.
- Spedding Road Designation is located within the northern corner of Precinct 2. At this time final designs for the road extension are not available, and there is potential that there may be some interaction of runoff from this road with stormwater management from this plan change.
- The development of the proposed plan change is indicated as being completed in four stages: three equal areas in Precinct 2 and a single phase for Precinct 1.
- Development will comply with the maximum imperviousness identified for each relevant land use as set out in Chapter H of the Auckland Unitary Plan (Operational in Part).

The 2016 Whenuapai Structure Plan (see Appendix 8) produced by Auckland Council outlines the preferred method of urbanising the FUZ area of the Whenuapai area. The Structure Plan was not officially adopted; however, the land uses and primary transport connections are retained as a guide to development in the area.

The development aims to integrate the objectives and outcomes outlined in the Whenuapai structure plan into its stormwater design approach. The proposed development indicative layout is shown below in Figure 28.

FIGURE 28. INDICATIVE LAYOUT OF THE PROPOSED PLAN CHANGE

The Whenuapai Structure Plan has marked the Plan Change area as being medium density. In the absence of a holistic structure plan potential zoning were used from the withdrawn Plan Change 5. The proposed zoning of the Plan Change area is shown below in Figure 29. Precinct 1 is proposed to be Business Light industrial. Precinct 2 is proposed to be split into Mixed-Housing Urban and Terrace Housing and Apartment Buildings.

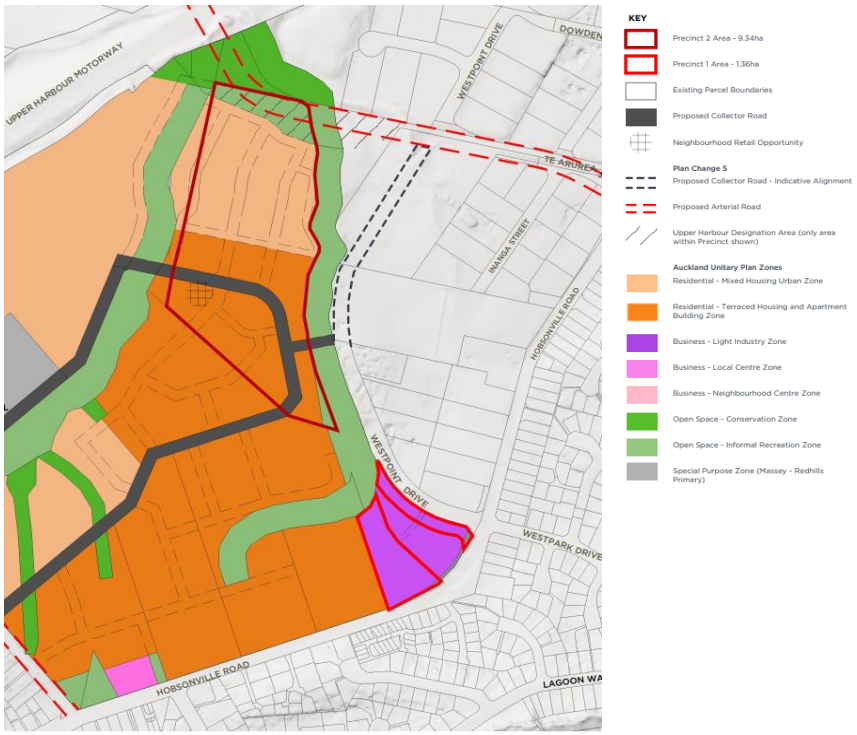


FIGURE 29. INDICATIVE ZONINGS OF THE PLAN CHANGE AREA

The northern portion of Precinct 2 is impacted by the Te Tupu Ngatahi Spedding Road Designation (refer to Figure 30 for an indicative extent of the designation). This currently considers that Spedding Road will be extended from Fred Taylor Drive in the west, through to Hobsonville Road in the east. Within the plan change area the designation includes batter slopes to support the new alignment and bridging structures over Trig Stream and Rawiri Stream.

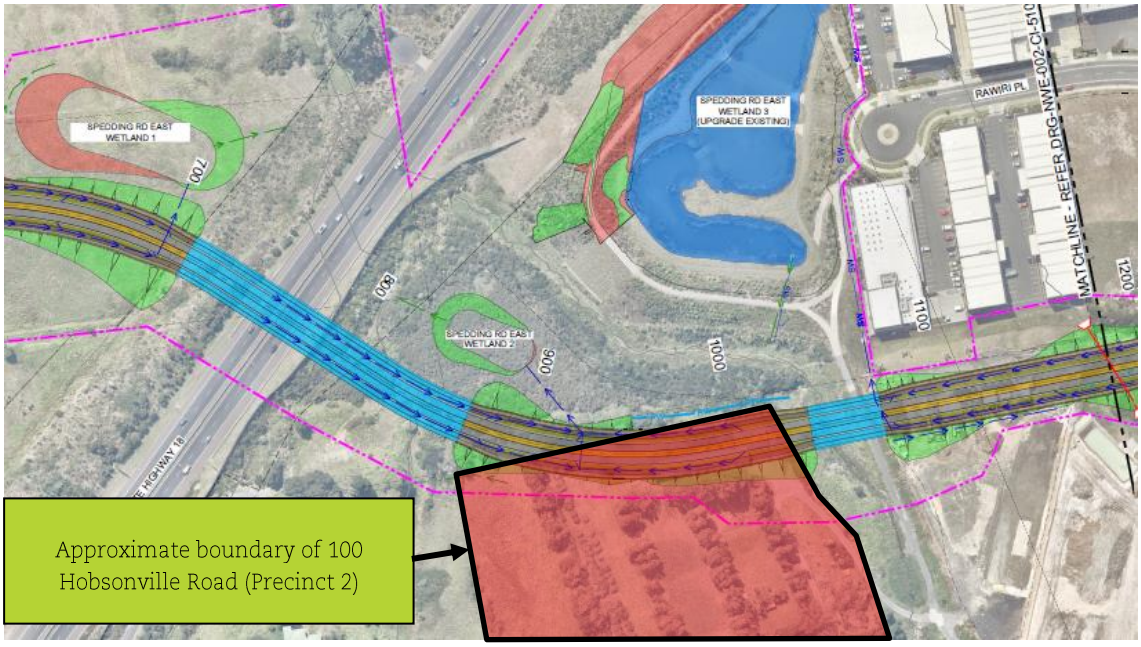


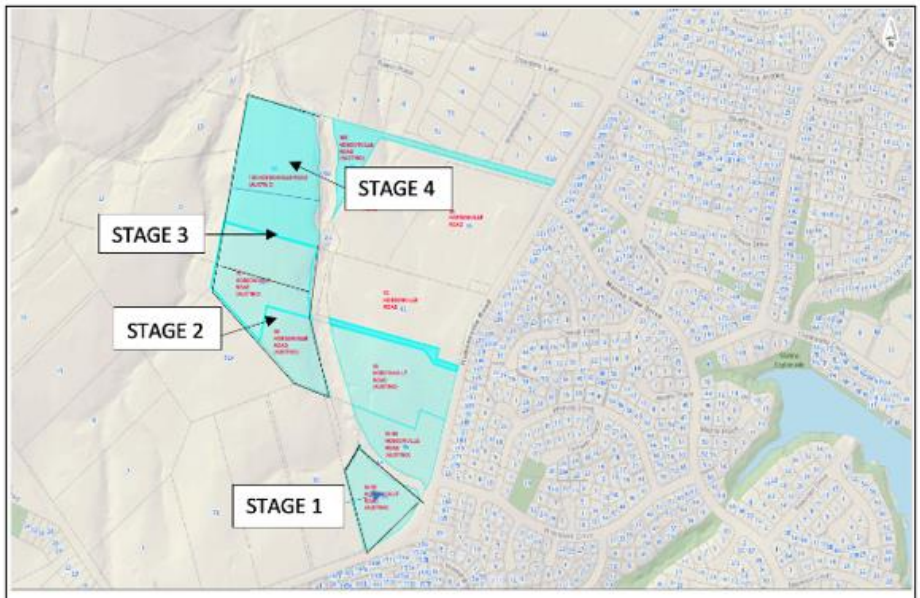
FIGURE 30. PROPOSED TE TUPU NGATAHI SPEDDING ROAD DESIGNATION

There is currently no confirmed timeline for delivery of the Spedding Road Extension. Vertical alignments are currently only at the concept stage so the final extent of the batter slopes may alter over time within the current designation boundary.

Currently, the designation seeks to construct its own water quality and attenuation device to the north of the proposed road alignment to mitigate runoff from their project. There could be an opportunity to negotiate with Te Tupu Ngatahi to construct the stormwater management within the northern portion of the proposed plan change area to optimise costs and devices. This would also need to be negotiated with Health Waters, as they will ultimately be the asset owner and operator once constructed.

6.1 DEVELOPMENT STAGING

A preliminary staging plan has been supplied that identifies four stages of the development, with Stage 1 being considered for the industrial precinct at the intersection of Hobsonville Road and Westpoint Drive and the remaining three stages evenly split within Precinct 2 from upstream to downstream, as illustrated in Figure 31



	Stage 1	Stage 2	Stage 3	Stage 4	TOTAL
Gross Site Area (sqm)	17,477	31,137	31,137	31,139	110,890
Total Developable Land (excludes open space, road widening)	15,442	30,050	30,050	30,050	106,942
Net Residential Land (excludes streets, lanes)	11,955	24,400	24,400	24,400	83,955

FIGURE 31. POTENTIAL STAGING OF DEVELOPMENT OF THE HOBSONVILLE GROVE PLAN CHANGE AREA (TO BE CONFIRMED DURING DESIGN AND CONSENTING STAGES OF DEVELOPMENT)

Table 10 below provides a summary of the potential land use for each of the stages.

Table 10. Summary of Potential Staging Land Uses

STAGE	TOTAL AREA (M2)	ROADS (ASSUMED 15% OF TOTAL AREA) (M2)	INDUSTRIAL DEVELOPMENT AREA (M2)	RESIDENTIAL DEVELOPMENT AREA (M2)
1	17,477	2,622	14,855	
2	31,137	4,508	-	26,629
3	31,137	4,508	-	26,629
4	31,139	4,508	-	26,631

In accordance with chapters H5 (Residential – Mixed Housing Urban Zone), H6 (Residential – Terrace Housing and Apartment Building Zone) and H17 (Business – Light Industry Zone) of the unitary plan, the maximum imperviousness allowed for in this report are 60%, 70%, and 100% respectively.

Stage 2 will consist of 100% THAB. Stage 3 will consist of 50% Mixed Housing Urban and 50% THAB. Stage 4 will consist of 100% Mixed Housing Urban. On average Precinct 2 is estimated to be approximately 50% THAB and 50% Mixed Housing Urban zone.

In the absence of a finalised master/structure plan, stormwater calculations have been based on the maximum impervious areas for the proposed land uses as set out in Chapter H of the Auckland Unitary Plan, allowing for 15% of the site area to be roading infrastructure. Due to the compaction and shaping required to form road reserves, the road area (assumed to be 15% of the total area) is assumed to be 100% impervious.

Table 11 below identifies the impervious and pervious area allowed for in the stormwater calculations. The figures presented in the table are upper limits of impervious area creation for the Hobsonville Grove Plan Change area based on the current land uses. As the regulatory consent process advances there will be a refinement of land uses (potentially including reserve areas, local neighbourhood centres, etc) that will influence the impervious areas and the required sizing of stormwater management devices.

Table 11. Summary of Pervious and Impervious Areas Used in Staging Calculations

STAGE	TOTAL AREA (M2)	ROADS (ASSUMED 15% OF TOTAL AREA) (M2)	DEVELOPMENT IMPERVIOUS AREA (M2)	REMAINING SITE PERVIOUS AREA (M2)
1	17,477	2,622	17,477	-*
2	31,137	4,508	18,640	7,989
3	31,137	4,508	17,310	9,319
4	31,139	4,508	15,979	10,652

**Policy H17.6.3(1) of the AUP:OP seeks to limit the imperviousness of Business – Light Industrial within riparian margins to allow for appropriate mitigation of contaminants and stormwater effects. It is believed that under PC12 there was the establishment of an Esplanade Reserve on the Rawiri Stream which is 20 m in width. This is likely to mean that there would be no regulatory requirement to limit imperviousness of Precinct 1.*

6.2 EARTHWORKS

At this stage detailed earthwork designs for the PPC area have not been designed. General Earthwork principles are summarised below.

- Contaminated material, if found, will be assessed and removed off site to a suitably licensed disposal facility under the supervision of a contamination expert.
- Proposed earthworks will work with landform to practicably maintain existing outlook and connectivity to the Trig and Rawiri Stream while achieving subdivision and development in accordance with anticipated outcomes of the plan change. The regional and district land modifications provisions of the AUP (Parts E11 and E12) shall apply to the site.
- Proposed land modification will retain natural wetlands and minimise actual and potential adverse effects on these features, in accordance with the National Policy Statement for Freshwater Management (NPS-FM); the Auckland-wide provisions of the Auckland Unitary Plan and any other relevant statutory framework documents, regulations and codes of standards.

- The standard Accidental Discover Protocols shall apply for the duration of earthworks. Should any features of cultural heritage or archaeological significance be discovered, works shall cease to enable cultural and archaeological investigation and recording of any items or features of interest.
- All bulk earthworks and land modifications will be supervised by a suitably qualified geotechnical engineer and certification provided to confirm that earthworks have been completed in accordance with the geotechnical recommendations for any project.

6.2.2 EROSION AND SEDIMENT CONTROL PRINCIPLES

- Prior to the commencement of earthworks, a final detailed sediment and erosion control plan will be submitted for Council approval and will cover all specific requirements in relation to the works and programme.
- All erosion and sediment controls will comply with the “Erosion and Sediment Control Guid for Land Disturbing Activities in the Auckland Region “Auckland Regional Council guideline document 2016/005 (GD05) updated November 2023.
- Liaison and coordination with Council monitoring officers will be undertaken at the time of preparing the final erosion and sediment control plan, throughout the construction work and up to completion to achieve the optimal environmental outcome for any future land development project.
- In particular, specific erosion and sediment controls in relation to earthworks in close proximity to watercourses and/or natural wetlands shall be employed to ensure that any actual or potential adverse environmental effects will be avoided or mitigated.

7.0 PROPOSED STORMWATER MANAGEMENT

- Stormwater management will comply with Schedule 2 and 4 of the Auckland Council Regionwide Network Discharge Consent.

7.1 STORMWATER PRINCIPLES OPTIONS AND PREFERRED APPROACH

This section of the SMP provides details on the principles that the stormwater management shall meet, together with the preferred approach to incorporating the devices into the PPC area. The stormwater management integrated approach and design principles adopted for the PPC area have been developed with consideration of the requirements or guidelines set out in the AUP:OP, GD01, GD04 and NDC (Schedule 4 – Greenfields), taking into consideration the topography, ecology, geotechnical conditions and proposed staging.

At this stage, the stormwater infrastructure within Precinct 1 will be privately owned and maintained while Precinct 2 devices are proposed to be vested to Council. The stormwater management approach for Precinct 1 will be required to meet the performance requirements outlined in Table 12.

Table 12 below summarises the principles, options and preferred approach that will inform the final stormwater solution for the plan change area. The table below excludes activities within Precinct 1 that may be high-risk industries and require a separate Industrial Trade Activity consent under section E.33 of the AUP.

TABLE 12. PROPOSED STORMWATER MANAGEMENT PRINCIPLES AND PREFERRED APPROACH

PRINCIPLE	PERFORMANCE REQUIREMENT	POTENTIAL STORMWATER MANAGEMENT OPTIONS	PREFERRED APPROACH FOR THE PPC
Water Quality			
Treatment of runoff from all impervious surfaces.	All runoff from impervious areas will be captured and treated utilising water sensitive design infrastructure and designed in accordance with Auckland Council's GD01 document. Communal bin/waste storage areas will have a Gross Pollutant Trap (GPT) fitted prior to runoff from these areas entering the public stormwater network. High Contaminant Generating Areas as defined in Chapter E9 of the Auckland Unitary Plan will (where possible) incorporate at source treatment prior to discharge to the public stormwater network.	**At source management options**: • Inert building materials coupled with private internal reuse tanks or infiltration devices. • Private bioretention devices located on lots and within JOALS. • Public bioretention devices located within the road reserve. • Permeable pavement for hardstand areas • For the private devices in Precinct 1 there may be an option for proprietary treatment devices. **Communal management options:** • Public bioretention devices located outside of the road reserve area providing treatment to both public and private spaces. • Public swales constructed adjacent to park edge roads and integrated into the amenity layout of the development. **End of pipe options:**	Inert Building materials to be used to minimise the risk of roof generated contaminants entering the public stormwater network and receiving environment. Appropriate GPT to collect runoff from communal bin storage areas that may be created through the urban development to remove litter and floatables that may be generated in these areas. In Precinct 2, six communal bioretention devices will be integrated into the public open spaces. The bioretention devices will be incorporated into the urban development layout and will be vested to Council. The preferred method of treatment in Precinct 1 is through private bioretention devices. The devices in Precinct 1 will be required to meet the performance requirements outlined in this table. There may be opportunity to incorporate roof runoff reuse tanks for non-potable reuse within houses (toilet

PRINCIPLE	PERFORMANCE REQUIREMENT	POTENTIAL STORMWATER MANAGEMENT OPTIONS	PREFERRED APPROACH FOR THE PPC
		• Public wetlands / raingardens (depending on contributing catchment area) providing treatment of each stage of the plan change development.	flushing and washing machine use) depending on the final lot layout. This would provide an alternative water quality outcome by removing the first flush from the roof runoff and adding a further carriage in the treatment train.
Stream Hydrology			
Minimum of SMAF 1 hydrology mitigation is provided for all impervious surfaces in the PPC area.	Provide retention (volume reduction) of at least 5mm runoff depth for the impervious area; and Provide detention (temporary storage) and a drain down period of 24 hours for the difference between the pre-development and post-development runoff volumes from the 95th percentile, 24-hour rainfall event minus the 5 mm retention volume or any greater retention volume that is achieved, over all impervious areas.	**At source management options**: • Private detention tanks to detain the 95th percentile storm event with overflow connections to the public pipe stormwater network. • Private bioretention devices located on lots and within JOALS. • Public bioretention devices located within the road reserve. **Communal management options:** • Public bioretention devices located outside of the road reserve area providing treatment to both public and private spaces. • Public bioretention swales constructed adjacent to park edge roads and integrated into the amenity layout of the development.	Geotechnical investigations have indicated that the existing ground conditions are not suitable for stormwater disposal via soakage. At this stage retention through infiltration is not considered practicable. This will be confirmed through further site investigations at the resource consent stage. For conservatism at this plan change stage, retention is not considered, and the full detention volume will be provided within the constructed bioretention devices located within the development staging shown in Figure 32. The detention volume for Precinct 1 and 2 was calculated to be 320 m^3 and 1989 m^3 respectively. A stream erosion assessment of the Rawiri and Trig streams has been

PRINCIPLE	PERFORMANCE REQUIREMENT	POTENTIAL STORMWATER MANAGEMENT OPTIONS	PREFERRED APPROACH FOR THE PPC
		End of pipe options: • Public wetlands / raingardens (depending on contributing catchment area) providing treatment of each stage of the plan change development. • There is an opportunity to divert 29% of Precinct 1 runoff after treatment to wetland 5 (W5). W5 has been designed to accommodate the extended detention volume and storm volume for the 2-, 10- and 100-year ARI event Once finalised earthworks plans have been produced at Resource Consent, the opportunity to convey 29% of Precinct 1 secondary runoff to Wetland 5 will be investigated. The remainder of the Precinct will need to provide a minimum of the equivalent of SMAF 1 hydrology mitigation.	conducted and is summarised in Section 2.6.1. This indicates that stream erosion at the modelled cross-sections is generally low. A minimum of SMAF 1 hydrology mitigation is considered appropriate for the PPC area. Site specific erosion assessment should be undertaken once the stormwater outfalls have been finalised to assess the applicability of the erosion assessment. There may be opportunity to incorporate roof runoff reuse tanks for non-potable reuse within houses (toilet flushing and washing machine use) depending on the final lot layout.
Flooding			

PRINCIPLE	PERFORMANCE REQUIREMENT	POTENTIAL STORMWATER MANAGEMENT OPTIONS	PREFERRED APPROACH FOR THE PPC
10% AEP primary network servicing	The primary stormwater network will be designed to convey the 10% AEP design rainfall adjusted for 2.1 degrees climate change. This is in accordance with the Draft CoP v4 (out for consultation). Hydraulic modelling of the PPC has indicated that attenuation of the development would not provide a benefit to infrastructure and property downstream. It is therefore not considered appropriate to provide attenuation to the Hobsonville Grove PPC. All erosion protection at stormwater outfalls will be designed in accordance with Auckland Council Technical Report 2013/018 – Hydraulic Energy Management Inlet and Outlet Design for Treatment Devices (TR18).	• Primary drainage network sized to convey the 10% AEP runoff without flooding to the discharge point from the network. • Incorporation of erosion protection at outfalls prior to discharge to stormwater devices or the stream.	Due to the topography of the PPC area, it is considered that a public pipe network with catchpits inlets will provide the most cost efficient and safe solution for conveying runoff from the 10% AEP event to the communal bioretention devices. Incorporation of erosion protection prior to discharge to stormwater devices or the stream. Specific design of all outlet erosion protection features is required. This includes any stormwater outlets that are intended to throttle discharge. The erosion-related effects of flow from the outlet can be assessed can be assessed during the Engineering Approval and Resource Consent processes. Green outfalls will be considered where practicable for discharges to the Rawiri and Trig stream, to minimise disturbances to the stream.
1% AEP secondary network servicing	The secondary stormwater network will safely convey runoff from the 1% AEP design rainfall adjusted for 3.8 degrees climate change. This is in accordance with the Draft CoP v4 (out for consultation).	• Internal flowpaths through the plan change precincts to be designed for the 3.8-degree climate change to ensure properties are future proofed for potential flood effects.	Finished Floor Levels of habitable floors will be located above the flowpath in accordance with the Building Code and the Stormwater Code of Practice. Overland flows will be located within the road and reserve areas before

PRINCIPLE	PERFORMANCE REQUIREMENT	POTENTIAL STORMWATER MANAGEMENT OPTIONS	PREFERRED APPROACH FOR THE PPC
	The 1% AEP flows will be contained within the road reserves to be conveyed to the streams and discharge points from the site. Flowpaths within road reserves will be designed in accordance with the Auckland Transport Technical Design Guide to ensure safe operation of the roads. Hydraulic modelling of the PPC has indicated that attenuation of the development would not provide a benefit to infrastructure and property downstream.		discharging to the Trig or Rawiri streams.

7.2 PROPOSED STORMWATER MANAGEMENT IMPLEMENTATION

7.2.1 GENERAL

Development of the PPC area will increase the impervious area which will increase the stormwater flows and volumes generated on site that need to be appropriately mitigated. The proposed land use zone for Precinct 1 is Business – Light Industry Zone with a maximum imperviousness of 90%. The proposed land use for Precinct 2 is a combination of Residential – Mixed Housing Urban Zone and Residential – Terrace Housing and Apartment Building Zone with a maximum imperviousness of 70%.

The preferred stormwater management approach for the Hobsonville Grove Plan Change is communal bioretention (raingardens) devices. Communal, or end of pipe, stormwater management devices minimise the number of public devices to be constructed and vested and will still provide protection of the Trig Stream and Rawiri Stream, maintaining baseflows to the watercourses and protecting the downstream environment from long-term erosion effects. The stormwater management approach will seek to integrate water quality and hydrology mitigation functions into a smaller number of devices to optimise construction, operation, and maintenance costs of the public stormwater network.

The proposed approach can effectively spread construction costs across the development delivery lifecycle, to provide a more efficient delivery model without complex precinct rules and notices on titles.

7.2.2 PRECINCT 1

The stormwater infrastructure within Precinct 1 will be privately owned and maintained. The stormwater management approach for Precinct 1 will be required to meet the performance requirements outlined in Table 12. The preferred approach for Precinct 1 is communal private bioretention device The area of development in Precinct 1 is relatively small (1.75 ha) and the solution can be incorporated into the light industrial development layout whilst still meeting the requirements to recharge the Rawiri Stream. The communal device will integrate water quality treatment and hydrology mitigation.

Once finalised earthworks plans have been produced at the Resource Consent stage, the opportunity to convey 29% of Precinct 1 secondary runoff to Wetland 5 will be investigated. This is not the preferred stormwater management approach for this portion of Precinct 1.

In areas where geotechnical assessments or percolation tests demonstrate instability issues or that subsoils have insufficient drainage capacity to support infiltration, retention volumes may be provided as part of the detention volume.

7.2.3 PRECINCT 2

The stormwater infrastructure within Precinct 2 is proposed to be vested to Council. The preferred approach for Precinct 2 is six communal bioretention devices. The devices will be integrated into the public open spaces and will be incorporated into the residential urban development layout. The preferred option will seek to maintain the natural escarpment in Precinct 2 to enable discharges directed to both the Rawiri and Trig streams to maintain base flows. These devices can be incorporated into the urban layout and will integrate water quality and hydrology mitigation

Areas of Precinct 2 are relatively steep with slopes exceeding 25%. The implantation of GD01 complaint bioretention devices will be further investigated with the production of

the earthworks plans at the Resource Consent stage. At this stage, the existing topography indicates areas where implementation of these devices is feasible.

7.2.4 INDICATIVE DEVICE SIZING AND LOCATION

The implementation of communal devices within the PPC area will coincide with the proposed staging of development. For Precinct 1, there would be one device coinciding with Stage 1. For Precinct 2, there would primarily be two devices per stage; one discharging to the Rawiri Stream and the other discharging to the Trig Stream. Consequently, Stages 2, 3 and 4 of Precinct 2 will require a total of six bioretention devices to be constructed to provide management of stormwater discharging to the watercourses.

Based on the staging information presented in Figure 31, the necessary volumes, potential surface areas and indicative location of the communal devices are shown in Figure 32.

The assumptions used to develop the potential sizes are summarised below.

- The following bioretention device (raingarden) characteristics were obtained from GD01;
    - Max ponding depth: 300 mm
    - Max bioretention media depth: 1 m
    - Max transition layer depth: 300 mm
    - Using the void space assumptions outlined in GD01, the effective water depth in the bioretention devices is assumed to be 700 mm.
- In Precinct 2, the surface area of the proposed devices are outlined in Figure 32 and includes an allowance for maintenance and access requirements that will also need to be implemented. At this stage this was assumed to be 15% of the device area.
- The catchments draining to the communal devices have been determined using the existing site topography.
- Earthworks plans have not been prepared as part of this PPC application. The location of the devices is indicative only.
- The total required detention volume for Stage 1 only relates to the Precinct 1 area and does not include the current live zoned section between the two Precinct 1 areas.
- The SMAF 1 equivalent detention volume is a static volume calculation. This volume will be optimised and refined with the production of the final development layout plans.

The detention volume and surface area of the devices shown is summarised in Table 13 below.

TABLE 13. INDICTIVE DEVICE DETENTION VOLUME AND SURFACE AREA SUMMARY

STAGE	DETENTION VOLUME (M3)	SURFACE AREA OF DEVICE OF DEVICE (M2)	SURFACE AREA REQUIRED FOR THE DEVICE AND SAFE ACCESS AND MAINTENANCE (M2)

Stage 1	320	460	Privately owned and maintained
Stage 2	369	528	608
	323	462	532
Stage 3	364	520	598
	358	512	588
Stage 4	312	446	513
	263	376	433

**Surface area of device has been estimated assuming 0.7 m depth of water within the device.*

The proposed devices will seek to be integrated into the preliminary urban layout as the stages of the development progresses as shown below in Figure 32. Precinct 1 devices are proposed to be private are not shown in Figure 32.

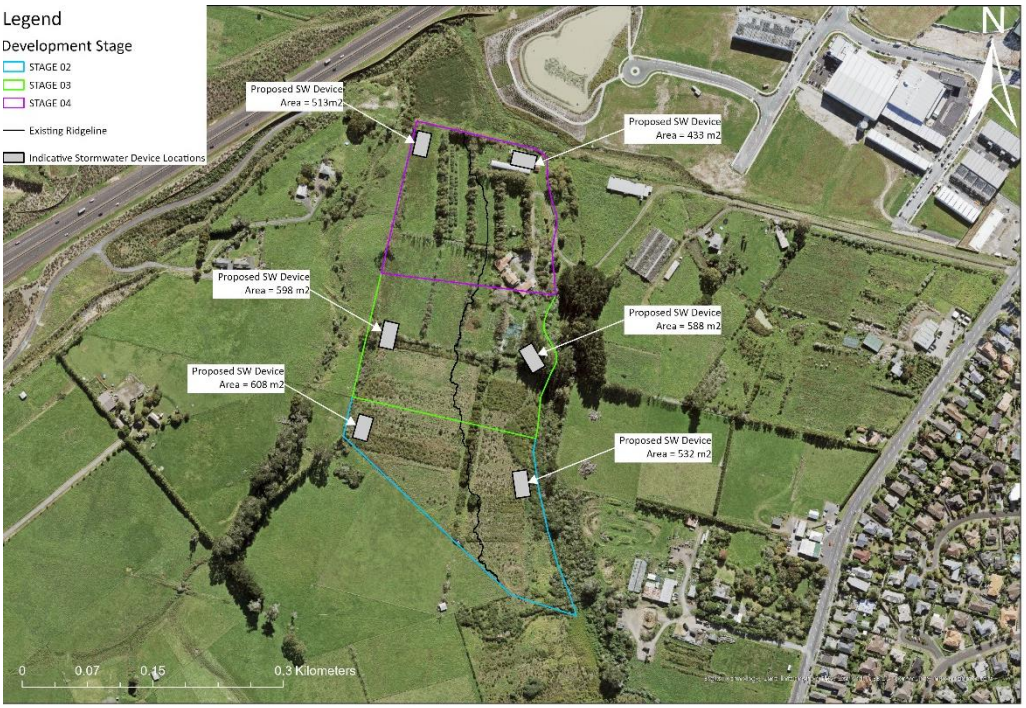


FIGURE 32. INDICATIVE COMMUNAL DEVICE LOCATIONS.

7.2.5 SUMMARY OF PREFERRED DEVICES FOR THE PPC AREA

Table 14 below summarises the proposed stormwater management device options.

TABLE 14. PREFERRED STORMWATER MANAGEMENT DEVICE OPTIONS.

MITIGATIVE OUTCOME	PROPOSED STORMWATER MANAGEMENT OPTIONS
Water Quality	Communal Bioretention devices

	Gross Pollutant Traps (for waste storage areas)
SMAF 1 Detention (95th percentile, 24 hr rainfall event minus retention volumes for all impervious areas)	Communal Bioretention devices
SMAF 1 Retention (5mm minimum retention for all impervious areas)	Option to implement on lot rainwater tanks providing a non-potable water supply

7.3 INFRASTRUCTURE OWNERSHIP

Devices located in public roads and reserves will be vested to Auckland Council's ownership in accordance with the Stormwater Code of Practice v4, March 2024 Section 4.3.6.2.

Following the completion of the site works, the new communal bioretention devices in Precinct 2 will be vested to councils at a date agreed between the developer and the Council.

All stormwater assets within the Precinct 1 area will be privately owned and maintained.

7.4 ONGOING MAINTENANCE REQUIREMENTS

All public stormwater management devices proposed within the PPC area will be designed in line with the Auckland Council guidelines and be vested to council upon completion. The operation and maintenance activities will be set out in an operation and maintenance plan. This will be provided to Council in draft format at the consent stage and progressively updated following commissioning and approval of As-built drawings.

7.5 DEPENDENCIES

At this stage of development there are no known dependencies for the implementation of the stormwater management.

8.0 PROJECT RISKS

TABLE 15. STORMWATER MANAGEMENT APPROACH RISKS

RISK TO THE PROPOSED STORMWATER MANAGEMENT	EFFECT OF RISK	WHAT IS THE RESULTANT LEVEL OF RISK	WHEN DOES THIS RISK NEED TO BE ADDRESSED
Proposed Te Tupu Ngatahi Spedding Road designation. This presents an opportunity to provide road runoff into the PPC devices.	Potential increase in device sizing	Minor (Small designation area relative to the PPC)	Subdivision and Development

Finalising the industrial area stormwater infrastructure ownership.	More public assets dependant on final development layouts.	Minor	Subdivision and Development

9.0 DEPARTURES FROM REGULATORY OR DESIGN CODES

At this stage no significant departures from regulatory or design codes are identified as part of this application. This will be progressively reviewed throughout the preliminary and detailed design process as designs and development plans are finalised.

10.0 CONCLUSIONS AND RECOMMENDATIONS FOR FURTHER INVESTIGATIONS

10.1 CONCLUSION

This SMP provides insight into the existing site features and the interventions that are required to mitigate the potential adverse effects of urbanisation on the Hobsonville Grove Plan Change Area. The stormwater management controls include water quality treatment and SMAF 1 hydrology mitigation. Hydraulic modelling of the PPC has indicated that attenuation of the development is not required, since it does not provide a benefit to the downstream infrastructure and property.

Based off the available current information this proposal outlines the preferred stormwater management approach which includes the implementation of 6 public bioretention devices with their construction coinciding with the proposed staging plan. The approach will provide safe management of flows through the development and wider sub-catchment of the Waiarohia Stream.

Modelling of the Hobsonville Grove PPC area in isolation indicates that development of the PPC area can occur without any negative impacts on the floodplain extents downstream.

10.2 FURTHER INVESTIGATIONS

- Through the development process, the potential to provide additional at source stormwater management will be considered to optimise the final stormwater solution, based on the current design information. The principles of stormwater management of the PPC area and compliance with Schedule 4 of the NDC will remain unchanged.
- The subsoil provides potential to incorporate infiltration through stormwater management devices to further contribute to protection of the Trig and Rawiri Streams. Future geotechnical investigations will be required to assess if infiltration will provide a feasible method of contributing to hydrology mitigation.

- The feasibility of implementing GD01 compliant communal bioretention devices will need to be investigated with the production of the final earthworks plan at Resource Consent stage.
- Once the outlet locations of the devices are finalised the erosion-related effects of flow from the outlet will be assessed can be assessed during the Engineering Approval and Resource Consent stages.
- Confirm subdivision of the industrial area to finalise the stormwater solution in consultation with stakeholders.
- Confirm earthworks staging of PPC to accommodate treatment of runoff during construction.

11.0 LIMITATIONS

11.1 GENERAL

This report is for the use by Austino New Zealand Limited only and should not be used or relied upon by any other person or entity or for any other project.

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 Harrison Grierson Consultants Limited. No responsibility is accepted by Harrison Grierson Consultants 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.

APPENDIX 1
DETAILED SITE INVESTIGATIONS (DSI) & GEOTECHNICAL COMPLETION REPORT & GEOTECHNICAL ASSESSMENT REPORT

APPENDIX 2
BIORESEARCHES WATERCOURSE ASSESSMENT OF ECOLOGICAL EFFECTS

APPENDIX 3
WAIAROHIA CULVERTS URS MODELLING REPORT

APPENDIX 4
ARCHAEOLOGICAL ASSESSMENT

APPENDIX 5
CULTURAL IMPACT ASSESSMENT

APPENDIX 6
STORMWATER MODELLING FLOOD ASSESSMENT

APPENDIX 7 STORMWATER FLOOD ASSESSMENT MAPS

APPENDIX 8 WHENUAPAI STRUCTURE PLAN