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

AUSTINO HOBSONVILLE 2 LIMITED

PROPOSED RESIDENTIAL DEVELOPMENT

DETAILED SITE INVESTIGATION (DSI) &

SITE MANAGEMENT PLAN (SMP)

86-90 & 100 HOBSONVILLE ROAD, HOBSONVILLE

Reference Number: REP-1329/DSI/MAR19

PREPARED FOR: AUSTINO HOBSONVILLE 2 LTD

22 MARCH 2019

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Statement

This site investigation has been prepared in accordance with the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011. It has been managed by a suitably qualified and experienced practitioner (SQEP); and reported on in accordance with the current edition of the Ministry for the Environment's *Contaminated Land Management guidelines No.1 – Reporting on Contaminated Sites in New Zealand.*

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Thank you for the opportunity to carry out this investigation. Should you have any queries regarding this report please do not hesitate to contact us on 09 475 0222.

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EXECUTIVE SUMMARY

Austino Hobsonville 2 Ltd propose to develop the piece of land encompassed by a 100, 90 and a portion of 86 Hobsonville Road through the subdivision of the land, the change in landuse from rural land to residential landuse and the development of the land into a residential configuration. As part of the development Geosciences Ltd (GSL) were engaged to undertake a detailed site investigation (DSI) of the land in order to address the requirements of the National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health (NES) and Chapter E.30 of the Auckland Unitary Plan (Operative in Part) (AUP(OP)).

The DSI included a review of the Auckland Council property files, a review of current and historic certificates of title, historic aerial images and the Auckland Council Contaminated Land Database. The historical aerial images identified that the site was developed from vacant pasture to horticultural landuse at some point between 1980 and 1996, while the property file identified that a poultry shed, residential dwelling and hay barn were constructed on 100 Hobsonville Road by 1981. Additionally, the property file identified the presence of domestic waste water infrastructure relating to the residential dwelling on 100 Hobsonville Road. The historical review identified the following potentially contaminating activities which can be encompassed by items included on the Ministry for the Environment (MfE) Hazardous Activities and Industries List (HAIL):

- Bulk storage and use of persistent pesticides during horticultural activities on the site;
- Storage of machinery or chemicals in buildings on site;
- Potential for lead based paints on buildings constructed prior to 1979;
- Potential for ACM on buildings constructed prior to 2000; and
- Septic tanks and Effluent disposal fields associated to the residential dwellings on site

Based on those activities GSL developed a conceptual site model for potential contamination on the site. The conceptual model noted that the majority of the site may have been subject to the sprayed application of persistent pesticides only, which is likely to result in a uniform distribution of potential contaminants across the topsoil horizon. While the potential for hotspots was identified as a result of the storage of farm machinery in discrete locations of storage sheds, the age and nature of horticultural landuse suggested storage is not likely given the configurations on site. Based on the conceptual model, GSL conducted a judgemental soil sampling regime including the collection of nine composite soil samples from across former horticultural blocks, and the collection of one discrete soil sample from an area of hydrocarbon stained soil in the barn on 100 Hobsonville Road. Composite Soil samples were analysed for arsenic, copper, lead, and organochlorine pesticides (OCPs) while the discrete soil sample was analysed for heavy metals, polycyclic aromatic hydrocarbons (PAH) and total petroleum hydrocarbons (TPH) as an initial screen to determine the likelihood of persistent pesticide use. Analysis of the soil samples revealed:

- All composite soil samples returned concentrations of heavy metals within the expected naturally occurring background ranges for non-volcanic soils in the Auckland Region, and concentrations of OCPs below the laboratory limit of reporting; and
- the composite soil sample returned concentrations of heavy metals within the expected naturally occurring background concentration ranges for non-volcanic soil in the Auckland Region, and concentrations of TPH below the laboratory limit of reporting;

- the discrete soil sample returned detectable traces of PAH on the limit of reporting

With respect to the effluent disposal field related to the dwelling on 100 Hobsonville Road, GSL notes that the systems remain in use during rental of the property and as such do not offer any value in sampling at this stage. During the demolition of the dwelling, the system can be decommissioned and validated following the completion of the removal to confirm soil quality in light of residential landuse.

Based on the findings of this investigation GSL concludes that the proposed subdivision, change in landuse and development is highly unlikely to result in any risk to human health or the environment. That being said, the identification of the effluent disposal systems and detectable PAH in soil in discrete portions of the site will require the regulations of the NES to be addressed. With respect to the regulations of the NES, GSL concludes that the change in landuse and subdivision can be considered a permitted activity under Regulation 8(4) of the NES, while the disturbance of soil relating to the PAH impacted soils and decommissioning of the effluent disposal systems are likely to be with the permitted activity criteria of Regulation 8(3) of the NES. Regulation 8(3) allows for the disturbance of up to 25 m^3 of soil per 500 m^2 site (6,788.6 m^3 for a site of this size) and the off site disposal of up to 5 m^3 per 500 m^2 site area (1,357 m^3 for a site of this size).

A site management plan has been provided at the rear of this report to address the requirements of the NES and AUP(OP) with regards to the removal of the effluent disposal systems and the disturbance of soil with detectable traces of PAH.

As no soil samples exceeded the AUP(OP) permitted soil acceptance criteria of Chapter E.30, the contaminated land provisions of the AUP(OP) are not considered relevant to the majority of the piece of land. The removal of the effluent disposal field is likely to be considered a controlled activity under Chapter E.30 subject to the appropriate controls set out in the accompanying SMP.

1 INTRODUCTION

Geosciences Ltd (GSL) has prepared the following report for Austino Hobsonville 2 Ltd in accordance with the GSL proposal, Ref: *Pro-1720/Feb19, dated 25 February 2019*.

This report has been prepared in accordance with the Ministry for the Environment (MfE) Contaminated Land Management Guidelines (CLMG): No. 1 - "*Guidelines for Reporting on Contaminated Sites in New Zealand*", and No. 5 – "*Site Investigation and Analysis of Soils*" (References 1 and 2).

2 PROPERTY DETAILS

Location:	A portion of 86, 90 & 100 Hobsonville Road
Legal Description:	86: SECT 1 SO 509537
	90: SEC 1 SO 490597, SEC 5 SO 490597
	100: SECT 1 SO 511858, SECT 3 SO 51858
Size:	13.5772 Ha combined
Zoning:	Future Urban Zone

The properties at the above addresses, and hereafter collectively referred to as “the site” (defined in Figure 1) in this report are comprised of some 13.5772 Ha of rural land on the western side of the Hobsonville Peninsula, West Auckland. The site is directly to the south of State Highway 18 and approximately 1.7 km to the south of the New Zealand Air Force Whenuapai Air Base.

3 PROPOSED CHANGE IN LANDUSE, SUBDIVISION AND DEVELOPMENT

Austino Hobonsville 2 Ltd proposes to develop the piece of land into a mix of residential developments as per their zoning under the Auckland unitary Plan (Operative in Part) as future urban land. Illustrative site plans indicate a mixture of standard residential lots and higher density housing alongside access roads, open space areas and infrastructure.

The proposed development therefore includes the subdivision of existing titles, the change in landuse from rural landuse and rural production, to residential and the development of the piece of land through the construction of residential dwellings.

4 STANDARDS AND REGULATIONS

Because of the change in landuse, subdivision, proposed development outlined above it will be necessary to address the requirements of the following standards, rules, and regulations applicable for the site.

4.1 NATIONAL ENVIRONMENTAL STANDARD (NES)

The *National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health* (NES) (MfE, 2012) ensures that land affected by contaminants in soil is appropriately

identified and assessed. When soil disturbance and/or land development activities take place it should be, if necessary, remediated or the contaminants contained to make the land safe for human use.

Under the NES, land is considered to be actually or potentially contaminated if an activity or industry on the MfE Hazardous Activities and Industries List (HAIL) has been, is, or is more likely than not to have been, undertaken on the land. Consequently, a change in landuse, subdivision, or development requires a Detailed Site Investigation (DSI) of the land to determine if there is a risk to human health because of any current or former activities that are occurring, or may have occurred, on the land under investigation.

4.2 AUCKLAND UNITARY PLAN (OPERATIVE IN PART) (AUP(OP))

Section 30(1)(f) of the RMA provides the Auckland Council with a statutory duty to investigate land for the purposes of identifying and monitoring contaminated land and for the control of discharges of contaminants into or onto land or water and discharges of water into water.

The Auckland Unitary Plan (Operative in Part) (AUP(OP)), which was formally notified on 30 September 2013, is a combined regional policy statement, regional coastal plan, regional plan, and district plan. Auckland Council notified an operative in part version of the plan on 15 November 2016 (Reference 4).

Chapter E.30 of the AUP(OP) deals specifically with contaminated land and maintains that Council is required to manage both the use of land containing elevated levels of contaminants and the discharge of contaminants from land containing elevated levels of contaminants. As no appeals have been lodged on Chapter E.30, the provisions of that section can be considered operative under Section 87 of the Resource Management Act 1991. For all purposes of this investigation, the relevant provisions of the AUP(OP) relating to soil contamination have legal jurisdiction and those provision have been considered where they may have an impact on the proposed development.

5 DSI OBJECTIVES

The objectives of this investigation were to assess:

- if the land is covered by the NES as a result of any current or former HAIL activities;
- the extent of any current or former HAIL activities on site;
- if the activity can comply with NES permitted activity conditions;
- what, if any, contaminated land rules of the AUP(OP) apply to the proposed development;
- the soil quality and associated risk to human health and the environment as a result of former activities on the site; and
- the need, if any, for further detailed investigations.

6 SCOPE OF WORKS

To achieve the objectives of the DSI, GSL has undertaken the following:

- A review of current and historical certificates of title for each of the properties;
- a review of historic aerial photographs of the site;
- a review of the property files held by Council for each of the properties;
- a search of the contaminated land database;
- a visual site inspection of the piece of land;
- the collection of nine composite soil samples from across the piece of land, and the collection of one discrete soil sample from a potential hotspot location;
- the laboratory analysis of the composite soil samples for arsenic, copper, lead and organochlorine pesticides (OCPs) and the analysis of the discrete soil sample for heavy metals, total petroleum hydrocarbons (TPH) and polycyclic aromatic hydrocarbons (PAH); and
- the preparation of this report in accordance with the Ministry for the Environment (MfE) Contaminated Land Management Guidelines (CLMG): No. 1 - "*Guidelines for Reporting on Contaminated Sites in New Zealand*", detailing the findings of this investigation and the need, if any, for further work.

7 SITE HISTORY

A desktop study of publically available files and photographs was undertaken to determine the history of the site with respect to any current or historic potentially contaminating landuses.

7.1 CERTIFICATE OF TITLE

GSL has reviewed copies of the current and historic Certificates of Title for the aforementioned properties, including any instruments on the title which detail relevant property information such as: current ownership, registered interests, easements, covenants, lease restrictions and transmissions, to determine if pre-existing consent notices or other restrictions / notifications which may be relevant to historic uses or potential soil contamination are held against the property. No notes of interest were recorded on the titles, the title indicate that the lot boundaries were established between 2016 and 2017. Copies of these documents are attached in Appendix B.

7.2 HISTORIC AERIAL PHOTOGRAPHS

Historic aerial photographs from 1950, 1963, 1972, and 1980 are available for the site on the Retrolens website, while images from 1996, 2000, 2010, and 2017 are available on the Auckland Council GEOMaps website. The findings of the historic aerial photograph review are summarised below, while copies of these aerial photographs have been attached in Appendix C.

1950-1972 The 1950 image is the earliest available image for the site shows the site predominantly vacant pasture with a well-defined gully running through centre of the site and well-established shelterbelts in a portion of the site. There are no distinct structures on the piece of land within the 1950 aerial image.

There are no discernible developments to the site through the 1963 and 1972 images, the site remains pasture with no discernible structures during this time.

1980 The 1980 image shows the first discernible development to the area of 100 Hobsonville Road, a gravel driveway has been constructed along the site's northern boundary leading to a large shed in the northeast corner of the sites main area. The driveway then curves to the south to a crossing of the gully and loops around to a dwelling which has been constructed to the west of the gully. Horticultural activity in the form of broadacre cropping has been established on the western portion of 86 Hobsonville Road, however no structures are evident in this portion.

1996-2000 By the time the 1996 image was captured, the full extent of 86, and 90 Hobsonville Road has been converted to broadacre cropping while 100 Hobsonville Road has been divided into paddocks by mature shelter belts. Some of the paddocks show soil disturbance suggesting potential broadacre usage.

The residential dwelling has been expanded by this stage and is now a very large dwelling in the same location. To the south of the dwelling ,a shade house has been constructed, additionally a new storage shed, and elongated barn have been constructed to the west of the gully on the sites northern boundary.

The 2000 image shows the only discernible developments to the site are horticultural activities in the paddocks on 100 Hobsonville Road.

2010-2017 By the time the 2010 image was captured, the majority of horticultural activities appear to have ceased across the site with pastoral landuse re-established.

The 2017 image is the most recent available for the site and shows the site in largely the same configuration as 2010 with the exception of the bulk of the piece of land appearing overgrown.

7.2.1 Summary of Historic Aerial Images

GSL has reviewed the available historic aerial images of the site, the aerial images show that the site was predominantly pasture until the 1980s, at which time horticultural activity progressively expanded across the piece of land, appearing to peak in 1996 – 2000. By 2010, horticultural activities had clearly ceased and the site became progressively more overgrown between 2010 and 2017. As the bulk storage and use of persistent pesticides is included on the MfE HAIL under Item A.10, the piece of land would be considered potentially contaminated. The bulk of the piece of land was clearly uniform in use and would have been subject to direct spray application only with any storage activities concentrated around the buildings and structures in the northern portion of the site .

The dwelling on 100 Hobsonville Road was originally constructed by 1980 before being expanded or potentially replaced by a large dwelling by 1996. A large shed was constructed on the northern boundary of 100 Hobsonville Road between 1972 and 1980 while a second large barn / shed was

constructed between 1980 and 1996. Any structure built prior to 1 January 2000 has the potential to contain asbestos containing materials (ACM), while structures constructed prior to 1979 have the potential for lead based paints to have been applied to the structures. ACM is included on the MfE HAIL under Item E.1 when in broken or degraded condition, while lead based paint can be encompassed by Item I of the MfE HAIL.

7.3 PROPERTY FILE

GSL requested the property file from Auckland Council for review of historic activities. The majority of information on the property files relates to the 100 Hobsonville Road, while the property file for 86 and 90 Hobsonville Road contains resource consent documentation regarding Austino Hobsonville 2 Ltd's proposed development of the site. Copies of relevant historic plans, correspondence, permits, and consents have been attached in Appendix D. The following items of note were on the supplied file:

1976 Plans and building permits are held on file relating to the construction of a large poultry shed. These relate to the large shed noted on the 1980 historic aerial image described above at the end of the access road from 100 Hobsonville Road.

1979 A building permit is held on file for the relocation of a dwelling onto 100 Hobsonville Road

1981 Building permits are held on file regarding the construction of a barn on site. These documents relate to the large barn noted in the aerial review above northwest of the poultry shed on the other side of the riparian gully.

2007 Drainage plans are held on file relating to the upgrade of the domestic wastewater treatment systems on 100 Hobsonville Road. The area of the disposal field is indicated on a hand drawn 'as built' drainage plan contained on file, described as being approximately 2,503 m^2 and contained within the pine tree plantation and riparian margin to the southeast and east of the dwelling.

GSL has identified the following potential sources of contamination in the property file review:

- Buildings constructed prior to 2000 have the potential to contain asbestos containing materials (ACM);
- Buildings constructed prior to 1979 have the potential for lead based paints to have been applied to the buildings; and
- Septic tanks and effluent disposal systems are considered to be encompassed by Items G.5 and G.6 on the MfE HAIL.

7.4 CONTAMINATED LAND DATABASE SEARCH

A request was made to Auckland Council for a search of the subject address against their contaminated land database which retains existing records of any investigated land contaminating activities that may have occurred at the site address and which were subsequently investigated by council. It should be noted that while there may be no information held on file this does not necessarily provide conclusive evidence that no potentially contaminating activities have taken

place at the site address. A copy of the site contamination enquiry is provided in Appendix E. Auckland Council could find no files in relation to the site address.

8 SITE INSPECTION & INFRASTRUCTURE

GSL personnel undertook a site inspection on 8 March 2019, at which time the weather was overcast with periods of heavy rainfall. At the time of the inspection the site appeared as it does in the most recent aerial photographs, that is; predominantly vacant rural land divided into blocks by thick, mature shelter belts, the site is accessed via gravel driveway along the northern boundary of 100 Hobsonville Road, while access to 90 Hobsonville Road was gained via farm gates at the southern boundary of 100 Hobsonville Road and access to 86 Hobsonville Road was gained from 88 Hobsonville Road to the immediate north of the property.

The only structures present on the piece of land were within 100 Hobsonville Road. The main structure is a large residential dwelling constructed on a U-shape around a large driveway / turn-around, located at the termination of the access road. The dwelling consists of three wings, with the southeast wing comprising the original dwelling located on the site, the main central wing and northwest wing are adjoined through glass conservatories. GSL did not note any visually obvious ACM on the dwelling, and no materials in broken or degraded condition that would impact soil quality. The dwelling is in excellent condition with no obvious signs of deterioration, painted surfaces are all in excellent condition with no areas of flaking etc. no paint flakes or chips were noted surrounding the dwelling. A full hazardous building materials survey will be required for demolition as set out in Section 13 below.

Along the northern boundary of the site is sited the poultry shed noted in the above sections, the shed is clad externally with fibre cement sheets considered likely to be asbestos containing materials and a corrugated iron roof, the building is constructed on a concrete foundation slab which extends approximately 1 m out from the walls of the shed, two grain silos are sited on the concrete slab at the southeast corner of the shed. The exterior cladding on the poultry shed is in generally good condition with the exception of one panel which has been broken (see Plate 2 in Appendix F), GSL considers the risk of gross soil contamination as a result of the fibre cement cladding to be low, however GSL notes that prior to demolition the building will require a hazardous building materials survey to be undertaken in order to confirm the location and extent of ACM with respect to specific demolition requirements. The volume of potential ACM is in excess of 10 m2 and as such will likely trigger Class B Asbestos Removal works.

To the east of the poultry shed is a large gully, on the western side of the gully is a large arched storage barn noted in the desktop review, the barn is timber framed and clad with corrugated iron with a bare earth floor, adjacent to the barn is a garage with a concrete foundation slab and again clad with fibre cement weatherboards, the cladding on the garage is noted to be in good condition, with no broken panels or fragments of material noted.

To the north of the barn is another, smaller storage shed, the shed is timber framed and clad with corrugated iron with the southern side open.

To the south of the dwelling is a disused domestic shade house, approximately 3,000 m^2 in area, the shade house is in a state of disrepair and has clearly been out of operation for several years.

To the south of the dwelling and structures, the full extent of the site is divided into former horticulture blocks which are now abandoned and densely overgrown. There are no further structures or features identifiable across the former horticultural blocks.

Site photographs are attached in Appendix G.

8.1 GEOLOGY & GEOHYDROLOGY

The local geology is described by Edbrooke (Reference 7) as pumiceous mud, sand and gravel with muddy peat and lignite: rhyolite pumice, including non-welded ignimbrite, tephra and alluvia of the Puketoka Formation.

8.2 TOPOGRAPHY AND DRAINAGE

The site is relatively level with a gradual fall from a high point of approximately 50 m above sea level (asl) at the southern extent of 86 Hobsonville Road to a low point in the gully floor of approximately 25 m asl on the northern boundary of 100 Hobsonville Road. The western portion of the site has a slight fall to the east toward the gully.

Drainage is via overland flow to the main gully feature, the Auckland Council GEOMaps server indicates that the gully forms a permanent water course, the Rawiri Stream which drains the site to the north and discharges to the Waitemata Harbour approximately 2 km to the northeast of the site.

A review of the floodplains, flood prone, or flood sensitive areas of the Auckland Region (available on the Auckland Council GIS) revealed that the site is not located on a flood plain nor is the site located on a flood prone or flood risk area area.

The site is not part of the Natural Stream Management Areas – refer to Map Series 1, Map 23, Riverhead, Rodney, of the Auckland Regional Council's Regional Plan Map Series. The site is located in the footprint of the Kumeu Waitemata Aquifer, which is identified as a sensitive aquifer area in the Auckland Regional Plan Map Series 2, Map 7.

9 CONCEPTUAL MODEL FOR POTENTIAL CONTAMINATION

Based on the desktop study GSL identified the following sources of potential contamination within the piece of land under investigation:

- Bulk storage and use of persistent pesticides during horticultural activities on the site;
- Storage of machinery or chemicals in buildings on site;
- Potential for ACM on buildings constructed prior to 2000; and
- Septic tanks and Effluent disposal fields associated to the residential dwellings on site

Based on the above, GSL considers the primary potential source of contamination to be the bulk use of persistent pesticides to crops during horticultural activities on site. As no discrete structures are noted across the majority of the piece of land where horticultural activities have been undertaken, GSL considers that the direct sprayed application of persistent pesticides to be the primary source for potential contamination across the former horticultural blocks. The direct sprayed application of persistent pesticides is likely to result in a reasonably uniform distribution of

contaminants through the uppermost topsoil horizon. It is not expected that the direct sprayed application of persistent pesticides would result in distinct hotspots of contamination the contaminants of concern relating to historic horticulture are arsenic, copper, lead, and organochlorine pesticides (OCPs).

GSL notes that the most common persistent pesticides with long half-lives had been phased out or banned by the 1990s. As an initial screen for their potential use across the site, GSL undertook a justified soil sampling regime through the collection of 9 composite soil samples from portions of the site potentially subject to persistent pesticide use in order to establish whether or not persistent pesticides had been applied to crops on the land. GSL did not identify any distinct evidence of the bulk storage of persistent pesticides on site during the walkover with the layout and nature of the sheds suggesting use for farm machinery, hay and residential aspects. No bulk storage of any chemicals was noted during the site inspection and no residual spray containers were identifiable.

While ACM products may be present in buildings constructed prior to 1 January 2000, asbestos containing materials only pose a risk for soil contamination where they are found to be in degraded condition. With the exception of one broken panel of fibre cement cladding on the poultry shed, any potentially ACM products were noted to be in good condition and therefore highly unlikely to result in a risk of fibre generation or soil contamination. With respect to the panel on the poultry shed, while broken the product remained in un-weathered condition and was unable to be crumbled by hand, which indicates that it is unlikely to be friable and should therefore be addressed during demolition of the poultry shed.

GSL did note the presence of some minor hydrocarbon staining in a discrete area at the eastern extent of the hay barn, likely as a result of the storage of farm machinery. Where leaks or spills of oils and fuels are present, they result in small highly constrained hotspots and contaminants generally do not infiltrate deeper soils or migrate far from the source.

Effluent disposal fields and domestic wastewater treatment systems are considered to encompassed by Items G.5 and G.6 of the MfE HAIL. The area which has the highest potential for impacts resulting from the wastewater treatment is the disposal field where effluent liquor is, in this case, pumped to drip lines and drained into the soil. The discharge can result in impacts to the soil along those driplines, however it would not be expected that any impacts to soil would be found outside the immediate area of the disposal field. The disposal field remains currently in use and as such, sampling at this time does not provide any value with respect to ongoing landuse. While Council have previously identified the contaminants of concern to be heavy metals, bacteria and viruses. GSL notes that laboratory techniques used for soil testing make the analysis for contaminants such as bacteria and viruses cost prohibitive and difficult to assess. Therefore, GSL considers the heavy metals are adequate as an indicator of any potential impacts or risks related to the disposal field. As the disposal field remains in use and are generally considered a low risk for potential contamination, GSL considers that during demolition of the dwelling the disposal systems can be removed, and validation soil sampling can be undertaken following the removal.

With respect to lead based paint, the original dwelling was established on site in the late 1970s, at which point GSL notes that use of lead had greatly reduced within paints, if not completely stopped. White lead pigment was banned in New Zealand in 1979 and had been drastically reduced in concentrations in paints from 1950 up to that point. GSL notes that it is unlikely that any dwelling constructed in 1979 would have been subject to the use of lead paint to an extent where soil contamination may have occurred.

10 SOIL SAMPLING AND ANALYSIS

Based on the conceptual model developed in the above sections, GSL carried out a judgemental soil sampling regime which included the collection of composite soil samples from former horticultural blocks. The former horticultural areas of the site were divided into nine areas with one composite soil sample, composed of four discrete subsamples, collected from each area. Subsamples were collected using a stainless steel foot corer following the removal of any surficial vegetative cover. Each subsample was placed into a plastic zipper bag with the date, composite soil sample identification number, location and initials of the sampler noted on the bag. Once the four subsamples had been collected in the sample bag the soil was thoroughly mixed in order to homogenate the composite sample. GSL notes that the topsoil horizon across the full extent of the site was assessed to be a uniform organic rich silty loam, as the conceptual model identified that any potential contamination is likely to be uniformly distributed through the topsoil layer, the conditions on site are considered ideal for use of the composite methodology.

One discrete soil sample was collected from within the storage barn in an area where some minor surficial hydrocarbons staining was noted on the earth floor of the barn. The soil sample was collected using a stainless steel foot corer and placed directly in a laboratory prepared glass sample jar with the date, sample identification number, sample depth, location, and initials of the sampler noted on the label.

Sampling equipment was decontaminated in between samples using a soft soap solution in accordance with GSL internal quality control procedures.

10.1 LABORATORY ANALYSIS AND QUALITY CONTROL

10.2 ACCEPTANCE CRITERIA AND RELEVANT GUIDELINES

The NES mandates fourteen soil contaminant standards (SCS) for the protection of human health for organic compounds and inorganic elements for various landuse criteria. While a range of residential landuses are proposed, the NES human health SCS criteria for a residential block with 10% home grown produce (residential 10%) have been applied as a suitably conservative risk assessment for the proposed subdivision and development.

The AUP(OP) also sets permitted activity environmental discharge and soil acceptance criteria for potentially contaminated land against which the results have been assessed.

Results are also compared to the expected naturally occurring background concentration ranges of inorganic elements in non-volcanic soils in the Auckland Region.

11 ANALYTICAL RESULTS

A comparison of the analytical results with the relevant guideline criteria is provided in Table 1 below. Copies of the laboratory chain of custody (COC) document and analytical transcripts are attached in Appendix G, while a discussion of the results is provided below. GSL notes that no soil sample returned detectable concentrations of OCPs or TPH (SS1) at the laboratory limits of detection, these results have therefore been omitted from the table.

11.1 HEAVY METALS

All soil samples returned concentrations of heavy metals within the expected naturally occurring background concentration ranges for non-volcanic soils in the Auckland Region.

11.2 ORGANOCHLORINE PESTICIDES (OCPS)

All soil samples returned concentrations of OCPs below the laboratory limit of reporting.

11.3 POLYCYCLIC AROMATIC HYDROCARBONS (PAHS)

Soil sample SS1 returned a concentration of fluoranthene on its limit of reporting (0.03 mg/kg) which has a BaP equivalent concentration of 0.0003 mg/kg which falls well below the NES SCS and AUP(OP) permitted activity soil acceptance criteria.

Table 1: Analytical Results[1]

	Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc	BaP
SC1	5.1	-	-	8.5	<5	-	-	-
SC2	4.2	-	-	6.6	<5	-	-	-
SC3	2.3	-	-	<5	<5	-	-	-
SC4	<2	-	-	<5	<5	-	-	-
SC5	4.9	-	-	7.2	5.5	-	-	-
SC6	<2	-	-	<5	<5	-	-	-
SC7	5.7	-	-	15	17	-	-	-
SC8	7.7	-	-	18	20	-	-	-
SC9	<2	-	-	5.1	10	-	-	-
SS1	2.6	<0.4	16	8.1	14	<5	38	**0.0003**
NES[2]	20	3	460	>10,000	210	NL	NL	10
AUP(OP)[3]	100	7.5	400	325	250	105	400	20
Background[4]	0.4-12	<0.1-0.65	2-55	1-45	<5-65	0.9-35	9-180	ND

Notes:

1. All concentrations measured in mg/kg
2. National Environmental Standards for Assessing and Manging Contaminants in Soil for Assessing and Managing Contaminants in Soil to Protect Human Health – Residential landuse with 10% homegrown produce
3. Auckland Unitary Plan (Operative in Part) – Table E.30.6.14.1. Permitted activity soil acceptance criteria
4. For benzo(a)pyrene (BaP) the equivalent BaP concentration is calculated as the sum of each of the nine carcinogenic PAHs multiplied by their respective potency equivalence factors as per Table 40 of *The Methodology*
5. Values in **BOLD** exceed the NES criteria, values in **BOLD** exceed the AUP(OP) criteria, values in **BOLD** exceed the background ranges

6. NL = No limit / ND = not detected / NA = not applicable

12 CONCLUSIONS

GSL has conducted a detailed site investigation, in accordance with the MfE Contaminated Land Management Guidelines to determine the location and extent of current and / or former HAIL Activities on site and the potential for soil contamination, and the associated risk to human health and the environment, as a result. GSL has consequently concluded that:

- the site has been predominantly vacant grazing for the majority of its discernible past;
- the majority of the site was converted to horticultural activity between 1980 and 1996;
- a large poultry shed was constructed on 100 Hobsonville Road in 1976;
- residential landuse was established on the site in 1979 when a dwelling was relocated onto 100 Hobsonville Road

Based on the findings of the desktop review GSL developed a conceptual site model for potential contamination on site which identified the following potential sources of contamination:

- Direct sprayed use of persistent pesticides during horticultural activities on the site;
- Storage of machinery or chemicals in buildings on site;
- Potential for ACM on buildings constructed prior to 2000; and
- Septic tanks and Effluent disposal fields associated to the residential dwellings on site

The conceptual model identified that as the wider site area may have been subject to the sprayed application of persistent pesticides, that a generally uniform distribution of potential contaminants may be present across the surficial topsoil horizon. No distinct evidence for the bulk storage of persistent pesticides, or any other bulk storage was noted during the site inspection. Based on the conceptual model and observations of site, GSL conducted a judgemental soil sampling regime which included the collection of nine composite soil samples from the former horticultural blocks, and the collection of one discrete soil sample from the large barn in the north or the site where machinery appears to have been stored and visual hydrocarbons staining was noted. Composite soil samples were analysed for arsenic, copper, lead and organochlorine pesticides (OCPs), while the discrete soil sample was analysed for heavy metals, polycyclic aromatic hydrocarbons (PAHs) and total petroleum hydrocarbons (TPH). Analysis of the soil samples revealed;

- All composite soil samples returned concentrations of heavy metals within the expected naturally occurring background ranges for non-volcanic soils in the Auckland Region, and concentrations of OCPs below the laboratory limit of reporting; and
- the composite soil sample returned concentrations of heavy metals within the expected naturally occurring background concentration ranges for non-volcanic soil in the Auckland Region, and concentrations of TPH below the laboratory limit of reporting;
- the discrete soil sample returned detectable traces of PAH on the limit of reporting.

Based on the analytical results, GSL concludes that horticultural activity is highly unlikely to have resulted in impacts to the soil on site and are therefore highly unlikely to result in a risk to human health or the environment. While trace detections of PAH are returned in the soil sample collected in the barn, the concentrations are highly unlikely to result in a risk to human health or the environment.

With respect to the effluent disposal field related to the dwelling on 100 Hobsonville Road, GSL concluded that as the systems remain in use, that during the demolition of the dwelling the system can be decommissioned and validated following the completion of the removal. A site management plan has been provided in Section 14 of this report to address the requirements of the NES with regards to the removal of the effluent disposal systems and the disturbance of soil with detectable traces of PAH.

12.1 NATIONAL ENVIRONMENTAL STANDARD (NES)

Due to the detection of PAH in soil in the barn, and the presence of the effluent disposal systems on 100 Hobsonville Road, those portions of the site will be required to address the regulations of the NES. That being said, as the detections of PAH are on the limit or reporting and fall orders of magnitude below the Residential 10% SCS, and as domestic waste water systems represent a very low risk to a discrete area of the site, GSL concludes that the proposed development is highly unlikely to result in a risk to human health. Subdivision and change in landuse of the site can therefore be considered a permitted activity under Regulation 8(4).

As the stained soil in the barn, septic tank and disposal field are considered HAIL, the regulations of the NES must be addressed should the disturbance of soil be undertaken in this area. GSL notes the volume of earthworks required to remove the disposal field infrastructure will likely comply with the permitted activity requirements of Regulation 8(3) of the NES.

Regulation 8(3) of the NES provides for small scale disturbance of soil on a piece of land as a permitted activity while the following conditions are met:

a) Controls to minimise the exposure of humans to mobilised contaminants must -
  i. Be in place when the activity begins;
  ii. Be effective while the activity is done;
  iii. Be effective until the soil is reinstated to an erosion resistant state;

b) The soil must be reinstated to an erosion resistant state within 1 month after serving the purpose for which the activity was done

c) The volume of disturbance on soil must not be more than 25 m^3 per 500 m^2;

d) Soil must not be taken away in the course of the activity except that -
  i. For the purpose of laboratory analysis, any amount of soil may be taken away as soil samples;
  ii. For all other purposes combined, a maximum of 5 m^3 per 500 m^2may be taken away per year.

e) Soil taken away in the course of the activity must be disposed of at a facility licensed to receive soil of that kind;

f) The duration of the activity must be no longer than two months;

g) The integrity of a structure designed to contain contaminated soil must not be compromised.

A site management plan commensurate to the scale of works and risk associated with the removal of the effluent disposal infrastructure has been included as Section 13 below, the site management

plan documents the controls, site practises and procedures to be in place in accordance with the requirements of Regulation 8(3). For a piece of land of this size (13.5772 Ha), GSL notes that Regulation 8(3) allows for the disturbance of up to 6788.6 m^3 of soil and the offsite disposal of 1,357.72 m^3 of soil as a permitted activity.

GSL considers that while the requirements of the site management plan are in place, the removal of domestic effluent disposal fields and septic tanks is very low risk and fall within the remit of Regulation 8(3) as a small scale soil disturbance activity on a piece of land.

With respect to the hydrocarbon stained topsoil in the barn, while the soil does not meet the definition of cleanfill due to visual staining and detectable PAH, there is no reason that soil from this area cannot remain on site for reuse as top cover of landscaping. That being said, should off-site disposal of the soil be desired, while the soil will be required to be disposed of at a suitably licensed facility, the removal of the soil can be undertaken as a permitted activity alongside the decommissioning of the septic tanks and disposal fields.

12.2 THE AUCKLAND UNITARY PLAN (OPERATIVE IN PART) (AUP(OP))

For the same reasons as outlined above, the piece of land does not meet the Auckland Council definition of actually or potentially contaminated land, and the provisions of Chapter E.30 of the AUP(OP) will not apply to the proposed change in landuse, subdivision, and development and no further work, in this respect is required.

With regards to the effluent disposal field, as with the NES the removal of the effluent disposal field can be undertaken as a permitted activity under Rule E.30.6.1.2 of the AUP(OP) which provides for small scale disturbance activities as follows:

1) *The volume of soil disturbed must not exceed:*
   a. *200 m^3 per site; or*
   b. *200 m^3 per project for sites or road with multiple concurrent land disturbance projects, where the cumulative total volume of soil disturbance associated with each given project will be used when determining activity status; or*
   c. *An average depth and width of 1 m for linear trenching by network utilities in the road or rail corridor. For the purposes of this rule, the railway corridor does not include land more than 10 m from the rail tracks;*
2) *Prior to the activity commencing:*
   a. *The Council must be advised in writing if the volume of soil disturbed on land containing elevated levels of contaminants exceeds 25 m^3, including the details of the measures and controls to be implemented to minimise discharges of contaminants to the environment, and such controls are to be effective for the duration of the activity and until the soil is reinstated to an erosion resistant state; and*
   b. *Controls on linear trenching must be implemented to manage discharges to the environment from trenches acting as migration pathways for contaminants.*
3) *Any discharge from land containing elevated levels of contaminants must not contain separate phase liquid contaminants including separate phase hydrocarbons.*
4) *The duration of soil disturbance on site must not exceed two months*

Any contaminated material removed from the site must be disposed of at a facility or site authorised to accept such materials.

Should those conditions not be met, then resource consent may be required as a controlled activity under the AUP(OP).

12.3 HEALTH AND SAFETY AT WORK (ASBESTOS) REGULATIONS 2016

With respect to the demolition of any building constructed prior to 1999 the *Health and Safety at Work (Asbestos) Regulations 2016, demands* a fully intrusive pre-demolition hazardous building materials survey to be undertaken before demolition works can commence. The survey must be conducted by a suitably WorkSafe NZ licensed asbestos assessor, and will identify the location and extent of any hazardous building materials, specifically ACM. Should ACM be identified in the survey then asbestos removal works will be required prior to the demolition of the dwelling, the removal must be completed by an appropriately licensed asbestos removal contractor and under the controls of an asbestos removal control plan (to be provided by the appointed contractor. The hazardous building materials survey will form the basis of any asbestos removal control plan.

13 SITE MANAGEMENT PLAN

While Auckland Council identify effluent treatment and disposal field as potentially contaminating activities, GSL considers that domestic wastewater treatment systems can generally be considered low risk and can be decommissioned and removed from sites within the remit of a permitted activity, subject to appropriate controls being in place and effective for the duration of the soil disturbance activities. As the system is currently in use on site, it is not practical to undertake disturbance activities to assess underlying soil quality in advance of decommissioning and would be unnecessarily destructive to that system. Figure 2 identifies the approximate location of the effluent disposal field and septic tank on site.

As GSL understands that the existing dwelling is to be demolished, including the disposal field infrastructure, GSL notes that validation sampling post decommissioning can achieve the same level of certification of soil quality and ensure that any residual soil within the site can meet the applicable landuse standard.

The following section provide an assessment of the removal works against the permitted activity standards alongside appropriate practises and procedures for removal and validation of residual soils to ensure that any risks to human health or the environment are managed to an acceptably low level.

13.1 LOCATION AND EXTENT OF IMPACTED SOIL

GSL notes that the area impacted by hydrocarbon staining in the barn is extremely limited, being less than 20 m^2 in the eastern end of the barn, staining is constrained to the uppermost 10 mm of surface soil and not present below that depth. Disturbance required to address the visual staining is expected to be minimal

Plans contained within the property file indicate that the system is comprised of an Hynds Septic System, which consists of a multi chamber system with two disposal fields constructed of approximately 400 m of driplines. The specification of the tanks are not noted in the property file, however it appears to be concrete and covers an area of approximately 14 m^2, the depth is likely to not exceed 2 m below surface resulting in approximately 28 m^3, while the drip lines are expected to be situated in the topsoil horizon (i.e. the uppermost 400 mm of the soil profile).

The indicative area of the disposal field is approximately 2,503 m^2, with a maximum extent of disposal field lines of approximately 400 m. The extent of the disposal field areas is indicated on Figure 2.

13.2 PERMITTED ACTIVITY STANDARDS

As set out in Section 12.1 and 12.2 above, Regulation 8(3) of the NES and Rule E.30.6.1.2 allow for minor earthworks as a permitted activity. In the context of the site, the provisions of Regulation 8(3) would allow for the disturbance of up to 6,788.6 m^3, and the off-site disposal of up to 1,357.72 m^3 of soil for a piece of land of this size (13.5772 Ha), while the AUP(OP) allows for the disturbance of up to 200 m^3. The expected volume of soil disturbance required for the proposed decommissioning works should readily comply with the permitted activity standards of the NES and the AUP(OP).

The remaining sections of this report provide the practises and procedures to manage the risk of any actual or potential discharges during those works and will ensure that all material removed from the site is disposed of to an appropriately licensed facility.

13.3 SITE MANAGEMENT

The main construction contractor will ultimately be responsible for the implementation of this SMP and will be regarded as the primary PCBU for the project, under instruction from the Client. The main construction contractor may nominate a project manager who will oversee daily site operations, and as a result will be responsible for ensuring the following sections of the SMP are implemented and followed for the duration of the project. Any complaints, incidences, or accidental discoveries shall be reported to the main construction contractor/PCBU in the first instance.

13.3.1 CONTRACTOR HIERARCHY & SITE MANAGEMENT

GSL has prepared the information in Table 4 below to outline the responsibilities of suitably qualified and licenced professionals in relation to remedial works at the site. Each of the outlined professionals shall work collectively where work streams overlap to ensure remedial works are streamlined and undertaken in an efficient manner.

TABLE 4: RESPONSIBLE PARTIES

POSITION	CONTACT NAME & COMPANY	TELEPHONE NUMBER	RESPONSIBILITY
Main Construction Contactor			Project Delivery
Project Manager			Management of Project, PCBU
Site Manager/supervisor			Implementation of RAP
Contaminated Land Advisor			Validation of Remedial Works On-call assistance

13.3.2 ENGAGEMENT OF CONTAMINATED LAND ADVISOR

A suitably qualified Contaminated Land Advisor (CLA) will be appointed to provide on-call direction in relation to contamination / disposal issues for the project. The CLA will be suitably qualified and experienced in the investigation, reporting, remediation, and validation of contaminated land.

The CLA's main functions will be to:

- Assist in inspecting / screening potentially contaminated material;
- Assess the effectiveness of environmental control measures;
- Manage the collection and analysis of any soil samples (if required) in accordance with the Ministry for the Environment's (MfE) Contaminated Land Management Guideline No 1, (Reference 1);
- Provide assessments of the investigation;
- Make recommendations based on findings; and

Maintain regular liaison with the authorities if necessary.

13.3.3 BRIEFING SESSIONS

The site manager is to commission a briefing session for relevant staff and subcontractors prior to the commencement of works. The briefing session will include as a minimum:

- Known areas of impacted soil;
- Appropriate PPE and safety measures;
- Familiarisation with the requirements of the SMP;
- Guidance for identifying contaminated material as works progress (Appendix B); and
- Procedures to be followed should contaminated material be encountered (Appendix B).

13.3.4 Health and Safety Procedures

While this SMP provides steps that are required in order to manage the removal of a small area of hydrocarbon staining alongside a septic system, the earthworks contractor is ultimately responsible for the H&S procedures related to the earthworks.

The concentrations of contaminants of concern identified within soils are compliant with the NES Soil Contaminant Standards for the commercial / industrial outdoor worker (unpaved), and provisions for the protection of the environment. Consequently, standard erosion, sediment and dust control mechanisms are considered more than adequate to manage any risks to the health and safety of workers during soil disturbance in this area.

The Health and Safety Guidelines on the Clean-up of Contaminated Sites developed by Occupational Safety and Health Services (OSH) provides reference to appropriate H&S measures that can be adopted for contaminated sites (Reference 2). A copy of this guideline can be provided upon request should the site manager have any distinct queries with respect to managing activities on site.

13.3.5 Personal Protective Equipment

The detected concentrations are not expected to present any specific risk to site workers. The major pathway for exposure to the identified contaminants of concern is via inhalation of contaminated dust. As this SMP includes provision for dust suppression, the minimum Personal Protective Equipment (PPE) which should be available on-site will be in accordance with the contractor's specific health and safety plan.

In the event of accidental discovery of unexpected contamination, or gross discharges of dust, GSL recommends that the following additional PPE be readily accessible to mitigate any risks associated with accidental discoveries:

- Protective leather or rubber gloves
- Safety glasses
- P2 Dust masks

The site manager will use his discretion with regard to the use of the additional PPE and might call on the CLA for advice on this matter.

13.4 Septic Tank and Effluent Disposal Field Removal Procedures

Prior to the excavation of the septic tank and disposal field, the site manager appointed by Austino Hobsonville 2 Ltd will arrange for the tank to be emptied through the use of an approved waste removal company utilising a suction truck specifically designed for this purpose. The waste will be disposed of by the appointed contractor to an approved liquid effluent receiving facility. Once empty, the tank will be carefully excavated and removed from site. Depending on the construction material and condition of the tank, it will either be disposed of to an appropriately licensed facility (e.g. landfill) or sent to a location for recycling under approved conditions.

After the tank has been pulled, the associated waste disposal infrastructure will be excavated alongside a small volume of soil and disposed of to an appropriately licensed waste receiver. The location of the septic tank and approximate extent of the dispersal field were confirmed in an

engineering inspection and report held on the Council property file. That said, it is noted that this is not an as built plan and as such the effluent disposal pipes should be 'chased out' using an excavator starting at the septic tank through to termination.

The use of experienced contractors and licensed disposal locations will provide the primary controls in managing any actual or potential adverse effects associated with the decommissioning process.

Appropriate Personal Protective Equipment (PPE), in accordance with the contractors H&S requirements will be utilised alongside mechanical excavation as far as possible to minimise any direct contact with actually or potentially hazardous waste. Decontamination (wash down) facilities will be available on site for the full extent of works for any personnel who may come into direct contact with residual waste or potentially impacted soil. In addition, all plant and equipment utilised during the decommissioning process will be appropriately decontaminated upon completion of those works and prior to being used in any other works.

With regards to earthworks controls, the works will include the excavation of the tank pit and trench which will not be expected to create any sediment laden run off. As the trench will be left open until validation has been undertaken, silt fences (or other appropriate controls as required) will be installed as required to prevent any sediment laden run off which might occur.

Should inclement weather be expected once works have commenced, but prior to stabilisation, localised erosion and sediment controls will be installed around the extent of works on an as necessary basis. If rainwater infiltrates the pit and trench it will be left to naturally percolate / drain into the underlying soil.

It is expected that those controls will primary be super silt fences and sediment socks as detailed in Auckland Council Guidance Document GD05, however the site manager / consent holder will use their discretion as to the exact extent of required controls.

Similarly, should works be undertaken in dry conditions and be observed to create visual plumes of dust, dust will be controlled through light and frequent water spraying under the direction of the site manager.

13.4.1 Validation of Effluent Disposal System

Following the completion of removal works for the septic tank and effluent disposal system, the appointed Contaminated Land Advisor will visually inspect the full extent of all excavations to confirm that all disposal infrastructure has been removed from site. In conjunction with that visual assessment, 4 - 5 validation soil samples will be collected from the excavation of the tank pit and disposal field as per the indicative locations shown on Figure 2. Soil samples will be collected from the base of the excavated disposal field and from the base of the tank pit, which are considered to represent the worst case scenarios of soil quality in light of the discharges.

Validation soil samples will be submitted to an accredited laboratory for the analysis of a suite of eight heavy metals. Analytical results will be compared against the NES soil contaminant standards for residential landuse with 10% homegrown produce as a suitably conservative remediation goal.

In the event that any of the validation soil samples return that exceeds the Soil Contamination Standards for Residential Landuse (10% Produce), the CLA in discussion with the landowner will determine the extent of any further remedial excavations that may be required, and further validation soil sampling will follow until such a time as all validation samples comply with the

remedial goal. It is noted that the CLA will be required to assess the quantum of additional remedial works required to ensure that those volumes remain within the permitted activity criteria stipulated by the NES and AUP(OP). Should volumes be expected to exceed the permitted activity threshold, works shall cease while any necessary resource consents area sought.

13.5 DISTURBANCE OF PAH IMPACTED SOIL

While detectable concentrations of PAH are noted in the barn in the northern portion of the site, the volume of disturbance required to address the stained areas of soil will be minimal and limited to a surface scrape of the stained area. GSL notes that there is no reason why unstained soil may not remain on site for re-use as topcover or landscaping.

The following practices and procedures will be implemented on site to manage any soil disturbance activities within the piece of land in light of the identified contaminants of concern.

- Prior to earthworks commencing, the contractor will arrange contingency disposal measures for any soil or excavated material encountered during earthworks that is deemed unacceptable for the proposed development. General surface soil must be disposed of at a managed-fill facility that is licenced to accept soil of this nature;
- Erosion and sediment control devices in accordance with Auckland Council Guidance Document GD05 will be established prior to any soil disturbance activities commencing;
- An area on site will be prepared for the temporarily stockpiling of material of suspicious nature that might be encountered during the earthworks;
- Any temporary stockpiles will be managed (kept damp) to ensure that there is no excess dust generated from the stockpiles;
- Earthworks will be undertaken predominantly through the use of mechanical excavation and should off-site disposal be required, direct loadout into trucks and / or truck and trailer units. All vehicles transporting material from site will travel directly to the approved fill facility;
- If necessary, silt fencing will be placed around the temporary stockpiles to ensure that there is no excess sediment run-off from the stockpiles;
- The CLA will be available on call to inspect any suspicious or noxious material that might be encountered during the earthworks. If necessary, the CLA will take soil samples for analysis of any foreign material that is discovered and advise on the disposal of any such material;
- Upon completion of the excavation the site manager shall ensure that plant and equipment are cleaned and decontaminated appropriately; and
- A landfill manifest or weigh bridge dockets of all material disposed of at a managed fill or landfill facility will be kept.

13.5.1 DUST CONTROL

Dust controls are required to minimise pollutants becoming airborne and reduce stormwater sediment loads. If the proposed earthworks are undertaken in dry conditions, dust can be

controlled by light frequent water spraying. Water spraying should be frequent enough to suppress the generation of dust but not as heavy as to generate sediment laden water run-off.

The site manager will use his discretion with regard to dust suppression and will be ultimately responsible for ensuring the control of dust during earthworks on site

13.6 CONTINGENCIES

In the event that other contamination is encountered on the site during the works, the site manager, in consultation with the CLA, will either:

- Identify the material in situ if possible (staining, odour, visible fibres or refuse etc.); or
- Excavate the material to a suitable leak proof and covered skip-bin or truck and take representative samples for analysis, placing the material on hold for appropriate disposal; or
- Halt excavations in the immediate vicinity of the discovery while the material is sampled in-situ, and removal / disposal options explored once the analytical results are returned.

An appropriate log will be kept by the site manager of any unidentified contamination encountered during the excavations.

GSL has produced a contaminated soil discovery guideline (CSDG) document that outlines the signs, risks, and remedial actions required for contamination scenarios that may be encountered during remedial earthworks (Appendix F).

Suspicious material will be investigated by the CLA and laboratory analysed if deemed necessary. The CLA will advise on the disposal options of any uncertain materials. Disposal options can include:

- remove to an appropriate temporary stockpile area for further testing and analysis; or
- disposal at a cleanfill, managed fill or landfill facility.

The appointed contractor might have their own discovery procedures based upon their specific experiences in working with contaminated land of various natures (urban to rural). Contractor specific documents may be used alongside or in conjunction with this RAP.

If any staff, contractors, or consultants discover contamination, they should notify the site manager immediately, who should enact the provisions of the plan.

13.7 FIBROUS MATERIAL (ASBESTOS)

It is not anticipated that any asbestos materials will be encountered within soils on the site. That being said, given the age of the barn and structures on site and the visually identifiable building materials, the presence of ACM cannot be ruled out entirely.

Where friable asbestos containing materials (ACM) are identified in the soil matrix, all works shall cease (including the excavation and disposal of affected materials) until the provisions of the *Health and Safety at Work (Asbestos) Regulations 2016* are exercised.

ACM identification will primarily be through visual identification by a suitably competent person. Any fibrous material observed during the excavations will be visually inspected, photographed and representative samples submitted to an accredited laboratory for analysis. Following receipt of

results, the site manager in conjunction with the CLA shall determine what, if any, further remedial steps are required, including the provision of asbestos removal control plans, semi-quantitative analysis, or site management under the *BRANZ New Zealand Guidelines for Assessing and Managing Asbestos in Soil (November 2017)*.

13.8 REPORTING AND RECORD KEEPING

At completion of the earthworks, the site manager shall provide a report that shall include records of the:

- Volume and nature of any material removed from site and all managed-fill/landfill disposal dockets;
- A log of any unknown or suspicious materials encountered during the earthworks;
- Laboratory reports, if any;
- Any complaints or incidents; and
- Site photographs of all excavations and re-instatement works.

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14 REFERENCES

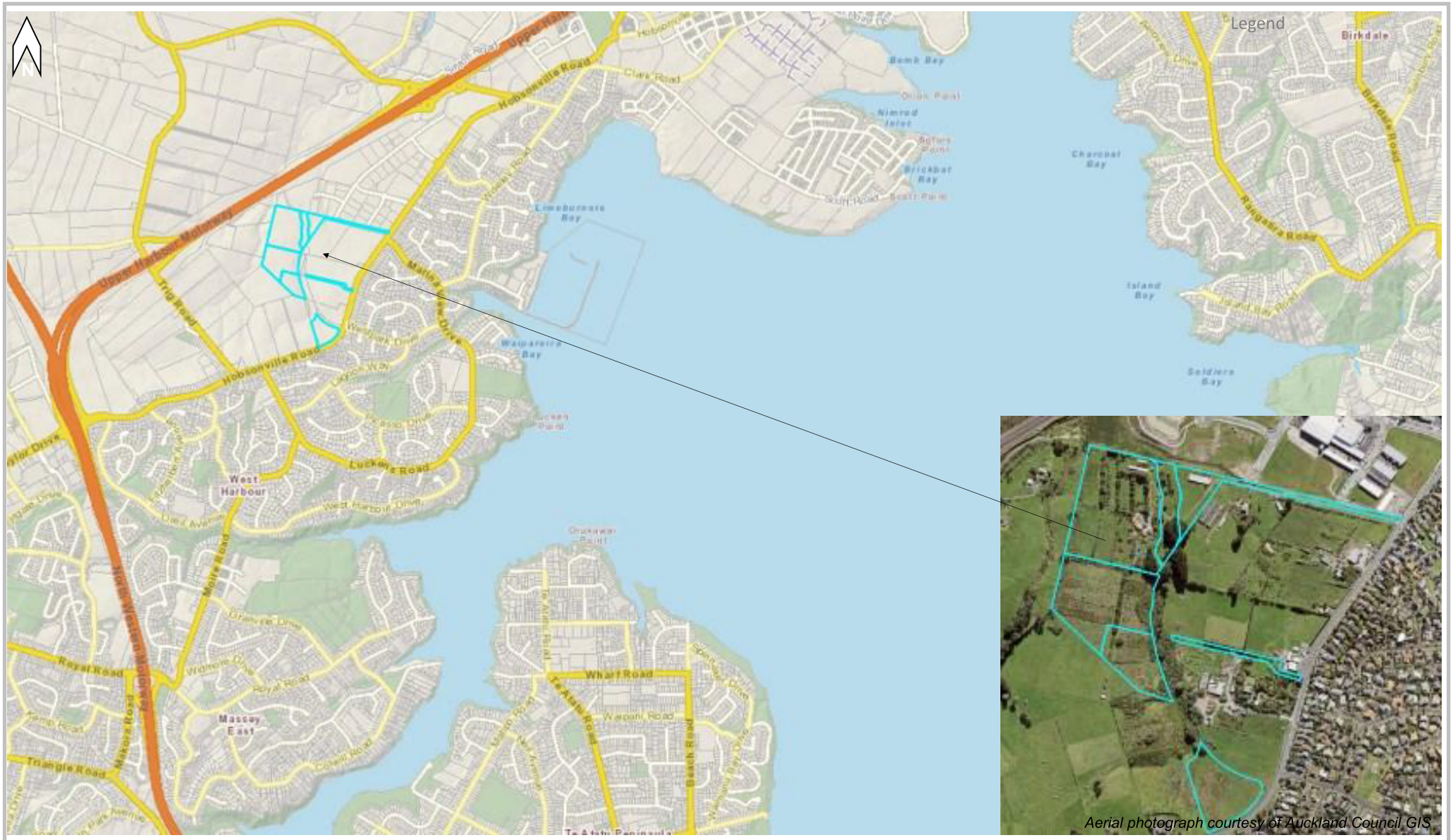
1. Ministry for the Environment (2003) — *Contaminated Land Management Guidelines No.1: Reporting on contaminated Sites in New Zealand*. Ministry for the Environment, Wellington, New Zealand.
2. Ministry for the Environment (2003) — *Contaminated Land Management Guidelines No.5: Site Investigation and Analysis of Soils*. Ministry for the Environment, Wellington, New Zealand.
3. Ministry for the Environment (2012) - Users Guide National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health. Ministry for the Environment, Wellington, New Zealand.
4. Auckland Council (2013) –*Auckland Unitary Plan (Operative in Part)*, Auckland, New Zealand.
5. Auckland Council (2011) - *Auckland Council GEOMAPS*. http://geomapspublic.aucklandcouncil.govt.nz/viewer/index.html
6. Retrolens Historical Image Resource - www.retolens.co.nz
7. Edbrooke, S.W (2001) — *Geology of the Auckland Urban Area* Institute of Geological and Nuclear Sciences Geological Map 3, Lower Hutt, New Zealand.
8. Ministry for the Environment (2011) – *Methodology for Deriving Standards for contaminants in Soil to Protect Human Health.* Ministry for the Environment, Wellington, New Zealand.
9. Gaw, S. K. (2002) - Pesticide Residues in Horticultural Soils in the Auckland Region, Auckland Regional Council Working Report No. 96. Auckland Regional Council, Auckland.
10. Auckland Regional Council (2001) – Background Concentrations of Inorganic Elements in Soils from the Auckland region (TP153) – Auckland.

15 LIMITATIONS

The conclusions and all information in this Report are given strictly in accordance with and subject to the following limitations and recommendations:

1. The assessment undertaken to form this conclusion is limited to the scope of work agreed between GSL and the client, or the client's agent as outlined in this Report. This report has been prepared for the sole benefit of the client and neither the whole nor any part of this report may be used or relied upon by any other party.
2. The investigations carried out for the purposes of the report have been undertaken, and the report has been prepared, in accordance with normal prudent practice and by reference to applicable environmental regulatory authority and industry standards, guidelines and assessment criteria in existence at the date of this report.
3. This report should be read in full and no excerpts are to be taken as representative of the findings. No responsibility is accepted by GSL for use of any part of this report in any other context.
4. This Report was prepared on the dates and times as referenced in the report and is based on the conditions encountered on the site and information reviewed during the time of preparation. GSL accepts no responsibility for any changes in site conditions or in the information reviewed that have occurred after this period of time.
5. Where this report indicates that information has been provided to GSL by third parties, GSL has made no independent verification of this information except as expressly stated in the report. GSL assumes no liability for any inaccuracies in or omissions to that information.
6. Given the limited Scope of Works, GSL has only assessed the potential for contamination resulting from past and current known uses of the site.
7. Environmental studies identify actual sub-surface conditions only at those points where samples are taken and when they are taken. Actual conditions between sampling locations may differ from those inferred. The actual interface between materials may be far more gradual or abrupt than an assessment indicates. Actual conditions in areas not sampled may differ from that predicted. Nothing can be done to prevent the unanticipated and GSL does not guarantee that contamination does not exist at the site.
8. Except as otherwise specifically stated in this report, GSL makes no warranty or representation as to the presence or otherwise of asbestos and/or asbestos containing materials ("ACM") on the site. If fill has been imported on to the site at any time, or if any buildings constructed prior to 1970 have been demolished on the site or materials from such buildings disposed of on the site, the site may contain asbestos or ACM .
9. Except as specifically stated in this report, no investigations have been undertaken into any off-site conditions, or whether any adjoining sites may have been impacted by contamination or other conditions originating from this site. The conclusion set out above is based solely on the information and findings contained in this report.
10. Except as specifically stated above, GSL makes no warranty, statement or representation of any kind concerning the suitability of the site for any purpose or the permissibility of any use, development or re-development of the site.
11. The investigation and remediation of contaminated sites is a field in which legislation and interpretation of legislation is changing rapidly. Our interpretation of the investigation findings should not be taken to be that of any other party. When approval from a statutory authority is required for a project, that approval should be directly sought by the client.
12. Use, development or re-development of the site for any purpose may require planning and other approvals and, in some cases, environmental regulatory authority and accredited site auditor approvals. GSL offers no opinion as to whether the current or proposed use has any or all approvals required, is operating in accordance with any approvals, the likelihood of obtaining any approvals, or the conditions and obligations which such approvals may impose, which may include the requirement for additional environmental works.
13. GSL makes no determination or recommendation regarding a decision to provide or not to provide financing with respect to the site. The on-going use of the site and/or planned use of the site for any different purpose may require the owner/user to manage and/or remediate site conditions, such as contamination and other conditions, including but not limited to conditions referred to in this report.
14. Except as required by law, no third party may use or rely on, this report unless otherwise agreed by GSL in writing. Where such agreement is provided, GSL will provide a letter of reliance to the agreed third party in the form required by GSL.
15. To the extent permitted by law, GSL expressly disclaims and excludes liability for any loss, damage, cost or expenses suffered by any third party relating to or resulting from the use of, or reliance on, any information contained in this Report. GSL does not admit that any action, liability, or claim may exist or be available to any third party.
16. Except as specifically stated in this section, GSL does not authorise the use of this report by any third party.

FIGURES



geosciences ltd ENVIRONMENTAL	Title:	Figure 1 - Site Locality	Reference: J1329 Date: 22/03/2019
Level 1, 47 Clyde Road, Browns Bay, 0630 Tel: (09) 475 0222	Project name:	86, 90 & 100 Hobsonville Road, Hobsonville	Drawn: DW Approved: COB

geosciences ltd
ENVIRONMENTAL
Level 1, 47 Clyde Road,
Browns Bay, 0630
Tel: (09) 475 0222

FIgure 2 - Site Infrastructure

86-100 Hobsonville Road, Hobsonville

Reference:	J1329
Date:	6/03/2019
Drawn:	DW
Approved:	COB

geosciences ltd
ENVIRONMENTAL
Level 1, 47 Clyde Road,
Browns Bay, 0630
Tel: (09) 475 0222

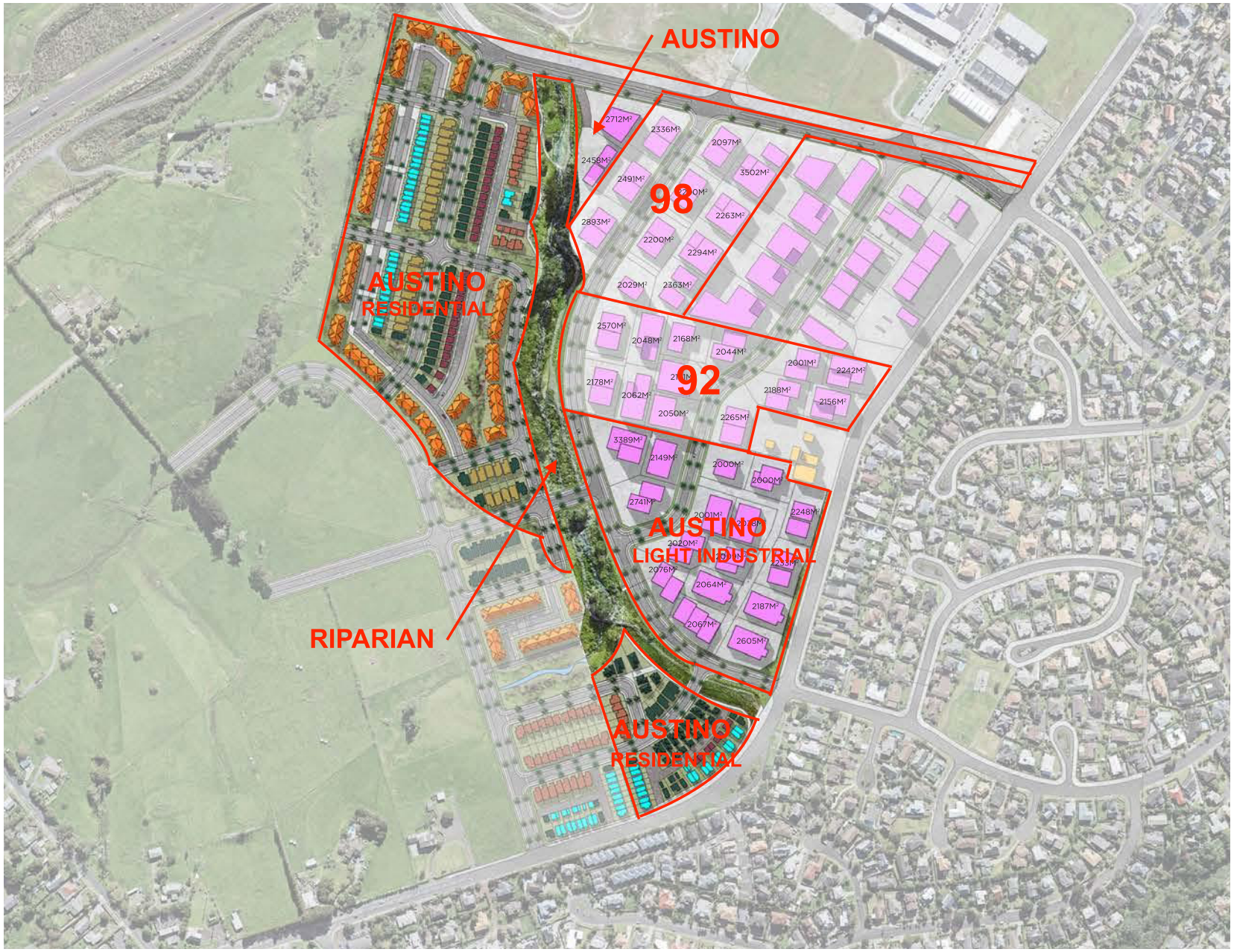
FIgure 3 - Soil Samples Locations

86-100 Hobsonville Road, Hobsonville

Reference:	J1329
Date:	6/03/2019
Drawn:	DW
Approved:	COB

APPENDIX A PROPOSED SCHEME PLAN

ILLUSTRATIVE SITE PLAN



KEY

- Zero Lot-line Detached Triple Storey Dwelling (4/5 bedrooms - approx. 210m2 GFA) ---------- 61
- Zero Lot-line Detached Triple Storey Dwelling (3/4 bedrooms - approx. 180m2 GFA with a ground level 1 bedroom - approx. 50m2 GFA minor unit) ---------- 62
- Terrace Triple Storey Dwelling (3 bedrooms - approx. 180m2 GFA with a ground level 1 bedroom - approx. 50m2 GFA minor unit) -- 36
- Duplex Double Storey Dwelling (2.5 bedrooms - approx. 100m2 GFA with a single car parking space within group parking) ---------- 54
- Minor Compact Dwelling (1 bedroom - approx. 50m2 GFA with a single car parking space) -------- 36
- Three Storey Walkup Apartment (2/2.5 bedrooms - 65/70m2 GFA with a single car parking within group parking) ---------- 231
- Light Industrial Site (minimum 2000m2 lot - 20m height limit) ---------- 18

Approximate Yield inside the Site (excluding 82, 92, 94, 96 & 98 Hobsonville Road)

Residential ---------- 480
Light Industrial ---------- 18

Note:

This conceptual layout is subject to more detailed technical investigations and other specialist inputs. Any proposal at this level requires appropriate discussion with Council to receive their feedback - which has not been obtained yet.

HARRISON GRIERSON

100 HOBSONVILLE ROAD

AUSTINO HOBSONVILLE 2 LIMITED

Project: 1021-144443-01
Date: 10 October 2018
Status: Draft
Scale: 1:4000 at A3
Revision: B

This document and design remain the property of Harrison Grierson Consultants Ltd. No liability shall be accepted for unauthorised use. This design is subject to further investigations into Planning, Survey and Engineering feasibility and may be derived from inaccurate source information.

File Path:U:\1021\144443_a\UD\Site Plans\144443_100 Hobsonville Road_revision_v2_5 Oct.indd

APPENDIX B CERTIFICATE OF TITLE

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD
Search Copy

R.W. Muir
Registrar-General
of Land

Identifier **728445**
Land Registration District **North Auckland**
Date Issued 10 February 2016

Prior References
NA119B/538

Estate	Fee Simple
Area	3.6151 hectares more or less
Legal Description	Section 1, 5 Survey Office Plan 490597

Registered Owners
Austino Hobsonville 2 Limited

Interests

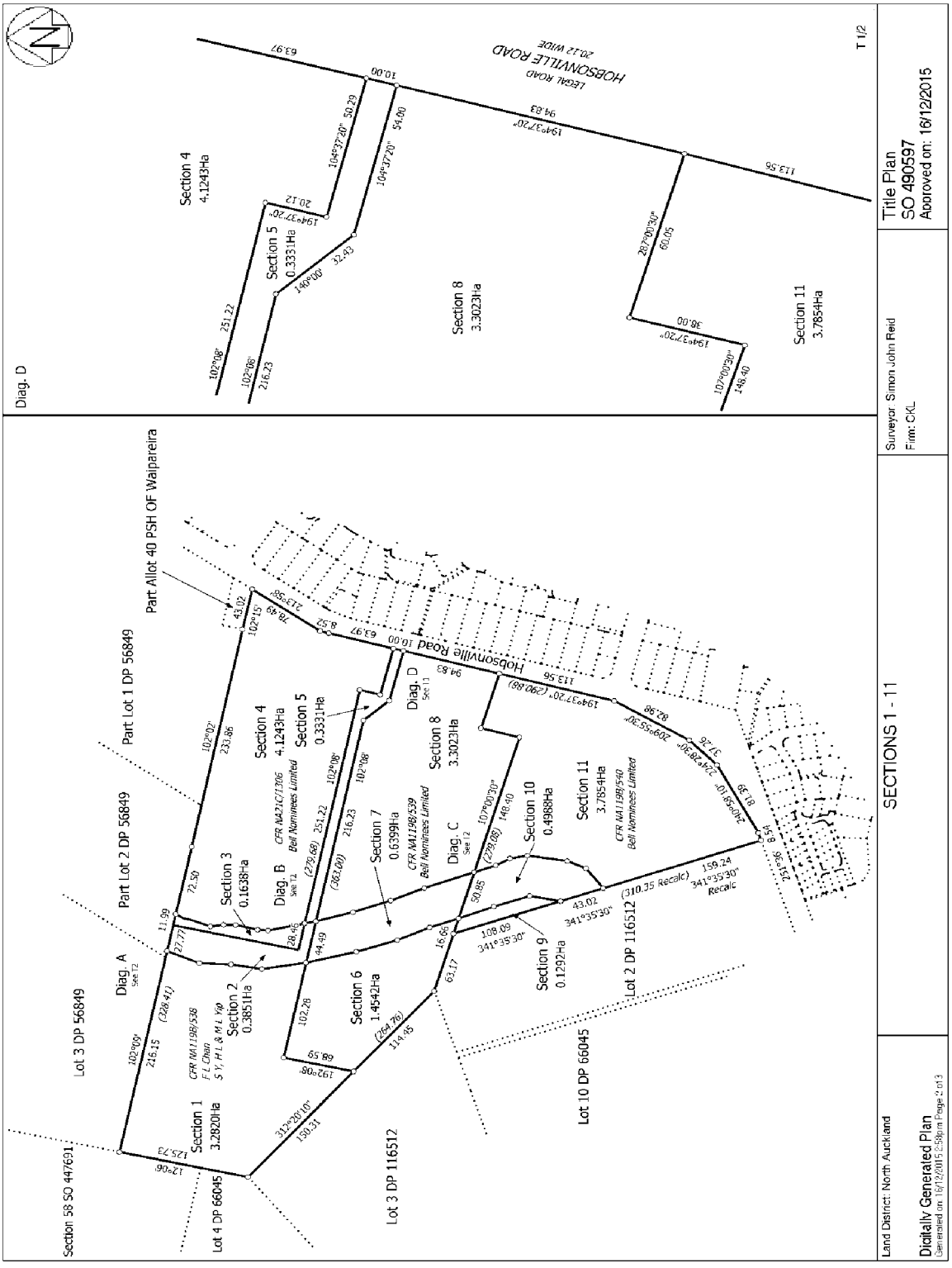
C428346.1 Notice pursuant to Section 94C Transit New Zealand Act 1989 declaring the adjoining State Highway No. 18 known as Hobsonville Road to be a limited access road - 5.11.1992 at 2.01 pm

8934563.4 Notice pursuant to Section 91 Government Roading Powers Act 1989 - 6.12.2011 at 7:00 am

Appurtenant hereto is a right of way created by Easement Instrument 11135543.1 - 23.8.2018 at 9:22 am

11363916.6 Mortgage to Bank of New Zealand - 1.3.2019 at 3:54 pm

Identifier **728445**



RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD
Historical Search Copy

R.W. Muir
Registrar-General
of Land

Constituted as a Record of Title pursuant to Sections 7 and 12 of the Land Transfer Act 2017 - 12 November 2018

Identifier **728445**
Land Registration District **North Auckland**
Date Issued 10 February 2016

Prior References
NA119B/538

Estate	Fee Simple
Area	3.6151 hectares more or less
Legal Description	Section 1, 5 Survey Office Plan 490597

Original Registered Owners
Bell Nominees Limited

Interests

C428346.1 Notice pursuant to Section 94C Transit New Zealand Act 1989 declaring the adjoining State Highway No. 18 known as Hobsonville Road to be a limited access road - 5.11.1992 at 2.01 pm

D388106.5 Mortgage to Bank of New Zealand - 13.5.1999 at 1.44 pm

8934563.4 Notice pursuant to Section 91 Government Roading Powers Act 1989 - 6.12.2011 at 7:00 am

10074417.1 Compensation Certificate pursuant to Section 19 Public Works Act 1981 by Auckland Council - 26.5.2015 at 9:42 am

10908145.1 Discharge of Compensation Certificate 10074417.1 - 26.9.2017 at 9:13 am

10942810.1 CAVEAT BY AUSTINO HOBSONVILLE 2 LIMITED - 27.10.2017 at 6:15 pm

Appurtenant hereto is a right of way created by Easement Instrument 11135543.1 - 23.8.2018 at 9:22 am

11363916.1 Withdrawal of Caveat 10942810.1 - 1.3.2019 at 3:54 pm

11363916.3 Discharge of Mortgage D388106.5 - 1.3.2019 at 3:54 pm

11363916.5 Transfer to Austino Hobsonville 2 Limited - 1.3.2019 at 3:54 pm

11363916.6 Mortgage to Bank of New Zealand - 1.3.2019 at 3:54 pm

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD
Search Copy

R.W. Muir
Registrar-General
of Land

Identifier **728447**
Land Registration District **North Auckland**
Date Issued 10 February 2016

Prior References
NA119B/539

Estate	Fee Simple
Area	4.7565 hectares more or less
Legal Description	Section 6, 8 Survey Office Plan 490597

Registered Owners
Austino Hobsonville 2 Limited

Interests

C428346.1 Notice pursuant to Section 94C Transit New Zealand Act 1989 declaring part State Highway No. 18 known as Hobsonville Road to be a limited access road - 5.11.1992 at 2.01 pm

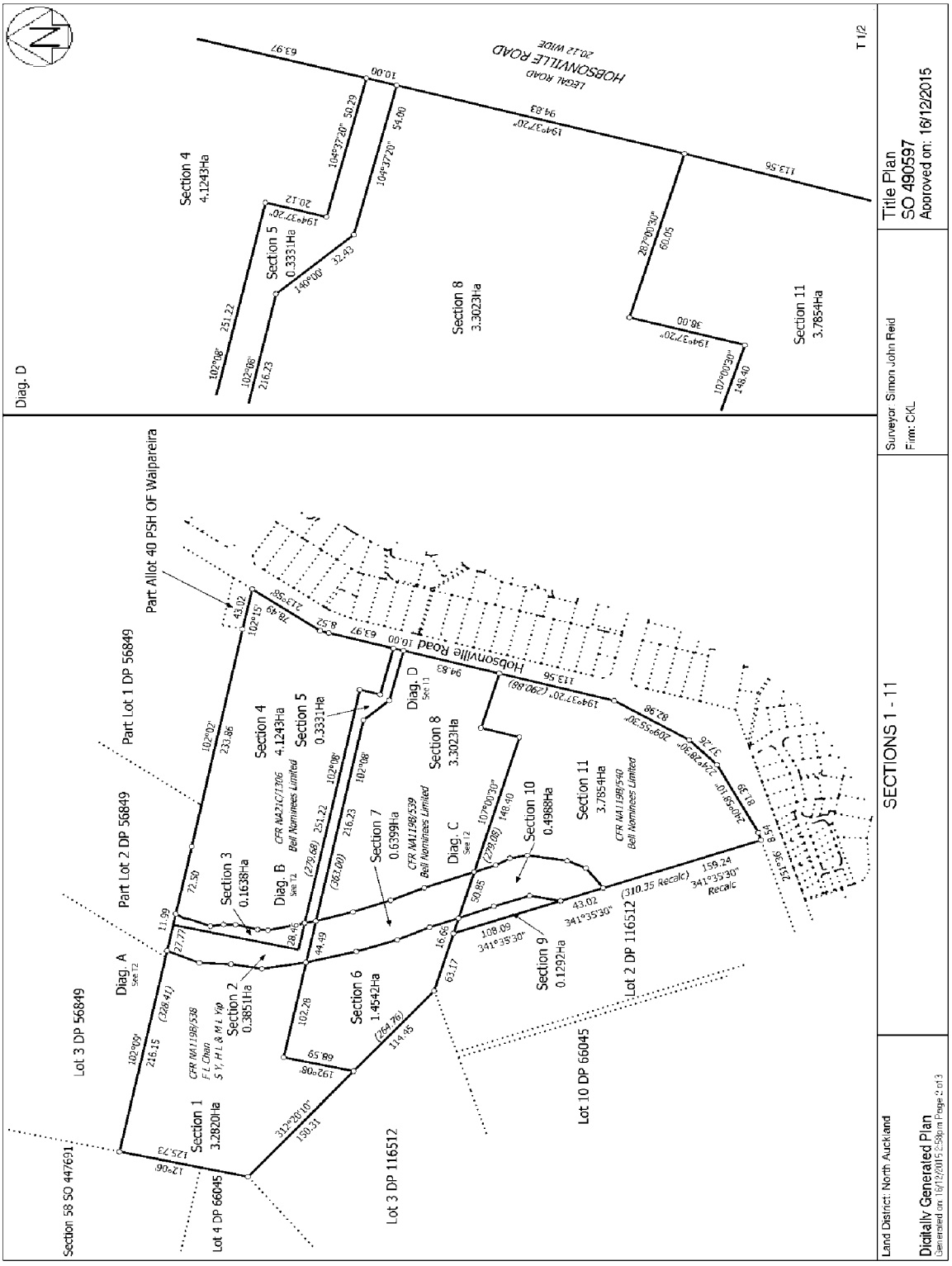
8934563.5 Notice pursuant to Section 91 Government Roading Powers Act 1989 - 6.12.2011 at 7:00 am

8934563.6 Notice pursuant to Section 91 Government Roading Powers Act 1989 - 6.12.2011 at 7:00 am

Appurtenant hereto is a right of way created by Easement Instrument 11143006.1 - 23.8.2018 at 9:22 am

11363916.6 Mortgage to Bank of New Zealand - 1.3.2019 at 3:54 pm

Identifier **728447**



RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD
Historical Search Copy

R.W. Muir
Registrar-General
of Land

Constituted as a Record of Title pursuant to Sections 7 and 12 of the Land Transfer Act 2017 - 12 November 2018

Identifier **728447**
Land Registration District **North Auckland**
Date Issued 10 February 2016

Prior References
NA119B/539

Estate	Fee Simple
Area	4.7565 hectares more or less
Legal Description	Section 6, 8 Survey Office Plan 490597

Original Registered Owners
Bell Nominees Limited

Interests

C428346.1 Notice pursuant to Section 94C Transit New Zealand Act 1989 declaring part State Highway No. 18 known as Hobsonville Road to be a limited access road - 5.11.1992 at 2.01 pm

D537290.3 Mortgage to Bank of New Zealand - 31.8.2000 at 3.48 pm

8934563.5 Notice pursuant to Section 91 Government Roading Powers Act 1989 - 6.12.2011 at 7:00 am

8934563.6 Notice pursuant to Section 91 Government Roading Powers Act 1989 - 6.12.2011 at 7:00 am

10074426.1 Compensation Certificate pursuant to Section 19 Public Works Act 1981 by Auckland Council - 26.5.2015 at 9:42 am

10908147.1 Discharge of Compensation Certificate 10074426.1 - 26.9.2017 at 9:15 am

10942810.1 CAVEAT BY AUSTINO HOBSONVILLE 2 LIMITED - 27.10.2017 at 6:15 pm

Appurtenant hereto is a right of way created by Easement Instrument 11143006.1 - 23.8.2018 at 9:22 am

11363916.1 Withdrawal of Caveat 10942810.1 - 1.3.2019 at 3:54 pm

11363916.4 Discharge of Mortgage D537290.3 - 1.3.2019 at 3:54 pm

11363916.5 Transfer to Austino Hobsonville 2 Limited - 1.3.2019 at 3:54 pm

11363916.6 Mortgage to Bank of New Zealand - 1.3.2019 at 3:54 pm

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD
Search Copy

R.W. Muir
Registrar-General
of Land

Identifier **798036**
Land Registration District **North Auckland**
Date Issued 11 July 2017

Prior References
728448

Estate	Fee Simple
Area	3.4000 hectares more or less
Legal Description	Section 1, 3 Survey Office Plan 509537

Registered Owners
Austino Hobsonville 2 Limited

Interests

C428346.1 Notice pursuant to Section 94C Transit New Zealand Act 1989 declaring part State Highway No. 18 known as Hobsonville Road to be a limited access road - 5.11.1992 at 2.01 pm

8934563.3 Notice pursuant to Section 91 Government Roading Powers Act 1989 - 6.12.2011 at 7:00 am

8934563.5 Notice pursuant to Section 91 Government Roading Powers Act 1989 - 6.12.2011 at 7:00 am

11363916.6 Mortgage to Bank of New Zealand - 1.3.2019 at 3:54 pm

Identifier **798036**

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD
Historical Search Copy

R.W. Muir
Registrar-General
of Land

Constituted as a Record of Title pursuant to Sections 7 and 12 of the Land Transfer Act 2017 - 12 November 2018

Identifier **798036**
Land Registration District **North Auckland**
Date Issued 11 July 2017

Prior References
728448

Estate	Fee Simple
Area	3.4000 hectares more or less
Legal Description	Section 1, 3 Survey Office Plan 509537

Original Registered Owners
Bell Nominees Limited

Interests

C428346.1 Notice pursuant to Section 94C Transit New Zealand Act 1989 declaring part State Highway No. 18 known as Hobsonville Road to be a limited access road - 5.11.1992 at 2.01 pm

D359875.9 Mortgage to Bank of New Zealand - produced 19.2.1999 at 11.08 am and entered 4.3.1999 at 2.58 pm

8934563.3 Notice pursuant to Section 91 Government Roading Powers Act 1989 - 6.12.2011 at 7:00 am

8934563.5 Notice pursuant to Section 91 Government Roading Powers Act 1989 - 6.12.2011 at 7:00 am

10074394.1 Compensation Certificate pursuant to Section 19 Public Works Act 1981 by Auckland Council - 26.5.2015 at 9:41 am

10655081.1 Compensation Certificate pursuant to Section 19 Public Works Act 1981 by Auckland Council - 12.12.2016 at 11:43 am

10892495.1 Departmental dealing correcting the plan image linked to the title - 31.8.2017 at 11:00 am

10908142.1 Discharge of Compensation Certificate 10074394.1 - 26.9.2017 at 9:12 am

10908143.1 Discharge of Compensation Certificate 10655081.1 - 26.9.2017 at 11:04 am

10942810.1 CAVEAT BY AUSTINO HOBSONVILLE 2 LIMITED - 27.10.2017 at 6:15 pm

11363916.1 Withdrawal of Caveat 10942810.1 - 1.3.2019 at 3:54 pm

11363916.2 Discharge of Mortgage D359875.9 - 1.3.2019 at 3:54 pm

11363916.5 Transfer to Austino Hobsonville 2 Limited - 1.3.2019 at 3:54 pm

11363916.6 Mortgage to Bank of New Zealand - 1.3.2019 at 3:54 pm

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD
Search Copy

R.W. Muir
Registrar-General
of Land

Identifier	**817760**
Land Registration District	**North Auckland**
Date Issued	04 December 2017

Prior References
NA12C/778

Estate	Fee Simple
Area	5.8896 hectares more or less
Legal Description	Section 1, 3 Survey Office Plan 511858

Registered Owners
Austino Hobsonville 1 Limited

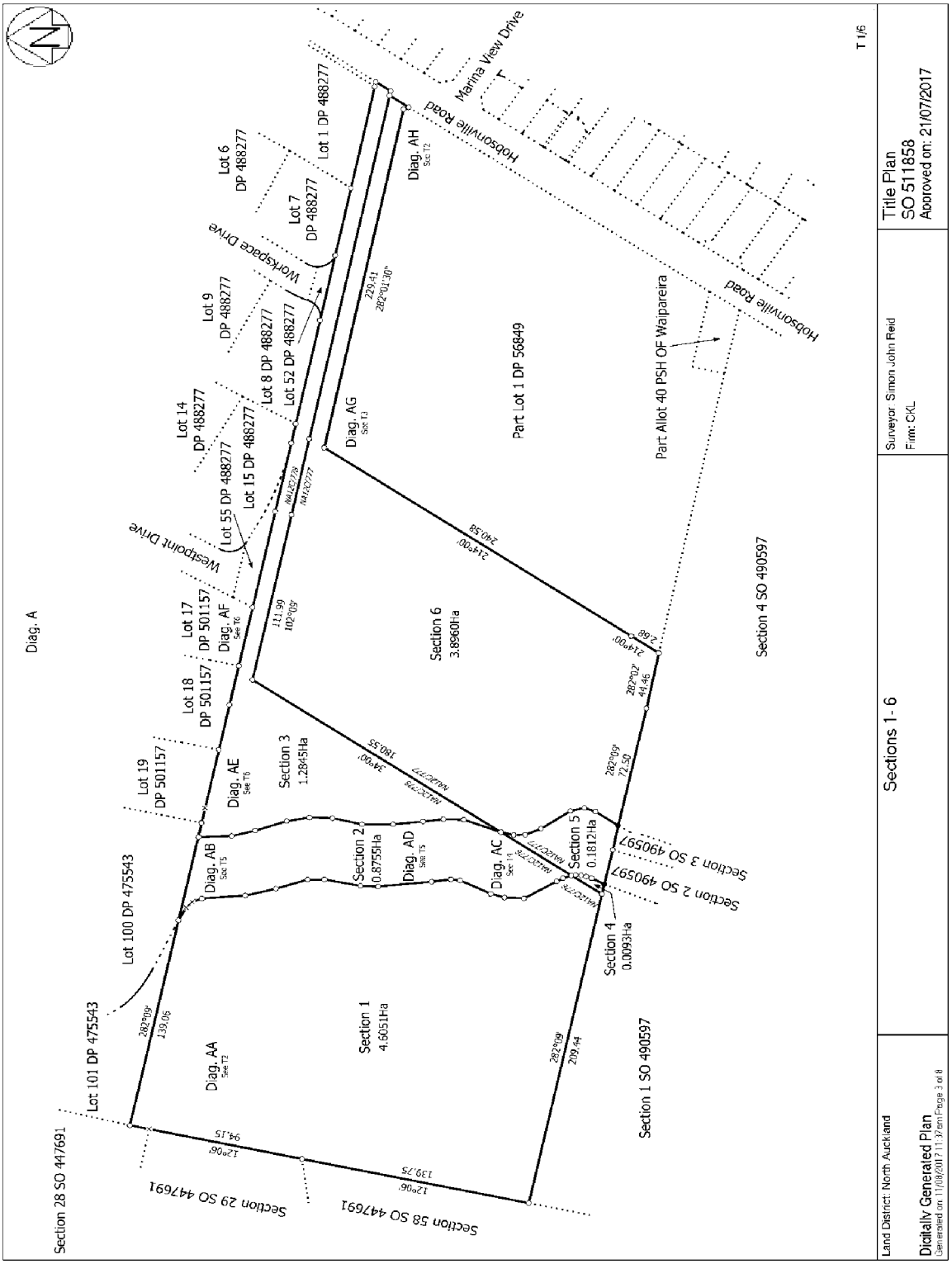
Interests

C428346.1 Certificate pursuant to Section 94(c) of the Transit New Zealand Act 1989 declaring that part of State Highway No.18 known as Hobsonville Road commencing at its junction with State Highway 16 and proceeding in an eastern direction to Upper Harbour Drive to be a Limited Access Road - 5.11.1992 at 2.01 pm

D149983.1 Compensation Certificate by the Minister of Lands - 29.5.1997 at 1.36 pm

Appurtenant hereto is a right of way (existing use and infrastructure construction works access) created by Easement Instrument 11173446.1 - 16.8.2018 at 10:38 am

11363916.7 Mortgage to Bank of New Zealand - 1.3.2019 at 3:54 pm


Marina View Drive
Hobsonville Road
Hobsonville Road
Workspace Drive
Westpoint Drive
Lot 1 DP 488277
Lot 6 DP 488277
Lot 7 DP 488277
Lot 9 DP 488277
Lot 14 DP 488277
Lot 8 DP 488277
Lot 52 DP 488277
Lot 15 DP 488277
Lot 55 DP 488277
Lot 17 DP 501157
Lot 18 DP 501157
Lot 19 DP 501157
Lot 100 DP 475543
Lot 101 DP 475543
Diag. A
Diag. AH
Diag. AG
Diag. AF
Diag. AE
Diag. AB
Diag. AD
Diag. AC
Diag. AA
Part Lot 1 DP 56849
Part Allot 40 PSH OF Waipareira
Section 1 4.6051Ha
Section 2 0.8755Ha
Section 3 1.2845Ha
Section 4 0.0093Ha
Section 5 0.1812Ha
Section 6 3.8960Ha
Section 1 SO 490597
Section 2 SO 490597
Section 3 SO 490597
Section 4 SO 490597
Section 28 SO 447691
Section 29 SO 447691
Section 58 SO 447691
Sections 1 - 6
Title Plan
SO 511858
Approved on: 21/07/2017
Surveyor: Simon John Reid
Firm: CKL
Land District: North Auckland
Digitally Generated Plan
T 1/6

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD
Historical Search Copy

R.W. Muir
Registrar-General
of Land

Constituted as a Record of Title pursuant to Sections 7 and 12 of the Land Transfer Act 2017 - 12 November 2018

Identifier **817760**
Land Registration District **North Auckland**
Date Issued 04 December 2017

Prior References
NA12C/778

Estate	Fee Simple
Area	5.8896 hectares more or less
Legal Description	Section 1, 3 Survey Office Plan 511858

Original Registered Owners
Austino Hobsonville 1 Limited

Interests

C428346.1 Certificate pursuant to Section 94(c) of the Transit New Zealand Act 1989 declaring that part of State Highway No.18 known as Hobsonville Road commencing at its junction with State Highway 16 and proceeding in an eastern direction to Upper Harbour Drive to be a Limited Access Road - 5.11.1992 at 2.01 pm

D149983.1 Compensation Certificate by the Minister of Lands - 29.5.1997 at 1.36 pm

10556165.1 Notice pursuant to Section 18 Public Works Act 1981 - 7.9.2016 at 3:41 pm

10895233.1 Notice pursuant to Section 23 Public Works Act 1981 - 5.9.2017 at 7:00 am

10420335.1 Compensation Certificate pursuant to Section 19 Public Works Act 1981 by Auckland Council - 17.10.2017 at 9:47 am

11078659.1 Withdrawal of Notice 10556165.1 pursuant to Section 18 Public Works Act 1981 - 6.4.2018 at 1:47 pm

11078659.2 Discharge of Compensation Certificate 10420335.1 - 6.4.2018 at 1:47 pm

11078659.3 Withdrawal of Notice 10895233.1 pursuant to Section 23 Public Works Act 1981 - 6.4.2018 at 1:47 pm

Appurtenant hereto is a right of way (existing use and infrastructure construction works access) created by Easement Instrument 11173446.1 - 16.8.2018 at 10:38 am

11363916.7 Mortgage to Bank of New Zealand - 1.3.2019 at 3:54 pm

APPENDIX C HISTORICAL AERIAL PHOTOGRAPHS

Title:	**Historic Aerial Photographs**	**Reference:**	J1329
Project name:	86-90 & 100 Hobsonville Road, Hobsonville	**Date:**	19/03/2019
		Drawn:	DW
geosciences ltd ENVIRONMENTAL	Level 1, 47 Clyde Road, Browns Bay, 0630, Tel: (09) 475 0222	**Approved:**	COB

Title:	**Historic Aerial Photographs**	**Reference:**	J1329
Project name:	86-90 & 100 Hobsonville Road, Hobsonville	**Date:**	19/03/2019
		Drawn:	DW
geosciences ltd ENVIRONMENTAL	Level 1, 47 Clyde Road, Browns Bay, 0630, Tel: (09) 475 0222	**Approved:**	COB

Title:	**Historic Aerial Photographs**	**Reference:**	J1329
Project name:	86-90 & 100 Hobsonville Road, Hobsonville	**Date:**	19/03/2019
		Drawn:	DW
geosciences ltd ENVIRONMENTAL	Level 1, 47 Clyde Road, Browns Bay, 0630, Tel: (09) 475 0222	**Approved:**	COB

Title:	**Historic Aerial Photographs**	**Reference:**	J1329
Project name:	86-90 & 100 Hobsonville Road, Hobsonville	**Date:**	19/03/2019
		Drawn:	DW
geosciences ltd ENVIRONMENTAL	Level 1, 47 Clyde Road, Browns Bay, 0630, Tel: (09) 475 0222	**Approved:**	COB

APPENDIX D PROPERTY FILE EXTRACTS

FJD:MM

22 February 1978

Mr.G.B.Murray,
100 Hobsonville Road,
HOBSONVILLE.

Dear Sir,

RE: BUILDING PERMIT 5298 - Poultry Shed on Lot 3 DP 56849, 100 Hobsonville Rd.

In connection with the above building permit, your attention is drawn to the writer's letter of 14 December 1977 in which you were advised that the Building Inspector for the area Mr.Forster was unable to carry out a final inspection of the work as he was unable to gain access to the property.

It is also understood that you rang Mr.Forster before Christmas and at that time indicated that you would ring Mr.Forster again when he returned from leave.

As yet no communication has been received, and your attention to this matter would be appreciated.

Yours faithfully,

F.J.DUCKWORTH
for CITY INSPECTOR

FJD:YBM

14 December 1977

Mr.C.B. Murray,
100 Hobsonville Road,
HOBSONVILLE.

Dear Sir,

RE: BUILDING PERMIT 5298 - Poultry Shed on Lot 3 DP 56849, 100 Hobsonville Road.

In connection with the above building permit, you are advised that the Building Inspector for the area Mr.Forster advises that he is unable to carry out a final inspection of the work related to the above building permit as he was unable to gain access to the property.

In view of the above, it would be appreciated if you would contact Mr.Forster at the Te Atatu District Office, 247 Edmonton Road, Te Atatu South, telephone NEW 61-113 to 61-119 between the hours of 8.30 and 9.45a.m. on any week day in order to arrange a suitable time for a final inspection to be carried out.

Yours faithfully,

F.J.DUCKWORTH
for CITY INSPECTOR

Alan
Situation Please
16/1/78

Mr Murray rang before Christmas & was to have rung me back when I came back from leave no communication received to date.

DH 20/2/78

WAITEMATA CITY COUNCIL

Date 13 December 1977

MEMORANDUM *for:-*

Mr Duckworth

Nº 33116

Subject: BP 5298 - G B & E Mr. Murray - 100 Hobsonville Rd Hobsonville.

Would you write to Mr Murray (Box 28034, Remuera) & advise him that a final inspection has not been made in relation to attached file. In order to make such an inspection it will be necessary to gain access. Would you request that he contact me & arrange such an inspection.

A. J. Foster.

NOTE — These memos are for staff and inter-office use only and must not be used for general correspondence.

C&D 62160

FJD:YMM

14 December 1977

Mr.G.B. Murray,
100 Hobsonville Road,
HOBSONVILLE.

Dear Sir,

RE: BUILDING PERMIT 5298 - Poultry Shed on Lot 3 DP 56849, 100 Hobsonville Road.

In connection with the above building permit, you are advised that the Building Inspector for the area Mr.Forster advises that he is unable to carry out a final inspection of the work related to the above building permit as he was unable to gain access to the property.

In view of the above, it would be appreciated if you would contact Mr.Forster at the Te Atatu District Office, 247 Edmonton Road, Te Atatu South, telephone HSN 61-113 to 61-119 between the hours of 8.30 and 9.45a.m. on any week day in order to arrange a suitable time for a final inspection to be carried out.

Yours faithfully,

F.J.DUCKWORTH
for CITY INSPECTOR

F 17590

19

CITY OF WAITEMATA

Roll No. / /

3270/008Pt

BUILDING PERMIT

Nº 5298

Owner of Section G.B. & E.H. Murray

Address Box 28034, Remuera

Date 15.9.76

THIS PERMIT is granted to the undermentioned person authorising the following building work on Lot No. 3 DP 66640

on 100 Hobsonville Road, Hobsonville in accordance with the plans lodged and subject to the following conditions: To notations on plans.
Drainlayer to confer with Drainage Inspector before commencing work.

Nature of proposed work
Poultry shed

Plumbing: $300
Drainage: $100
Value of work, $ 12,856

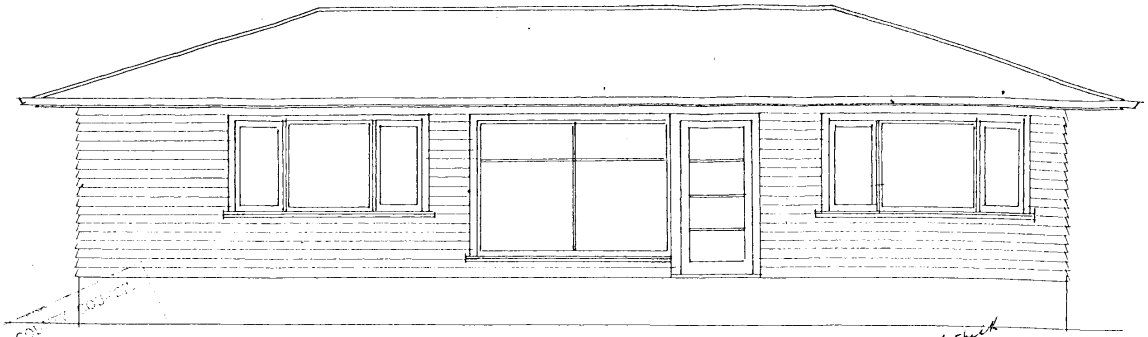
Fee $ 60 00 Rec. No 2672 2 - 23.8.76
Structural Fee $15.00 25725 - 23.8.76

G.D. Murray

Bldr: H.H. Simcons
Holrose Road,
HILLSBOROUGH

For the Waitemata City Council

Duly Authorised Officer.

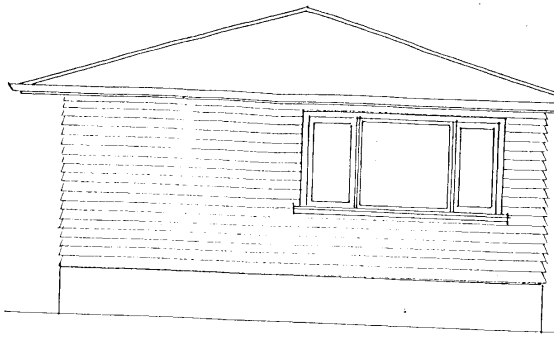


FRONT ELEVATION

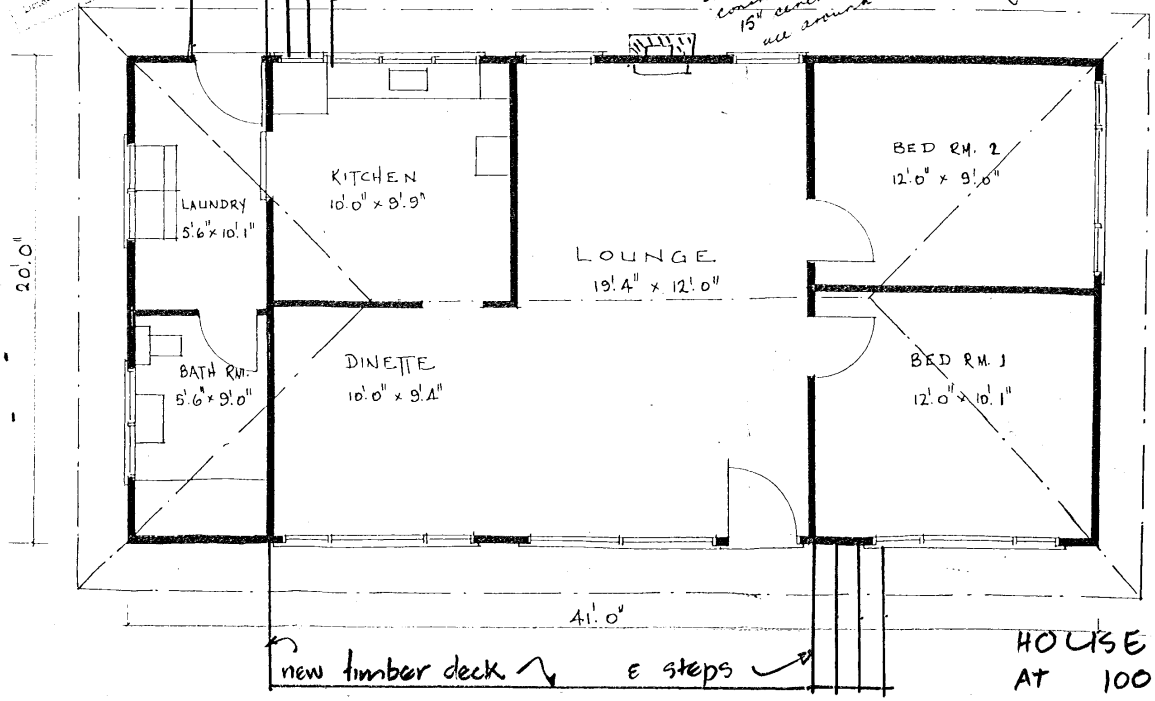
new porch & steps

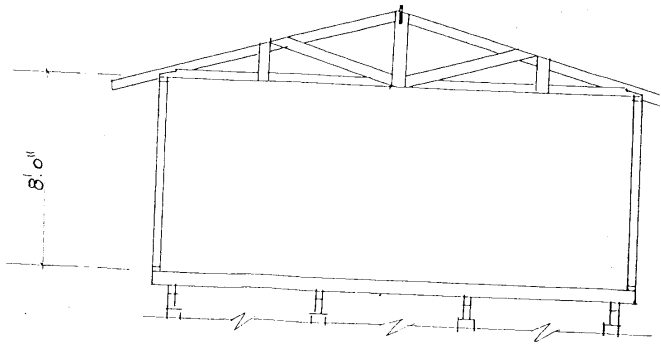
Pre fab. chimney to be installed. Foundation to be 6" thick concrete reinforced with steel rods at 15" centres. Foundation to be 6" wider all around than chimney base.

O.B. Nilsen



END ELEVATION





CROSS SECTION

HOUSE TO BE RE-LOCATED AT 100 HOBSONVILLE RD FOR G.B.MURRAY.

F 17.5.90

16

CITY OF WAITEMATA

Roll No: / /
32700/608/2

BUILDING PERMIT

Nº 17441

Owner of Section L.V. AND V.M. GAVIN, Date 6th July 1981

Address 4 Holgate Ave, HERLAD ISLAND.

THIS PERMIT is granted to the undermentioned person authorising the following building work on Lot No. 3 D.P. 56849 on 100 Hobsonville Rd, HOBSONVILLE. in accordance with the plans lodged and subject to the following conditions:

Nature of proposed work BARN

L. V. GAVIN,

Value of work, $9,000

Fee $ 60 : 0 : 0 Rec. No. E054 15/6/1981

For the Waitemata City Council

Duly Authorised Officer.

Unity Press 57580/81

INSPECTORS' DEPARTMENT

REPORT ON BUILDING REQUIRING SPECIAL CONSIDERATION, INCLUDING COMMERCIAL AND INDUSTRIAL PREMISES, CHURCHES, HALLS ETC.

REFERENCE: B.P.A. No 689/5

OWNER: L.U.9.U.M. GAUIN

BUILDER: SAME

APPLICANT: SAME

LOCATION OF JOB: 100 HODGSONVILLE RD HODGSONVILLE

TYPE OF BUILDING: HAY BARN

BUILDING INSPECTORS' REPORT

CHAPTER 5 CHECK

(1) DESIGN & CONSTRUCTION REQUIREMENTS

5.6/5.7 Classification of Occupancies and Mixed Occupancies - state classification:- D1

5.8 Fire Risk Area (State):- outer B

5.9 Limitations of areas & storeys:-

	Area of Storey			No Storeys	Type of Constr.
	1	2	3		
Permitted	800m²			1	5
Actual	315m²			1	5

5.10 Exceptions to limits under 5.9:-

Reduction of Upper Floors:-

Area allowed for remote outlets:-

Area allowed for sprinkler installation:- BA

Total area permitted per floor:- (1) (2) (3)

Total area permitted for mezzanine:-

5.11 F.R.R.:- (Check and note amendments necessary - if none initial space)

DA

5.12/5.13 External Walls & Separation Distances, Protection of Openings

(a) Omission of External Walls:- (Quote clause and relevant reason for accepting omission). Note amendments required - if none initial space.

DA

(1) Cont'd

5.12/5.13 Cont'd

Separation Distances:- (State Elevation References & Relevant Separation Distances):-

F.R.R. & % Of Openings

	Components	Permitted	Actual
Elevation 1 over 0.9	Walls Panels % Openings	N/A	OK
Elevation 2 over 0.9	Walls Panels % Openings	N/A	OK
Elevation 3 over 0.9	Walls Panels % Openings	N/A	OK
Elevation 4 over 0.9	Walls Panels % Openings	N/A	OK
Elevation	Walls Panels % Openings		

5.14 Protection of Portal Frames:- (Check for height and location of portal frames and note that both legs must be considered. State amendments required - if none initial space):-

5.15 and 3.7 Parapets (ALSO CHECK FOR COMPLIANCE WITH 3.7 .....) State Amendments necessary - if none initial space:-

5.16 Floors (Applicable to types 1,2,3 Const.)

Required Rating (1st) (2nd) (3rd)

Actual Rating (1st) (2nd) (3rd)

Exceptions:-

State amendments required - if none initial space:-

.....Cont'd .....

BUILDING INSPECTOR

(1) Cont'd

5.17 Internal Structural Members:- (Check Against Table 3 and note any amendments required)

5.18/5.19/5.20 Structural Members Supported by Fire Walls & Openings in Fire Walls:- (Check and note amendments required - if none initial space):-

5.21 Separation of Dwelling Units & Other Occupancies Within a Fire Compartment:- (Check and note any amendments required - if none initial space):-

5.22/5.23/5.24 Fire Partitions, Fire Stopping, Restrictions on Roof Space:- (Check and note any amendments required - if none initial space):-

5.25/5.26 Flame Spread. Roof Coverings (Check and note any amendments required - if none initial space):-

(2) MEANS OF EGRESS (5.27)

Check each of the following clauses and note any amendments required. If none are required, initial space.

5.28 Types of Exitways:-

5.29 Arrangement of Exitways:-

5.30 Number of Exitways:-

5.31) 5.32) Capacity of Exitways:-

5.33 Combined Exitways:-

5.34 Separation of Occupancies for purposes of Exitways:-

5.35) 5.36) Mezzanines & Basements:-

5.37 Cul de sacs:-

N/A AGRICULTURAL BUILDING

....

.....Cont'd .....

(2) Cont'd

5.38/5.39/5.40 Doors, Smoke Stop Doors, Windows :-

5.41/5.42/5.43/5.44/5.45/5.46 Hallways, Stairs etc:-

5.47 Obstruction in exitways:-

5.48/5.49 Signs and Lighting:-

5.50/5.51/5.52/5.53/5.54 Special Requirements for Accomodation, Dwellings, Hospitals, Shops (10,000 sq.ft.) Fire Alarms, Emergency Lighting:-

N/A AGRICULTURAL BUILDING

(3) SPECIAL REQUIREMENTS FOR PLACES OF ASSEMBLY

If relevant check requirements and note any amendments necessary. If none, then initial space following each item:-

5.57/5.58/5.59 Compliance and Construction Requirements:-

5.60/5.61/5.62/5.63/5.64 Street width, Exitways, Doors:-

5.65/5.66 Seating Arrangements & Aisles:- N/A

5.67/5.68 Ceiling, Walls & Floors :-

5.69/5.70/5.71 Boilers & Ducts :-

5.72/5.73 Lighting

(4) SPECIAL REQUIREMENTS FOR THEATRES AND CINEMAS:

If relevant check requirements and note any amendments necessary, If none, then initial space following each item:-

THEATRES ONLY:- 5.75 to 5.85 inclusive. Special Exits, Proscenium Walls, Safety Curtains, Vents over Stage, Stages & Stage Floors, 'Workshop', Dressing Rooms:-

N/A

..... Cont'd .....

(4) Cont'd

THEATRES & CINEMAS:- 5.85 Protection of concealed spaces:-

CINEMAS ONLY:- 5.86 Projection Rooms:- N/A

6

GENERAL COMPLIANCE WITH OTHER BYLAWS

General Construction and check for compliance with all other relevant building bylaws or allied statutory controls:- (State amendments required - if none initial space):-

D.G. INSP.:- Not Applicable

SUMMARY OF ALL AMENDMENTS REQUIRED BY BUILDING INSPECTORS: -

.....Cont'd .....

PG ALL OTHER DEPARTMENTAL CHECKS OR REQUIREMENTS, A BUILDING PERMIT MAY BE ISSUED SUBJECT TO THE FOLLOWING CONDITIONS :-

Signed: ..A. Frost.....
BUILDING INSPECTOR.

Date: ...26/6/81.....

DRAINAGE AND PLUMBING INSPECTORS' REPORT

(1) DESCRIPTION OF DRAINAGE SYSTEM (i.e. Connection to sewer or other type of system - State type):-

(2) (a) DRAINAGE SET OUT CHECKED: (Initial)
(b) PLUMBING SET OUT CHECKED: (Initial)
(c) TRADE WASTES CHECKED: (Initial)
} N/A

(3) THE FOLLOWING AMENDMENTS OR ALTERATIONS OR ADDITIONAL INFORMATION MUST BE MADE (OR SUPPLIED) BEFORE APPROVAL IS POSSIBLE: - (List clearly, sign and date requirements)

SENIOR INSPECTOR

RECOMMENDATION

(a) The matters listed above have been settled to my satisfaction, and I recommend that the application be APPROVED subject to the following conditions:-

Signed: ..... PLUMBING & DRAINAGE INSPECTOR

Date: 22/6/81

HEALTH INSPECTOR'S REPORT

(1) CONVENIENCES & ABLUTION FACILITIES: (Check and note amendments necessary - If none initial space):-

(2) LIGHT AND VENTILATION TO ALL PARTS OF PREMISES: (Check and note amendments necessary - If none initial Space):-

N/A

(3) FOOD PREMISES ONLY: (Check for compliance with relevant health regulations or other licensing requirements. Note amendments required - if none initial space):-

N/A

(4) THE FOLLOWING AMENDMENTS OR ALTERATIONS OR ADDITIONAL INSTALLATION MUST BE MADE (OR SUPPLIED) BEFORE APPROVAL IS GRANTED:-

(List clearly, sign and date requirements).

HEALTH INSPECTORS' REPORT CONTINUED:

RECOMMENDATION

The matters listed above have been settled to my satisfaction, and I recommend that the application be APPROVED subject to the following conditions:-

Signed ..... HEALTH INSPECTOR

Date ..... 19.6.81.....

SENIOR DISTRICT INSPECTORS' REPORT

I have checked the above reports and recommendations of the Building, Health and Plumbing & Drainage Inspectors, and recommend:-

That the application be APPROVED subject to the conditions set out in the above mentioned reports and the following additional conditions:-

Signed .....
SENIOR INSPECTOR

DATE .....

[illegible]

[illegible] APPLICATION NO. 689/5

APPLICANT'S NAME: L.V. & D.M. GAVIN

BUILDER'S NAME: SAME

PROPOSAL: HAY BARN

LEGAL DESCRIPTION: LOT: 3 D.P. 56849

ROAD NAME & LOCALITY: 100 HOBSONVILLE RD HOBSONVILLE

ITEMS TO BE CHECKED BY STRUCTURAL ENGINEER:-
(To be listed clearly by Building Inspector)

complete check

CALCULATIONS & STRUCTURAL CHECK

1. THE FOLLOWING AMENDMENTS, ALTERATIONS OR ADDITIONAL INFORMATION MUST BE MADE (OR SUPPLIED), BEFORE APPROVAL CAN BE CONSIDERED: (Please list clearly, and date and sign requirements):-

RECOMMENDATION:

The matters listed in (1) above (when applicable), have been settled to my satisfaction and I recommend that the application be APPROVED subject to the following conditions:-

Barn structure to comply with Paton standard Arch Series I Farm Building Design & Specification

STRUCTURALLY APPROVED
SUBJECT TO ENDORSEMENTS
DATE 1/7/87 B

Dealt with by _____ Date _____
(STRUCTURAL ENGINEER)

REPORT ON COMMERCIAL OR INDUSTRIAL BUILDINGS

ENGINEERS REPORT

Application No. 689/5

APPLICANT'S NAME: L.V. & V.M. GAVIN

BUILDER'S NAME: SAME

PROPOSAL: HAY BARN

ROAD NAME: 100 HOBSONVILLE RD HOBSONVILLE RIDING LINCOLN

LEGAL DESCRIPTION: LOT 3 DP 56949

DISTRICT ENGINEER'S REPORT

(See Page 2 for Services Engineers Report)

1 ROADING REQUIREMENTS

N/A.

2 FOOTPATH

N/A.

3 CROSSING

Existing crossing.

4 PARKING AREA ON DEDICATED ROAD

N/A.

5 FLOOR LEVELS

N/A.

6 STORMWATER

Plumbing & Drainage Inspectors satisfaction and approval.

7 ADDITIONAL INFORMATION OR AMENDMENTS REQUIRED BEFORE APPROVAL CAN BE CONSIDERED - (Sign and date requirements)

* RECOMMENDATION

(a) The matters listed in 7 above (where applicable) have been settled to my satisfaction and I recommend that the application be APPROVED subject to the following conditions:

(b) I recommend that the application be NOT APPROVED for the following reasons:

* Delete not applicable.

Dealt with by R. Jemp. of Engineers Dept on 1-7-81

To Engineer _____ on _____

SERVICE ENGINEER'S REPORT

to be returned by_____

1 WATER SUPPLY available

2 SEWERAGE

3 TRADE WASTES

4 ALTERNATIVE DRAINAGE

5 ADDITIONAL INFORMATION OR AMENDMENTS REQUIRED BEFORE APPROVAL CAN BE CONSIDERED - (Sign and date requirements)

RECOMMENDATION:

+ (a) The matters listed in 5 above (where applicable) have been settled to my satisfaction and I recommend that the application be APPROVED subject to the following conditions:

+ (b) I recommend that the application be NOT APPROVED for the following reasons:

+ Delete not applicable

Dealt with by _____of Engineers Dept on _____

To Engineer _____Returned on _____

-oOo-

SPECIFICATIONS

RURAL ARCH

PARAMOUNT ARCHED BUILDINGS

Manufactured by:
Kelvin G. Paton Ltd

Phone 37
HELENSVILLE

P.O. Box 46
HELENSVILLE

TIMBER
Purlins and girts to be B or No 2 framing grade. All timber 125 x 50 mm or larger to be A or No 1 framing grade.

SHEATHING
26 gauge galvanised iron on purlins spaced at maximum 1200mmc/c or 24 gauge galvanised iron on purlins spaced at maximum 1350mm c/c.

STEEL
All steelwork to N.Z.S.S. 1900 chapter 9.4. All steelwork to be suitably protected from corrosion and this protection shall consist of one coat of steel primer.

CONCRETE
Concrete for foundations shall be mixed in no less proportions than one cement to six of all in agregate (1:6) by volume and have a minimum crushing strength of 10 m.p.a. at 28 days.

BRACING
Cross brace each end bay as indicated with PRYDE tension straps (top of Purlins). In buildings of 7 or more bays every fourth bay must be crossed braced.

NOTE: Tension straps before nailing with 76 or 64 x 2 mm galv. Flat head nails.

Property Id: 18402

NO ABA-2007-2471

AS BUILT DRAINAGE PLAN

ENTERED
Waitakere City Council
Te Taiao o Waitakere

SITE INFORMATION

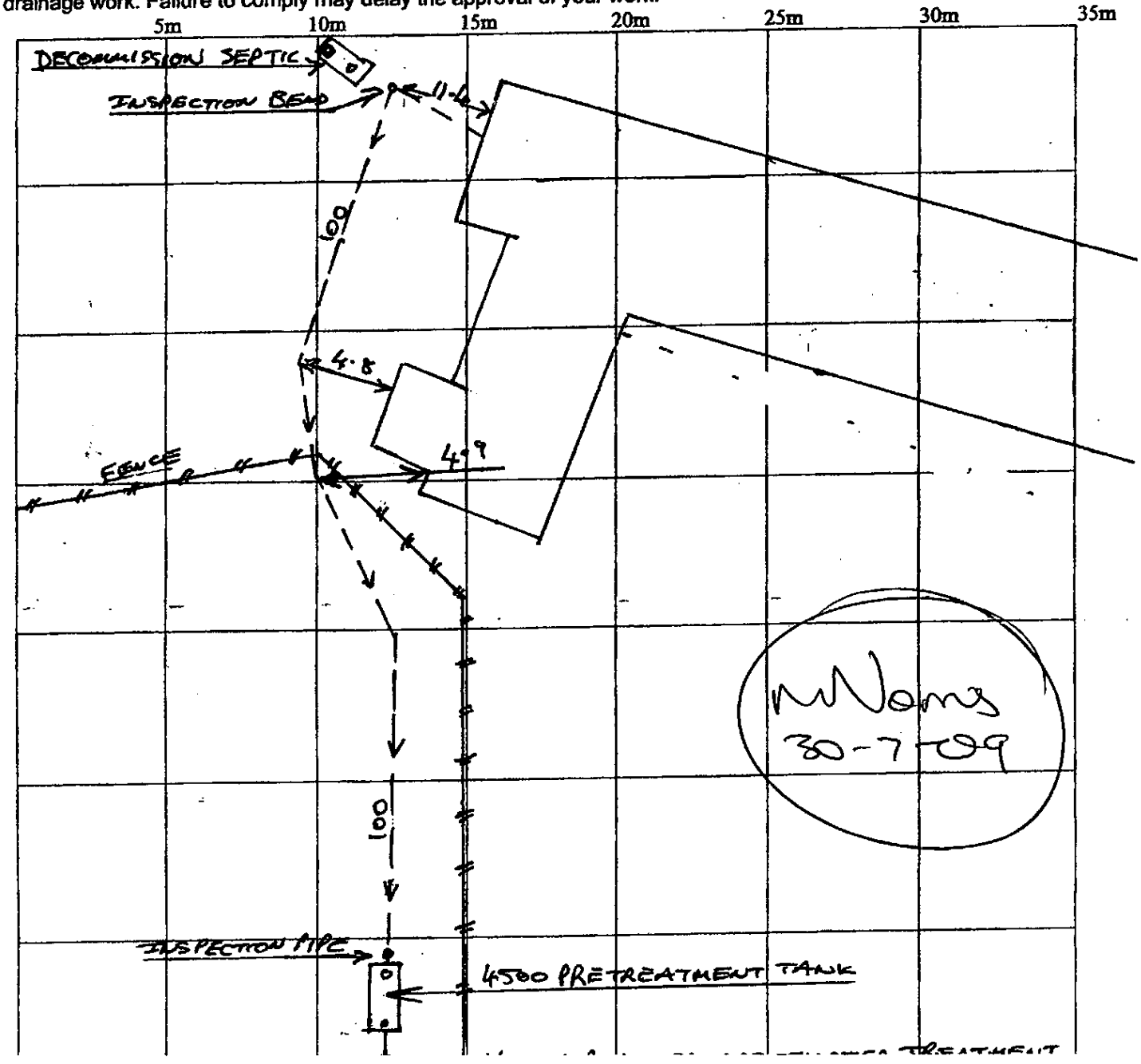
Building Consent No: ABA 2007-2471 Inspector: Murray Norris

Owners Name: TUXFORD PROPERTIES Drainlayers Name: DAVID REYLAND - 4597

Site Address: 100 HOBSONVILLE ROAD - HOBSONVILLE

Lot: 3 DP: 56849 Date inspected: 30-07-2009

Drainage plans are required for all new work and extensions to drains including effluent disposal systems. The plan is to be completed accurately drawn in ink to a scale of 1:200 and must show clearly the street boundary, property boundaries, outline of the buildings as well as the layout of ALL drains and inspection fillings. Please indicate the scale used if it is different than 1:200. Please ensure that this as built plan is completed prior to the inspection of the drainage work. Failure to comply may delay the approval of your work.



GLENN MOSER
16/8/11
SA Rd

HYNDS ENVIRONMENTAL

Site Plan

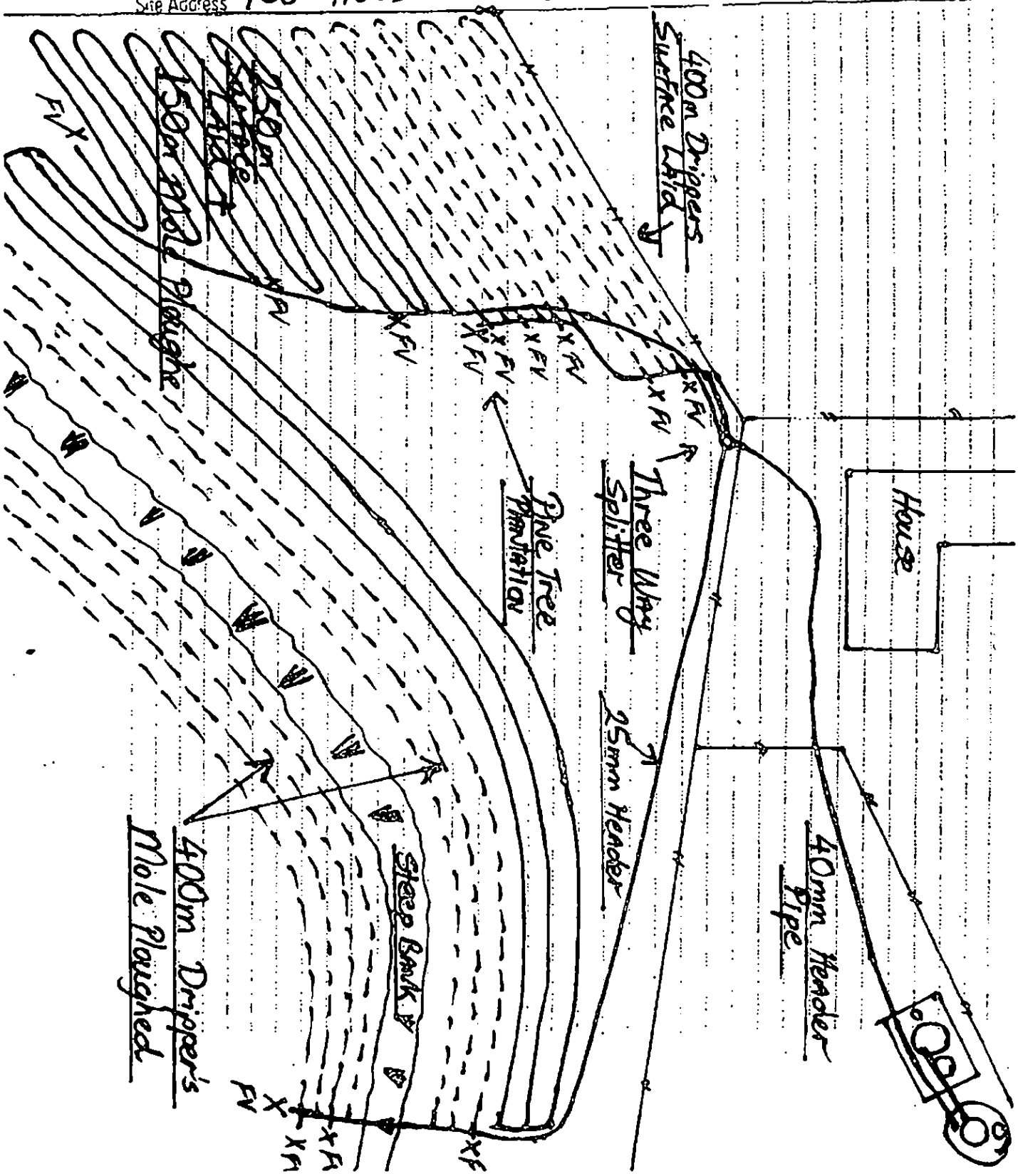
waste-water asbuilt plan.
ABA 2007-2471

property key: 18402

Name

Date 31/7/09

Site Address 100 Hobsonville Rd. Hobsonville.



16/8/11
GLENN MOSER

AS BUILT DRAINAGE PLAN

Waitakere City Council
Te Taiao o Waitakere

SITE INFORMATION

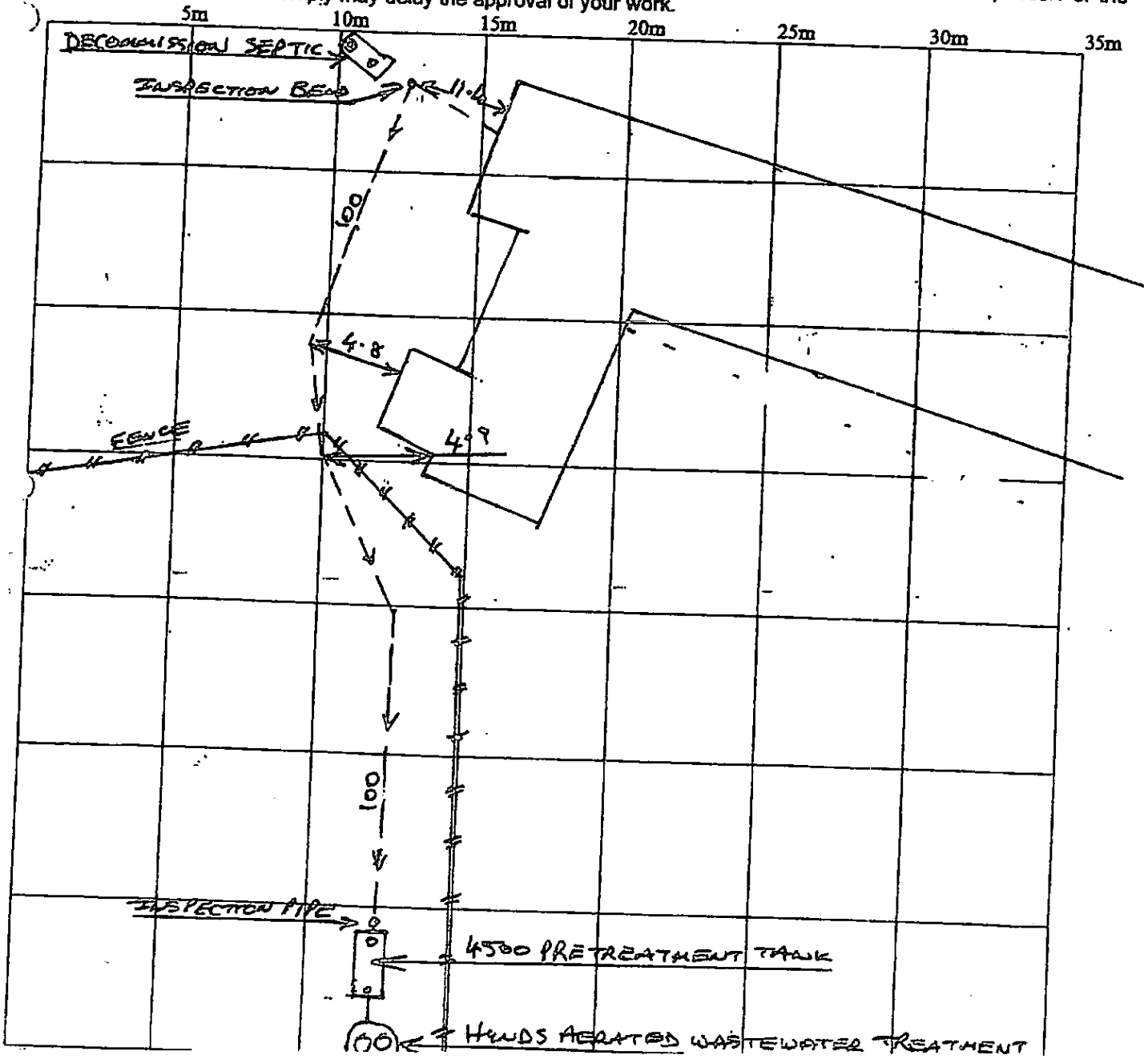
Building Consent No: ABA 2007-2471 Inspector: MURRAY

Owners Name: TUXFORD PROPERTIES Drainlayers Name: DAVID REYLAND – 4597

Site Address: 100 HOBSONVILLE ROAD – HOBSONVILLE

Lot: 3 DP: 56849 Date inspected: 30-07-2009

Drainage plans are required for all new work and extensions to drains including effluent disposal systems. The plan is to be completed accurately drawn in ink to a scale of 1:200 and must show clearly the street boundary, property boundaries, outline of the buildings as well as the layout of ALL drains and inspection fillings. Please indicate the scale used if it is different than 1:200. Please ensure that this as built plan is completed prior to the inspection of the drainage work. Failure to comply may delay the approval of your work.



APPENDIX E CONTAMINATED LANDUSE DATABASE

15th March 2019

Geosciences Limited
PO Box 35366
Browns Bay
Auckland 0753

Attention: David Wilkinson

Dear David

Site Contamination Enquiry – *100 Hobsonville Road*

This letter is in response to your enquiry requesting available site contamination information for the above 100 Hobsonville Road. The following details are based on information available from the former Auckland Regional Council records system and information currently held by the Auckland Council Natural Resources and Specialist Input Unit. The details provided below exclude any property information held by the former district/city councils.

No pollution incident files regarding spills/contamination were found for the above site. The general catchment file and site visit file for the catchment 510 were not searched. These files contain pollution incidents where the source of pollution was not traced to a particular site, site visits where no follow-up correspondence was required and some information from archived files.

If the above site is coastal or beside a river, it is possible that historic, unconsented reclamation may have occurred. The Auckland Council Specialists Unit Coastal Team may be able to provide further information.

The records reviewed as part of this Site Contamination Enquiry search do not identify individual horticultural sites in the region. However, there is a possibility that horticultural activities may have occurred at the site. The local Auckland Council customer service centre, specific to the area of the site may be able to provide relevant information where former horticultural sites have been mapped.

If you are concerned that a historic land use (such as filling) may have caused the underlying soils to become contaminated, it is recommended that you obtain an independent environmental assessment of the site. Staff from the Auckland Council Earthworks and Contaminated Land Team can provide advice on the results of any evaluation in terms of site remediation and/or potential consent requirements.

The former Auckland Regional Council and current databases were searched for records of closed landfills, bores, air discharge, industrial and trade process consents, contaminated site discharge consents, and environmental assessments within a 200m radius. Relevant details of the pollution incidents and identified consents are appended to this letter as an excel spreadsheet. **Please refer to the column labelled 'Property Address' and Incident/Consent/Bore ID (where applicable) on the attached spreadsheet to aid in identifying corresponding data on the map.**

The details provided are in accordance with the obligation to make information publicly available upon request. While the Auckland Council has carried out the search using its best practical endeavours, it does not warrant its completeness or accuracy and disclaims any responsibility or liability in respect of the information. If you or any other person wishes to act or to rely on this information, or make any financial commitment based upon it, it is recommended that you seek appropriate technical and/or professional advice.

In addition, further site specific pollution incidents may be held at the area office below. It is recommended that you contact the local customer service centre of the Auckland Council, specific to the site being investigated: 1 The Strand, Takapuna as they also may hold files with further relevant information.

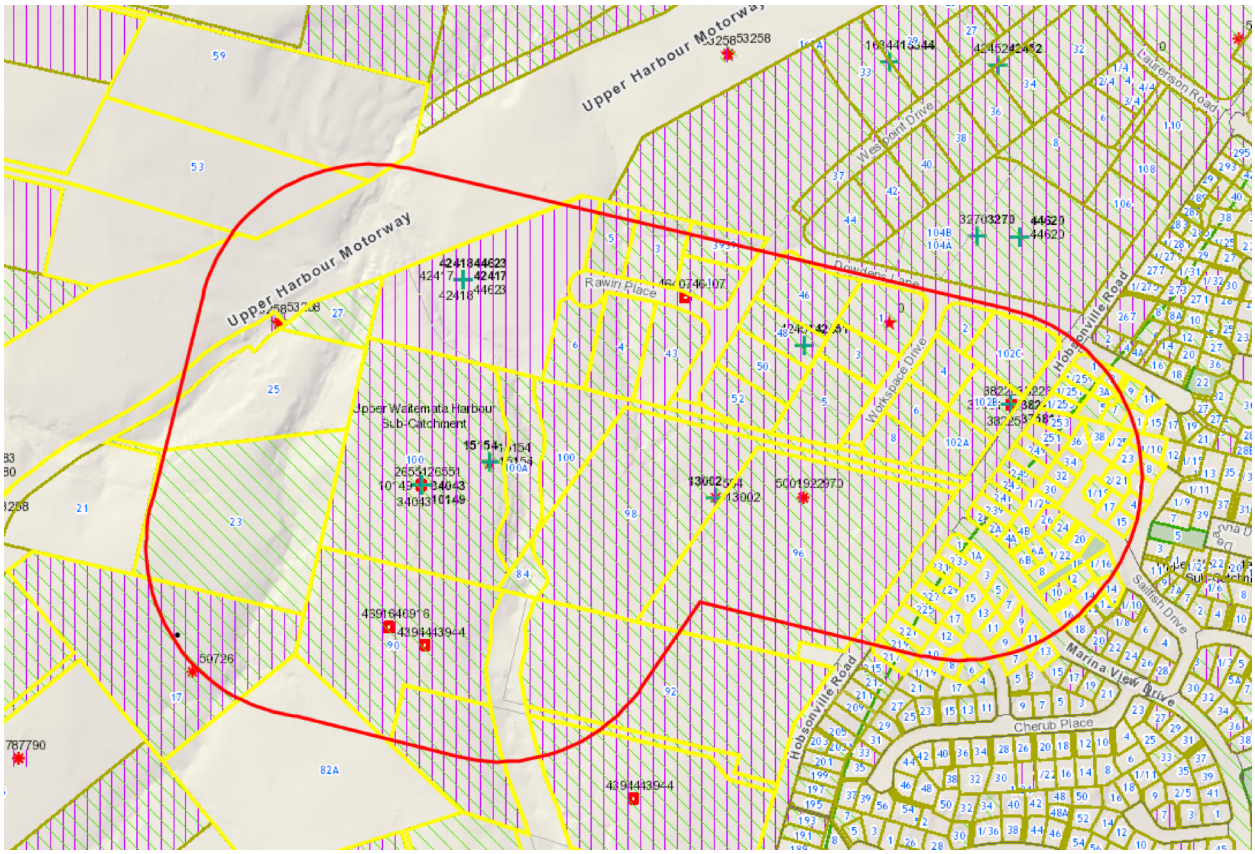
I trust that this answers your query. If you wish to discuss the matter further, please contact **Andrew Kalbarczyk** on 301 0101. Should you wish to request any of the files listed above for viewing, please contact the Auckland Council Call Centre on 301 0101 and note you are requesting former Auckland Regional Council records (the records department requires three working days' notice to ensure files will be available).

Please note: the Auckland Council cost recovers officer's time for all site enquiries. A basic enquiry takes approximately 1 - 2.5 hours to search the files and databases in which information is held. As such an invoice for the time involved in this enquiry will follow shortly.

Yours sincerely,

pp. EM
Jared Osman
Team Leader – Contaminated Air, Noise
Specialist Unit | Resource Consents

Please refer to the column labelled 'Property Address' and Incident/Consent/Bored ID (where applicable) on the attached spreadsheet to aid in identifying corresponding data on the map.



APPENDIX F SITE PHOTOGRAPHS

PLATE 1: ACCESS ROAD ALONG NORTHERN BOUNDARY OF 100 HOBSONVILLE ROAD

PLATE 2: BROKEN FIBRE CEMENT PANEL ON EASTERN END OF POULTRY SHED

PLATE 3: INTERIOR OF POULTRY SHED

PLATE 4: GRAIN SILOS ON SOUTHEAST CORNER OF POULTRY SHED

PLATE 5: BARN IN NORTHER PORTION OF 100 HOBSONVILLE RD, STAINED AREA IN FOREGROUND

PLATE 6: GARAGE ADJACENT TO HAY BARN

PLATE 7: ORIGINAL DWELLING WITH MODERN GARAGE EXTENSION IN FOREGROUND

PLATE 7: CENTRAL AND WESTERN WINGS OF DWELLING

PLATE 9: SEPTIC TANKS ON 100 HOBSONVILLE RD

PLATE 10: AREA OF 86 HOBSONVILLE, COMPOSITE 9

PLATE 11: COMPOSITE AREA 8, INDICATIVE OF CONDITION OF FORMER HORTICULTURAL AREAS

PLATE 10: COMPOSITE AREA 6, WESTERN EXTENT OF SITE

PLATE 13: DERELICT SHADE HOUSE SOUTH OF DWELLING

PLATE 14: RESIDUAL SHADE HOUSE INFRASTRUCTURE SOUTH OF DWELLING

APPENDIX G LABORATORY TRANSCRIPTS

CHAIN OF CUSTODY RECORD

☐ Eurofins | mgt Auckland Office — 35 O'Rorke Road, Penrose, AUCKLAND 1061, New Zealand
P : 0800 856450 (free dial)
E : ScottCarroll@eurofins.co.nz ; OnurMehmet@eurofins.com.au

☐ Eurofins | mgt Wellington Office — 85 Port Road, Seaview, Lower Hutt, WELLINGTON 5011, New Zealand
P : 0800 856450 (free dial)
E : ScottCarroll@eurofins.co.nz ; OnurMehmet@eurofins.com.au

☐ Eurofins | mgt Melbourne Lab — 2 Kingston Town Close, Oakleigh, VIC 3166, Australia
P : 0800 856450 (free dial)
E : ScottCarroll@eurofins.co.nz ; OnurMehmet@eurofins.com.au

Company	Geosciences Ltd	Purchase Order		Project Manager	Carl O'Brien
Address	47 Clyde Road, Browns Bay	Eurofins | mgt Quote №		Project №	J1329
Contact Name	David Wilkinson				
Contact Phone №	(09) 475 0222				
Special Direction					
Relinquished by (Signature)					
(Time / Date)	___:___ 11 / 03 / 2019				

Project Name	86, 90 & 100 Hobsonville Road
Electronic Results Format	pdf
Email for Results	david@geosciences.co.nz
Turn Around Requirements	☐ 1 DAY* ☐ 2 DAY* ☐ 3 DAY* * Surcharges apply ☑ 5 DAY (Std.) ☐ Other ( )

Analysis (Note: Where metals are requested, please specify "Total" or "Filtered")

Containers: 1L Plastic | 250mL Plastic | 125mL Plastic | 200mL Amber Glass | 40mL Vial | 125mL Amber Glass | Jar | Bag

Method of Shipment: ☑ Courier (#) ☐ Hand Delivered ☐ Postal

№	Client Sample ID	Date	Matrix	B22-NZ	B48-NZ	M7-NZ	1L Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL Vial	125mL Amber Glass	Jar	Bag	Sample Comments / DG Hazard Warning
1	Comp 1	8/03/2019		X										X	
2	Comp 2	8/03/2019		X										X	
3	Comp 3	8/03/2019		X										X	
4	Comp 4	8/03/2019		X										X	
5	Comp 5	8/03/2019		X										X	
6	Comp 6	8/03/2019		X										X	
7	Comp 7	8/03/2019		X										X	
8	Comp 8	8/03/2019		X										X	
9	Comp 9	8/03/2019		X										X	
10	SS1	8/03/2019			X	X							X		
11															
12															

Laboratory Use Only									
Received By	Kanishma Patel	AUCK | WELL | MELB	Date	12 / 3 / 19	Time	9 : 00 AM	Signature		Temperature	
Received By		AUCK | WELL | MELB	Date	___ / ___ / ___	Time	___ : ___	Signature		Report №	644763

Submission of samples to the laboratory will be deemed as acceptance of Eurofins | mgt Standard Terms and Conditions unless agreed otherwise. A copy of Eurofins | mgt Standard Terms and Conditions is available on request.

Geosciences Ltd
First Floor, 47 Clyde Road
Browns Bay
Auckland NZ 0630

NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Carl O'Brien**

Report **644763-S**
Project name 86 90 & 100 HOBSONVILLE ROAD
Received Date Mar 12, 2019

Client Sample ID			**COMP 1**	**COMP 2**	**COMP 3**	**COMP 4**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**K19-Ma12343**	**K19-Ma12344**	**K19-Ma12345**	**K19-Ma12346**
Date Sampled			**Mar 08, 2019**	**Mar 08, 2019**	**Mar 08, 2019**	**Mar 08, 2019**
Test/Reference	LOR	Unit				
Organochlorine Pesticides (NZ MfE)						
2.4'-DDD	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
2.4'-DDE	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
2.4'-DDT	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
4.4'-DDD	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
4.4'-DDE	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
4.4'-DDT	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
a-BHC	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Aldrin	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
b-BHC	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Chlordanes - Total	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
cis-Chlordane	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
d-BHC	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Dieldrin	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Endosulfan I	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Endosulfan II	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Endosulfan sulphate	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Endrin	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Endrin aldehyde	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Endrin ketone	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
g-BHC (Lindane)	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Heptachlor	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Heptachlor epoxide	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Hexachlorobenzene	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Methoxychlor	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Toxaphene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
trans-Chlordane	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Dibutylchlorendate (surr.)	1	%	125	148	149	131
Tetrachloro-m-xylene (surr.)	1	%	128	120	119	123
Heavy Metals						
Arsenic	2	mg/kg	5.1	4.2	2.3	< 2
Copper	5	mg/kg	8.5	6.6	< 5	< 5
Lead	5	mg/kg	< 5	< 5	< 5	< 5
% Moisture	1	%	15	11	11	9.2

Client Sample ID			COMP 5	COMP 6	COMP 7	COMP 8
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			K19-Ma12347	K19-Ma12348	K19-Ma12349	K19-Ma12350
Date Sampled			Mar 08, 2019	Mar 08, 2019	Mar 08, 2019	Mar 08, 2019
Test/Reference	LOR	Unit				
Organochlorine Pesticides (NZ MfE)						
2.4'-DDD	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
2.4'-DDE	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
2.4'-DDT	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
4.4'-DDD	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
4.4'-DDE	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
4.4'-DDT	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
a-BHC	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Aldrin	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
b-BHC	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Chlordanes - Total	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
cis-Chlordane	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
d-BHC	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Dieldrin	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Endosulfan I	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Endosulfan II	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Endosulfan sulphate	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Endrin	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Endrin aldehyde	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Endrin ketone	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
g-BHC (Lindane)	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Heptachlor	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Heptachlor epoxide	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Hexachlorobenzene	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Methoxychlor	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Toxaphene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
trans-Chlordane	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Dibutylchlorendate (surr.)	1	%	87	139	115	147
Tetrachloro-m-xylene (surr.)	1	%	75	119	111	117
Heavy Metals						
Arsenic	2	mg/kg	4.9	< 2	5.7	7.7
Copper	5	mg/kg	7.2	< 5	15	18
Lead	5	mg/kg	5.5	< 5	17	20
% Moisture	1	%	17	10	21	22

Client Sample ID			COMP 9	SS1
Sample Matrix			Soil	Soil
Eurofins | mgt Sample No.			K19-Ma12351	K19-Ma12352
Date Sampled			Mar 08, 2019	Mar 08, 2019
Test/Reference	LOR	Unit		
Total Petroleum Hydrocarbons (NZ MfE 1999)				
TPH-SG C7-C9	5	mg/kg	-	< 5
TPH-SG C10-C14	10	mg/kg	-	< 10
TPH-SG C15-C36	20	mg/kg	-	< 20
TPH-SG C7-C36 (Total)	35	mg/kg	-	< 35

Client Sample ID			COMP 9	SS1
Sample Matrix			Soil	Soil
Eurofins | mgt Sample No.			K19-Ma12351	K19-Ma12352
Date Sampled			Mar 08, 2019	Mar 08, 2019
Test/Reference	LOR	Unit		
Organochlorine Pesticides (NZ MfE)				
2.4'-DDD	0.01	mg/kg	< 0.01	-
2.4'-DDE	0.01	mg/kg	< 0.01	-
2.4'-DDT	0.01	mg/kg	< 0.01	-
4.4'-DDD	0.01	mg/kg	< 0.01	-
4.4'-DDE	0.01	mg/kg	< 0.01	-
4.4'-DDT	0.01	mg/kg	< 0.01	-
a-BHC	0.01	mg/kg	< 0.01	-
Aldrin	0.01	mg/kg	< 0.01	-
b-BHC	0.01	mg/kg	< 0.01	-
Chlordanes - Total	0.01	mg/kg	< 0.01	-
cis-Chlordane	0.01	mg/kg	< 0.01	-
d-BHC	0.01	mg/kg	< 0.01	-
Dieldrin	0.01	mg/kg	< 0.01	-
Endosulfan I	0.01	mg/kg	< 0.01	-
Endosulfan II	0.01	mg/kg	< 0.01	-
Endosulfan sulphate	0.01	mg/kg	< 0.01	-
Endrin	0.01	mg/kg	< 0.01	-
Endrin aldehyde	0.01	mg/kg	< 0.01	-
Endrin ketone	0.01	mg/kg	< 0.01	-
g-BHC (Lindane)	0.01	mg/kg	< 0.01	-
Heptachlor	0.01	mg/kg	< 0.01	-
Heptachlor epoxide	0.01	mg/kg	< 0.01	-
Hexachlorobenzene	0.01	mg/kg	< 0.01	-
Methoxychlor	0.01	mg/kg	< 0.01	-
Toxaphene	0.1	mg/kg	< 0.1	-
trans-Chlordane	0.01	mg/kg	< 0.01	-
Dibutylchlorendate (surr.)	1	%	138	-
Tetrachloro-m-xylene (surr.)	1	%	117	-
Polycyclic Aromatic Hydrocarbons (NZ MfE)				
Acenaphthene	0.03	mg/kg	-	< 0.03
Acenaphthylene	0.03	mg/kg	-	< 0.03
Anthracene	0.03	mg/kg	-	< 0.03
Benz(a)anthracene	0.03	mg/kg	-	< 0.03
Benzo(a)pyrene	0.03	mg/kg	-	< 0.03
Benzo(a)pyrene TEQ (lower bound)*	0.03	mg/kg	-	< 0.03
Benzo(a)pyrene TEQ (medium bound)*	0.03	mg/kg	-	0.04
Benzo(a)pyrene TEQ (upper bound)*	0.03	mg/kg	-	0.07
Benzo(b&j)fluoranthene[N07]	0.03	mg/kg	-	< 0.03
Benzo(g.h.i)perylene	0.03	mg/kg	-	< 0.03
Benzo(k)fluoranthene	0.03	mg/kg	-	< 0.03
Chrysene	0.03	mg/kg	-	< 0.03
Dibenz(a.h)anthracene	0.03	mg/kg	-	< 0.03
Fluoranthene	0.03	mg/kg	-	0.03
Fluorene	0.03	mg/kg	-	< 0.03
Indeno(1.2.3-cd)pyrene	0.03	mg/kg	-	< 0.03
Naphthalene	0.1	mg/kg	-	< 0.1
Phenanthrene	0.03	mg/kg	-	< 0.03
Pyrene	0.03	mg/kg	-	0.04
p-Terphenyl-d14 (surr.)	1	%	-	80
2-Fluorobiphenyl (surr.)	1	%	-	144

Client Sample ID			COMP 9	SS1
Sample Matrix			**Soil**	**Soil**
Eurofins | mgt Sample No.			**K19-Ma12351**	**K19-Ma12352**
Date Sampled			**Mar 08, 2019**	**Mar 08, 2019**
Test/Reference	LOR	Unit		
Heavy Metals				
Arsenic	2	mg/kg	< 2	-
Copper	5	mg/kg	5.1	-
Lead	5	mg/kg	10	-
Metals M7 (NZ MfE)				
Arsenic	2	mg/kg	-	2.6
Cadmium	0.4	mg/kg	-	< 0.4
Chromium	5	mg/kg	-	16
Copper	5	mg/kg	-	8.1
Lead	5	mg/kg	-	14
Nickel	5	mg/kg	-	< 5
Zinc	5	mg/kg	-	38
% Moisture	1	%	17	19

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Eurofins | mgt Suite B4B-NZ: TPH, PAH (NZ MfE)			
Total Petroleum Hydrocarbons (NZ MfE 1999)	Melbourne	Mar 14, 2019	14 Day
- Method: LTM-ORG-2010 TRH C6-C40			
Polycyclic Aromatic Hydrocarbons (NZ MfE)	Melbourne	Mar 14, 2019	14 Day
- Method: LTM-ORG-2130 PAH and Phenols in Soil and Water			
Eurofins | mgt Suite B22-NZ: OCP, Metals (As,Cu,Pb) (NZ MfE)			
Organochlorine Pesticides (NZ MfE)	Melbourne	Mar 14, 2019	14 Day
- Method: LTM-ORG-2220 OCP & PCB in Soil and Water			
Heavy Metals	Melbourne	Mar 15, 2019	180 Day
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Metals M7 (NZ MfE)	Melbourne	Mar 15, 2019	6 Months
- Method: USEPA 6010/6020 Heavy Metals			
% Moisture	Melbourne	Mar 12, 2019	14 Day
- Method: LTM-GEN-7080 Moisture			

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Address: First Floor, 47 Clyde Road
Browns Bay
Auckland NZ 0630

Project Name: 86 90 & 100 HOBSONVILLE ROAD

Order No.:
Report #: 644763
Phone: 0011 64 9 4760 454
Fax:

Received: Mar 12, 2019 9:00 AM
Due: Mar 19, 2019
Priority: 5 Day
Contact Name: Carl O'Brien

Eurofins | mgt Analytical Services Manager : Swati Shahaney

Sample Detail						Moisture Set	Metals M7 (NZ MfE)	Eurofins | mgt Suite B4B-NZ: TPH, PAH (NZ MfE)	Eurofins | mgt Suite B22-NZ: OCP, Metals (As,Cu,Pb) (NZ MfE)
Auckland Laboratory - IANZ#									
Christchurch Laboratory - IANZ#1290									
Eurofins Australia Laboratory						X	X	X	X
External Laboratory									
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**				
1	COMP 1	Mar 08, 2019		Soil	K19-Ma12343	X			X
2	COMP 2	Mar 08, 2019		Soil	K19-Ma12344	X			X
3	COMP 3	Mar 08, 2019		Soil	K19-Ma12345	X			X
4	COMP 4	Mar 08, 2019		Soil	K19-Ma12346	X			X
5	COMP 5	Mar 08, 2019		Soil	K19-Ma12347	X			X
6	COMP 6	Mar 08, 2019		Soil	K19-Ma12348	X			X
7	COMP 7	Mar 08, 2019		Soil	K19-Ma12349	X			X
8	COMP 8	Mar 08, 2019		Soil	K19-Ma12350	X			X
9	COMP 9	Mar 08, 2019		Soil	K19-Ma12351	X			X
10	SS1	Mar 08, 2019		Soil	K19-Ma12352	X	X	X	
Test Counts						10	1	1	9

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure, April 2011 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.2 2018
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 50-150%-Phenols & PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.2 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

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Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Petroleum Hydrocarbons (NZ MfE 1999)							
TPH-SG C7-C9	mg/kg	< 5			5	Pass	
TPH-SG C10-C14	mg/kg	< 10			10	Pass	
TPH-SG C15-C36	mg/kg	< 20			20	Pass	
TPH-SG C7-C36 (Total)	mg/kg	< 35			35	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Copper	mg/kg	< 5			5	Pass	
Lead	mg/kg	< 5			5	Pass	
Method Blank							
Metals M7 (NZ MfE)							
Cadmium	mg/kg	< 0.4			0.4	Pass	
Chromium	mg/kg	< 5			5	Pass	
Nickel	mg/kg	< 5			5	Pass	
Zinc	mg/kg	< 5			5	Pass	
LCS - % Recovery							
Total Petroleum Hydrocarbons (NZ MfE 1999)							
TPH-SG C7-C9	%	84			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic	%	107			80-120	Pass	
Copper	%	104			80-120	Pass	
Lead	%	106			80-120	Pass	
LCS - % Recovery							
Metals M7 (NZ MfE)							
Cadmium	%	106			80-120	Pass	
Chromium	%	113			80-120	Pass	
Nickel	%	107			80-120	Pass	
Zinc	%	108			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Organochlorine Pesticides (NZ MfE)				Result 1					
2.4'-DDD	K19-Ma12369	NCP	%	100			70-130	Pass	
2.4'-DDE	K19-Ma12369	NCP	%	94			70-130	Pass	
2.4'-DDT	K19-Ma12369	NCP	%	104			70-130	Pass	
4.4'-DDE	K19-Ma12369	NCP	%	85			70-130	Pass	
Aldrin	K19-Ma12369	NCP	%	81			70-130	Pass	
Chlordanes - Total	K19-Ma12369	NCP	%	88			70-130	Pass	
cis-Chlordane	K19-Ma12369	NCP	%	88			70-130	Pass	
Dieldrin	K19-Ma12369	NCP	%	90			70-130	Pass	
Endosulfan I	K19-Ma12369	NCP	%	80			70-130	Pass	
Endosulfan II	K19-Ma12369	NCP	%	74			70-130	Pass	
Endrin	K19-Ma12369	NCP	%	92			70-130	Pass	
Endrin aldehyde	K19-Ma12369	NCP	%	90			70-130	Pass	
Endrin ketone	K19-Ma12369	NCP	%	89			70-130	Pass	
Heptachlor epoxide	K19-Ma12369	NCP	%	74			70-130	Pass	
Hexachlorobenzene	K19-Ma12369	NCP	%	81			70-130	Pass	
trans-Chlordane	K19-Ma12369	NCP	%	89			70-130	Pass	
Spike - % Recovery									

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Heavy Metals				Result 1					
Arsenic	K19-Ma12344	CP	%	105			75-125	Pass	
Copper	K19-Ma12344	CP	%	108			75-125	Pass	
Lead	K19-Ma12344	CP	%	104			75-125	Pass	
Spike - % Recovery									
Metals M7 (NZ MfE)				Result 1					
Cadmium	K19-Ma12344	CP	%	104			75-125	Pass	
Chromium	K19-Ma12344	CP	%	113			75-125	Pass	
Nickel	K19-Ma12344	CP	%	109			75-125	Pass	
Zinc	K19-Ma12344	CP	%	109			75-125	Pass	
Spike - % Recovery									
Total Petroleum Hydrocarbons (NZ MfE 1999)				Result 1					
TPH-SG C7-C9	K19-Ma16376	NCP	%	119			70-130	Pass	
Spike - % Recovery									
Metals M7 (NZ MfE)				Result 1					
Cadmium	K19-Ma12368	NCP	%	115			75-125	Pass	
Chromium	K19-Ma12368	NCP	%	106			75-125	Pass	
Nickel	K19-Ma12368	NCP	%	100			75-125	Pass	
Zinc	K19-Ma12368	NCP	%	97			75-125	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Organochlorine Pesticides (NZ MfE)				Result 1	Result 2	RPD			
2.4'-DDD	K19-Ma12343	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
2.4'-DDE	K19-Ma12343	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
2.4'-DDT	K19-Ma12343	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
4.4'-DDD	K19-Ma12343	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
4.4'-DDE	K19-Ma12343	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
4.4'-DDT	K19-Ma12343	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
a-BHC	K19-Ma12343	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Aldrin	K19-Ma12343	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
b-BHC	K19-Ma12343	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Chlordanes - Total	K19-Ma12343	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
cis-Chlordane	K19-Ma12343	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
d-BHC	K19-Ma12343	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Dieldrin	K19-Ma12343	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endosulfan I	K19-Ma12343	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endosulfan II	K19-Ma12343	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endosulfan sulphate	K19-Ma12343	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endrin	K19-Ma12343	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endrin aldehyde	K19-Ma12343	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endrin ketone	K19-Ma12343	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
g-BHC (Lindane)	K19-Ma12343	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Heptachlor	K19-Ma12343	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Heptachlor epoxide	K19-Ma12343	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Hexachlorobenzene	K19-Ma12343	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Methoxychlor	K19-Ma12343	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
trans-Chlordane	K19-Ma12343	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
Polycyclic Aromatic Hydrocarbons (NZ MfE)				Result 1	Result 2	RPD			
Acenaphthene	K19-Ma12343	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Acenaphthylene	K19-Ma12343	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Anthracene	K19-Ma12343	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Benz(a)anthracene	K19-Ma12343	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Benzo(a)pyrene	K19-Ma12343	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	

Duplicate									
Polycyclic Aromatic Hydrocarbons (NZ MfE)				Result 1	Result 2	RPD			
Benzo(b&j)fluoranthene	K19-Ma12343	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Benzo(g.h.i)perylene	K19-Ma12343	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Benzo(k)fluoranthene	K19-Ma12343	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Chrysene	K19-Ma12343	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Dibenz(a.h)anthracene	K19-Ma12343	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Fluoranthene	K19-Ma12343	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Fluorene	K19-Ma12343	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Indeno(1.2.3-cd)pyrene	K19-Ma12343	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Naphthalene	K19-Ma12343	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Phenanthrene	K19-Ma12343	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Pyrene	K19-Ma12343	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	K19-Ma12343	CP	mg/kg	5.1	4.5	12	30%	Pass	
Copper	K19-Ma12343	CP	mg/kg	8.5	7.9	8.0	30%	Pass	
Lead	K19-Ma12343	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Duplicate									
Metals M7 (NZ MfE)				Result 1	Result 2	RPD			
Cadmium	K19-Ma12343	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	K19-Ma12343	CP	mg/kg	13	12	9.0	30%	Pass	
Nickel	K19-Ma12343	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Zinc	K19-Ma12343	CP	mg/kg	26	23	9.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	K19-Ma12344	CP	mg/kg	4.2	4.1	3.0	30%	Pass	
Copper	K19-Ma12344	CP	mg/kg	6.6	6.5	2.0	30%	Pass	
Lead	K19-Ma12344	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Duplicate									
Metals M7 (NZ MfE)				Result 1	Result 2	RPD			
Cadmium	K19-Ma12344	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	K19-Ma12344	CP	mg/kg	9.3	9.2	1.0	30%	Pass	
Nickel	K19-Ma12344	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Zinc	K19-Ma12344	CP	mg/kg	18	18	1.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	K19-Ma12351	CP	%	17	16	2.0	30%	Pass	
Duplicate									
Polycyclic Aromatic Hydrocarbons (NZ MfE)				Result 1	Result 2	RPD			
Acenaphthene	K19-Ma12368	NCP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Acenaphthylene	K19-Ma12368	NCP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Anthracene	K19-Ma12368	NCP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Benz(a)anthracene	K19-Ma12368	NCP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Benzo(a)pyrene	K19-Ma12368	NCP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Benzo(b&j)fluoranthene	K19-Ma12368	NCP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Benzo(g.h.i)perylene	K19-Ma12368	NCP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Benzo(k)fluoranthene	K19-Ma12368	NCP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Chrysene	K19-Ma12368	NCP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Dibenz(a.h)anthracene	K19-Ma12368	NCP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Fluoranthene	K19-Ma12368	NCP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Fluorene	K19-Ma12368	NCP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Indeno(1.2.3-cd)pyrene	K19-Ma12368	NCP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Naphthalene	K19-Ma12368	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Phenanthrene	K19-Ma12368	NCP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Pyrene	K19-Ma12368	NCP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	

Duplicate									
Metals M7 (NZ MfE)				Result 1	Result 2	RPD			
Cadmium	K19-Ma12368	NCP	mg/kg	0.7	0.7	1.0	30%	Pass	
Chromium	K19-Ma12368	NCP	mg/kg	21	21	2.0	30%	Pass	
Nickel	K19-Ma12368	NCP	mg/kg	13	13	1.0	30%	Pass	
Zinc	K19-Ma12368	NCP	mg/kg	69	70	2.0	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N07	Please note:- These two PAH isomers closely co-elute using the most contemporary analytical methods and both the reported concentration (and the TEQ) apply specifically to the total of the two co-eluting PAHs

Authorised By

Swati Shahaney	Analytical Services Manager
Emily Rosenberg	Senior Analyst-Metal (VIC)
Joseph Edouard	Senior Analyst-Organic (VIC)

Glenn Jackson
General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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29 November 2023

PROPOSED PRIVATE PLAN CHANGE

100 HOBSONVILLE ROAD, HOBSONVILLE

GEOTECHNICAL ASSESSMENT REPORT

Austino Property Group

AKS2023-0062AB Rev A

AKS2023-0062AB		
Date	**Revision**	**Comments**
29 November 2023	A	Initial draft for client consultant review
	B	Final draft for internal review
	0	Final issue

	Name	Signature	Position
Prepared by	Eugene Crestanello		Principal Engineering Geologist
Reviewed and Authorised by	Sam Gibb		Principal Geotechnical Engineer CMEngNZ, CPEng

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Appendices

Appendix A: Site Investigation Plan

Appendix B: Hand Auger Borehole Records

Appendix C: Topographic Survey Plan Precinct 1

1 INTRODUCTION

CMW Geosciences (CMW) was engaged by Austino Property Group to carry out a geotechnical assessment of a site located at 100 Hobsonville Road, Hobsonville,. This report is to provide geotechnical input to support a Private Plan Change (PPC) Application to rezone 2 property blocks as follows:

Proposed re-Zoning			
Precinct	**Size (Ha)**	**Current Zone**	**Plan Change Zone**
1A	0.3851	Open Space	Light Industrial
1B	0.7880	Light Industrial	Light Industrial
1C	0.9480	Future Urban	Light Industrial
2	9.3413	Future Urban	Mixed Housing Urban / Terraced Housing & Apartment Building Zone

The purpose of this report is to summarise the existing geotechnical information, provide preliminary ground conditions expected, and to identify and quantify geotechnical risks to future development within the proposed plan change zones.

1.1 Scope of Work

The scope of work and associated terms and conditions of our engagement were detailed in our services proposal letter referenced AKS2023-0062AA, Rev 0 dated 20 July 2023, and is defined as follows:

- Desktop study of available information, including review of available existing reports and hand auger borehole investigations, historic aerial photographs, and published geology;
- Preparation of a high-level Geotechnical Assessment Report which describes potential constraints as well as Geohazards which could affect future light industrial development across Precinct 1 and urban residential housing in Precinct 2.

2 SITE LOCATION AND LANDFORM

The site comprises 2 parcels referred to as Precinct 1 to the south and Precinct 2 to the north.

The current general landform is presented on ***Figure 2***.

Precinct 1 was subject to land disturbance earthworks in recent years with the contours shown in Figure 2 having been altered to some degree. Specifically, the lower-lying landform to the north, was filled as part of subdivisional earthworks the bulk of which was undertaken to the north-east of the site. Attached in Appendix ? is a topographic survey showing the modified landform. The northern portion of the landform is now mostly very gently sloping apart from an approximately 8m high batter slope to the north-west the gradient of which averages around 1V:3H. There is also a large soil stockpile which sits on the modified plateau. as well as a fill batter. The amphitheatre shaped slope in the southern portion of site is believed to be unaltered and comprises gradients of 1V:6H.

Precinct 2 is formed over a ridgeline trending from south to north and constrained by natural gullies to the east and west. The ridgeline is, for the most part, very gently sloping becoming more moderately sloping where the flanks of the ridgeline slope down to the gullies. The eastern gully is heavily vegetated whilst the western gully is predominantly denuded. Whilst the gradients of the sloping flanks are typically no steeper than 1V:3H there are signs of surface terracettes (i.e. soil creep) and possibly larger slow-moving landslides. We discuss the geomorphological features in section ?? below.

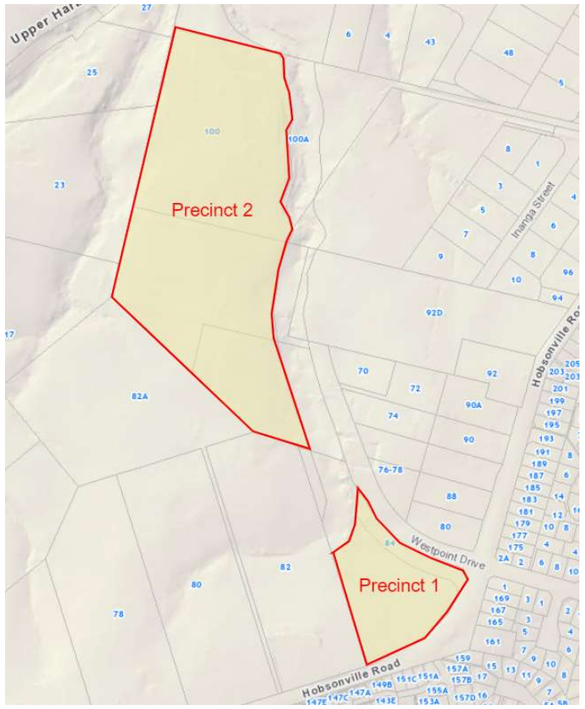

Figure 1: Site Location Plan (Source: Auckland Council Geomaps)

Figure 2: Site Aerial & Contours circa 2016 (Source: Auckland Council Geomaps)

FACTUAL

3 DESKTOP STUDY

3.1 Historic Aerial Photographs

Historical Aerial Photographs		
Source	**Date**	**Notes/Observations**
Auckland Council Geomaps	1959	Both Precinct 1 & 2 appear to be grazed paddocks with no obvious evidence of land disturbance or instability.
	1996	The grazed paddocks have been converted to ploughed fields as well as a dwelling and associated buildings appearing in Precinct
	2007	No major or obvious changes since 1996

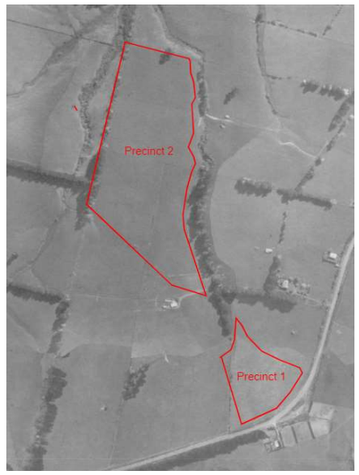

Figure 3: 1940

Figure 4: 1996

Figure 5: 2017

3.2 Existing Geotechnical Investigations

Related Documents
Hand auger boreholes records and site plan for investigations across 86, 88, 19 & 100 Hobsonville Road by Geotek Solutions on 18 and 19 March 2019
Geotechnical Investigation Report (GIR) for Proposed 10-Lot Light Industrial Subdivision at 86-88 Hobsonville Road prepared by Geotek Solutions dated 27 May 2019 (Reference 7273, Resource Consent Issue)
Geotechnical Completion Report (GCR) for Proposed 10-Lot Light Industrial Subdivision at 86-88 Hobsonville Road prepared by Geotek Solutions dated 11 November 2021 (Reference 94185.1 GCR)

3.2.1 Hand Auger Borehole Investigations

Figure 7 below shows the extent of 5m deep hand auger borehole investigations undertaken by a previous consultant which we discuss in section 4.3 below.

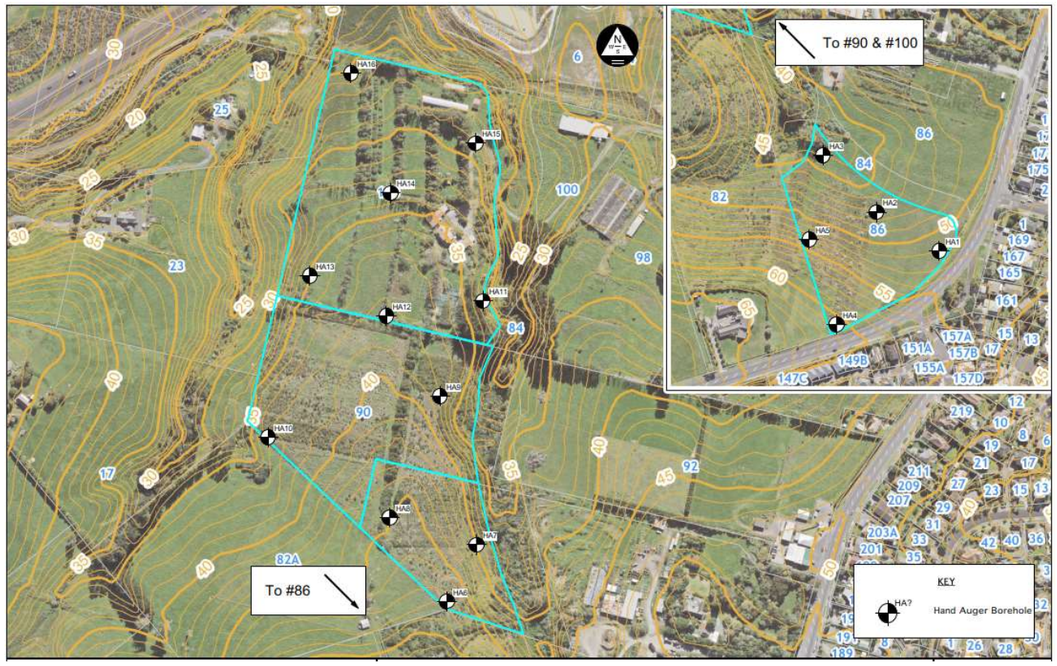

Figure 6: Geotek Solutions Hand Auger Borehole Site Investigation Plan

3.2.2 GIR & GCR for Neighbouring Subdivision

Site investigations were undertaken by a consultant on the block of land to the east with subsequent earthworks development for a 10-Lot light-industrial subdivision. We discuss the ground conditions and report findings in section 4.4 below.

FACTUAL

4 GROUND MODEL

4.1 Published Geology

Published geological maps[1] for the area depict the regional geology as comprising Late Pliocene to Mid Pleistocene alluvial deposits belonging to the Tauranga Group of the Puketoka Formation (Pup) as illustrated in ***Figure 9***.

These alluvial deposits include pumiceous mud, sand and gravel with muddy peat and lignite, rhyolitic pumice (including non-welded ignimbrite, tephra and alluvial pumice deposits) and massive micaceous sand beds. Below these upper soil layers, the deeper geological formation is reported to comprise, interbedded muddy sandstones and siltstones of the East Cast Bays Formation (Mwe) within the Waitemata Group.

The main geotechnical hazards within the Puketoka Formation strata are the potential for low bearing capacity and settlement from soft/organic/ compressible soils when surcharge loads such as earthworks fill and /or building loads are applied.

4.2 Geomorphology

The geomorphology of Precinct 2 was mapped by examination of aerial photographs and the site contours ***(See Figure 10)***. The geomorphology of Precinct 1 was not considered to be of any significant influence on future development given the previous land modification.

As noted above, site gradients are typically relatively gentle, although they do steepen adjacent to the gully flanks, above the gully watercourses that run adjacent to the eastern and western margins of the site before merging into one another north of the landform. We consider that there may be the presence of soil creep headscarps which extend up from the watercourses likely as a result of gully toe erosion and long-term seasonal shrink/swell cycles.

4.3 Investigation Findings

In general, the hand auger investigations undertaken across the proposed Precinct 1 and 2 have confirmed the expected geology and ground conditions comprising Tauranga Group Alluvium. The landform is predominantly underlain with stiff to very stiff, slightly to moderately plastic, clayey SILTS and silty CLAYS. There are sometimes seemingly isolated pockets of organic materials intermixed with the alluvial soils but no obvious evidence of soft soils, fibrous peat nor amorphous peat. There was also a seemingly isolated location where pre-existing fill was encountered at the ground surface which is not unexpected given the rural setting.

4.4 Groundwater

Groundwater was rarely encountered at the time the hand augers were drilled in March 2019. However, we would expect that during periods of prolonged rainfall such as during winter, groundwater levels may be present at shallower depths across the landform.

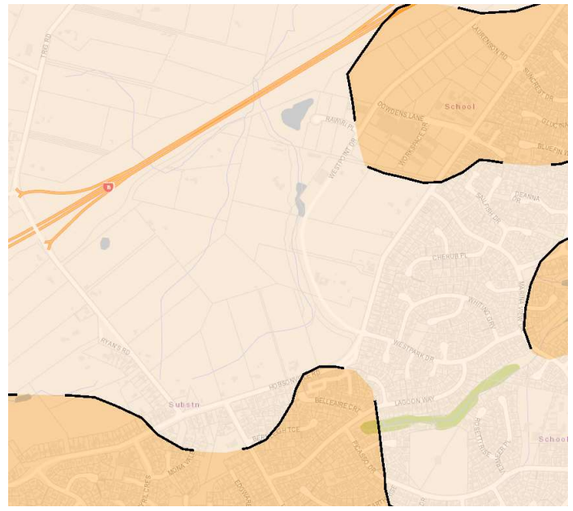

Figure 7: Regional Geology (GNS Science Web Geology Map)

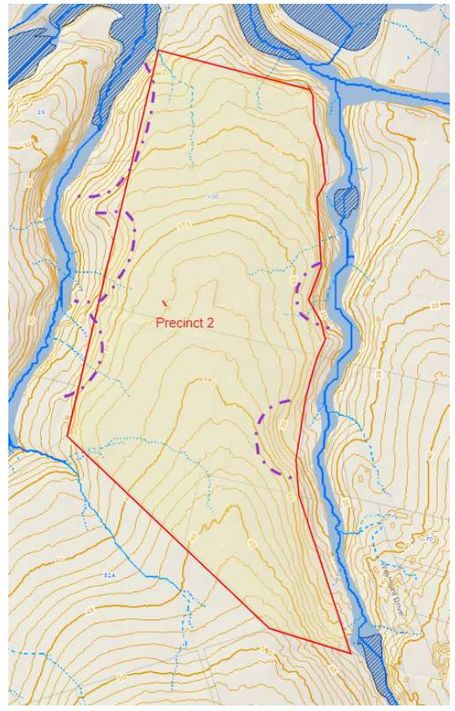

Figure 8: Precinct 2 Geomorphology Plan with possible soil creep headscarps delineated by purple dot-dash lines . Watercourses in dark blue and overland flow paths in light blue.

4.5 Precinct 1 Earthworks

Precinct 1 was subject to earthworks modification between January 2020 and August 2021. In ***Figure 9*** we have reproduced an as-built earthworks fill plan which shows the presence of up to 7.5m of fill above an underfill subsoil drainage network following the removal of topsoil, gully mullock and other unsuitables. The site also contains a stockpile of spoil as shown in ***Figure 10.***

4.6 86 & 88 Hobsonville Subdivision Development

The ground conditions encountered under the neighbouring landform to the east are very similar to the subject site and we would also expect that East Coast Bays Formation to underlying the alluvial soils. There were no reports of weak and/or compressible deposits and earthworks development for the 10-lot, light residential subdivision appear to have been completed as anticipated.

In reading the GCR, the development included the following restrictions relating to Geohazards:

- Class H (Highly) expansive soils;
- Future fills limited to 0.5m (10 kPa) and Future floor loads limited to 15 kPa to mitigate the risk of consolidation of the underlying subsoils;
- Class C shallow soil stratigraphy (NZS1170.5);
- No onsite soakage of stormwater.

DRAWING CERTIFICATION

CUT/FILL DEPTH TABLE

Number	Minimum Elevation	Maximum Elevation	Colour
1	-6.000	-5.000	
2	-5.000	-4.000	
3	-4.000	-3.000	
4	-3.000	-2.000	
5	-2.000	-1.000	
6	-1.000	0.000	
7	0.000	1.000	
8	1.000	2.000	
9	2.000	3.000	
10	3.000	4.000	
11	4.000	5.000	
12	5.000	6.000	
13	6.000	7.000	
14	7.000	8.000	

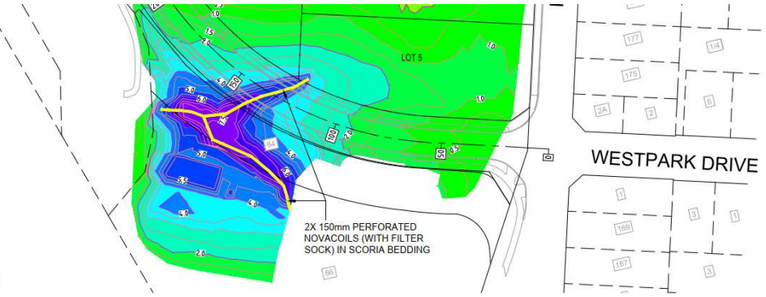

Figure 9: Cut/Fill as-built plan from Geotek Solutions GCR

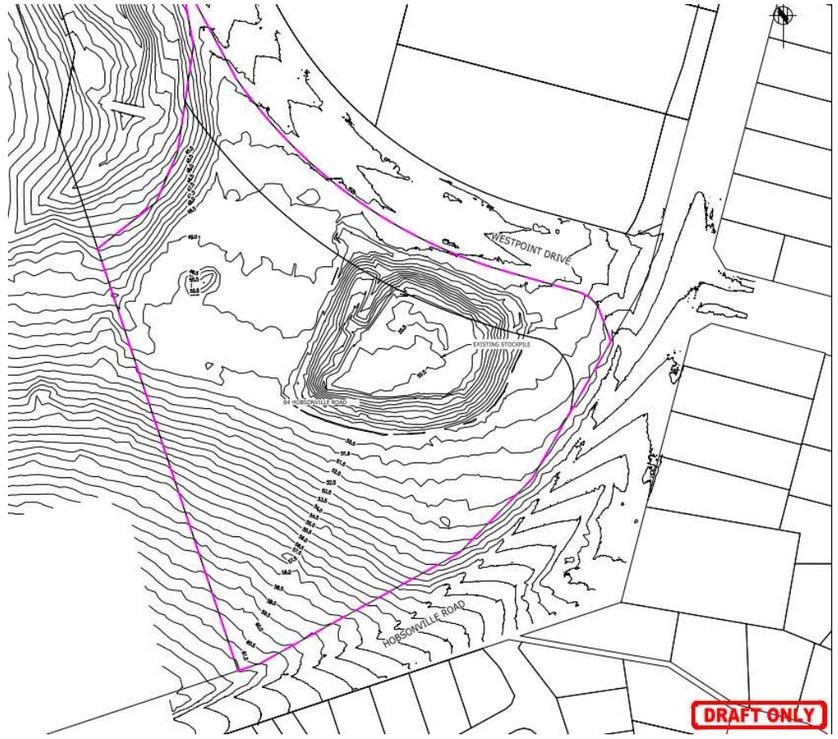

Figure 10: Topographic survey plan of Precinct 1 dating from October 2022 by HG

5 GEOHAZARDS ASSESSMENT & MITIGATION

Geotechnical Assessment and Mitigation			
Geotechnical Hazard	**Description**	**Area Affected**	**Comments and Geotechnical Control / Mitigation Measures**
Water/Groundwater	Surface Water	Margins of Precinct 2	Whilst there are no watercourses defined with the site, nor are there any overland flow paths entering into the site, we do note that, from Auckland Council Geomaps, the potential for overland flow paths developing along the margins and flowing into the defined watercourses to the east, west and north of the landform. For the purposes of this report, we have assumed that the overland flowpath extents can be filled. It can be assumed that any filling will have underfill drainage placed beneath it to allow the flow of any occasional water flows to continue and to prevent the build-up of groundwater pressures from developing beneath the fill.
	Stormwater Disposal	Entire Site	Stormwater soakage to ground is typically not feasible and will need to be reticulated and discharged away from the site.
Erosion	Cut Batters	Unknown (future cut areas)	Mitigated by designing for maximum 1V:3H gradient, or steeper with surface stabilisation / treatment included in design (such as undercuts, by over excavation and replacement) as well as support with retaining walls.
	Fill Batters	Unknown (future fill areas)	Mitigated by designing for maximum 1V:3H gradient, stormwater control and/ or steeper with surface stabilisation / treatment in design (such as reinforced earth slopes / retaining walls).
Landslip	Global Slope Instability	Elevated areas and slopes.	Most of the site is relatively gently sloping and not considered subject to instability risk. The western and eastern margins of Precinct 2, adjacent to the watercourses may require slope stability remedial works comprising undercuts and/or small shear keys. Installation of retaining walls, palisade piles, or set-backs from the steeper slopes, may be required. This would be subject to detailed investigation and stability analysis, dependant on the earthworks and/or future development proposed.
	Soil Creep	Elevated areas and slopes.	A function of slope gradient and the expansive nature of the materials, movement is likely to be limited to approximately 1m to 1.5m depth, where present. Creep is limited to the sloped areas partially along ridge flanks. To be mitigated by design of slope gradients, including use of retaining walls, subsoil drainage and by design of footings.
	Cut & Fill Batter Instability	Future cut, and fill areas	Both temporary and permanent batters need to be considered. Mitigated smart construction staging as well as controls on gradient, stormwater and surface stabilisation.
Expansive Soils	Expansive Soils	Entire site	Expansive soils are classified in NZS 3604 as those soils having a liquid limit of more than 50% and linear shrinkage of more than 15%. Alluvial soils are typically highly expansive. Mitigation of the expansive soil hazard is by foundation design at Building Consent stage and will be addressed on a lot-by-lot basis in the Geotechnical Completion Report(s) at the conclusion of the development works.
Subsidence	Soft Soils/ Load Induced Settlement	Entire Site	The topography and existing information indicate that there are no significant concerns across Precinct 1 as well as within the upper 5m of the soil profile across Precinct 2. Further geotechnical investigation using deeper investigation techniques such as Cone Penetrometer Testing (CPT) is recommended once landform modifications (i.e. cut and filling) are defined. In areas where fills and/ or significant building construction or storage loads are placed over soft deposits, allowance needs to be made for post-construction settlement of the fills and the underlying ground that could cause damage to structures. Consideration in the design needs to be given to the quantum of settlement that is likely to occur (i.e. ensuring it is insufficient to influence the cut/ fill volumes and balance during earthworks and/ or damage structures) and the time taken for the settlement to occur (i.e. ensuring it will be largely completed by the time a normal civil works programme would likely be commencing). The most appropriate mitigation is to avoid the potential for highly loaded structures in areas of weak/compressible materials during Master Planning, or to allow for ground improvement / piled foundations. However another remedial option for accelerating settlements in areas of deep alluvium / peat soils involve preloading. Locations and heights of surcharge must be subject to geotechnical review to avoid causing bearing capacity failure in the underlying alluvium.

INTERPRETIVE

Geotechnical Assessment and Mitigation			
Geotechnical Hazard	**Description**	**Area Affected**	**Comments and Geotechnical Control / Mitigation Measures**
Existing Fill	Uncontrolled Fill overlying Engineered Fill	Precinct 1	The stockpile across Precinct 1 will need to be removed and the underlying engineered fill exposed and confirmed before any futur earthworks are to proceed.
	Uncontrolled Fill	Precinct 2	Existing uncontrolled fill has been identified in an isolated location. Re-engineering of existing fill may be required in some areas. Following environmental testing (by others) material reworking may be considered appropriate.
Seismicity	Liquefaction	Entire Site	Liquefaction is a process where typically saturated, granular soils develop excess pore water pressures during cyclic (earthquake) loading that exceed the effective stress of the soil. Liquefaction potential will be largely dependent on material characteristics of the underlying soils. A region-wide liquefaction assessment has been undertaken by Auckland Council in accordance with MBIE document "Planning and engineering guidance for potential liquefaction-prone land Resource Management Act and Building Act aspects" (2017). The liquefaction potential has been assessed to be unlikely. However additional investigations will be required to determine the potential for the recently identified peat soils to be subject to liquefaction.

6 CONCLUSION

Based on our hazard assessment, we consider that the land is generally suitable for creating stable building platforms and infrastructure, having acceptable levels of post-development residual risk from natural hazards. Consideration of the key geotechnical hazards should be incorporated into Master Planning once more detailed investigations are undertaken.

Development may require earthworks and drainage to provide improved stability around the margins of Precinct 2. This is achievable given appropriate design, and construction. Any proposed earthworks are to be undertaken in accordance with all relevant standards and documents. The engineering controls required to control existing, latent risks are commonplace works in this terrain that are consistent with those being adopted on adjacent land.

Further site investigation and design will need to be undertaken to quantify the geotechnical controls prior to resource consent application and the commencement of any works.

7 CLOSURE

Additional important information regarding the use of your CMW report is provided in the '*Using your CMW Report*' document attached to this report.

This report has been prepared for use by Austino Property Group in relation to the 100 Hobsonville Road Private Plan Change project in accordance with the scope, proposed uses and limitations described in the report. Should you have further questions relating to the use of your report please do not hesitate to contact us.

Where a party other than Austino Property Group seeks to rely upon or otherwise use this report, the consent of CMW should be sought prior to any such use. CMW can then advise whether the report and its contents are suitable for the intended use by the other party.

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USING YOUR CMW GEOTECHNICAL REPORT

Geotechnical reporting relies on interpretation of facts and collected information using experience, professional judgement, and opinion. As such it generally has a level of uncertainty attached to it, which is often far less exact than other engineering design disciplines. The notes below provide general advice on what can be reasonably expected from your report and the inherent limitations of a geotechnical report.

Preparation of your report

Your geotechnical report has been written for your use on your project. The contents of your report may not meet the needs of others who may have different objectives or requirements. The report has been prepared using generally accepted Geotechnical Engineering and Engineering Geology practices and procedures. The opinions and conclusions reached in your report are made in accordance with these accepted principles. Specific items of geotechnical or geological importance are highlighted in the report.

In producing your report, we have relied on the information which is referenced or summarised in the report. If further information becomes available or the nature of your project changes, then the findings in this report may no longer be appropriate. In such cases the report must be reviewed, and any necessary changes must be made by us.

Your geotechnical report is based on your project's requirements

Your geotechnical report has been developed based on your specific project requirements and only applies to the site in this report. Project requirements could include the type of works being undertaken; project locality, size and configuration; the location of any structures on or around the site; the presence of underground utilities; proposed design methodology; the duration or design life of the works; and construction method and/or sequencing.

The information or advice in your geotechnical report should not be applied to any other project given the intrinsic differences between different projects and site locations. Similarly geotechnical information, data and conclusions from other sites and projects may not be relevant or appropriate for your project.

Interpretation of geotechnical data

Site investigations identify subsurface conditions at discrete locations. Additional geotechnical information (e.g. literature and external data source review, laboratory testing etc) are interpreted by Geologists or Engineers to provide an opinion about a site specific ground models, their likely impact on the proposed development and recommended actions. Actual conditions may differ from those inferred to exist due to the variability of geological environments. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions. Interpretation of factual data can be influenced by design and/or construction methods. Where these methods change review of the interpretation in the report may be required.

Subsurface conditions can change

Subsurface conditions are created by natural processes and then can be altered anthropically or over time. For example, groundwater levels can vary with time or activities adjacent to your site, fill may be placed on a site, or the consistency of near surface conditions might be susceptible to seasonal changes. The report is based on conditions which existed at the time of investigation. It is important to confirm whether conditions may have changed, particularly when large periods of time have elapsed since the investigations were performed.

Interpretation and use by other design professionals

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a geotechnical report. To help avoid misinterpretations, it is important to retain the assistance of CMW to work with other project design professionals who are affected by the contents of your report. CMW staff can explain the report implications to design professionals and then review design plans and specifications to see that they have correctly incorporated the findings of this report.

Your report's recommendations require confirmation during construction

Your report is based on site conditions as revealed through selective point sampling. Engineering judgement is then applied to assess how indicative of actual conditions throughout an area the point sampling might be. Any assumptions made cannot be substantiated until construction is complete. For this reason, you should retain geotechnical services throughout the construction stage, to identify variances from previous assumption, conduct additional tests if required and recommend solutions to problems encountered on site.

A Geotechnical Engineer, who is fully familiar with the site and the background information, can assess whether the report's recommendations remain valid and whether changes should be considered as the project develops. An unfamiliar party using this report increases the risk that the report will be misinterpreted.

Environmental Matters Are Not Covered

Unless specifically discussed in your report environmental matters are not covered by a CMW Geotechnical Report. Environmental matters might include the level of contaminants present of the site covered by this report, potential uses or treatment of contaminated materials or the disposal of contaminated materials. These matters can be complex and are often governed by specific legislation.

The personnel, equipment, and techniques used to perform an environmental study can differ significantly from those used in this report. For that reason, our report does not provide environmental recommendations. Unanticipated subsurface environmental problems can have large consequences for your site. If you have not obtained your own environmental information about the project site, ask your CMW contact about how to find environmental risk-management guidance.

Appendix A: Site Investigation Plan

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Appendix B: Hand Auger Borehole Records

Appendix C: Topographic Survey Plan Precinct 1

APPENDIX 2
BIORESEARCHES WATERCOURSE ASSESSMENT OF ECOLOGICAL EFFECTS

Bioresearches
A Babbage Company

Assessment of Ecological Effects: 84, 90 & 100 Hobsonville Road, West Harbour, Auckland.

Austino Limited

March 2024

Assessment of Ecological Effects: 84, 90 & 100 Hobsonville Road, West Harbour, Auckland. **March 2024**

DOCUMENT APPROVAL

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Prepared for:	Austino Limited
Version:	Draft
Date:	18 March 2024
Document name:	66164 – Assessment of Ecological Effects – 84 & 100 Hobsonville Road

Author:	Christel du Preez Senior Ecologist	
Reviewer:	Kate Feickert Senior Ecologist	

Reference: Bioresearches (2024). Assessment of Ecological Effects: 84, 90 & 100 Hobsonville Road, West Harbour, Auckland.. Report for Austino Limited pp 44.

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1 INTRODUCTION

1.1 Background

Austino New Zealand Limited engaged Bioresearches to complete an Ecological Impact Assessment (EcIA) in support of a private plan change (PPC) application for 86, 90 and 100 Hobsonville Road, West Harbour, Auckland (hereafter referred to as 'the site') (Figure 1). The PPC seeks to rezone the 10.7 ha site from Future Urban Zone to Residential - Terraced Housing and Apartment Building Zone, Residential - Mixed Housing Urban, and to Business - Light Industry Zone, which will be applied to under two precincts (Precinct 1 And Precinct 2). Refer to Section 0 for more details.

Bioresearches undertook an ecological constraints assessment of the site in 2019 (Bioresearches, 2019), which was used to inform this current assessment. This report addresses the potential ecological effects to accompany the PPC application, by providing:

- An assessment of the ecological values of native flora and fauna and freshwater habitats within the site;
- An assessment of the ecological effects associated with the proposed PPC; and
- Recommendations to avoid, remedy or mitigate potential adverse effects and offset and/or compensate potential residual adverse effects.

1.2 Site description

The site is located south of the Upper Harbour Motorway and north of Hobsonville Road. The surrounding area to the west is utilised for agricultural purposes, while light industrial developments are located to the east of the site. The Rawiri Stream originates between Precinct 1 and 2 and forms the eastern boundary of Precinct 2. Trig Stream forms the western boundary of Precinct 2.

The site is currently zoned as Future Urban Zone, with the north-eastern extent of Precinct 1 zoned as Open Space – Informal Recreation Zone.

Due to the historical agricultural use of the site, the primary vegetation cover over the site is exotic pasture grasses, which are maintained through mowing. Mature trees and scrub make up shelterbelts along boundaries of the site. No Significant Ecological Areas (SEA's) are located within the site or are in close proximity thereof.

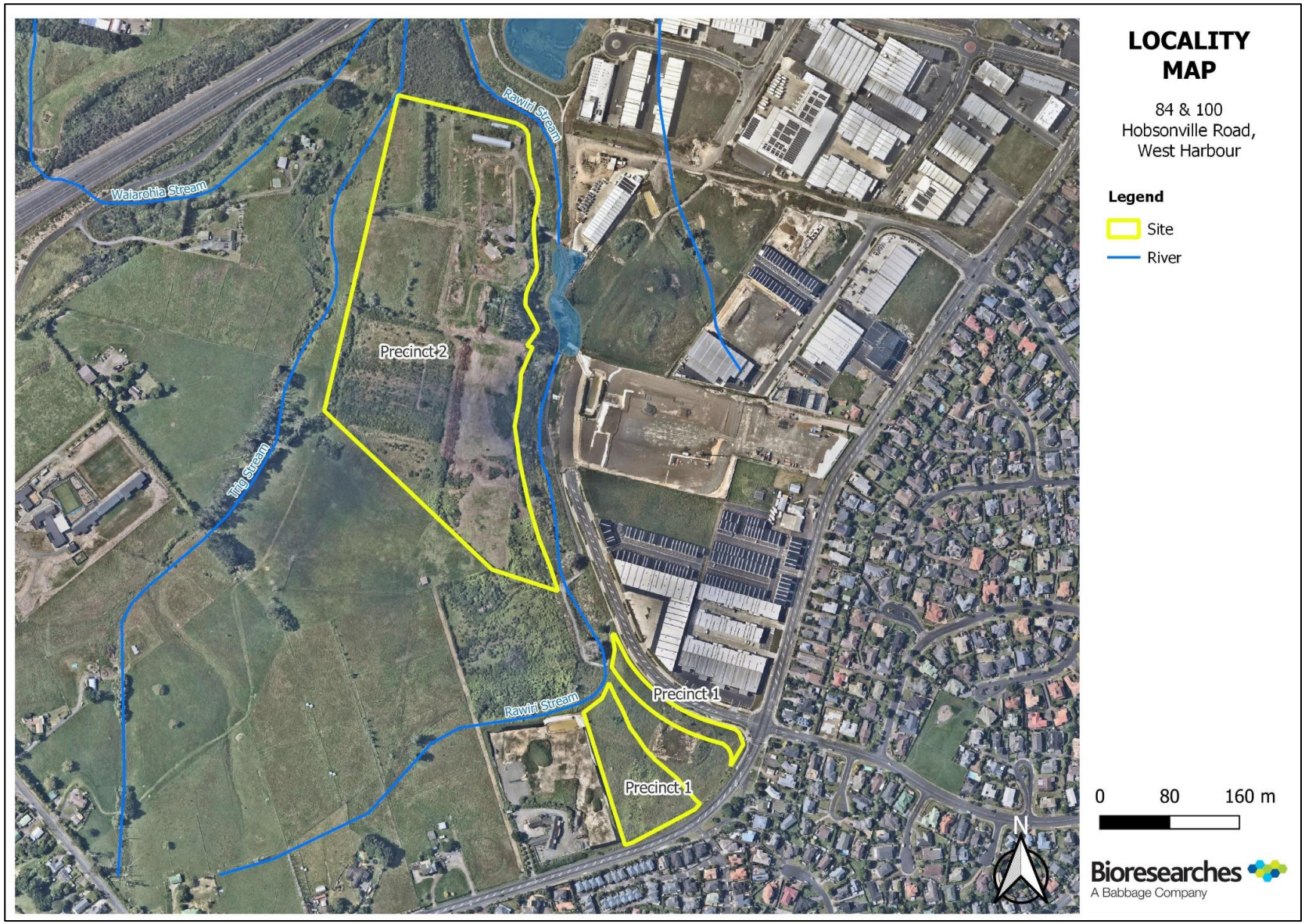

Figure 1. Overview of the site, presenting the permanent streams as obtained from Auckland Council GeoMaps.

1.3 Proposed PPC design

The following information was extracted from the Urban Design Statement (Harrison Grierson, 2023). Figure 2 and Figure 3 reflects the draft urban design.

Precinct descriptions

The proposed zoning for Precinct 1 would be 'Business - Light Industrial', which partly matches the current zoning of 84 Hobsonville Road. This would align with the existing industrial zoning adjacent, and with the wider Hobsonville industrial area. Precinct 2 are proposed a mixture of Residential - Mixed Housing Urban and Residential - Terraced Housing Apartment zoning. Both Precinct areas include a boundary interface with future urban zoned land.

Transport network

A collector road is proposed across the southern section of Precinct 2, with connections across the eastern boundary (crossing the Rawiri Stream), western boundary and the south boundary. As part of this assessment report, the effects of a proposed crossing along the eastern boundary were assessed.

There are currently three easements (A, B and C) over the Rawiri Stream to access the site from the east/Westpoint Drive. It is envisioned to combine the three easements to one location over the Rawiri Stream (to either easement A or B) and potentially relinquish easement C (the most northern crossing point).

Riparian environment

The existing riparian environment for Rawiri Stream will be enhanced through the provision of an open space zone which would be vested to council. Potential altering of the stream environment could be an opportunity as the current interface would be improved upon. Other green spaces will be incorporated along the most northern boundary of the site, as well as within the central western corner of the site.

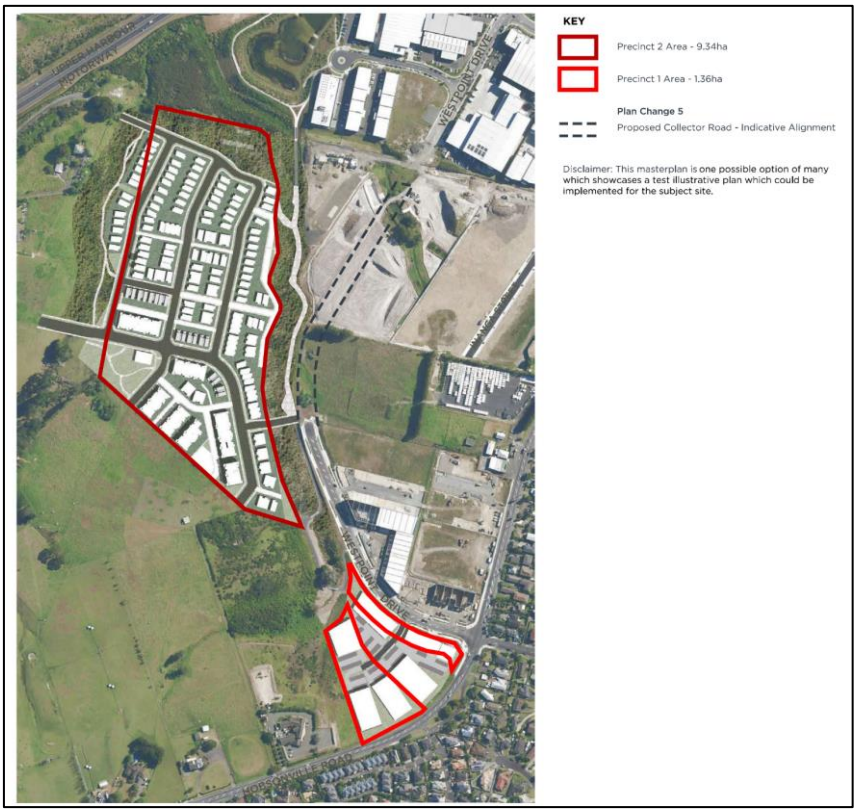

Figure 2. Draft illustrative masterplan of Precincts 1 and 2

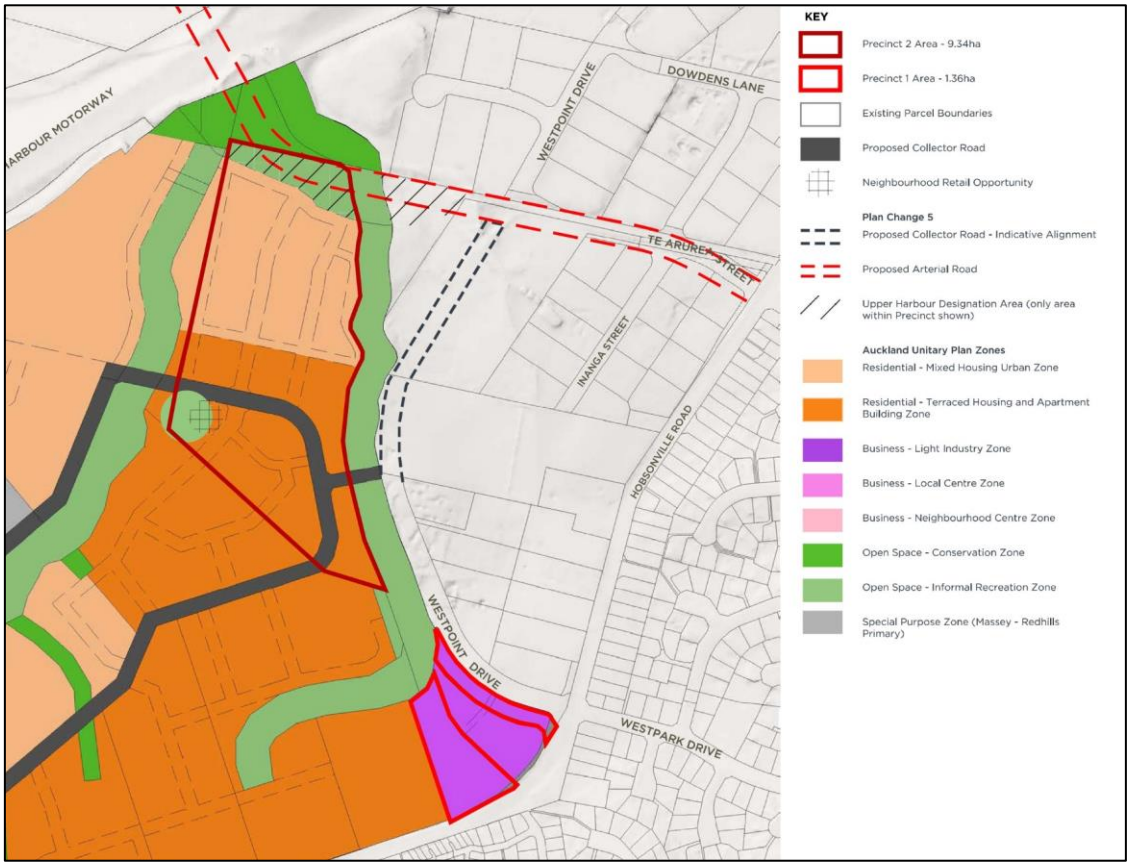

Figure 3. Draft zoning masterplan and proposed transport connections (noting the crossing of the Rawiri Stream outside the eastern Precinct 2 boundary) of Precincts 1 and 2.

2 STATUTORY CONTEXT

This section summarises the legislation, policy, plans and strategies relevant to the protection, conservation and enhancement of nature conservation interests associated with the site. Section 6.4 provides more detailed description of the relevance of the National Policy Statements (NPS) and Auckland Unitary Plan (AUP) and how the PPC meets the required objectives.

The ecological values described in this report allow significant ecological issues and adverse effects to be identified as they relate the Resource Management Act 1991 (RMA). The identification of significant values and subsequent management recommendations to mitigate adverse effects are consistent with standards and objectives of the following legislative, policy statement and regional plan documents.

2.1 Legislation

2.1.1 Resource Management Act 1991 (RMA)

The purpose of the RMA is to achieve sustainable management. Important elements of this are the maintenance of indigenous biodiversity and protection of significant indigenous vegetation and habitats. The RMA requires that any adverse effects of development be avoided in the first instance, and where avoidance is not reasonably practicable, impacts should be minimised, remedied, or mitigated. These elements are given effect in Sections 5, 6 and 7, and Schedule 4 sets out the requirements for effects assessments.

2.1.2 Wildlife Act 1953

The Wildlife Act (WA, 1953) provides legal protection to listed species classed as wildlife. It controls how people interact with Wildlife, including all native birds, bats, frogs and lizards and some invertebrates. Note is does not cover plants or freshwater fish.

2.1.3 National Environmental Standards for Freshwater (NES-F, 2020)

The National Environmental Standards for Freshwater 2020 (NES-F) set requirements for carrying out certain activities that pose risks to freshwater and freshwater ecosystems. As part of the PPC, a watercourse crossing is proposed to provide access to the site. During the resource consenting phase, an updated ecological assessment should be undertaken to ensure it aligns with the NES-F or any future environmental standards.

2.2 National policy statements

2.2.1 Freshwater

The National Policy Statement for Freshwater Management 2020 (NPS-FM) provides direction under the RMA, to local authorities on managing activities that affect the health of freshwater, and provides protections to freshwater bodies, including natural inland wetlands, includes provisions for monitoring and reporting on freshwater quality and quantity, and for addressing the impacts of land use activities on freshwater resources.

As part of the PPC, a watercourse crossing is proposed to provide access to the site. During the resource consenting phase, an updated ecological assessment should be undertaken to ensure it aligns with the NPS-FM or any future guidance policies.

2.2.2 Indigenous Biodiversity

The NPS-IB provides direction to councils to protect, maintain and restore indigenous biodiversity in the terrestrial environment, requiring at least no further reduction nationally. It is relevant to the proposal because the site is within the terrestrial environment, and it contains indigenous biodiversity as defined in Section 1.6 (Interpretation) of the NPS-IB.

The indigenous biodiversity within the site includes that which is subject to a notified Significant Natural Area (SNA, or SEA as per the Auckland Unitary Plan (AUP), NPS-IB), some of which occurs within the Special Purpose Quarry Zone (SPQZ) for the Auckland Unitary Plan, as well as indigenous biodiversity that is not subject to SNA.

The NPS-IB requires that indigenous biodiversity that is not protected by an SNA:

a. Is managed by applying the effects management hierarchy (avoid, minimise, remedy, offset, compensate), where those effects are significant.
b. is managed to give effect to its Objective and Policies, where those effects are not significant (Section 3.16 (2)).

2.3 Regional plans and policies

The Auckland Unitary Plan (AUP) is the principal statutory planning document for Auckland. It was prepared by Auckland Council for the purpose of giving effect to the RMA as a regional council and as a territorial authority.

There are no AUP overlays within the site which pertain to ecology (e.g., Significant Ecological Areas (SEAs)).

3 ASSESSMENT APPROACH AND METHODOLOGY

3.1 EcIA Assessment

This assessment generally follows the EcIA Guidelines for use in New Zealand published by the Environmental Institute of Australia and New Zealand (EIANZ) (Roper-Lindsay *et al.,* 2018). The EcIA Guidelines provide a standardised matrix framework that allows ecological effects assessments to be clear, transparent, and consistent. The EcIAG framework is generally used in Ecological Impact Assessments in New Zealand as good practice, and a detailed analysis of this methodology is presented in Appendix A.

Note that this report does not quantify any offset/compensation requirements (if applicable).

3.2 Tangata Whenua as Partners

The NPSIB recognises tangata whenua as kaitiaki of, and partners, in the management of indigenous biodiversity (NPSIB, Policy 2). At the time of preparation of this report, no acknowledged taonga species have been identified with respect to this project or are currently listed in the public domain.

3.3 Desktop Review

A desktop review of various online GIS databases was undertaken to determine the extent of ecological protection overlays (e.g., covenants, conservation land, Significant Ecological Area's (SEA)), 'ecosystem type' classifications, and visualise historical land-use using historical aerial images. The scheduling of SEAs and classification of ecosystems provides a means for Councils to protect and maintain indigenous biodiversity within Districts and Regions. The desktop review also included a search for fauna records from various information sources.

Specifically, the following databases were reviewed:

- Department of Conservation Bioweb records for herpetofauna and bats[1];
- Auckland Council herpetofauna records;
- iNaturalist records for herpetofauna and birds within approximately a 5 km radius from the site[2];
- New Zealand Bird Atlas eBird database[3]. Bird data is recorded in 10 km^2 grid squares. Grid square AB66 was accessed as this is positioned over the site[4];
- NIWA's New Zealand Freshwater Fish Database[5] records were accessed for affected stream catchments;
- Auckland Council Geomaps[6];
- Department of Conservation Threat Classification Series[7];
- Auckland Council conservation status reports for vascular plants (Simpkins *et al.*, 2022)[8], bats (Woolly *et al.*, 2023)[9], and reptiles (Melzer *et al.*, 2022)[10];
- Retrolens historic aerial imagery[11]; and
- Indigenous terrestrial and wetland ecosystems of Auckland (Singers *et al.*, 2017)[12].

3.4 Site Investigations

A site visit was undertaken on 1 March 2024. During the visit, additional information was gathered on terrestrial and freshwater habitats and native fauna presence within the site. The methodologies utilized for each of these assessments are listed below in the sections below.

[1] https://www.doc.govt.nz/our-work/monitoring-reporting/request-monitoring-data/
[2] https://inaturalist.nz/home
[3] https://ebird.org/home
[4] https://ebird.org/atlasnz/block/blkAB66
[5] https://nzffdms.niwa.co.nz/
[6] https://geomapspublic.aucklandcouncil.govt.nz/viewer/index.html
[7] All Department of Conservation Threat Classification Documents are listed in the below webpage. When individual reports are referenced hereafter, they are referenced in-text.
https://www.doc.govt.nz/aboutus/science-publications/conservation-publications/nz-threat-classification-system/
[8] https://knowledgeauckland.org.nz/media/egzhyd1g/tr2022-19-conservation-status-of-vascular-plant-species-in-auckland.pdf
[9] https://knowledgeauckland.org.nz/media/2592/tr2023-04-conservation-status-of-bat-species-in-auckland.pdf
[10] https://knowledgeauckland.org.nz/media/2324/tr2022-03-conservation-status-reptile-species-auckland.pdf
[11] https://retrolens.co.nz/
[12] https://knowledgeauckland.org.nz/media/1399/indigenous-terrestrial-and-wetland-ecosystems-of-auckland-web-print-mar-2017.pdf

3.4.1 Terrestrial Habitats

The vegetation within the site was assessed using a 'walk through' methodology. Botanic values recorded included native and exotic vascular vegetation, and notes were made on the quality and extent of vegetation present on site. Potential fauna habitats for indigenous lizards, bats and birds were assessed qualitatively.

3.4.2 Freshwater habitats

During the site assessment, the presence and extent of wetlands, streams and other freshwater habitats within the site were noted and the quality of any freshwater habitat was visually assessed as described below.

3.4.2.1 Streams

During the site assessment, the presence and extent of water was noted, reference photos were taken, and freshwater habitats were marked using a handheld GPS unit. Watercourses were classified under the Auckland Unitary Plan (AUP) to determine, in accordance with the definitions in these plans, the ephemeral, intermittent or permanent status of these watercourses (Table 1). In addition, these watercourses were assessed as to whether they were natural or artificial, in accordance with AUP definitions, using information from both the desktop review and site visit.

Table 1. AUP criteria for permanent, intermittent rivers and streams and ephemeral streams[13]

Criteria	Definition
Permanent Stream	
1	The continually flowing reaches of any river or stream, excluding ephemeral reaches
Intermittent or ephemeral stream*	
1	Evidence of natural pools
2	Well defined banks and bed
3	Retains surface water present more than 48 hours after a rain event
4	Rooted terrestrial vegetation not established across channel
5	Organic debris from flooding present on floodplain
6	Evidence of substrate sorting, including scour and deposition
***If three or more of the six assessment criteria can be met with confidence, the watercourse is considered intermittent. If at least three criteria cannot be met, the watercourse is considered ephemeral.**	

The quality of the aquatic habitat was assessed, noting ecological aspects such as channel modification, hydrological heterogeneity, riparian vegetation extent, substrate type and any fish or macroinvertebrate habitat observed. Riparian and catchment information was also reviewed.

The ecological value of the stream was then assigned based upon factors such as:

- The intactness of the riparian zone;
- Permanency of flow and complexity of habitat present within the stream;
- Observable water quality parameters; and
- Modifications to hydrology and catchment of the stream.

[13] Table reproduced from: https://content.aucklanddesignmanual.co.nz/regulations/practice-notes/Documents/RC%203.3.17%20Stream%20Classification.pdf

3.4.2.2 Natural Inland Wetlands

Potential natural inland wetlands were assessed following the Ministry for the Environment's (MfE) wetland delineation protocols (MfE, 2022) to ascertain if the area presented with the physical characteristics to be considered an RMA wetland (Figure 4), which is defined as:

> *'permanently or intermittently wet areas, shallow water, and land water margins that support a natural ecosystem of plants and animals that are adapted to wet conditions'.*

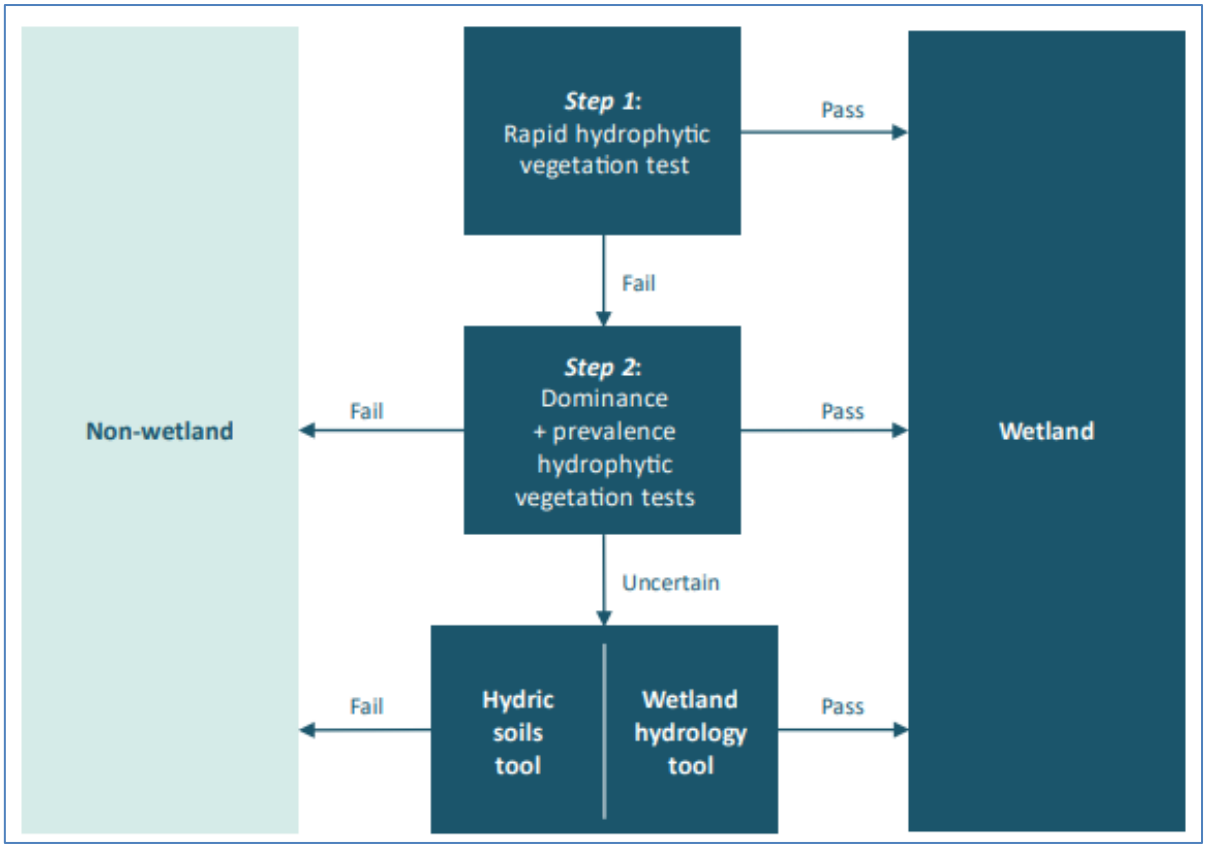

Figure 4. Simple flow chart of steps for determining an RMA wetland using the hydrophytic vegetation, hydric soils and wetland hydrology tools. Reproduced from MfE (2022).

When following this process, if the rapid test was not appropriate for determining if an area was an RMA wetland, vegetation assessment in accordance with Clarkson (2013) was undertaken; based on the dominance and prevalence of plant species assigned the following 'wetland plant indicator ratings' within a vegetation plot:

- Obligate wetland vegetation (OBL) – almost always a hydrophyte, rarely in uplands;
- Facultative wetland (FACW) – usually a hydrophyte, but occasionally found in uplands;
- Facultative (FAC) – commonly occurs as either a hydrophyte or non-hydrophyte;
- Facultative upland (FACU) – occasionally a hydrophyte but usually in uplands; and
- Upland (UPL) – rarely a hydrophyte, almost always in uplands.

Where the dominance and/or prevalence tests applied to the vegetation plot results showed unclear results, hydric soils and hydrology tests were undertaken in accordance with the associated protocol (Ministry for the Environment, 2021; Fraser *et al.,* 2021).

If the area did meet the definition of an RMA wetland, then the definition of a Natural Inland Wetland (as published in the National Policy Statement for Freshwater Management (NPS-FM)) was applied to ascertain if the area could also be considered a 'natural inland wetland'. This definition is as follows:

> ***natural inland wetland*** *means a wetland (as defined in the Act) that is not:*
> *a) in the coastal marine area; or*
> *b) a deliberately constructed wetland, other than a wetland constructed to offset impacts on, or to restore, an existing or former natural inland wetland; or*
> *c) a wetland that has developed in or around a deliberately constructed water body, since the construction of the water body; or*
> *d) a geothermal wetland; or*
> *e) a wetland that:*
> *(i) is within an area of pasture used for grazing; and*
> *(ii) has vegetation cover comprising more than 50% exotic pasture species (as identified in the National List of Exotic Pasture Species using the Pasture Exclusion Assessment Methodology (see clause 1.8)); unless*
> *(iii) the wetland is a location of a habitat of a threatened species identified under clause 3.8 of this National Policy Statement, in which case the exclusion in (e) does not apply.*

3.4.3 Fauna

Opportunistic observations of fauna during the site visits were recorded. In addition, a hand-search method was used to identify any potentially present lizard fauna under woody debris and deadfall where available (Wildlife Authority 37605-FAU, 98006-FAU), and an informal assessment of the suitability of the terrestrial habitats to support bats was undertaken, by observing the structure and features of mature trees on site. A formal bat survey was not undertaken.

4 EXISTING ENVIRONMENT

4.1 Vegetation

4.1.1 Desktop assessment

Historically (pre-1900's), the site would have been vegetated with Pūriri forest (WF7). By the 1940s, mature vegetation had been largely cleared, as indicated by the earliest historic aerial imagery available for the site (Figure 4). Typical shelterbelts and scrub vegetation were observed along the property boundaries. For the most part, it seems like the site was utilized for agricultural purposes up until fairly recently.

No other legal vegetation protections (e.g., DOC, QEII National Trust, Nature Heritage Fund Covenants, or Nga Whenua Rahu) were identified on or in the vicinity of the site.

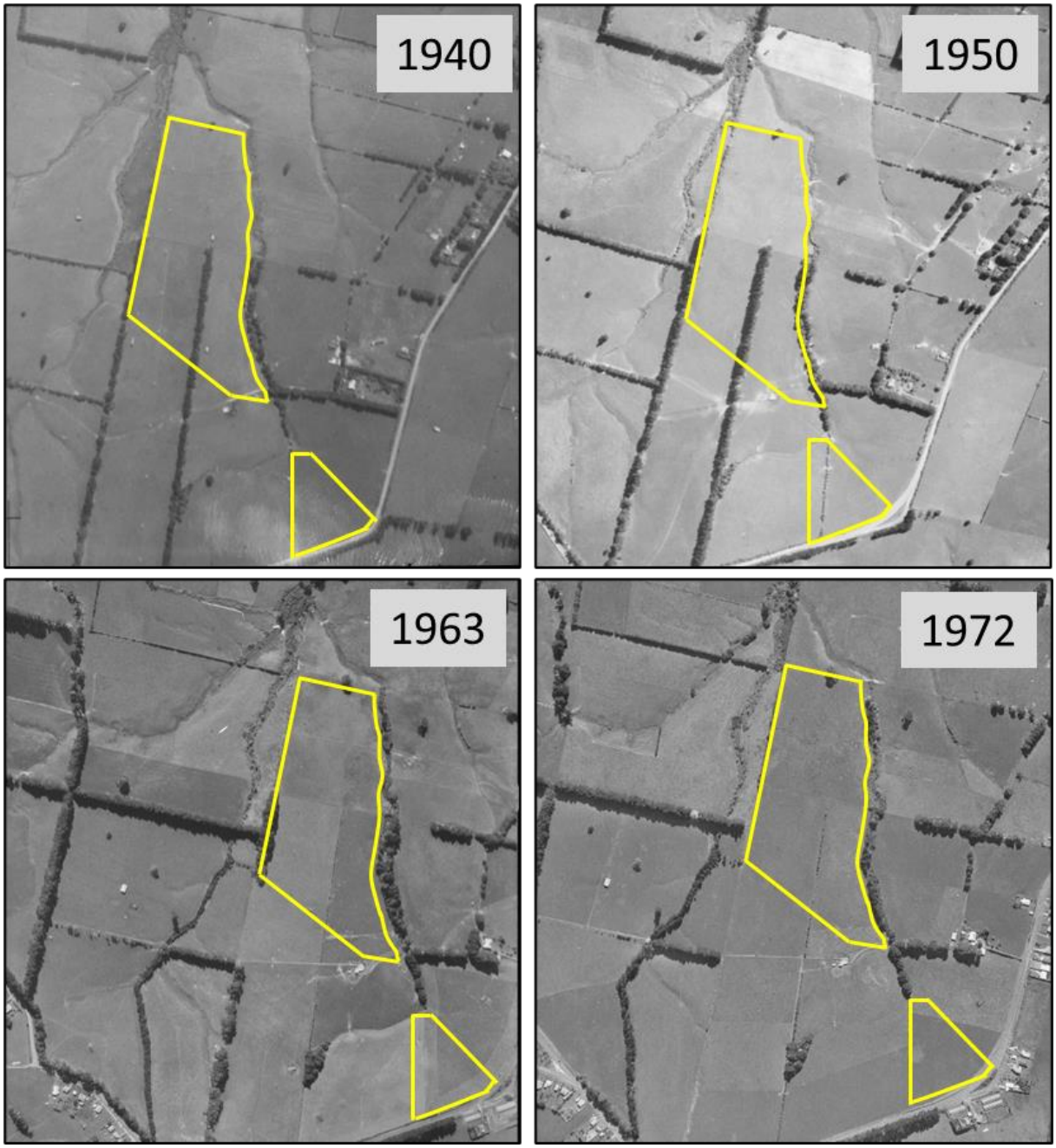

Figure 5. Historic aerial image of the site (yellow polygons) from 1940 to 1972. Imagery sourced from Retrolens.

4.1.2 Vegetation descriptions

The site does not support a recognised ecosystem classification; and the vegetation within, and surrounding the site is not subject to a SEA overlay or contains notable trees.

4.1.2.1 Precinct 1

Until 2019, the southern end of the site (where Precinct 1 is proposed) was used for pasture (Figure 6). Between 2020 and 2021, earthworks extended into the site, resulting in the removal of all vegetation. Since then, common pasture species and rank grasses have established across the site. A stockpile remains within the proposed Precinct 1 area.

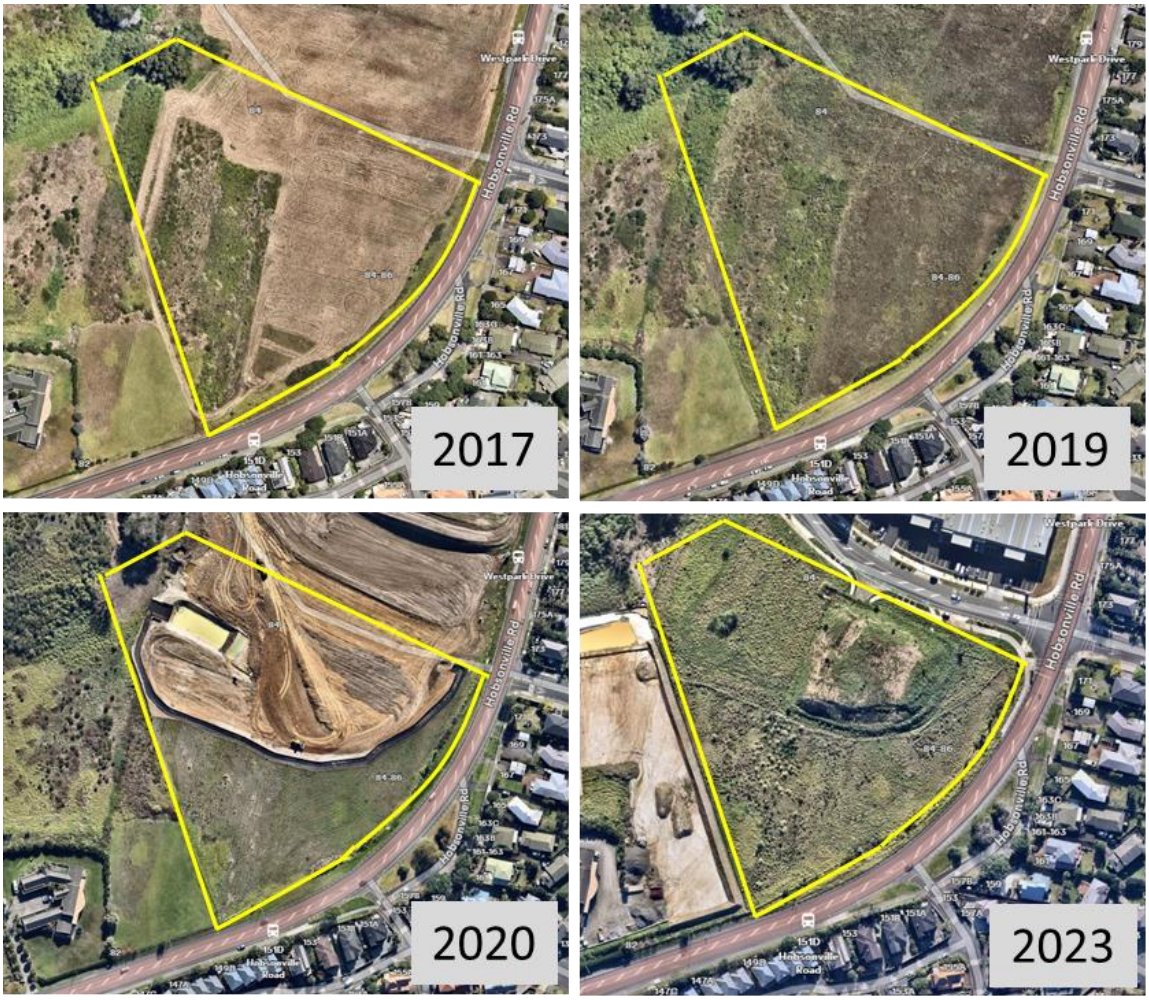

Figure 6. Overview of the land use changes to proposed Precinct 1 (yellow outline) between 2017 and 2023).

The vegetation associated with the proposed Precinct 1 primarily comprised long pasture grasses (Figure 7). A few cabbage trees (*Cordyline australis*) were observed along Hobsonville Road (likely amenity planting) and were the only native vegetation in this section of the site. Other exotic vegetation located along the road included gorse (*Ulex europaeus*), woolly nightshade (*Solanum mauritianum*) and pampas grass (*Cortaderia selloana*).

Figure 7. Overview of proposed Precinct 1. Photographs depicts the most southwestern extent (left) and northwestern extent (right) of proposed Precinct 1.

Given that the vegetation within proposed Precinct 1 consists predominantly of exotic species, lacks complexity, and is not connected to any other vegetated area, the site is considered to have **very low** botanical value.

4.1.2.2 Precinct 2

Historically, proposed Precinct 2 was also used for agricultural purposes, including pasture and fruit orchards. Following the initial assessment conducted by Bioresearches in 2019, vegetation clearing has taken place in select locations (Figure 8).

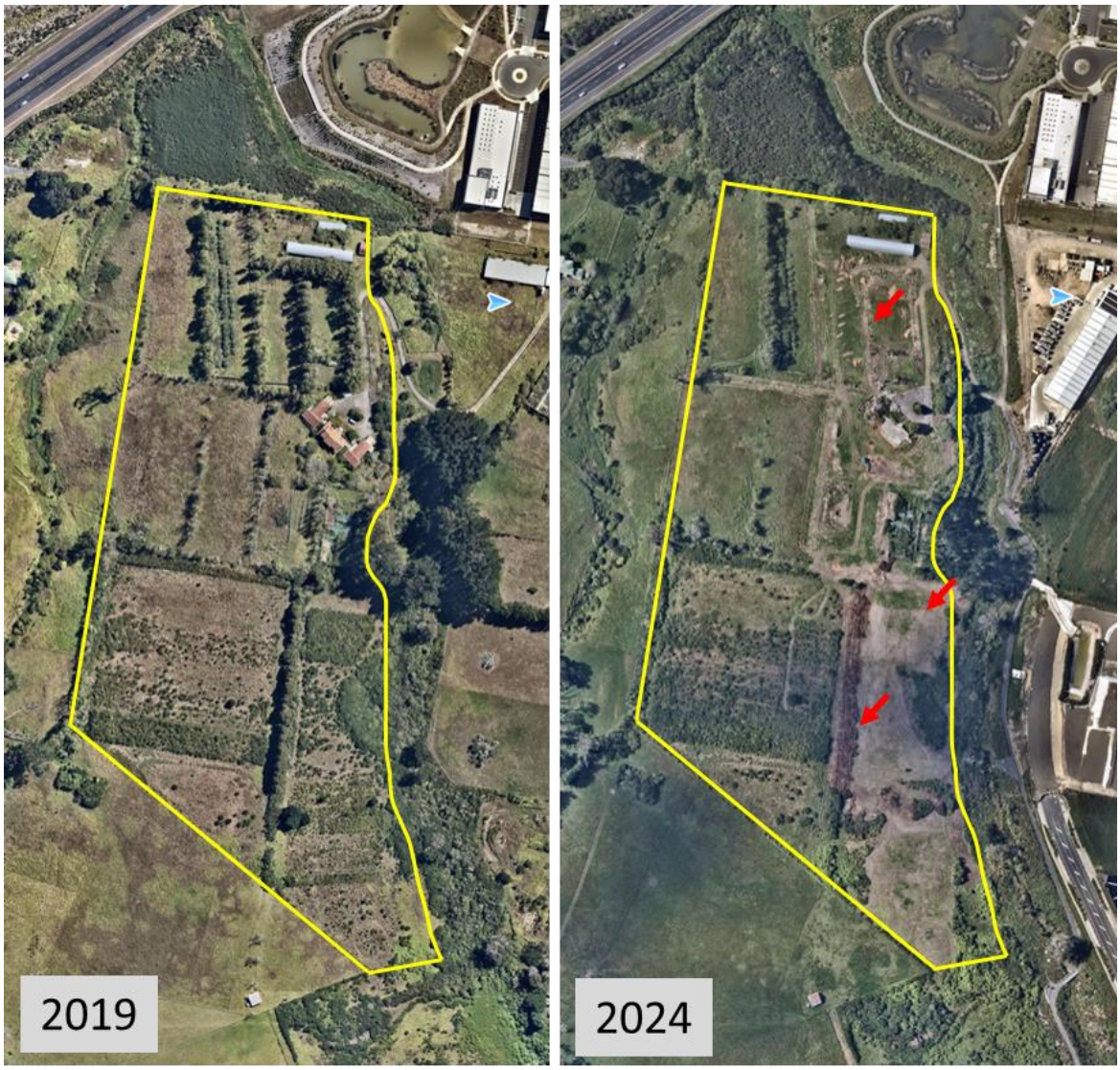

Figure 8. Proposed Precinct 2 in 2019 versus 2024, indicating (red arrows) areas of vegetation clearing.

- **Northern extent (100 Hobsonville Road)**

The vegetation of proposed Precinct 2 was predominantly composed of rank pasture grass, with shelter belts consisting of large pine (*Pinus* spp.) and feijoa (*Acca sellowiana*) trees, along with amenity plantings primarily located in the central eastern portion, surrounding the remaining building platform (Figure 9). Fruit trees have been removed in the northeastern extent of the site. Chinese privet (*Ligustrum sinense*) saplings have

sporadically established throughout the area. Native vegetation observed was limited to māhoe (*Melicytus ramiflorus*) trees, occasional cabbage trees, and pōnga (*Cyathea dealbata*).

Figure 9. (Left) Rank grasses dominate the northern portion of the site. Noting the large pine trees in the background, located along the eastern boundary of the site. (Right) Shelterbelts/fruit trees have been cut down.

- **Southern extent (90 Hobsonville Road)**

The vegetation associated with the southern portion of the site was characterized by long pasture grasses in the eastern extent and dense patches of Chinese privet, particularly in the western portion and the southernmost corner of the site (Figure 10). Japanese honeysuckle (*Lonicera japonica*) was also notable along the southeastern boundary. Native vegetation was limited to a few mamaku (*Sphaeropteris medullaris*), karamū (*Coprosma robusta*), and cabbage trees scattered sparsely across the area (Figure 11).

Considering the low diversity and abundance of native vegetation throughout proposed Precinct 2, the site is considered to be of **very low** botanical value.

Figure 10. Typical vegetation of the southern portion of proposed Precinct 2. (Left) long rank grasses surrounded by Chinese privet scrub. (Right) A strip cleared of trees (former shelterbelt) overlooking an area of short rank grasses.

Figure 11. Single native species (Left – cabbage tree; Right – mamaku) amongst the exotic species, primarily Chinese privet, gorse, and notably Japanese honey suckle (left).

4.1.2.3 Riparian vegetation along eastern boundary

Between 2020 and 2022, the riparian yard along the Rawiri Stream has undergone revegetation (Figure 12) with native vegetation as part of the industrial development situated along Westpoint Drive. This was guided by the ecological and landscape enhancement plan established by Morphum Environmental in 2015.

Prior to revegetating the riparian margin of the stream, the vegetation in the upper reaches of Rawiri Stream was characterized by a canopy dominated by exotic plant species, with some indigenous vegetation regenerating. The mid-reaches featured mature exotic trees, including stands of pine and willow trees, with patches of limited vegetated cover interspersed between the exotic stands. Vegetation in the lower reaches of the stream consisted of *Glyceria* grass species, with exotic scrub on the true left bank, and a planted true right bank incorporated into the stormwater pond landscaping (Morphum Environmental, 2015).

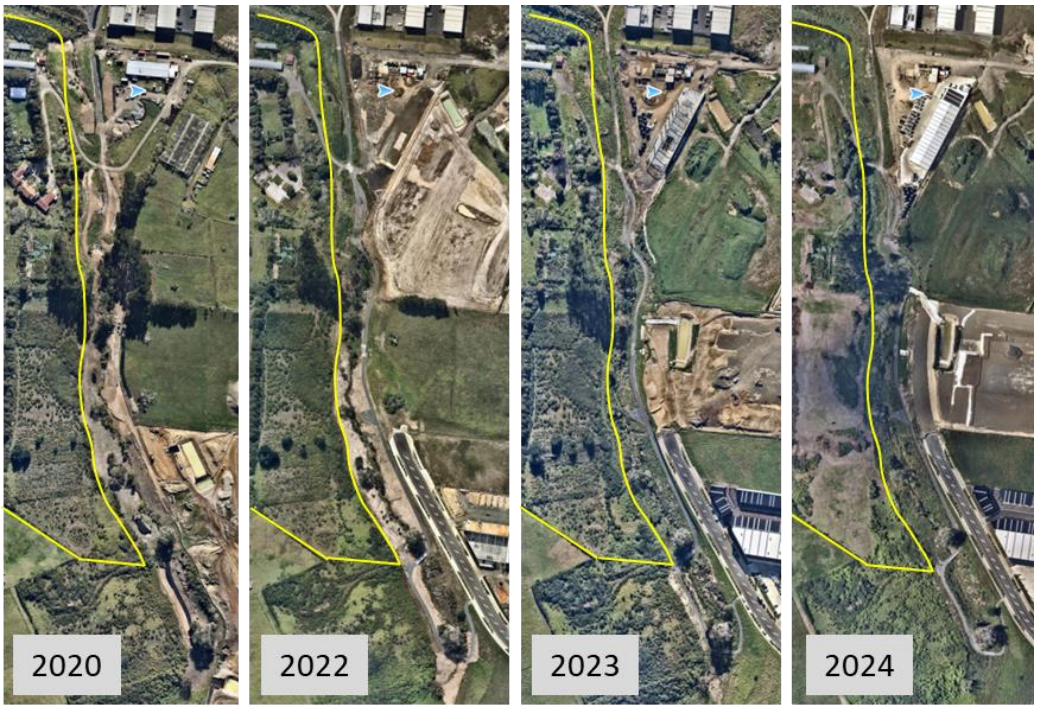

Figure 12. Revegetation of the Rawiri Stream outside the proposed Precinct 2 boundary (yellow line) between 2020 and 2024.

During the site assessment in March 2024, the riparian vegetation comprised native species such as *Machaerina* spp., a variety of *Carex* species, giant umbrella sedge (*Cyperus ustulatus*), cabbage trees and karamū. Long, rank grasses have also become established along the stream, alongside invasive exotic species such as gorse and Chinese privet.

The planting of native species within the riparian margin along the stream has not yet yielded an immediate effect on the overall ecological value of the stream. However, it is anticipated that as the vegetation becomes more established, it will eventually have a positive influence. Consequently, the riparian vegetation is currently regarded as having **low** botanical value.

Figure 13. Riparian vegetation composition of the Rawiri Stream, outside the eastern boundary of the site.

4.2 Avifauna

Table 2 lists the avifauna recorded from desktop databases; however, sea birds, pond (such as the New Zealand Dabchick) and wetland birds (such as the pūweto / spotless crake) and non-native species were excluded, due to a lack of any marine, coastal or wetland/pond habitat within or immediately adjacent to the site.

Table 2. Native avifauna identified during the desktop study, with corresponding conservation status (Robertson et al., 2021).

Conservation status	Common name	Scientific name	Record source
At Risk - Declining	North Island fernbird	*Poodytes punctata vealeae*	New Zealand Bird Atlas
Not Threatened	Masked lapwing / spur-winged plover	*Vanellus miles*	New Zealand Bird Atlas
	kererū / New Zealand pigeon	*Hemiphaga novaeseelandiae*	iNaturalist, New Zealand Bird Atlas
	Kāhu / swamp harrier	*Circus approximans*	New Zealand Bird Atlas
	pīpīwharauroa / shining cuckoo	*Chrysococcyx lucidus lucidus*	New Zealand Bird Atlas, iNaturalist
	pīwakawaka / North Island fantail	*Rhipidura fuliginosa placabilis*	New Zealand Bird Atlas, iNaturalist
	Pied Stilt / poaka	*Himantopus himantopus*	New Zealand Bird Atlas
	pūkeko	*Porphyrio melanotus melanotus*	New Zealand Bird Atlas
	pūtangitangi / Paradise Shelduck	*Tadorna variegata*	iNaturalist, New Zealand Bird Atlas
	riroriro / grey warbler	*Gerygone igata*	New Zealand Bird Atlas
	Kōtare / sacred kingfisher	*Todiramphus sanctus vagans*	New Zealand Bird Atlas
	tauhou / silvereye	*Zosterops lateralis lateralis*	New Zealand Bird Atlas, iNaturalist
	welcome swallow	*Hirundo neoxena neoxena*	New Zealand Bird Atlas, iNaturalist
	ruru / morepork	*Ninox novaeseelandiae novaeseelandiae*	New Zealand Bird Atlas, iNaturalist
	Pūkeko	*Porphyrio melanotus*	New Zealand Bird Atlas
	kakīānau / black swan	*Cygnus atratus*	New Zealand Bird Atlas
	Tūī	*Prosthemadera novaeseelandiae*	New Zealand Bird Atlas

The desktop study identified the presence of a Threatened or At Risk (TAR) bird species (North Island fernbird) within the vicinity of the site, however the North Island fernbird is found mainly in dense wetland vegetation but is occasionally found in drier shrubland. Fernbirds are also sensitive to the impacts of introduced predators. Given the low suitability of the site for fernbirds, coupled with its position near roadways (i.e. SH18/Upper Harbour Motorway to the northwest of the site) and surrounding ongoing urbanisation, it is considered highly unlikely fernbird would be present within the site. Consequently, the habitats present within the site are not considered suitable to support the TAR species identified within the desktop study.

The site is therefore expected to support a range of common, not threatened native bird species, and is consequently considered to be of **Low** ecological value for birds.

4.3 Herpetofauna

The indigenous herpetofauna of the Auckland Region includes 18 terrestrial taxa, of which 12 occur on the region's mainland (c.f. islands). A further four introduced species are also known to occur in the region (van Winkel *et al*., 2018). The terrestrial species are listed in Table 3, which also lists the species recorded within 5 km of the site during the literature search. This includes three native and one introduced lizard species. None of these identified species are located within the site, with the closest record (native elegant gecko) approximately 1.2 km south of the site.

Table 3. Terrestrial herpetofauna of the Auckland region, corresponding NZ conservation statuses and reported occurrence within 5 km of the site.

	Common name	Species name	NZ threat status*	Reported within 5 km of the site
Indigenous	***Woodworthia "Muriwai"***	Muriwai gecko	Nationally Critical	
	Mokopirirakau granulatus	Forest gecko	At Risk – Declining	
	Naultinus elegans	Elegant gecko	At Risk – Declining	✓
	Dactylocnemis pacificus	Pacific gecko	At Risk – Relict	✓
	Woodworthia maculata	Raukawa gecko	Not Threatened	
	Oligosoma ornatum	Ornate skink	At Risk – Declining	
	Oligosoma striatum	Striped skink	At Risk – Declining	
	Oligosoma moco	Moko skink	At Risk – Relict	
	Oligosoma smithi	Shore skink	At Risk – Naturally Uncommon	
	Oligosoma aff. smithi	Tatahi skink	At Risk – Naturally Uncommon	
	Oligosoma aeneum	Copper skink	At Risk – Declining	✓
	Leiopelma hochstetteri	Hochstetter's frog	At Risk – Declining	
Introduced	***Lampropholis delicata***	Plague skink	Introduced & Naturalised	✓
	Ranoidea aurea	Green and golden bell frog	Introduced & Naturalised	
	Ranoidea raniformis	Southern bell frog	Introduced & Naturalised	
	Litoria ewingii	Whistling tree frog	Introduced & Naturalised	

* Hitchmough *et al*., 2021; Burns *et al*., 2018

4.3.1 Field assessment

The opportunistic searches carried out on site (Figure 14) did not detect any native lizards, however, plague skinks were observed. The plague skink is an 'Unwanted Organism' (Biosecurity Act 1993) that has the potential to compete with indigenous skinks. However, the impacts of this species on indigenous lizards are not clearly understood and therefore, its presence does not add or detract from the site's ecological values. As this species is exotic, it is not considered further.

4.3.2 Habitat assessment for native herpetofauna

Skinks and geckos in the Auckland Region generally require dense ground cover (ground dwelling species such as copper and ornate skink) or contiguous areas of vegetation with dense foliage, cavities (such as cracks, flaky bark and hollows) and / or epiphytes (suitable for forest gecko, pacific gecko and elegant gecko (which are arboreal species)).

Native lizard habitats are largely absent from the northern portion of the site, as:

- It lacks substantial native vegetation within the site;
- The regular mowing of open green spaces is preventing development of 'rank grassland' type habitats; and
- The lack of understorey in areas associated with stands of trees.

It is unlikely that native lizards will inhabit the area due to the lack of suitable habitat within the northern portion of the site and the lack of connectivity to suitable vegetation outside of the site. However, rank grassland is present within the southern portion of proposed Precinct 2 and within proposed Precinct 1.

The habitat suitability pertaining to native geckos is considered **low,** and these are considered highly unlikely to be present, however, the site may support native skinks, in particular copper skink which are known to persist in modified, edge habitats.

Figure 14: Potential lizard habitat searched during the site visit.

4.4 Bats (pekapeka)

Two endemic species of bats (pekapeka) are found in New Zealand, including the long-tailed bat (LTB; *Chalinolobus tuberculatus*) and short-tailed bat (STB; *Mystacina tuberculata*); the latter is represented by three subspecies (O'Donnell *et al.,* 2023). Both species are listed as 'Threatened' or 'At Risk' under the New Zealand threat classification system (i.e., LTB - 'Nationally Critical' and Southern STB – 'At Risk – Recovering') (Townsend *et al*., 2008; O'Donnell *et al*., 2023). Their threat statuses reflect the chronic decline in populations across much of New Zealand, due to the loss and fragmentation of habitats and adverse impacts of pest mammals (e.g., rodents, cats), with some population recovery from conservation management apparent in Southern STB populations.

4.4.1 Desktop assessment

Department of Conservation (DOC) bat records were accessed within the vicinity of the site (Figure 15). The closest record was for a LTB, 2.1 km northwest within a raupō reedland and 1.7 km northeast of the site close to the Sinton Stream. Other LTB records were recorded southwest of the site, still within the 5 km site radius. Whilst other surveys have been completed nearer to the site (530 m to the west) which have not detected bats, the area is generally not well surveyed.

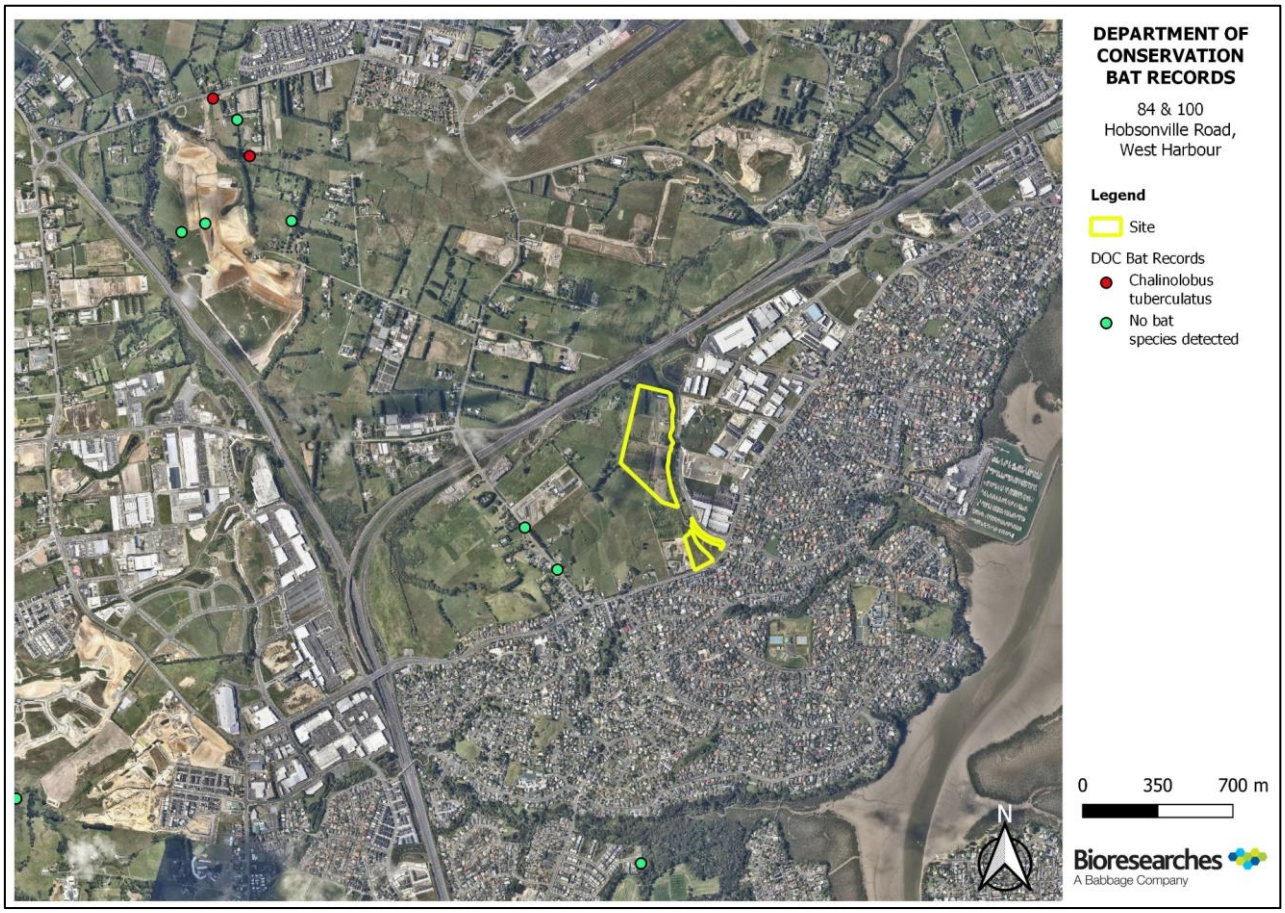

Figure 15. Bat records within the vicinity of the site.

4.4.2 Habitat assessment

Long-tailed bats utilise habitat features such as vegetated stream corridors for foraging and flight paths, and mature trees (both native and exotic) with habitat features such as loose bark, cracks or rot holes as roosts. The pine treeland along the central eastern boundary of proposed Precinct 2 may potentially provide suitable bat habitat (Figure 16).

Mature pine trees (along the central eastern boundary) that may potentially be removed from site were of large enough size to be considered as bat habitat (>15 cm DBH, or diameter at breast height). These trees also contained potential roost habitat with cavities or epiphytic vegetation present.

Although there are no bat records within the immediate vicinity of the site, or within the wider riparian corridor associated with the Rawiri Stream located along the eastern boundary of the site, LTBs can have very large home ranges (>100 km^2). It is very unlikely that the site would form an important part of a LTB's home range. However, suitable habitat, though scarce, is present on-site in the form of mature pines. The presence of LTB records within 10 km of the site, often located within similar fringe/fragmented forest pieces, also prevents the presence of LTBs from being excluded.

Jones *et al*. (2019) discusses the impact of roadways on bat habitat:

> "Either because of direct mortality or behavioural avoidance of the road due to light, noise or traffic movement, roads can be barriers to bats' foraging, commuting and migration."

The impact of the adjacent roads (such as SH18/Upper Harbour Motorway and Hobsonville Road) is likely to render the habitat significantly less important to LTBs, due to the impacts of noise, light and traffic. The value of the vegetation pertaining to native bats is therefore considered **low.**

Figure 16: Potential bat-roosting trees (pine trees) that may potentially be removed from the site.

4.5 Freshwater Habitat

Figure 17 below maps the freshwater habitats identified surrounding the site, as discussed in the sections that follows.

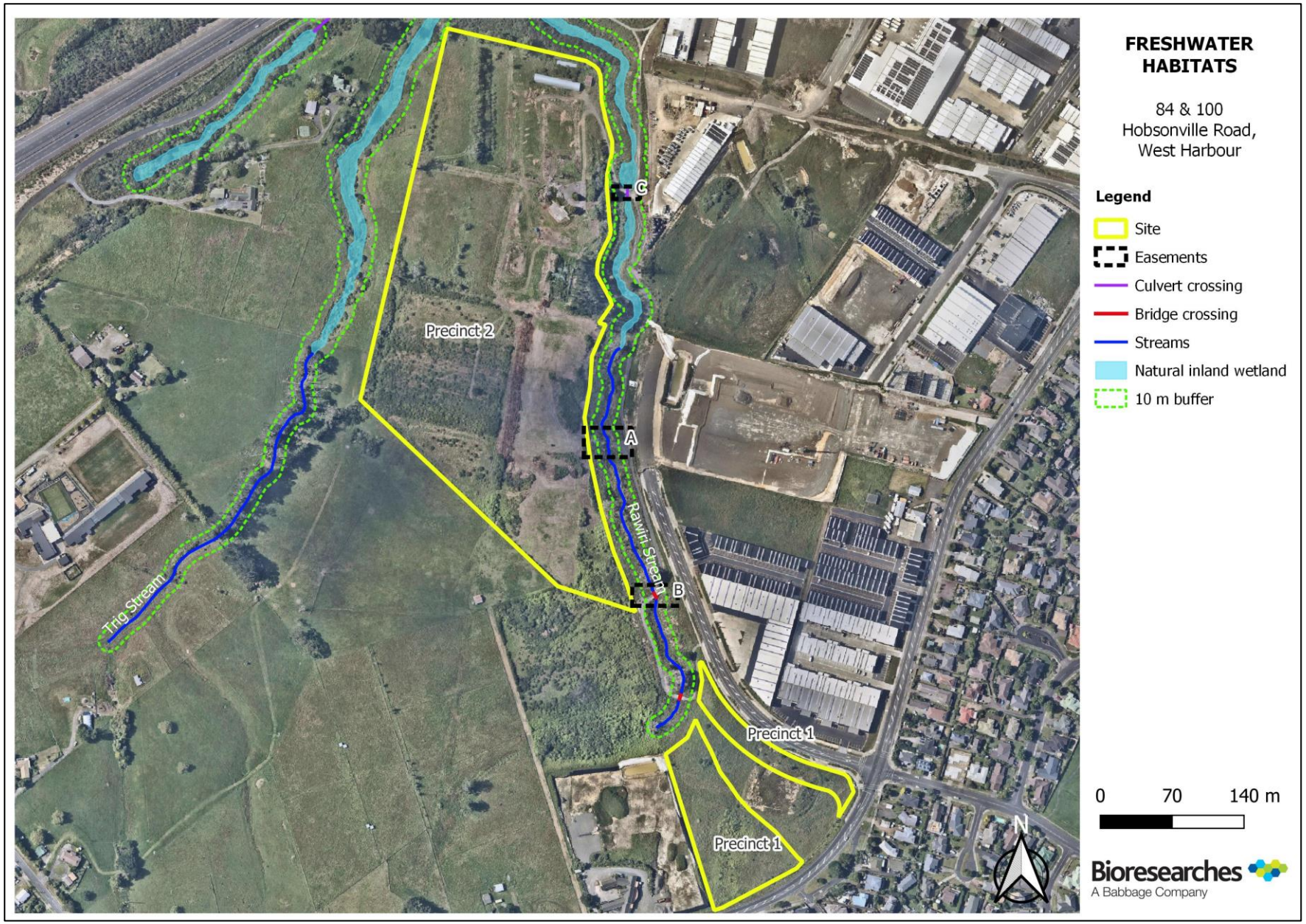

Figure 17: Freshwater habitats surrounding the site.

4.5.1 Precinct 1

According to the Bioresearches assessment conducted in 2019, none of the predicted flow paths in the southern corner of the site were classified as permanent or intermittent streams. No channels or water were observed during the site assessment in 2019, and terrestrial pasture grasses were rooted throughout the area. The earthworks carried out during 2020/2021 have also led to topographical changes in this area. However, during the 2024 site assessment, no areas presenting natural inland wetland or stream characteristics were identified.

Therefore, no freshwater watercourses are situated within the boundaries of proposed Precinct 1.

4.5.2 Precinct 2

There are no natural inland wetlands present within the boundaries of proposed Precinct 2.

As part of the 2019 Bioresearches assessment, all of the overland flow paths indicated by Auckland Council GeoMaps were investigated. It was confirmed that there are no defined channels or water in the vicinity of any of these indicated flow paths, and terrestrial vegetation, such as long pasture grass and Chinese privet, was rooted throughout these areas. Therefore, none of the indicated overland flow paths within proposed Precinct 2 met the criteria for intermittent or permanent streams.

4.5.3 Freshwater habitats outside the site boundaries

Focus was placed on providing an overview of the watercourses outside the eastern boundary of the site, since it is likely that the eventual development would require an access way crossing over this watercourse (Rawiri Stream).

4.5.3.1 Rawiri Stream

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 stream channel within the site averages between 0.7 to 1.2 m wide (Figure 18). The depth is variable, ranging from 0.25 m to approximately 0.7 m deep. The streambed primarily consists of soft sediment, with occasional gravels observed. A significant portion of the banks of the stream sections were incised (notably that of the upstream reach), and active erosion on the banks was observed. The substrate within the stream is mostly solid clay, and a high loading of fine sediment was observed, causing the water to be murky and opaque in areas of very slow-flowing water. The hydrological heterogeneity within this reach is moderate, with runs, riffles, and shallow to deep pools present in the stream. A variety of favourable aquatic habitats, including woody debris, riffles, undercut banks, and root mats, were observed.

As detailed in Section 4.1.2.3, the riparian vegetation of the Rawiri Stream consists of a mix of recently established native species and exotic weeds. While the riparian vegetation, combined with steep stream banks in the upstream reach and overhanging vegetation in the midstream reach, effectively shades the stream, the lower stream reach and wetland areas have minimal shading due to lower embankments and

less dense vegetation. Although the riparian corridor is expected to provide filtration and bank stability functions, this is currently limited due to the recent establishment of vegetation.

A desktop search for native fish records, using the New Zealand Freshwater Fish Database (NZFFDB), was undertaken within the stream catchment, but no fish have been recorded. Two native fish species, however, have been documented in the Waiarohia Stream downstream of the confluence with the Rawiri Stream. This includes Not Threatened species shortfin eel (*Anguilla australis*) and banded kōkopu (*Galaxias fasciatus*). Considering the habitat characteristics of the stream, which include suitable habitat for native fish species, it is likely that these fish species are present in the Rawiri Stream.

Overall, the Rawiri stream does retain some ecological values and the surrounding land use changes, and due to the native fish habitat, which this stream provides, it is considered of **moderate** ecological value.

Figure 18: Typical characteristics of the Rawiri Stream.

4.5.3.2 Natural inland wetland

The downstream reach of the Rawiri Stream hosts a natural inland wetland, likely formed due to sediment deposition resulting from a change in gradient or instream structure (Morphum Environmental, 2015). Hydrologically driven by frequent overbank flooding from the shallow Rawiri Stream channel flowing through it, this wetland was observed to have shallow surface water during a site visit in March 2024.

Exotic reed sweetgrass (*Glyceria maxima*), which has a wetland indicator status rating of 'Obligate' dominated the downstream reach of the wetland. Wetland areas not dominated by reed sweetgrass comprised a mixture of exotic sedges, rushes and pastural weeds including mercer grass (*Paspalum distichum* - FACW), paspalum (*Paspalum dilatatum* - FACU), Yorkshire fog (*Holcus lanatus* - FAC), soft rush (*Juncus effusus* - FACW), water pepper (*Persicaria hydropiper* - FACW), buttercup (*Ranunculus repens* - FAC), narrow-leaved plantain (*Plantago lanceolata* - FACU) and lotus (*Lotus pedunculatus* - FAC). This wetland passed the 'Rapid Test' and was classified as a 'natural inland wetland' under the NPS-FM, and therefore no further tests (i.e., soil or hydrology) were undertaken.

The hydrologic variation and habitat diversity within the wetland was assessed as low, comprising shallow surface water. However, the shading provided by the recently planted riparian margin would provide moderate value habitat for native freshwater fauna both within the stream and the wetland. Despite being dominated by exotic weed species, the wetland serves important hydrological functions and is considered to have **moderate** ecological value.

Figure 19: Overview of the wetland associated with the Rawiri Stream. The wetland dominated by mercer grass and willow weed looking downstream (top left) and upstream (top right) of an existing culvert crossing (easement C). Reed sweetgrass dominated the lower reach of the wetland (bottom).

Another natural inland wetland is located outside the western boundary of the site (Figure 20), associated with the Trig Stream. While this wetland was not ground-truthed, its extent depicted in Figure 17 is delineated based on desktop analysis. Given its characteristics, including a homogeneous cover predominantly consisting of what appeared to be mercer grass, and a lack of riparian vegetation coverage, it was assumed to possess similar ecological value to that of the Rawiri Stream wetland.

Figure 20: Overview of the wetland located outside the western boundary of the site.

5 ECOLOGICAL VALUE

Table 4 combines the fauna and habitat information presented in Section 4 to assign an ecological value for each habitat present within the site.

Table 4. Summary of ecological values of habitats and species within and surrounding the site. The ecological value is assigned by considering the information discussed in Section 4 on the structure and condition of the habitats combined with their potential to support native fauna.

Habitat	Botanic value	Species which habitat may support				Ecological value of habitat
		Avifauna	Herpetofauna	Bats	Fish	
Grassland vegetation within Precinct 1	Very Low	Unlikely to support any more than common, Not Threatened species.	Potentially supports copper skink.	No	N/A	**Moderate**
Grassland vegetation within Precinct 2	Very Low	Unlikely to support any more than common, Not Threatened species.	Potentially supports copper skink.	No	N/A	**Moderate**
Mature pine treeland within Precinct 2	Very Low	Unlikely to support any more than common, Not Threatened species.	No	May provide a flight corridor and roosting habitat, although highly unlikely to be important habitat or frequently visited.	N/A	**Moderate**
Riparian corridor vegetation	Low	Unlikely to support any more than common, Not Threatened species.	Potentially supports copper skink.	May provide a flight corridor and roosting habitat, although highly unlikely to be important habitat or frequently visited.	N/A	**Moderate**
Rawiri stream	N/A	Unlikely to support any more than common, Not Threatened species.	N/A	N/A	Could be utilised by native fish, however this isn't likely to be high-value habitat.	**Moderate**
Rawiri Stream wetland	N/A	Unlikely to support any more than common, Not Threatened species.	N/A	N/A	Could be utilised by native fish, however this isn't likely to be high-value habitat.	**Moderate**

6 ASSESSMENT OF ECOLOGICAL EFFECTS

The proposed PPC seeks to rezone approximately 10.7 ha of land from predominantly FUZ to either residential zones (proposed Precinct 2) or Business – Light Industrial Zones under the AUP. No additional provisions are proposed as part of the PPC. All Auckland-wide and zoning provisions within the AUP will apply to the re-zoned land and will enable Auckland Council to regulate and manage future development of the area.

The main threats to the long-term viability of ecosystems in the Auckland regions include habitat destruction, fragmentation, edge effects and invasion by pest plants and animals. These threats are often augmented through an increase in human population density.

This section assesses the potential effects of the proposed PPC on the current and potential ecological values within the site and the associated wider landscape. It is noted that any future development of the site is likely to require resource consenting and therefore be subject to more detailed assessments of effects.

6.1 Terrestrial Ecology

6.1.1 Terrestrial Vegetation

Future rezoning to residential/business will likely result in the majority of the site being cleared of vegetation to facilitate development. While this development will be subject to future resource consents, the plan change ultimately enables a fundamental change in land use. However, despite the future dominance of residential (Precinct 2) and business (Precinct 1) land use, there will be opportunities to retain existing ecological values where appropriate and protect land from further degradation through considered design. There will be opportunities to enhance terrestrial ecological values through revegetation and the protection of the riparian margin and development of an esplanade reserve. These potential enhancements will increase the quantity and diversity of native vegetation within the site, as well as result in a large increase in ecological connectivity and available terrestrial habitat for indigenous fauna.

Future residential/business zoning is expected to result in a high magnitude of effect due to the expected total clearance of the site. This will largely be the removal of exotic species from site (specifically Chinese privet) but may include native scrub vegetation suck as karamū. Exotic vegetation within the riparian margin of the Rawiri Stream is proposed to be removed to improve the biodiversity value of this habitat. Larger specimen trees that may need to be removed (and which provide value to fauna) should be replaced with native species that provide a similar fauna function. It is noted that exotic vegetation removal has already occurred within the riparian margin of the Rawiri Stream (refer to Section 4.1.2.3), as such, removal of any young exotic specimens that has established since then does not warrant addressing effects associated with loss.

However, it will also provide opportunities for restoration and enhancement that would provide significant improvement in regard to terrestrial ecological values.

6.1.1.1 Terrestrial vegetation - Objectives and policies

Chapter E15 of AUP outlines the direction for managing vegetation and biodiversity across the Auckland region. The AUP requires the maintenance or enhancement of contiguous indigenous vegetation cover and biodiversity values, with provisions for addressing degraded ecological areas while also acknowledging the necessity for development. This enhancement involves activities such as managing and removing pest plants along riparian areas, which is a permitted activity under Chapter E15.4.1.

Although there is a general emphasis on protecting contiguous vegetation cover, instances where vegetation removal (albeit predominantly grassland and exotic scrub) is unavoidable in small areas are anticipated. Any adverse effects resulting from these activities will be mitigated through on-site restoration, enhancement planting, and weed control measures along the Rawiri Stream corridor.

For any rezoning that occurs in urban areas, it will be a restricted discretionary activity to carry out vegetation alteration or removal within 10 m of a stream (Table E15.4.1; A19). This is not considered to be likely, as the Rawiri Stream and wetland, is located more than 10 m outside of the site boundaries.

6.1.1.2 Pest Mammals

The future residential zoning of proposed Precinct 2 is expected to lead to a significant increase in the human population density within the area. An increase in human population density has been found to decrease possum and rodent numbers, and increase domestic cats in residential areas (Miller, 2020). In turn, mustelids numbers can become very limited where cats are in abundance.

The current site is not known to have pest control measures, and most pest mammals are likely at carrying capacity. The anticipated reduction in agricultural land with an urban re-zone will likely result in an overall decrease in the possum, mustelid, and rodent abundance, however, may increase hedgehog and domestic cat numbers. Overall, urbanisation of the site is expected to provide positive outcomes for reducing pest mammal populations within the site. Future rezoning to urban will provide opportunities for increases in vegetation cover and increases in ecological spaces within then site, which would provide opportunities to decrease possum, mustelid, hedgehog and rodent densities.

6.1.2 Terrestrial fauna

The current land use within the site has led to the replacement of native vegetation with rank and pasture grasses. Ecologically valuable areas are thus limited, mostly confined to the eastern boundary of the site, specifically associated with the Rawiri Stream.

The transition from FUZ to residential/business land use may have indirect implications for native terrestrial fauna due to habitat loss and reduced food sources. However, the majority of vegetation along the riparian margin will likely be further enhanced through infill planting and weed management. Consequently, the anticipated impact is deemed low to moderate, with the retained vegetation likely improving in quality under the proposed changes.

Potential indirect consequences of the land use change include alterations to light and noise levels, as well as disturbances during and after construction, especially during sensitive periods like breeding seasons. Although it is acknowledged that, over recent years that urbanisation surrounding the site has rapidly increased, and some of these aspects already impact on the site.

The removal of vegetation carries the risk of adversely affecting terrestrial fauna. Direct impacts on bats, birds, and herpetofauna could include damage to roosts, nests, eggs, and fledglings, as well as the loss of individuals during vegetation removal, construction, and earthworks.

The Wildlife Act 1953 protects native fauna such as bats, lizards and birds. Therefore, it is a legal requirement to manage potential direct and indirect effects on fauna which may result from the clearance of vegetation and potential bat, avifauna, and lizard habitat across the site. Management plans are proposed to address high level changes associated with the plan change, which will be required and implemented through resource consent activities. As such, it is considered important to manage both direct and indirect effects on fauna resulting from vegetation clearance and potential habitat loss. To address these concerns, surveys for native fauna should be undertaken during the resource consenting phase, so that effects can be avoided, and appropriate effects management strategies can be integrated into the design, to minimise effects to native fauna as much as possible. If native species are detected, management plans must also be composed (during the resource consenting phase) to focus on the proposed changes associated with the PCC.

6.1.2.1 Bats

Land-use changes in the site will have the potential to directly and indirectly affect LTB's that may potentially be in the immediate area. Potential direct effects may include foraging, commuting and roost habitat loss; injury and/or death of individual bats (in a worst-case scenario) during tree felling; and impacts on foraging and commuting behaviour patterns due to changes in levels of artificial light. Indirect effects may include an increase in predation pressure in the landscape due to an increase in pest numbers (e.g. rats, cats).

The small pine treeland located along the central eastern portion of the site (proposed Precinct 2) may potentially provide suitable bat habitat. These trees have the potential to be utilised as roosting habitat for native bats. If a tree with bats roosting inside was felled (removal thereof yet to be confirmed), this could lead to the death or injury of native bats.

It is recommended that a bat survey be undertaken to determine the presence or absence of bats. If they are found to be present, the design of the Precincts should consider how bats are using the site to ensure that connectivity is maintained to minimise habitat loss for bats, and a site-specific Bat Management and Monitoring Plan (BMMP) should be prepared to manage potential adverse effects on LTB's. The BMMP should at a minimum outline roost tree felling protocols, contingencies measures for the incidental detection of bats during felling operations, and appropriate measures to compensate for the roost trees, where necessary (e.g. provision of artificial roost box and monitoring).

Overall, the change in land-use may impact LTB's. However, provided a survey is completed which allows for the finalised precinct designs to not result in a net loss of bat habitat, and maintain habitat connectivity for bats; and a BMMP is developed by the time of resource consenting, to include appropriate management measures, it is considered these adverse effects can be adequately managed.

Should the finalised precinct designs not result in a net loss of bat habitat and maintain habitat connectivity for bats; and any effects management measures detailed in a BMMP be implemented, it is considered that the magnitude of effects of the proposed vegetation clearance to bats would be low.

6.1.2.2 Herpetofauna

The site and riparian yard contain low value herpetofauna habitat, and there is a low potential for the presence of copper skinks. All indigenous reptiles and amphibians are legally protected under the Wildlife Act 1953, and vegetation and landscape features that provide significant habitat for native herpetofauna are protected by the Resource Management Act 1991. Statutory obligations require management of resident reptile and amphibian populations if they are threatened by land disturbance i.e., land development.

The clearance of the vegetation within Council land, as it pertains to fauna values, could result in the harm or mortality of indigenous skinks. Potential direct and indirect effects of vegetation removal include tree removal, habitat loss, and food resources loss, however it is considered the enhancement planting and weed management of the Rawiri Stream will provide an improvement on the current situation in the long-term.

To confirm if lizards are present in the site, a lizard survey should be undertaken. If this confirms that native lizards are absent from these areas, the vegetation could be removed without further consideration of lizards. However, if the survey detects that native lizards are present, or if a lizard survey is not undertaken, a Lizard Management Plan (LMP) should be prepared to manage potential effects of the vegetation clearance to lizards. The LMP should address the following (where relevant):

- *Credentials and contact details of the ecologist/herpetologist who will implement the plan;*
- *Timing of the implementation of the LMP;*
- *A description of methodology for survey, trapping and relocation of lizards rescued including but not limited to: salvage protocols, relocation protocols (including method used to identify suitable relocation site(s)), nocturnal and diurnal capture protocols, supervised habitat clearance/transfer protocols, artificial cover object protocols, and opportunistic relocation protocols;*
- *A description of the relocation site(s); including discussion of:*
    - *provision for additional refugia, if required e.g., depositing salvaged logs, wood or debris for newly released native skinks that have been rescued;*
    - *any protection mechanisms (if required) to ensure the relocation site is maintained (e.g.) covenants, consent notices etc;*
    - *any weed and pest management to ensure the relocation site is maintained as appropriate habitat.*
- *Monitoring methods, including but not limited to:*
    - *baseline surveying within the site;*
    - *baseline surveys outside the site to identify potential release sites for salvaged lizard populations and lizard monitoring sites;*
    - *ongoing annual surveys to evaluate translocation success;*
    - *pre and post – translocation surveys; and*
    - *monitoring of effectiveness of pest control and/or any potential adverse effects on lizards associated with pest control;*
- *A post-vegetation clearance search for remaining lizards.*

If these effects management measures are followed, it is considered that the magnitude of effects of the proposed vegetation clearance to lizards would be low, resulting in an overall **Low** level of effect. No further effects management measures for lizards are required.

6.1.2.3 Birds

The vegetation removal activities on site have the potential to disturb nesting common native birds utilising the affected vegetation. Adult birds are likely able to relocate themselves during vegetation removal, and the surrounding area contains many areas of higher quality habitat than the vegetation proposed to be removed, which any displaced birds can utilise.

However, chicks and eggs are at risk of injury or death during vegetation removal activities, as they are not able to relocate themselves. Consequently, the following effects management measures are proposed to reduce the likelihood of impacts to native birds:

> *"Vegetation removal must be undertaken outside the main native bird breeding season (September to January inclusive) except where a suitably qualified ecologist has confirmed that vegetation is clear of any native nesting birds, eggs, or chicks. Should an active nest be found, a 10 m exclusion zone must be demarcated, and works must remain outside of this zone until the chicks have fully fledged."*

If these effects management measures are followed, it is considered that the magnitude of effects of the proposed vegetation removal upon birds would be low.

6.2 Freshwater Ecology

6.2.1 Rawiri Stream

The proposed PPC will not affect stream protection measures required by the AUP's objectives, policies and rules. The PPC will not require any stream works. Any future stream works undertaken as part of future development will be subject to resource consenting at a later stage.

A stream crossing will be required to facilitate access to the site, likely associated with easement A or B (Figure 17). It is anticipated that future stream crossings will adhere to best practices, resulting in minimal effects on aquatic values. An updated ecological assessment of the Rawiri Stream and assessment of the effects of the proposed access road crossing should be undertaken during the resources consenting phase. Given the Rawiri Stream's narrow channel, the use of a short-span bridge structure is highly recommended. This will avoid any stream works, maintain flow within the stream and ensure ongoing fish passage throughout the stream.

Future residential/business rezoning is expected to result in changes to water quality as a result of changes in land use. Rural waterways tend to be affected by high sediment loads, nutrients and stock faecal contamination, while urban waterways tend to be affected by altered hydrological regimes, heavy metals and hydrocarbons. During development there will be the opportunity for riparian margin restoration and protection, and treatment of contaminants as part of the wider development.

6.2.2 Natural inland wetlands

Since no natural inland wetlands are located within the site, no reclamation of wetlands is expected. Considering that the Rawiri Stream wetland is located directly adjacent to the site (within 100 m of the site, but more than 10 m away from the site - Figure 17), it may potentially be subjected to indirect effects. Resource consents will be required as part of the resource consenting stage, and the effects of any changes to wetlands, will be assessed at that stage.

6.2.3 Earthworks and associated sedimentation

Earthworks activities associated with the land use change, including any works in watercourses, have the potential to result in an uncontrolled discharge of sediment laden water. Increased sediment in the receiving environment can impact water quality within the surrounding streams and wetlands and result in sediment deposition, changing habitat features. Further, modifications to landforms through earthworks can result in changes to contributing catchments.

Activities such as earthworks, associated with the change in land use, carry the risk of sediment-laden runoff to enter watercourses. The streams and wetlands can be negatively affected by increased sediment inputs, specifically on factors like water quality and altered habitat characteristics, similar to what possibly led to the development of the Rawiri Stream wetland. Additionally, alterations to landforms through earthworks may affect the contributing catchments.

While the potential alterations to the contributing catchments remain unclear, measures to control earthworks will be addressed at the time of resource consent. However, it is anticipated that potential sediment effects resulting from earthworks across the site can be effectively managed through the implementation of erosion and sediment control plans (ESCPs) designed and maintained in accordance with Auckland Council's GD05 - Guidance for Erosion and Sediment Control. Special attention should be given to areas where earthworks are planned in close proximity to the Rawiri Stream and its associated wetland.

Development of these ESCPs will reduce the potential for an uncontrolled discharge of sediment laden water to the receiving freshwater environment, to an overall low magnitude of effects.

6.2.4 Stormwater management

The main threats to the freshwater ecology, as a result of a the proposed residential/business zones, are in relation to stormwater through:

- The potential increase in impervious surfaces as a result of subsequent development (change in water quantity and the hydrological regime); and/or,
- The potential increase in pollutant runoff as a result of subsequent development (change to water quality).

Future development of the land for urban purposes is expected to result in an increase in impervious surfaces. This increase can amplify the adverse stormwater effects on the receiving freshwater environment by resulting in scouring, erosion or high levels of contaminant inputs. The Rawiri Stream and wetland is already receiving stormwater runoff from neighbouring industrial developments (along the eastern side of the stream). Increased impervious surfaces have the potential to alter the volume and rate at which stormwater enters the receiving environment. High velocity flows can cause stream erosion and scour, which

contributes to bank instability and sediment deposition. In contrast, baseflows can be reduced as a result of infiltration being reduced as surface flows are directed to the stormwater network.

The national, regional and local regulations and guidelines outline the requirement of a Water Sensitive Design (WSD) approach to be undertaken for stormwater for any future development. The aim of this is to protect and enhance downstream environments and mimic natural water systems and processes for stormwater management. Auckland Council GD01 and GD04 provides guidance on applying a water sensitive urban design approach to treating urban stormwater runoff. This includes using devices such as swales, rain gardens, tree pits and permeable paving to treat stormwater prior to it entering the receiving environment.

To align with the NPS-FM and NES-F, future stormwater design will be required when rezoning occurs, to avoid adverse effects on any freshwater habitats surrounding the site, by minimising erosion through appropriate setbacks, achieving net neutrality and minimising/avoiding partial or complete wetland drainage.

The following WSD examples should be considered (but are not limited to) as part of the stormwater design includes:

- It is preferable that stormwater devices/management infrastructure be located outside of the delineated extent of streams and wetlands;
- It is preferred to have all stormwater discharges located in the highest possible point in the catchment;
- It is preferred that discharge be first to land or to a constructed wetland or raingarden, and not directly into a natural inland wetland or stream, as this will allow for water filtration and reduced the attenuate flow into the wetland or stream;
- Drainage of wetlands that would alter its water level range or hydrological regime must be avoided;
- Ensure well designed erosion control measures.

A preliminary stormwater management plan (SMP), prepared by Harrison Grierson in 2023, has been developed to guide the approach to stormwater management for the site. It proposes the construction of seven raingardens/constructed wetlands, aligned with the proposed staging plan. The draft SMP adheres to Auckland Council GD01 and GD04 recommended designs for managing stormwater, taking into account water quality, stream hydrology, and flood prevention. The stormwater management strategy adopts a communal management device approach (e.g., rain gardens/constructed wetlands) and aligns with the region-wide Network Discharge Consent (NDC).

6.3 Summary of terrestrial and freshwater effects

Table 5 summarises the potential ecological effects of the PPC upon the ecological features.

Table 5: Summary of effects, management measures and expected level of effect on native terrestrial and freshwater values

Habitat / Species	Potential effect	Summarised recommended effects management measures	Level of effect
Avifauna	Removal of suitable habitat vegetation (i.e. mature trees)	Remove vegetation outside of the breeding season or undertake pre-clearance surveys	Low
Herpetofauna	Removal of grassland vegetation	Maintain site conditions to prevent lizard habitat formation; undertake a lizard survey and/or implement LMP if conditions change	Low
Bats	Removal of potential suitable habitat (i.e. mature Pine trees) Indirect effect of light and noise on bat passage	Undertake bat survey and/or implement BMMP Any potential effects are likely to be reduced by infill planting the corridor along Rawiri Stream	Unknown until bat survey implemented. Very low to low
***Rawiri Stream Wetland**	Potential loss of catchment yield	Ensure suitable stormwater management devices are installed to maintain predevelopment catchments.	Very low
	Indirect effects of the development (i.e. untreated stormwater runoff, sedimentation)	Planting of wetland and 10 m buffer with native species. Implement ESCP	Very low/ possibly a positive effect Very low
***Rawiri Stream**	Vegetation removal within 10 m as part of access road crossing	Implement ESCP	Very low
	Access road crossing construction (assumed no stream works)	Planting of stream riparian zones with native vegetation	Very low
	Loss of catchment yield	Ensure suitable stormwater management devices are installed to maintain predevelopment catchments.	Very low

*Updated ecological and effects assessment to be undertaken as part of the resource consenting phase, when confirmed locality and design of the crossing structure is available.

6.4 Relevant Policy Documents

6.4.1 National Policy Statements

6.4.1.1 National Policy Statement for Freshwater Management (NPS-FM) 2020

The NPS-FM provides national direction for decisions regarding water quality and quantity, and integrated management of land, freshwater and coastal environments under the Resource Management Act 1991. The NPS-FM contains national objectives for protecting ecosystems, indigenous species and the values of outstanding water bodies and wetlands.

The main objective of the NPS-FM is to ensure the health and well-being of water bodies and freshwater ecosystems are prioritised. The PPC is in accordance with the objective of the NPS-FM as all freshwater ecosystems have been identified within the site; no wetland/stream reclamation or works are proposed and any potential significant adverse effects identified during future re-zoning to urban will be able to be appropriately avoided, minimised, remedied or offset under the effects management hierarchy.

As part of the PPC, a watercourse crossing is proposed to provide access to the site. During the resource consenting phase, an updated ecological assessment should be undertaken to ensure it aligns with the NPS-FM or any future guidance policies.

6.4.1.2 National Policy Statement for Indigenous Biodiversity (NPS-IB)

The NPS-IB provides direction to councils to protect, maintain and restore indigenous biodiversity in the terrestrial environment, requiring at least no further reduction nationally. It is relevant to the proposal because the site is within the terrestrial environment, and it contains indigenous biodiversity as defined in Section 1.6 (Interpretation) of the NPS-IB.

The indigenous biodiversity within the site includes that which is subject to a notified Significant Natural Area (SNA, or SEA as per the Auckland Unitary Plan (AUP), NPS-IB), some of which occurs within the Special Purpose Quarry Zone (SPQZ) for the AUP, as well as indigenous biodiversity that is not subject to SNA.

The NPS-IB requires that indigenous biodiversity that is not protected by an SNA:

c. Is managed by applying the effects management hierarchy (avoid, minimise, remedy, offset, compensate), where those effects are significant.
d. is managed to give effect to its Objective and Policies, where those effects are not significant (Section 3.16 (2)).

There are no AUP overlays within the site which pertain to ecology (e.g., Significant Ecological Areas (SEAs)).

6.4.2 Auckland Unitary Plan

The AUP sets out a number of policies and objectives that gives effect to the RMA to promote the sustainable management of natural and physical resources. This section addresses the objectives and policies set out in the AUP pertaining to ecology.

6.4.2.1 B2 – Urban Growth and Form

Consistent with B2, through vegetation protection and enhancement, the PPC will provide ample opportunity to enhance the quality of the natural environment, including those scheduled in the AUP. Additionally, it has been demonstrated above that the adverse environmental effects of the PPC, including potential significant adverse effects on receiving waters, will be avoided/minimised.

Adverse environmental effects of urban rezoning in future, including significant adverse effects from urban development on receiving waters that can be appropriately avoided, remedied or mitigated.

6.4.2.2 B7 – Natural Resources

Consistent with B7, areas of significant indigenous biodiversity value and freshwater environments have been identified within and surrounding the site, and these areas will not be adversely affected by the proposed PPC.

Urbanisation of the site in future will provide opportunities for all freshwater habitat to be protected from significant adverse effects of subdivision use and development, as well as provide further opportunities to maintain indigenous biodiversity through the protection, restoration and enhancement of areas where ecological values are degraded and where development is occurring, namely through planting and protection of riparian margins.

6.4.2.3 E1 – Water Quality and Integrated Management

Consistent with E1, the PPC to residential/business zones avoids adverse effects on freshwater systems as no physical works are proposed, since no watercourses are located within the site. However, consideration should be given to a potential access road crossing over the Rawiri Stream.

Anticipated future urbanisation can appropriately manage discharges, subdivision and development that affect freshwater systems to maintain or enhance water quality, flows, stream channels and their margins.

6.4.2.4 E3 – Lakes, Rivers, Streams and Wetlands

Consistent with E3, upon investigation of the site, no watercourses are present within the site, by streams and wetlands are located in close proximity to it, specifically along the eastern boundary. Additionally, reclamation and adverse effects will be avoided, and future residential/business development within the site provides opportunities to protect and enhance the freshwater systems.

6.4.2.5 E15 – Vegetation Management and Biodiversity

Consistent with E15, the vegetation and biodiversity values of the site have been identified. The PPC avoids adverse effects on vegetation and biodiversity values (through the application of relevant management plans) within the site and receiving environments.

Subsequent urban rezoning in future is expected to provide opportunities to maintain and enhance ecosystem services and indigenous biodiversity values, particularly in sensitive environments, and buffer any areas of existing indigenous vegetation cover (such as the Rawiri Stream), while providing for appropriate subdivision, use and development.

6.4.2.6 Appendix 1 – Structure Plan Guidelines

Consistent with the Structure Plan Guidelines, it has been demonstrated that the PPC provides opportunities and mechanisms to protect and maintain natural resources, particularly those that have been scheduled in the AUP.

6.4.3 Auckland Plan 2050

The Auckland Plan 2050, states that Auckland's natural environment is inextricably connected to Aucklanders' sense of identity and place. Auckland's natural environment not only supports its people, but it is home to many special local ecosystems and is essential for the survival of both indigenous wildlife and species from across the world. However, many of Auckland's treasured natural environments, ecosystems, and indigenous species are already under significant pressure from human activity, and some are in decline. To reverse this decline, Auckland must ensure that development is sustainable and has minimal negative impacts on the natural environment.

Consistent with the Auckland Plan 2050, the proposed PPC and anticipated future rezoning provides opportunity to restore degraded ecosystems where appropriate, while providing for appropriate development.

6.4.4 Auckland's Urban Ngahere (Forest) Strategy

Auckland's Urban Ngahere (Forest) Strategy was formed to protect Auckland's urban ngahere in the face of a growing and urbanising population through supporting principles such as; preference for natives, ensure urban forest diversity, protect mature healthy trees, create ecological corridors and connections and access for all residents.

The expected future urbanisation of the site will be consistent with the Urban Ngahere Strategy, as it will create opportunities for enhancement of ecological corridors, connections and diversity through the planting of native riparian vegetation and maintaining existing vegetation where practicable, while also providing for public access.

7 SUMMARY

The impact of rezoning from FUZ to residential/business zones has been considered in relation to the terrestrial and freshwater values present on site. It is considered that the proposed PPC is appropriate for the site.

The ecological values of the site reflect those typically associated with its historical rural land uses and its current surrounding urban development. While isolated areas of higher ecological value have been noted, the terrestrial ecological values within the site are primarily attributed to the majority of low-value exotic vegetation. It is crucial to conduct thorough bat surveys to ascertain the potential presence of bats utilizing the site and the identified habitats. No freshwater habitats are present within the site, but consideration was given to the Rawiri Stream, and wetland located outside the eastern boundary of the site, which are both considered of moderate ecological value.

Future development of the site is anticipated to provide for the appropriate protection and enhancement of indigenous terrestrial and freshwater biodiversity values of the site and surrounding areas. It is recognised that the operative AUP and the NES-F provide a framework that manage any proposed future development at the resource consenting phase to ensure development aligns with the appropriate polices and regulations.

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9 APPENDICES

Appendix A – Ecological Impact Assessment Methodology

The assessments were undertaken in general accordance with Ecological Impact Assessment guidelines, published by the Environment Institute of Australia and New Zealand (EIANZ; Roper-Lindsay *et al*. 2018). The Guidelines provide criteria for assigning value to habitat for assessment purposes. Values are assigned (High, Moderate, Low, Very Low, Table 7) based on the following four assessment matters (as described in Roper Lyndsay et al. 2018):

1. Representativeness
2. Rarity / Distinctiveness
3. Diversity / Pattern
4. Ecological Context

The level of effect is then determined by determining the magnitude (Table 8) and combining the value of the ecological feature/attribute with the score or rating for magnitude of effect to create a criterion for describing the level of effects (Table 9). The cells in Table 9 italics in represent a 'significant' effect under the EIANZ 2018 guidelines.

Cells with low or very low levels of effect represent low risk to ecological values rather than low ecological values *per se*. A moderate level of effect requires careful assessment and analysis of the individual case. For moderate levels of effects or above, measures are expected to be introduced to avoid through design, or appropriate mitigation needs to be addressed (Roper-Lindsay *et al*. 2018).

Table 6. Criteria for assigning value to habitat/species for assessment.

Value	Determining Factors
Very High	Nationally Threatened species found in the 'zone of influence' (ZOI) either permanently or seasonally. Area rates 'High' for at least three of the assessment matters of Representativeness, Rarity/distinctiveness, Diversity and Pattern, and Ecological Context. Likely to be nationally important and recognised as such.
High	Species listed as At Risk – Declining found in the ZOI either permanently or seasonally. Area rates 'High' for two of the assessment matters, and 'Moderate' and 'Low' for the remainder OR area rates 'High' for one of the assessment matters and 'Moderate' for the remainder. Likely to be regionally significant and recognised as such.
Moderate	Species listed as At Risk – Relict, Naturally Uncommon, Recovering found in the ZOI either permanently or seasonally. Locally uncommon or distinctive species. Area rates 'High' for one of the assessment matters, 'Moderate' or 'Low' for the remainder OR area rates as 'Moderate' for at least two of the assessment matters and 'Low' or 'Very Low' for the remainder. Likely to be important at the level of the Ecological District.
Low	Nationally and locally common indigenous species. Area rates 'Low' or 'Very Low' for majority of assessment matters, and 'Moderate' for one. Limited ecological value other than as local habitat for tolerant native species.
Negligible	Exotic species including pests, species having recreational value. Area rates 'Very Low' for three assessment matters and 'Moderate', 'Low' or 'Very Low' for the remainder.

Table 7. Criteria for describing the magnitude of effects (EIANZ 2018)

Magnitude	Description
Very High	Total loss of, or a very major alteration to, key elements/features of the existing baseline conditions, such that the post-development character, composition and/or attributes will be fundamentally changed and may be lost from the site altogether; AND/OR Loss of a very high proportion of the known population or range of the element/feature.
High	Major loss of major alteration to key elements/features of the existing baseline conditions such that the post-development character, composition and/or attributes will be fundamentally changed; AND/OR Loss of a high proportion of the known population or range of the element/feature.
Moderate	Loss or alteration to one or more key elements/features of the existing baseline conditions, such that the post-development character, composition and/or attributes will be partially changed; AND/OR Loss of a moderate proportion of the known population or range of the element/feature.
Low	Minor shift away from existing baseline conditions. Change arising from the loss/alteration will be discernible, but underlying character, composition and/or attributes of the existing baseline condition will be similar to pre-development circumstances and patterns; AND/OR Having minor effect on the known population or range of the element/feature.
Negligible	Very slight change from the existing baseline condition. Change barely distinguishable, approximating to the 'no change' situation; AND/OR Having negligible effect on the known population or range of the element/feature.

Table 8. Criteria for describing the level of effects (EIANZ 2018). Where text is italicised, it indicates 'significant effects' where mitigation is required.

Magnitude of Effect	Ecological Value				
	Very High	High	Moderate	Low	Negligible
Very High	*Very High*	*Very High*	*High*	*Moderate*	Low
High	*Very High*	*Very High*	*Moderate*	Low	Very Low
Moderate	*High*	*High*	*Moderate*	Low	Very Low
Low	*Moderate*	Low	Low	Very Low	Very Low
Negligible	Low	Very Low	Very Low	Very Low	Very Low
Positive	Net Gain	Net Gain	Net Gain	Net Gain	Net Gain

APPENDIX 3
WAIAROHIA CULVERTS URS MODELLING REPORT

Report

Waiarohia Culverts - Modelling Report

30 AUGUST 2012

Prepared for

Auckland Council

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URS

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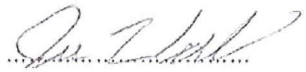

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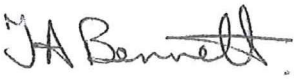

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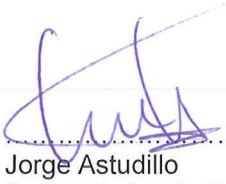

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Executive Summary

Auckland Council appointed URS New Zealand Limited to undertake a review of the installed and designed culverts beneath State Highway 18; Hobsonville Deviation in the Waiarohia catchment.

This Model Build Report is a defined deliverable, highlighting the model build process for the Waiarohia stormwater catchment model and discussion of the results.

The Waiarohia catchment has a total area of approximately 4.45 km^2 (445 ha) and the catchment boundary was defined using the true topographic catchment.

Currently, stormwater runoff from the study area drains overland to a number of small tributaries in Waiarohia catchment that cross SH18 through a variety of culverts, which discharge back to creeks that discharge into the Waiarohia inlet; making them tidally influenced.

The model was constructed in the hydraulic and hydrologic software package, InfoWorks ICM v2.0, using asset data based survey provided by the Council in tabular format, CAD/Geographic Information System databases and record drawings provided by HEB. Missing information or more detailed information were assumed or inferred using engineering judgement. Data sources and inferences made in the course of this model were flagged in Infoworks Model.

Data uncertainty was encountered mainly due the various sources of information; their weights were ranked based on the hierarchy presented in this document.

Two land use scenarios were modelled and called land use Scenario 1 and Scenario 2 respectively. The former incorporating Plan Changes 14, some of Plan Change 13 and the second adding Fulton Hogan Precinct A2 and potential development associated with Whenuapai Stage 2 ICMP.

The 100 year design storm with climate change was run for both Land Uses with a constant tide of 1.89 mRL as indicated in the Auckland City Council Flood Modelling Specifications. This report summarises the maximum capacity of the different culverts under surcharging conditions, and the maximum flow that each culvert conveys on design event basis. In summary most culverts surcharge for the 24 hour 100 year storm event with climate change for both Land Use Scenarios. However surcharge is not predicted to result in increased flood risk to the proposed urban development, motorway or roadways and flood extents are confined within localised storage and the motorway designation.

Landuse scenario 2 produces more runoff than Landuse scenario 1 as it is more impervious, consequently it drives higher peak flows.

Appendix D contains flood extent areas for each design event.

No calibration was undertaken as this falls outside of the agreed scope of works.

This report details only the model build process and results analysis, and does not cover water quality issues.

Introduction

Auckland City Council appointed URS New Zealand Limited to undertake a review of the designed and installed culverts beneath State Highway 18; Hobsonville Deviation in the Waiarohia catchment.

The scope of works initially covered by this project in February 2012 included:

- Use of hydrologic and hydraulic modelling to review the capacity of installed and designed culverts beneath State Highway 18; Hobsonville Deviation.
- The mapping of flood extents for the 100 year ARI storm event.

Assumptions and limitations of this study are summarised in Section 2.2.6.

Deliverables included:

- A brief modelling report describing the modelling methodology, assumptions and including the hydraulic capacity of the culverts.
- Shapefiles of the flood extents and depths for each scenario.
- Land use and geology maps.
  Hydrologic and hydraulic model.

Following review of the DRAFT report issued on 24th February 2012 additional tasks were added to the scope of work. They included the following :

- Update model to reflect downstream connection of Culvert O to existing pipework
- Update the ground model upstream of Culvert O based on survey provided by Watercare Services Ltd.
- Analysis of effective performance of Culvert M as a result of changes to Culverts L and O
- Model the upstream manhole of Culvert I as a closed manhole as requested by GHD
- Increase catchment draining to Culvert L in line with Crang Civil survey around the bowling club.
- Update flood extent to reflect the above changes

This report details only the model build process, initial observations, assumptions, results of the initial and additional scope of work; but does not cover water quality issues.

This study also includes the interpretation of model predictions in order to identify key areas in the catchment where there are issues as a result of network performance (i.e. flooding).

The overall modelling approach was carried out in accordance with Auckland Council Modelling Specifications 2011, allowing for the fact that Infoworks ICM was used.

Methodology

2.1 General

The Waiarohia catchment has a total area of approximately 4.45 km^2 (445 ha). The catchment boundary for this study was defined using the true topographic catchment.

Currently, stormwater runoff from the study area drains overland to a number of small tributaries in the Waiarohia catchment that cross SH18 through a variety of culverts, which in turn, discharge to downstream tributaries that flow into the Waiarohia inlet.

2.1.1 Modelling Approach

InfoWorks ICM v2.0 (an Innovyze Software package) has been used to model this catchment. The software enables the construction of an integrated hydrological and hydraulic model, with 1D and quasi 2D features enabling a good representation of the flow paths. The hydrological model calculates the runoff from various land uses during rainfall, while the hydraulic model routes the calculated runoff through a 1-dimensional representation of the reticulated pipe network. Flood compartments were built between cross sections and over storage areas to show flooding extent in the model.

This study required a modelling approach that could facilitate the comparison of a large number of options, both hydrological and hydraulic. The model therefore includes the following components:

- Hydrological sub catchments with land use delineation (pervious and impervious) for the land use as defined by the 2007 Plan Change 14 and 13 shape files as provided by Auckland Council, Precinct A2 as derived from URS previous contaminant load model work for Fulton Hogan Limited and the shape file created for the potential future development of the Whenuapai Stage 2 ICMP area. Land use layers were created in GIS;
- Time-series rainfall input;
- Hydrological runoff calculation;
- Stormwater network, including reticulation, natural storage areas and watercourses.

Each of these components is discussed in detail below.

In May 2012, the network model was slightly modified to reflect the results of recent survey completed by Auckland Council and that provided by Watercare Services Limited. Key changes to the network included the following:

- The upstream manhole at culvert I (I-1) was sealed following a request from Council to model this scenario
- Delineation of the subcatchments that drain to Culverts L and M was revised following survey in the vicinity of the bowling club
- Extension of the downstream extent of Culvert O to include the existing 75 m pipe
- Update of the storage area upstream of Culvert O based on the survey data provided by Watercare Services Ltd.
- Adjustment of the ponding area upstream of Culvert M based on the new survey data
- Addition of a potential overland flow path between Culverts M and O

The results of these revisions to the model are addressed in subsequent sections of this report.

2.2 Construction of the model

2.2.1 Hierarchy

The model was constructed using a number of sources of information; with the basis being the Council's asset data i.e. culvert as- built drawings as provided by HEB and available GIS information for the system. Where information was unavailable it was inferred from that which was provided.

The data hierarchy for the model is as follows, with Level 1 considered to be the most reliable, and Level 3 the least reliable.

Level 1 - Asset survey/information provided in tabular format.

Level 2 - Site visits.

Level 3 – LiDAR (ground levels only).

Level 4 – Road DEM

2.2.2 Ground Model

A "merged" ground model was generated as follows:

- A 1m x 1m DEM was available that was generated from Auckland LiDAR data; this DEM included the "road" area but excluded the new land forms beside the road;
- A DEM was generated from the points provided in AutoCAD by the contractors and converted to 12D format. 12D was used to output a 1m grid with 1metre vertical resolution. The previous DEMs were merged and imported in Infoworks ICM to be used in the model.

Figure 2-1 Waiarohia's Ground Model

2 Methodology

2.2.3 Culverts

This assessment only included those culverts that were available in the AutoCAD/GIS shapefiles provided, thus 14 culverts were included.

Geometry, inlet conditions, inverts and material were obtained via Council representatives and compiled in a summary table by URS; this source of information is considered reliable and assumes to have the highest hierarchy level. The table is included in Appendix A.

An unnamed culvert next to culvert B was identified on the CAD drawings provided, its existence is certain, but not its properties; thus it was assumed that it is identical to culvert B; this assumption was flagged up in the model respectively, this culvert was named as XXX to allow us to report it and map it. The team attempted to visit the culvert but was unable to gain access to the site in order to obtain specific data.

All the culvert entrances had vertical headwalls and appropriate head losses to account for the presence of the walls were assumed. These coefficients are defined in the Culvert Design Manual (1997) published by CIRIA and available in the Infoworks ICM help, see Table 2-1. These values were cross checked against manual headloss calculations (Hy8 method) and found to be comparable.

Table 2-1 Head loss coefficients for square edge headwalls

Material	Inlet type/edge type	Parameters					
		Type	K	M	c	Y	Ki
Concrete	Headwall / square edge	A	0.0098	2	0.0398	0.67	0.5

Colebrook-White was the chosen method to model friction head losses assigning a constant coefficient of 1.5 which is considered reasonable for concrete pipes.

Storage areas were included at the entrance of the culverts to simulate the effect of on-site attenuation due to water “backup” behind the culverts. The attenuation capacity of these storage areas is approximate as they were extracted from the DEM.

Specific site survey was not undertaken for this project, therefore this model was based on the levels supplied by the Contractor; nevertheless a few culvert outlets/inlets did not match with the ground model. This caused the inverts to be inconsistent with the ground model and therefore a 1D connection was made in order to assure hydraulic correctness, but flooding of the area will not be correctly represented until the ground model issue is resolved.

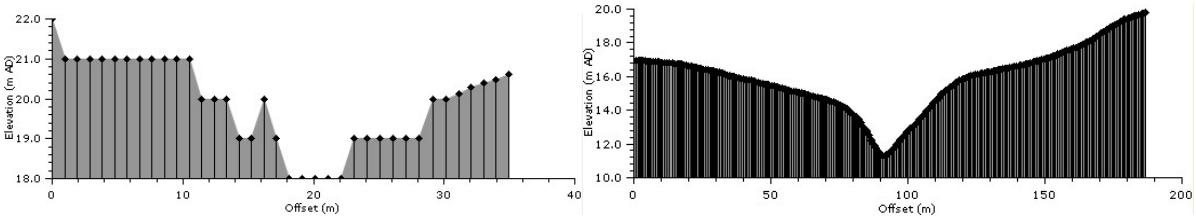
2.2.4 Open drains/creeks and tidal influence

No rivers/streams upstream of the crossings were included in the model as this is not the aim of this study; however all the creeks/open drains and downstream of the crossings were included.

All stream cross sections were sampled from the provided ground model. Sections sampled in areas covered by the LiDAR ground model were smooth, whereas those sampled over the 1 metre DEM were coarser, see Figure 2-2 below where the example on the left shows the inferred DEM and the other the LiDAR. This led to some degree of uncertainty in the model and that has to be taken in consideration when reviewing the results.

2 Methodology

Figure 2-2 Cross Section Sampled



All the cross sections were connected through flood compartments wide enough to predict flooding in all the areas potentially inundated. They were all assigned a Manning coefficient of 0.06 which is considered conservative.

The stream tributaries eventually discharge into Waiarohia inlet and are therefore tidally influenced. A constant tide of 1.89 mRL was assigned to all the scenarios, this tide level was assumed from Auckland Council Stormwater Flood Modelling Specifications. During wet weather the main stream surcharges next to the estuary due to its tide influence. Ingress of sea water in areas next to the estuary is likely especially during high tide and wet weather conditions. The downstream invert of culverts O was found to be below the constant tide level.

2.2.5 Special Structures

No major structures in this catchment needed to be included in the model except for a scruffy dome at the entrance of culvert L (see Figure 2-3). This was modelled in a similar way to a bell-mouth spillway: a broad-crested weir connected to a culvert that is laid out at a deeper level, this weir regulates the amount of inflow in the culvert.

Figure 2-3 Scruffy Dome at the entrance of Culvert L

2.2.6 General assumptions of the model

The following assumptions were made for the modelling:

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- The model includes culverts and their associated catchments.
- The basis of the rainfall volumes were determined using SCS as specified in TP108
- A Mannings coefficient of 0.06 was assigned for channel roughness
- Modelling was based on the 2007 LiDAR DEM. Modified DEM was not provided, but was created from provided survey points as provided on Auto-CAD drawings.
- Existing sub-catchments were automatically generated based on LiDAR.
- Culvert as-built drawings were available but did not include all culvert properties.
- Future sub-catchments were not determined based on specific information regarding to the Fulton Hogan Development and Ponds 1 and 2 as these were not made available.
- Two landuse scenarios were modelled and the most conservative was assumed to be that detailed the Draft Whenupai Stage 2 ICMP.
- Storage areas, pipes and other infrastructure necessary to build an appropriate model were provided; therefore they were completely sampled from the DEM.
- Discharge curves from proposed Auckland Council stormwater treatment and detention ponds were not provided and therefore the potential effects of these ponds on culvert capacity were not assessed.
- Water quality ponds to treat the runoff from the SH18 were not included. Details of these structures were not available and they were not designed to control big storm events, which is the purpose of this work. The assumption is these devices are pre/post and therefore could be disregarded as contributing flows would be similar to pre-developed conditions.

2.2.7 Hydrology

Rainfall assumptions:

The scope of the present study is to model and assess culvert capacities for the 100 year ARI storm event with and without climate change. These storms were defined using Auckland Council's TP108 methodology and verified by using the online HIRDS database available from the NIWA website.

The "Preparing for Climate Change guideline" suggests percentage adjustments per degree of warming to apply to extreme rainfalls; values are given for various average recurrence intervals (ARIs) and for different rainfall durations, for a 1:100 24-hour storm this value is 8% per degree for instance.

This same guideline suggests projected annual mean temperature changes for different regions of New Zealand; the suggested temperature change for Auckland for the period 1990–2040 is 2.5°C (high). Table 2-2 shows the rainfall depths for different return period events with and without climate change, other design rainfall depths for other ARI are presented as well.

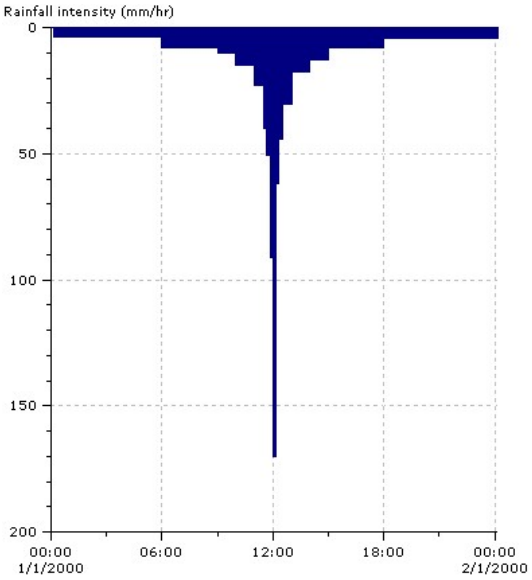
Table 2-2 Design Rainfall Depths (with and without climate change)

	ARI (yrs)			
24 hours	2	5	10	100
no climate change	87	112.5	133.3	210
2.5º climate change	96.4	127.7	154.3	**252**

Figure 2-4 depicts the 100 year-24 hour design storm with the effect of climate change.

2 Methodology

Figure 2-4 100 year 24 hour Rainfall Profile (climate change)



The basis of the rainfall volumes were determined using SCS as specified in TP108, consequently 74 and 98 were the Curve Numbers for pervious and impervious areas respectively.

No base flow was assumed.

A summary of the hydrological parameters per sub-catchment including curve number, lag time, slope and length of the catchment is included in Appendix E. Subcatchments are depicted on Figure 1 of Appendix B. Revised subcatchments relating to the May 2012 scope of work are included on Figure 1A, also found in Appendix B.

2.3 Catchment Description

The study focuses on the subcatchments created by development and the installation of the new roadway. Waiarohia sub-catchments are short and relatively steep.

2.3.1.1 Land Use

The Current land use for the Waiarohia catchment is based on land use drafted for the proposed Waitakere City District Plan Change 14 and a small part of Plan Change 13. This is considered the current land use (Scenario 1) even though much of the area has yet to be developed. This scenario excludes Fulton Hogan Precinct A2.

The Future Land Use (Scenario 2) includes Plan Change 14, part of Plan Change 13, Fulton Hogan Precinct A2 and the potential development associated with Whenuapai Stage 2 development. Refer Appendix B, Figures 2 and 3 depicting land use scenarios.

Tables 2-3 and 2-4 below provide a breakdown of the proposed future land use scenario 1 and 2 respectively, with associated accepted imperviousness for each land use. Imperviousness in the study catchment is estimated to be an average of 27% and 57% for Current (Scenario 1) and Future

2 Methodology

(Scenario 2) land use respectively, with a proportion of the study catchment anticipated to remain in rural / countryside land use. Figures in Appendic C depict Land use for scenario 1 and 2.

Table 2-3 Future Land Use (LU Scenario 1)

Land Use	Area		% Impervious*
	Ha	% of study area	
Community/Utility	3.0	1	70
Drainage Ecological Open Space	8.4	2	0
General Rural	307.8	69	5
High Density Residential	2.8	1	90
Industry/Commercial	34.3	8	90
Medium Density Residential	25.5	6	60
Mixed Use/Town Centre	3.0	1	90
MU Work and Live	9.5	2	90
Possible School	3.5	1	60
Riparian Margin	0.7	0	0
Roads	41.5	9	100
Urban Open Space	7.3	2	0
Wetland/Pond	0.7	0	0
Total	**447.8**		

*Note: percentages are based on an average 'subdivision' scale, rather than a 'per lot' scale.

Table 2-4 Future Land Use (LU Scenario 2)

Land Use	Area		% Impervious*
	Ha	% of study area	
Buildings	0.1	<1%	90
Community/Utility	3.1	1%	80
Drainage Ecological Open Space	56.5	13%	5
Frontage Control A2	0.5	<1%	90
General Rural	90.8	20%	5
High Density Residential	39.1	9%	85
Industry/Commercial	114.2	25%	90
Medium Density Residential	17.6	4%	58
Mixed Use/Town Centre	2.9	1%	90
Motorway Designation	27.5	6%	90
MU Work and Live	6.0	1%	90
Open Space/Landscaping	14.7	3%	5
Possible School	13.0	3%	78
Reserve/Esplanade	2.1	<1%	5
Riparian Margin	0.9	<1%	5
Roads	56.1	13%	100
Urban Open Space	0.0	<1%	5
Wetland/Pond	2.2	<1%	5
WW Pumpstation Site	0.6	<1%	90
Total	**447.8**		

*Note: percentages are based on an average 'subdivision' scale, rather than a 'per lot' scale.

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2.3.1.2 Geology

Most of the catchment lies over 2 major stratification units: East Coast Bays Formation and Puketoka Formation. A geology map for the catchment is shown in Figure 4 of Appendix C.

Results and Discussion

Water quality assessment is not included in the scope of works of this study; thus limiting discussion to the flood extent in areas of interest and reviewing the capacity of the installed and designed culverts beneath State Highway 18 in Waiarohia catchment.

3.1 Flood Extent

The 24 hour 100 year design storm with climate was modelled for the 2 land uses as described in section 2.3.1.1. Their respective flood extents were mapped out (Refer to Appendix D).

The model run with land use Scenario 2 triggered more volume and flood extent since this land use is more impervious than land use Scenario 1.

Both flood maps indicate that water is ponded at the entrance of most culverts; however some exceptions are described in section 3.3. Water is contained within the open channels, low points in the localised topography or within the motorway designation and presents no major problems related to areas of interest/urban areas through inundation. The flood levels are provided in Shape files for the use of Auckland Council.

As a result of the changes made to the model in May 2012 which relate to Culverts I, L, M, and O, slight changes in flood extent are predicted, as indicated by the flood maps in Appendix D. More detailed discussions are presented in the following sections.

3.2 Culvert capacities

This InfoWorks model assessment considered both the nominal and modelled “real” culvert capacity. It assumes the nominal capacity of each culvert to be the maximum flow that can pass through a pipe given only its diameter, slope and roughness, and considering a maximum head at the culvert soffit. Nominal capacity does not take into account entrance losses or downstream conditions. If the culvert is part of a set of connected pipes, the nominal capacity is then defined by pipe sections with a flatter slope (culverts B, H and I).

The real culvert capacity is defined as the maximum flow that can pass through the pipe with the application of an upstream water level at the soffit of the pipe. In this case the water level also includes the entrance head losses and considers the interaction with the rest of the system. At a full culvert capacity the pipe is not completely full.

For the different landuse scenarios, the water level upstream of the culvert helps to define the risk of flood depending on the level of the road at each location.

Table 3-1 summarises the culvert capacities. This table also includes the maximum modelled flow (real capacity) that the pipes can convey during the design storm for both land use scenarios, together with its respective water level at the upstream end of the each culvert. The critical flood elevation in the table corresponds to the minimum ground elevation from where the water would first overflow to other areas (roads or other flooding areas). This value has been extracted directly from the LiDAR ground model as an approximate indication of the risk of flooding.

The model results and Table 3-1 show that most culverts get surcharged in the 100yr event. The capacity of some storage areas upstream of the culverts provides extra head over the soffit of the pipes helping driving more water through them. Land use scenario 2 is more impervious than LU scenario 1 and consequently leads to more runoff.

Even though the culverts surcharge it does not necessarily mean that flooding issues will arise. The effectiveness of the culverts is assessed comparing the upstream water levels with critical flood

3 Results and Discussion

elevations to ensure no over road flow occurs. The model results confirm that the water level of the upstream ponding areas do not reach their respective critical flood elevation. The most sensitive areas are around culverts A3 and C1 where 100yr water levels are predicted to be only 230mm and 290mm below critical flood levels.

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Table 3-1 Culvert Capacity Summary

Culvert	Tributary Sub-catchments	Area (ha)	Culvert Invert level Inlet (mRL)	Culvert Invert level-outlet (mRL)	Culvert length (m)	Diameter (mm)	Slope/Gradient
XXX	XXX	6.39	33.00	26.00	111.6	1800	0.06
B	B+XXX	29.46	25.57	24.02	130.3	1800	variable
A3	A3	13.39	26.44	24.43	41.9	1350	0.05
C1	XXX+B+A3+C1	46.39	18.57	18.39	47.2	1950	0.00
C (C2 Twin Pipe)	XXX+B+A3+C1+(C2&3)/2	66.15	15.07	14.29	69.8	2100	0.01
C (C3 Twin Pipe)	XXX+B+A3+C1+(C2&3)/2	66.15	15.05	14.26	69.9	2100	0.01
D	D	29.29	16.29	14.31	66.5	1950	0.03
E	E	39.58	15.91	15.68	75.1	2100	0.00
H	H	16.76	14.16	7.06	225.9	1600	variable
I	I	7.50	18.30	16.38	175.4	1350	variable
J	J	17.70	15.86	14.46	126.9	1350	0.01
K	K	9.91	20.63	19.41	63.4	1350	0.02
L	L	9.285	15.91	15.73	69	1200	0.00
M	M	5.21	10.07	9.27	44	975	0.02
O	O	39.54	1.58	0.72	185.7	1500	0.00

3 Results and Discussion

Table 3-1 Continued

				Land Use 1			Land Use 2			
Culvert	Nominal capacity (m3/s)	Real capacity (m^3/s)	Critical flood level (m RL)	Peak Flow (m^3/s)	Water Level (mRL)	Surcharge in 100yr event?	Peak Flow (m^3/s)	Water Level (mRL)	Surcharge in 100yr event?	Flooding Issue?
XXX	26.5	4.00	34.80	1.72	33.95	No	2.26	34.08	No	No
B	4.66	5.28	29.90	6.41	27.89	Yes	7.04	28.72	Yes	No
A3	11.21	2.50	29.10	3.85	28.26	Yes	4.95	28.87	Yes	No
C1	8.87	6.25	21.80	9.51	21.2	Yes	10.57	21.51	Yes	No
C (C2 Twin Pipe)	16.76	7.50	20.00	8.63	17.38	Yes	10.59	17.96	Yes	No
C (C3 Twin Pipe)	16.86	7.40	20.00	8.73	17.38	Yes	10.59	17.96	Yes	No
D	22.55	6.32	20.00	6.42	18.23	Yes	8.98	18.74	Yes	No
E	14.86	7.69	20.50	8.69	18.18	Yes	11.69	18.79	Yes	No
H	10.12	3.90	17.60	4.41	15.88	Yes	5.68	16.21	Yes	No
I	1.69	2.58	21.30	2.92	19.79	Yes	3.02	19.82	Yes	No
J	5.64	2.65	21.50	4.31	17.94	Yes	5.61	18.76	Yes	No
K	7.9	2.45	24.30	3.14	22.21	Yes	3.16	22.22	Yes	No
L	1.86	2.60	20.60	2.56	17.02	No	3.35	17.36	Yes	No
M	3.02	1.10	12.00	1.4	11.22	Yes	1.51	11.28	Yes	No
O	6.56	3.22	10.27	6.59	4.52	Yes	6.63	4.55	Yes	No

3 Results and Discussion

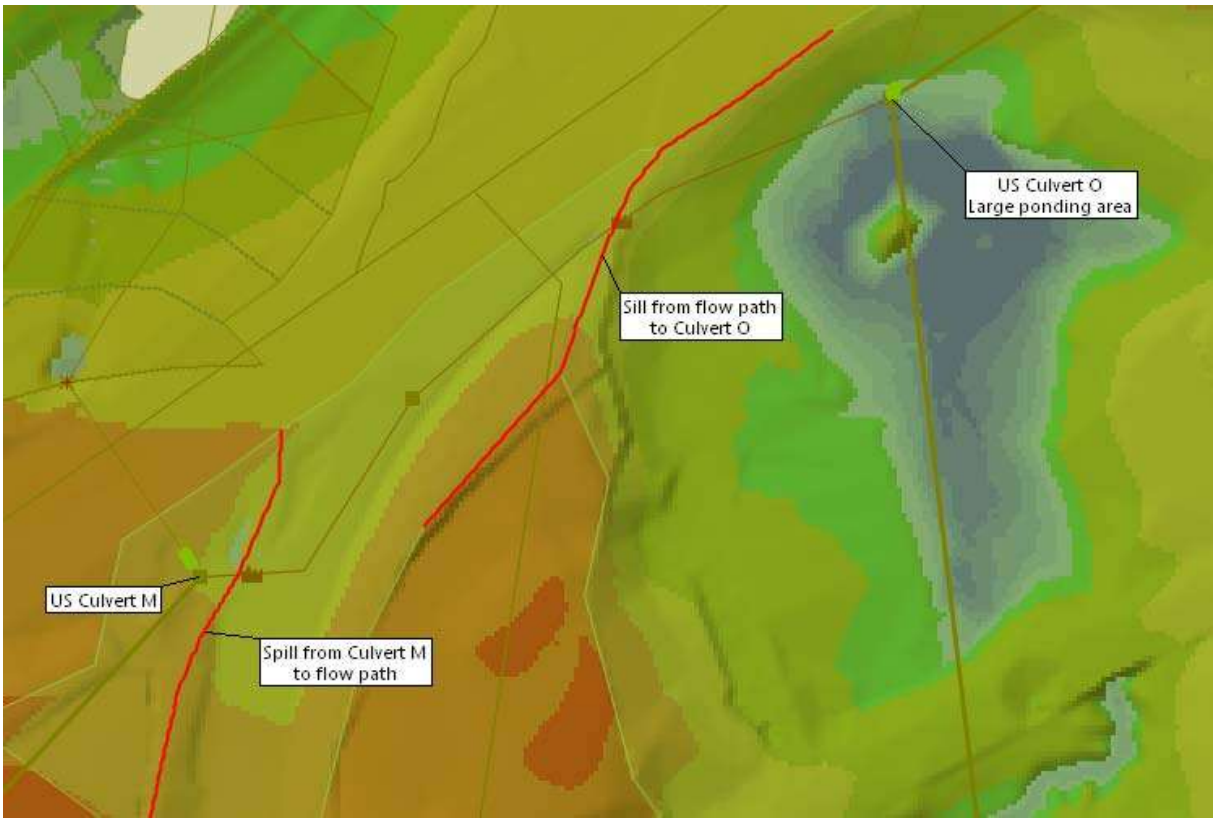
3.3 Discussion

As stated previously, the system in general works well despite most culverts predicting surcharge for the 100year ARI event. The flood extent presents as localised ponding at the inlet to most culverts which does not generally present a risk to the proposed urban areas. Additionally, no ponding area is predicted to present a flood risk to the motorway or respective local roads.

Some additional assumptions applied for Culvert M are explained as follows:

- Limited ponding occurs upstream of Culvert M, the coarse DEM shows a flow path that goes along the road and that would lead to discharge into Culvert O.
- The flow path offers a small amount of additional storage before spilling over to Culvert O through a second additional spill path
- With this approach we consider that more accurate flood levels have been represented in the model, together with a more reliable flow condition for both culverts M and O (Figure 3-1).

Figure 3-1 Culvert M and O

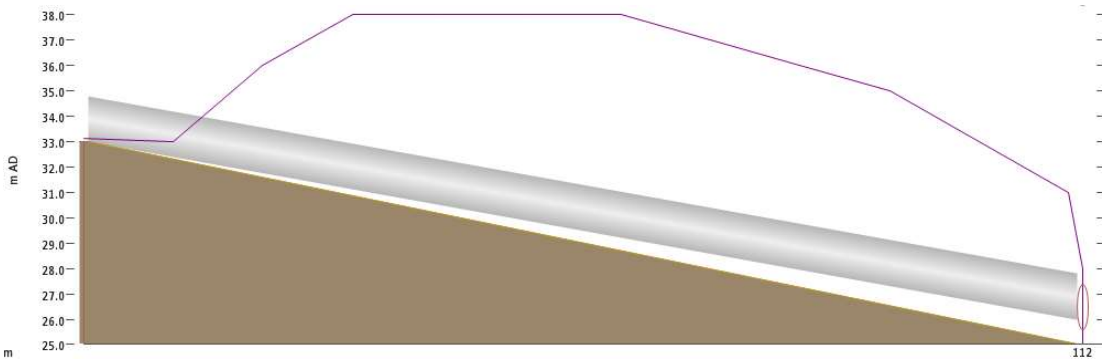


The maximum capacity of Culvert XXX as presented in Table 3-1 is likely to be incorrect because the properties of this culvert were unknown. As-built details were not available and the culvert was not able to be examined during the site visit due to site specific safety concerns. Therefore the properties of the culverts were assumed to be identical to Culvert B as described in section 2.2.3, both invert levels were assigned such the pipe would match with the ground model. For Culvert XXX this resulted in a layout that suggests a 7 metre drop (33 mRL to 26 mRL) in 111.6 metres. Figure 3-2 depicts a

3 Results and Discussion

longitudinal profile of this pipe. As-built data regarding, pipe diameter, invert levels and materials could be added to the model to rectify this uncertainty.

Figure 3-2 Longitudinal profile of Culvert XXX



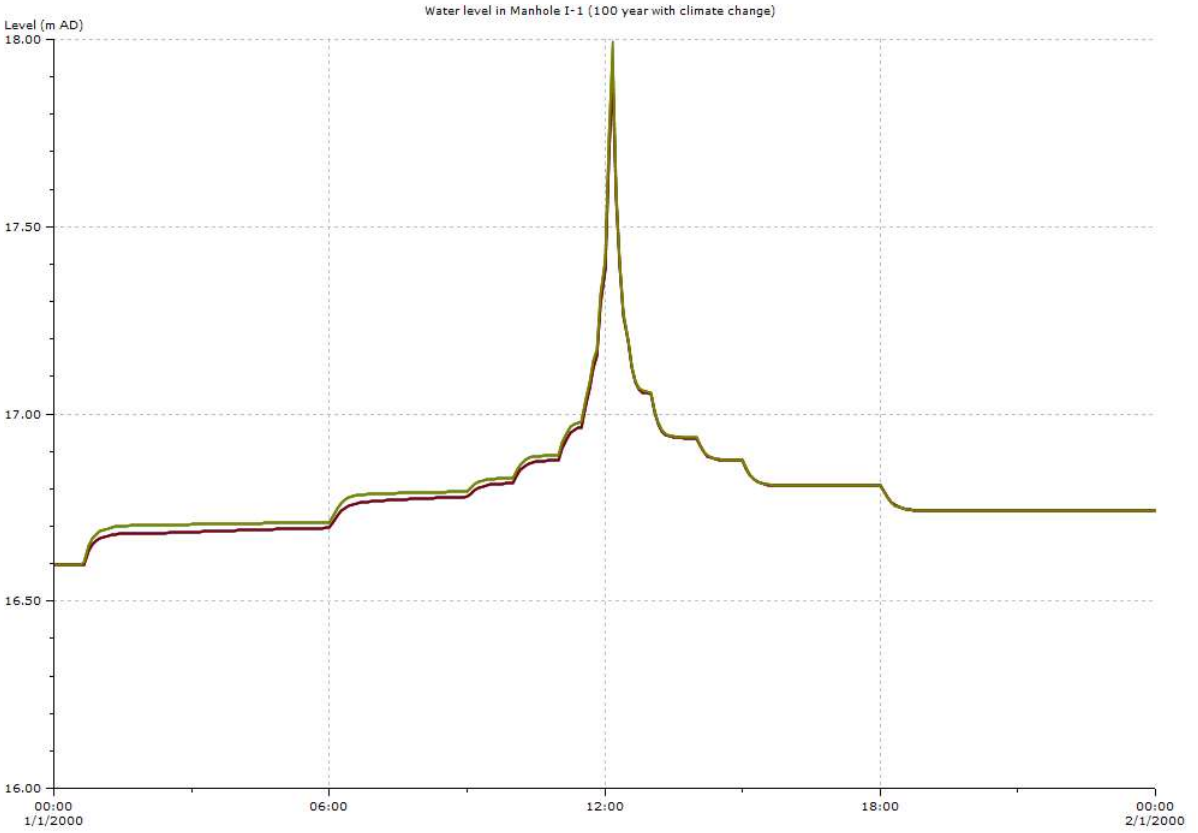
Based on the as-built information provided, Culvert O appears to be tidally influenced and submerged even during DWF (dry weather flow conditions) as the upstream invert is 1.58 mRL and the design tide is 1.89 mRL. The as-built provided for Culvert O also shows the pipe ending at a catchpit in the roadway rather than continuing to a downstream discharge point. This seems an unlikely situation, in reality. As part of the additional work carried out in May 2012 the downstream connection of Culvert O to an existing discharge pipe was confirmed and the storage capacity upstream of the inlet increased in the model due to the revised ground model.

The results of the additional tasks carried out in relation to Culvert I, L, O and M can be summarised as follows:

- As indicated in Figure 3-3, no difference in water levels in manhole I-1 were identified after sealing the manhole as requested..

3 Results and Discussion

Figure 3-3 Water level comparison in manhole I-1 (100 year with climate change)



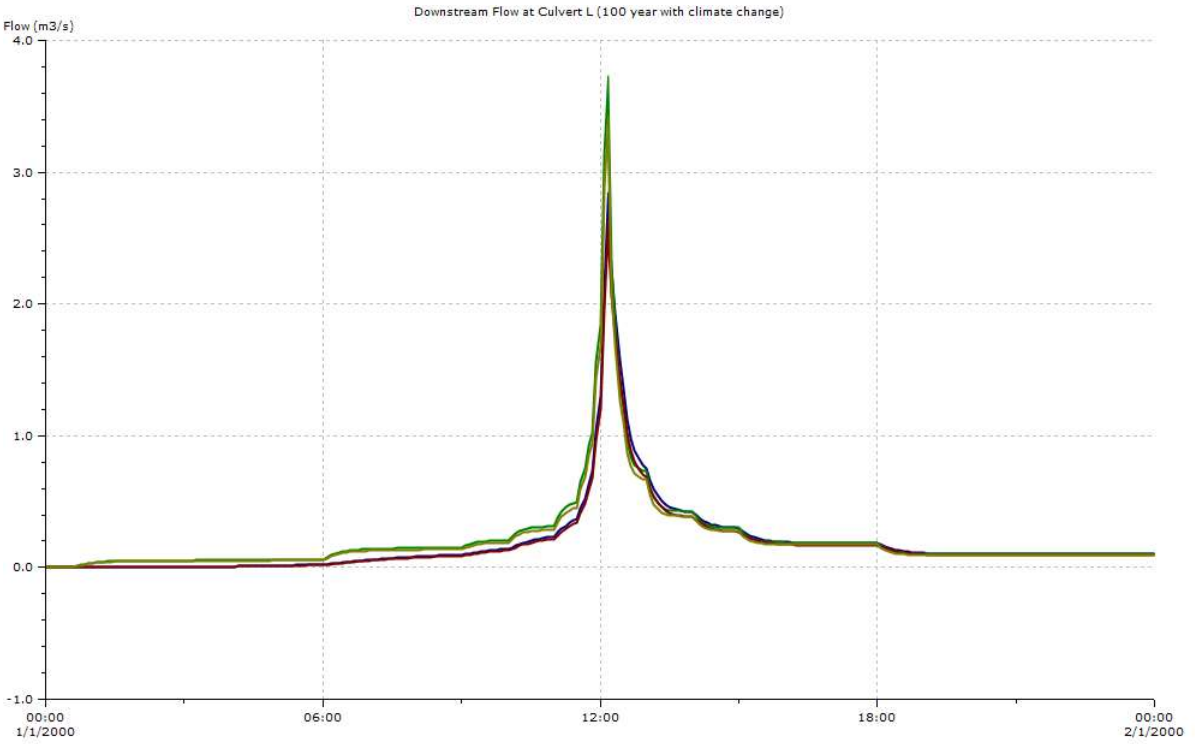
	Level	
	Min	Max
Current Scenario (Manhole Sealed)	16.597	17.907
Future Scenario (Manhole Sealed)	16.597	17.963
Current Scenario (Previous Model)	16.597	17.907
Future Scenario (Previous Model)	16.597	17.963

- Following the new delineation of subcatchment L and M, the flows through both Culvert L and M are depicted in Figure 3-4 and Figure 3-5, respectively. The slight increase of flow in Culvert L can be attributed to the slight increase in the contributing subcatchment area applied in the updated model. The flow increase in Culvert M may reflect the reduced storage area at the culvert M entrance, as indicated by the survey data provided and updated DEM.
- The revised ground model showed a revised overland flow path between culvert O and M. See Figure 3-1 which has been updated.
- As shown in Figure 3-6, the overland flow path in the May 2012 model does not appear to be flooded in both current and future land use scenarios for a 100-year storm event with climate change consideration. However, the inclusion of this overland flow path in the current network reduces the storage area at the entrance of Culvert M, which subsequently raised the flood flow through Culvert M.
- Flood level at the ponding area immediately upstream of Culvert O was shown to increase slightly in the revised model, as a consequence of the adjustment of the storage area with the new survey data (Figure 3-7). Additionally the configuration of Culvert O now includes an extension of the pipe. This additional length of culvert is creating additional headloss due to friction which is reducing flows in the culvert. The result is a small increase in flooding and less flow. The flow through Culvert O is shown in Figure 3-8. It is noted that as a result of the revised ground model the

3 Results and Discussion

ponding predicted upstream of Culvert O does not flood the site of the Watercare pump station on Buckley Avenue.

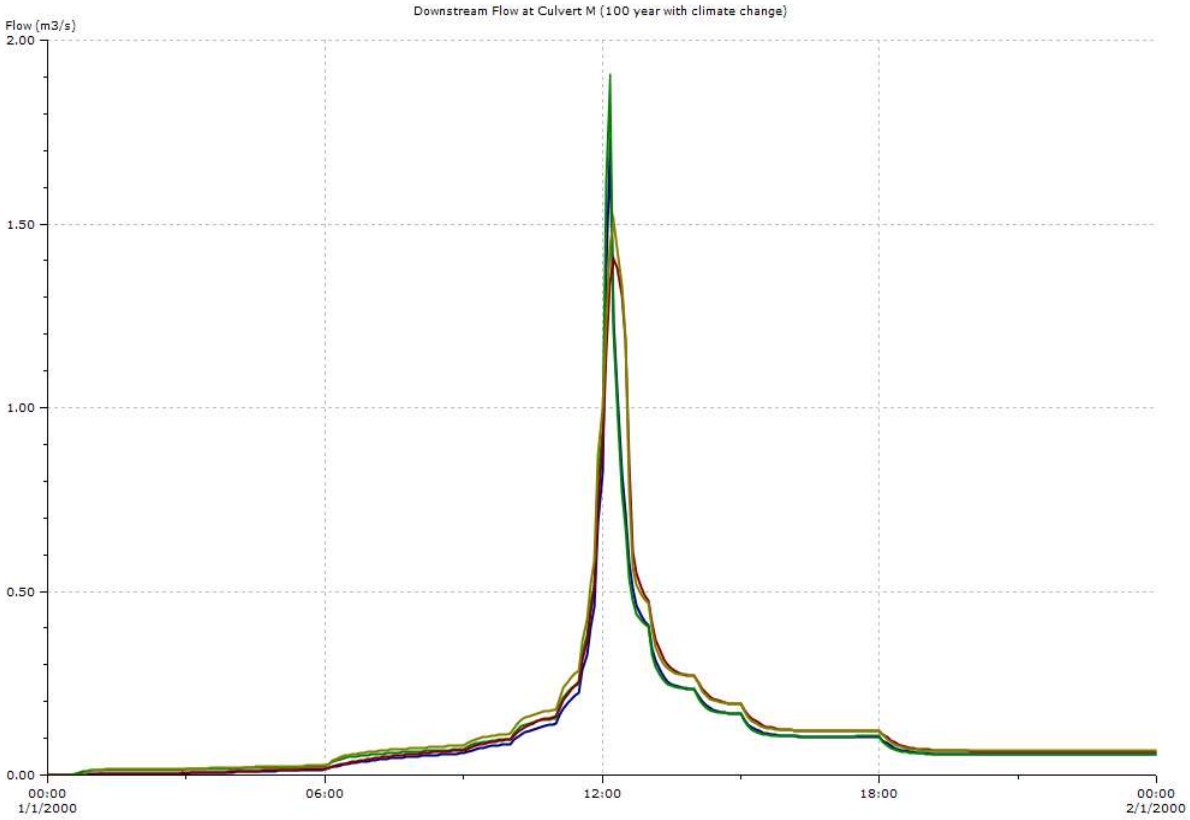
Figure 3-4 Flow in Culvert L (100 year with climate change)



	Flow	
	Min	Max
Current Scenario (Current Model)	-0.000	2.759
Future Scenario (Current Model)	-0.000	3.643
Current Scenario (Previous Model)	-0.000	2.548
Future Scenario (Previous Model)	-0.000	3.341

3 Results and Discussion

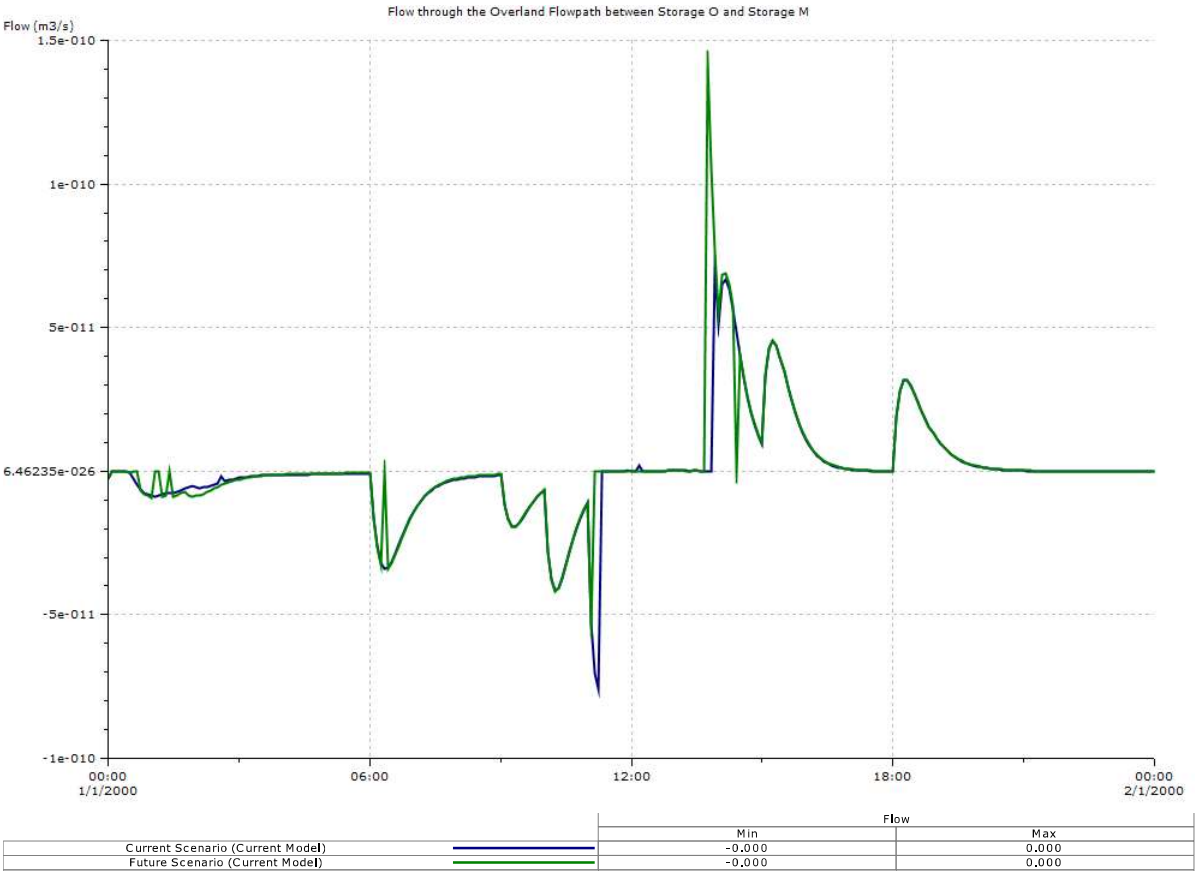
Figure 3-5 Flow in Culvert M (100 year with climate change)



	Flow	
	Min	Max
Current Scenario (Current Model)	0.000	1.702
Future Scenario (Current Model)	0.000	1.877
Current Scenario (Previous Model)	0.000	1.404
Future Scenario (Previous Model)	0.000	1.507

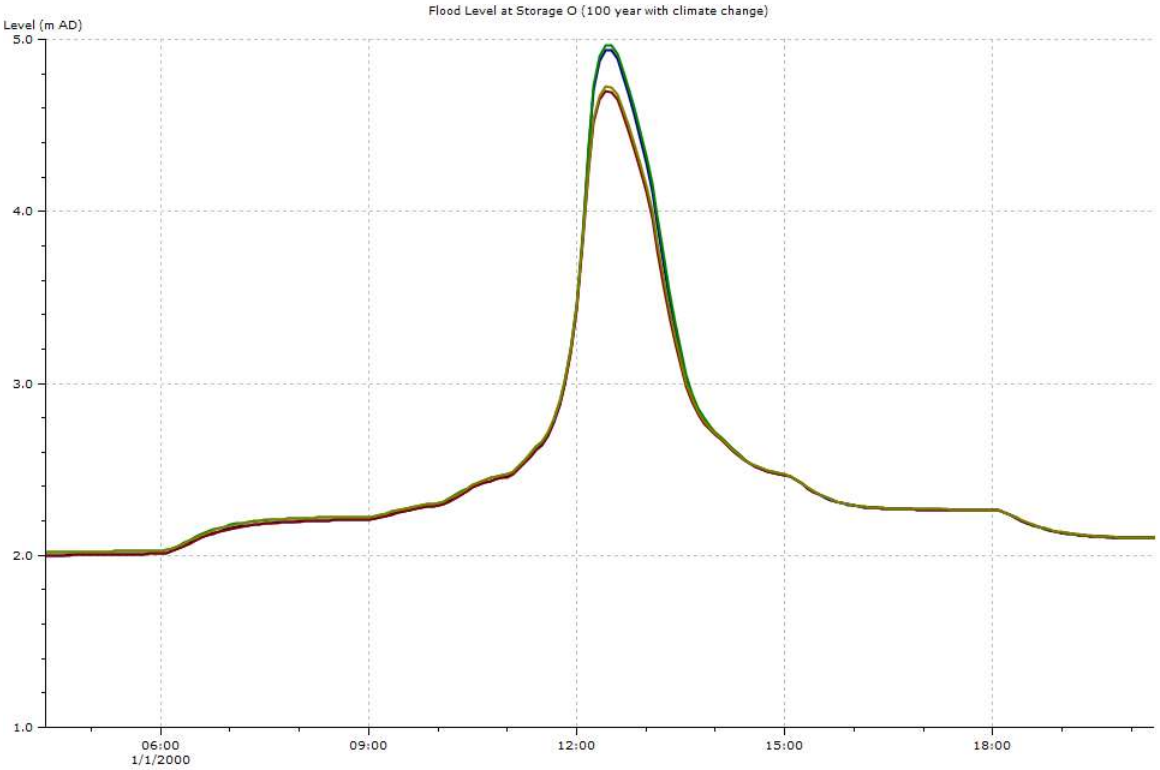
3 Results and Discussion

Figure 3-6 Flow through the overland flow path between storage O and storage M



3 Results and Discussion

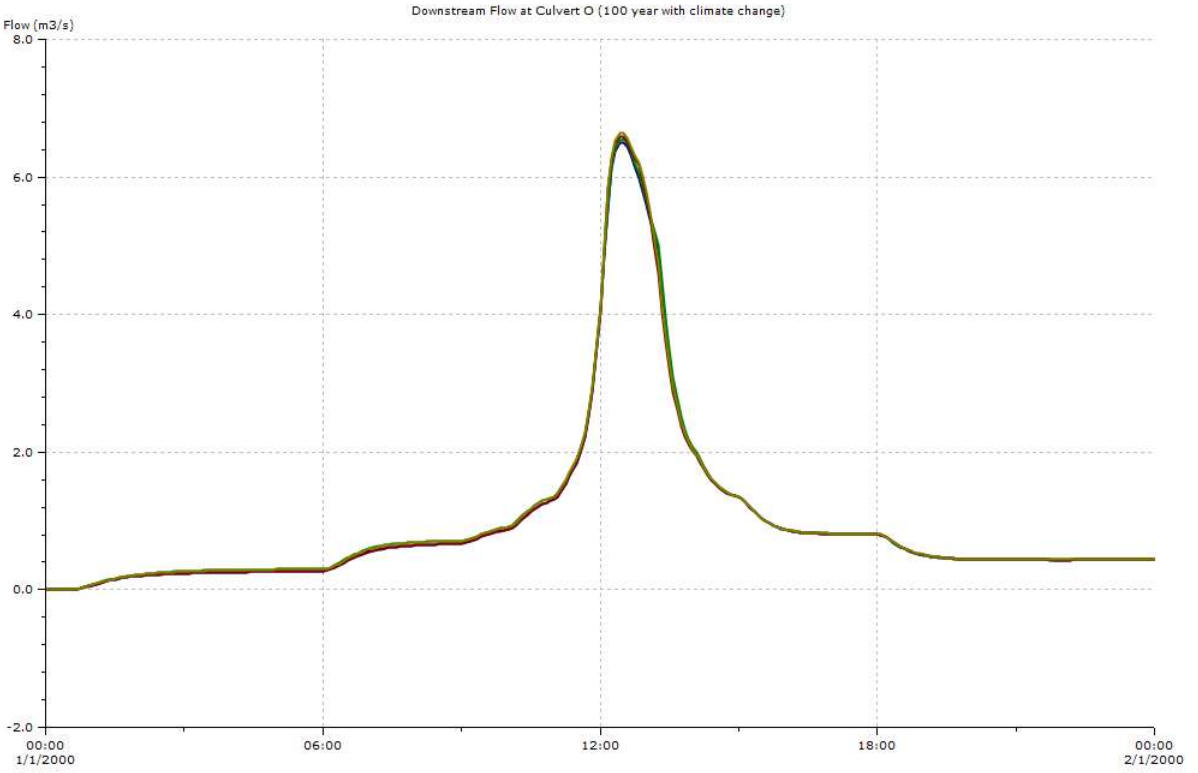
Figure 3-7 Flood level at storage O (100 year scenario with climate change)



	Level	
	Min	Max
Current Scenario (Current Model)	2.000	4.938
Future Scenario (Current Model)	2.018	4.967
Current Scenario (Previous Model)	2.000	4.701
Future Scenario (Previous Model)	2.018	4.726

3 Results and Discussion

Figure 3-8 Flow through Culvert O (100 year scenario with climate change)



	Flow	
	Min	Max
Current Scenario (Current Model)	-0.000	6.502
Future Scenario (Current Model)	-0.000	6.545
Current Scenario (Previous Model)	-0.000	6.592
Future Scenario (Previous Model)	-0.000	6.632

Overall, the model predicts that most culverts surcharge in the 100year ARI event, but pose little risk to the proposed development or roadways since ponding is generally localised at the culvert mouth or contained within the motorway designation.

Referenced Material

A list of the materials made available to provide context and input to this modelling project is provided below :

- Survey by Crang Civil , May 2012, Bowling Green and Culvert O.
- Survey provided by Watercare Services for upstream area of Culvert O
- LiDAR survey provided by Auckland City Council.
- Points over the road provided in AutoCAD by the contractors and converted to 12D format.
- Shapefiles and Autocad drawing with the geographic location and alignment of the culverts.
- Asset data information including culvert characteristics provided in tabular format.
- TP108.
- *"Preparing for Climate Change guideline"* (2007), Ministry for the Environment, New Zealand.
- Shape files for Plan Change 13 and 14 land use (2007) as provided by Auckland Council
- Shape files for potential Whenuapai Stage 2 Landuse (2009) as provided by URS
- Drawing 320 (July 2009) as provided by Woods as landuse for Precinct A2
- HEB As-Built drawing HD-HW-AB-101,(November 2011)
- HEB As-Built drawing HD-HW-AB-102,(November 2011)
- HEB As-Built drawing HD-HW-AB-103,(November 2011)
- HEB As-Built drawing HD-HW-AB-104,(November 2011)
- HEB As-Built drawing HD-HW-AB-105,(November 2011)
- HEB As-Built drawing HD-HW-AB-106,(November 2011)
- HEB As-Built drawing HD-HW-AB-107,(November 2011)
- HEB As-Built drawing HD-HW-AB-108,(November 2011)
- HEB As-Built drawing HD-HW-AB-109,(November 2011)
- HEB As-Built drawing HD-HW-AB-109a,(November 2011)
- HEB As-Built drawing HD-HW-AB-110,(November 2011)
- HEB As-Built drawing HD-HW-AB-111,(November 2011)
- HEB As-Built drawing HD-HW-AB-112,(November 2011)
- HEB As-Built drawing HD-HW-AB-113,(November 2011)
- HEB As-Built drawing HD-HW-AB-114,(November 2011)
- HEB As-Built drawing HD-HW-AB-115,(November 2011)
- HEB As-Built drawing HD-HW-AB-116,(November 2011)
- HEB As-Built drawing HD-HW-AB-201,(November 2011)
- HEB As-Built drawing HD-HW-AB-202,(November 2011)
- HEB As-Built drawing HD-HW-AB-203,(November 2011)
- HEB As-Built drawing HD-HW-AB-204,(November 2011)
- HEB As-Built drawing HD-HW-AB-205,(November 2011)
- HEB As-Built drawing HD-HW-AB-205a,(November 2011)
- HEB As-Built drawing HD-HW-AB-206,(November 2011)
- HEB As-Built drawing HD-HW-AB-207,(November 2011)
- HEB As-Built drawing HD-HW-AB-208,(November 2011)
- HEB As-Built Ground levels, DWG file as provided October 2011
- HEB Hobsonville Deviation Topo, DWG file as provided October 2011
- Ockleston Road Overland Flow path report, (October 2011) by Walkers
- Opus Detailed Design Report – Culvert and Streamworks. Hobsonville Deviation and SH16 Extension. Client Report for HEB Construction (2009)
- Auckland Council Stormwater Flood Modelling Specifications (September 2011)
- Land use imperviousness values as agreed with Auckland Council -11th February 2012.

Limitations

URS New Zealand Limited (URS) has prepared this report in accordance with the usual care and thoroughness of the consulting profession for the use of Auckland City Council and only those third parties who have been authorised in writing by URS to rely on the report.

It is based on generally accepted practices and standards at the time it was prepared. No other warranty, expressed or implied, is made as to the professional advice included in this report.

It is prepared in accordance with the scope of work and for the purpose outlined in the Proposal dated on 21 September 2011 addressed to Gareth Phelps.

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Any estimates of potential costs which have been provided are presented as estimates only as at the date of the Report. Any cost estimates that have been provided may therefore vary from actual costs at the time of expenditure.

A

Appendix A Asset data used in the Infoworks ICM model

Appendix A - Asset data used in the Infoworks ICM model

	Culvert	US Invert 1 (mRL)	DS Invert 1 (mRL)	Length 1 (m)	US Invert 2 (mRL)	DS Invert 2 (mRL)	Length 2 (m)	US Invert 3 (mRL)	DS Invert 3 (mRL)	Length 3 (m)	Culvert Shape	Culvert Width (mm)
1	O	1.58	0.72	85.9							Round	1500
2	M	10.07	9.27	44.1							Round	975
3	L	SD Rim 19.5	15.73	69.0							Round	1200
		15.91										
4	K	20.63	19.41	63.4							Round	1350
5	J	15.86	14.46	127.0							Round	1350
6	I	18.3	16.53	129.4	16.53	16.38	46				Round	1350
7	H	14.16	8.72	128.0	8.72	7.06	98				Round	1600
8	E	15.91	15.68	75.1							Round	2100
9	D	16.29	14.31	66.5							Round	1950
10	C (C2)	15.05	14.26	69.9							Round	2100
11	C (C3)	15.07	14.29	69.8							Round	2100
12	C1	18.57	18.39	40.5							Round	1950
13	B	25.57	25.55	10.0	25.55	25.22	99	25.22	24.02	21	Round	1800
14	A3	26.44	24.43	22.1							Round	1350
15	XXX	33	26	116.6							Round	1800

Note Culvert C is a Twin Pipe culvert with pipes labelled C2 and C3 in the model.

B

Appendix B Tributary Catchments per Culvert

C

Appendix C Land Use Scenarios and Geology

D

Appendix D 24 Hour 100 year ARI Flood Extents with climate change

E

Appendix E Key Hydrological Parameters

Appendix E - Key Hydrological Parameters

Subcatchment ID	Contributing to Culvert/discharge point	CN	Catchment Length (m)	Slope (m/m)	lag time (minutes)
1	A3	93.3	206.4	0.047	11
2	B	96.2	119.5	0.057	9
10	B	90	243.2	0.038	14
3	C1	93.2	106.1	0.035	7
5	C2 and C3	88.2	354.7	0.032	21
16	Creek 1	96.8	36.2	0.063	7
20	Creek 1	78.4	84.2	0.024	21
22	Creek 1	96.9	89.2	0.041	11
27	Creek 2	87.6	34.1	0.023	15
28	Creek 2	81.3	141.5	0.057	12
33	Creek 2	75.5	21.9	0.097	7
34	Creek 2	97	46.6	0.015	9
7	D	93.2	305.4	0.033	7
9	E	95.2	355	0.037	17
12	H	91.7	231	0.063	7
13	I	90.7	142.2	0.064	7
15	I	95.9	60.5	0.065	7
21	J	92.3	237.4	0.042	19
23	K	95.2	177.6	0.039	14
24	L	88.1	171.9	0.04	8
25	M	80.6	128.8	0.036	11
18	O	92.3	350.2	0.024	7
31	O	80.9	56.8	0.015	9
30	Waiarohia Inlet	79.3	231.7	0.034	10
32	Waiarohia Inlet	75.6	231.6	0.037	9
35	Waiarohia Inlet	76	211.6	0.05	23
36	Waiarohia Inlet	75.4	216.9	0.04	7
6	Waiarohia stream	89.4	153.1	0.076	8
8	Waiarohia stream	84.9	153.9	0.013	13
11	Waiarohia stream	94	86.7	0.051	7
14	Waiarohia stream	84.7	293.3	0.011	13
17	Waiarohia stream	96.1	143.6	0.04	7
19	Waiarohia stream	79.1	158.5	0.004	7
26	Waiarohia stream	83.3	411.7	0.02	10
4	XXX	92.6	142.6	0.053	9

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APPENDIX 4
ARCHAEOLOGICAL ASSESSMENT

100 Hobsonville Rd: archaeological assessment

report to
Austino Hobsonville 2 Ltd

Ella Ussher and Jacqueline Craig

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100 Hobsonville Rd:
archaeological assessment

report to
Austino Hobsonville 2 Ltd

Prepared by: .....
Ella Ussher

Reviewed by: .....
Matthew Campbell

Date: 9 April 2019
Reference: 19-0966

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100 Hobsonville Rd: archaeological assessment

Austino Hobsonville 2 propose a light industrial development over several property boundaries within the Future Urban and Light Industry zones under the Auckland Unitary Plan (AUP). These are all within the original granted Lots 39 and 40 Parish of Waipareira, including 86 Hobsonville Rd (Sections 1 and 3 SO 509537), 88, 90 and 92 Hobsonville Rd (Sections 1, 4 and 8 SO 490597), and 98 and 100 Hobsonville Rd- (Sections 1, 3 and 6 SO 511858) (Lot 40). These plans also work in conjunction with the development of the Council-owned Riparian Sections for cycle/walkways, including: Sections 2, 3, 7, 9 and 10 SO 490597, and Sections 2, 4 and 5 SO 511858. There are no recorded archaeological sites within the proposed development sites, but the proximity of these properties to existing waterways and a rich historical landscape within Hobsonville warranted further investigation. Russel Strahle, Development Manager of Austino Property Group, on behalf of Austino Hobsonville 2 Ltd, commissioned CFG Heritage to conduct an archaeological assessment of effects within the development footprint in support of resource consent applications to Auckland Council and potential archaeological authority applications to heritage New Zealand Pouhere taonga (HNZPT).

Statutory requirements

All archaeological sites, whether recorded or not, are protected by the provisions of the Heritage New Zealand Pouhere Taonga Act 2014 and may not be destroyed, damaged or modified without an authority issued by Heritage New Zealand Pouhere Taonga (HNZPT).
An archaeological site is defined in the Heritage New Zealand Pouhere Taonga Act as:

(a) any place in New Zealand, including any building or structure (or part of a building or structure), that—
  (i) was associated with human activity that occurred before 1900 or is the site of the wreck of any vessel where the wreck occurred before 1900; and
  (ii) provides or may provide, through investigation by archaeological methods, evidence relating to the history of New Zealand; and
(b) includes a site for which a declaration is made under section 43(1).

The Resource Management Act 1991 requires City, District and Regional Councils to manage the use, development, and protection of natural and physical resources in a way that provides for the wellbeing of today's communities while safeguarding the options of future generations. The protection of historic heritage from inappropriate subdivision, use, and development is identified as a matter of national importance (Section 6f).

Historic heritage is defined as those natural and physical resources that contribute to an understanding and appreciation of New Zealand's history and cultures, derived from archaeological, architectural, cultural, historic, scientific, or technological qualities.

Historic heritage includes:

- historic sites, structures, places, and areas
- archaeological sites;
- sites of significance to Maori, including wahi tapu;
- surroundings associated with the natural and physical resources (RMA Section 2).

These categories are not mutually exclusive and some archaeological sites may include above ground structures or may also be places that are of significance to Maori.

Where resource consent is required for any activity the assessment of effects is required to address cultural and historic heritage matters.

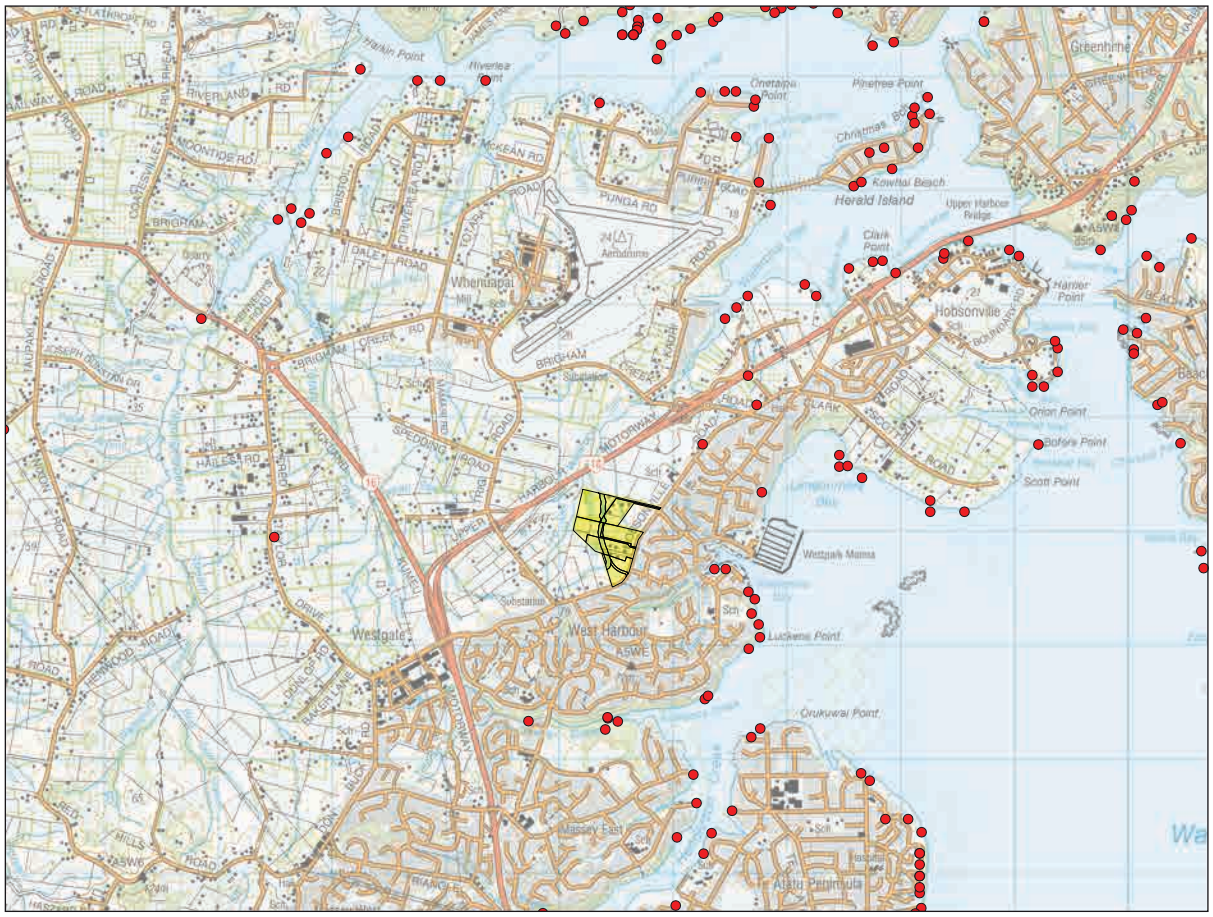

Figure 1. Location of the proposed Austino Hobsonville 1 and Austino Hobsonville 2 developments, showing archaeological sites recorded in the vicinity.

Method

Records of archaeological sites in the general vicinity were accessed from the New Zealand Archaeological Association (NZAA) Site Recording scheme (SRS) through ArchSite (www.archsite.org.nz). Archaeological site reports were accessed from the Heritage New Zealand Pouhere Taonga (Heritage NZ) digital library. Old maps and survey plans held by Land Information New Zealand (LINZ) were accessed using QuickMap. Property Deeds and Titles were accessed using the Archives New Zealand Archway database, and hard copies housed at the Auckland Regional Office of Archives New Zealand. The history of the area was investigated using reports from previous archaeological work in the area, published books and online sources including Papers Past (https://paperspast.natlib.govt.nz/). Further historical information was also gathered during a visit to the West Auckland Historical Society at the Mill Cottage. Soil reports were accessed from Landcare Research using their S-Map Online (http://smap.landcareresearch.co.nz). A site visit was carried out on 14 March 2019 by Ella Ussher and Mat Campbell of CFG Heritage to assess the development footprint.

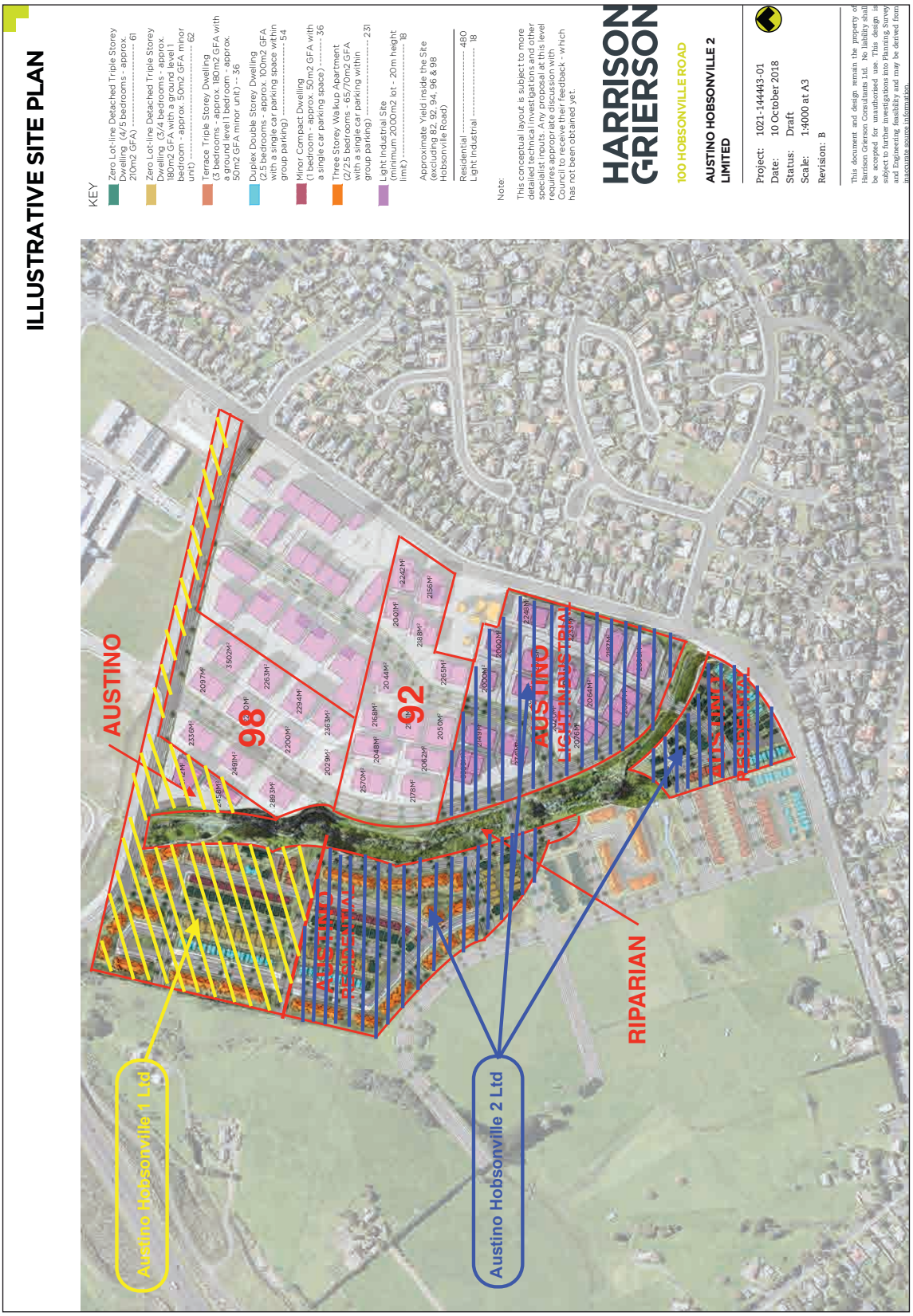

Figure 2. Proposed Austino Hobsonville 1 Ltd and Austino Hobsonville 2 Ltd residential and light industrial development.

Background

Hobsonville is located on a peninsula at the western extent of the Waitemata Harbour. This peninsula is relatively low, rising to less than 30 meters above sea level. The area is dominated by impeded allophanic soils, usually yellow-brown loams which are hard or slowly permeable. The soils were noted as less than ideal by the first New Zealand Surveyor-General Felton Mathew in June of 1840, when he referred to the land as being:

> …of the most sterile and desolate description, being composed of a sour red and white clay – the fern is dwarfish and thinly scattered, the surface chiefly covered in rushes, varied by an occasional patch of stunted scrub (cited in Foster and Felgate 2011: 8).

These soils were, however, suited to the heavy clay industry which began in Hobsonville in the 1850s, with market gardening and farming becoming the prevalent industries of the 20th century. Much of the horticultural land has since been converted to housing or is zoned residential under the AUP.

Pre-European Maori background

The Waitemata Harbour was an important resource in pre-European New Zealand, and Hobsonville was no exception. Although the soil was not of a high quality and not suited to Maori horticulture, the area was heavily exploited for marine resources. Of the recorded pre-European Maori archaeological sites within three kilometres of the site, most are recorded as shell midden.

Hobsonville is also located between two important pre-European portages, the Ngongitepata and Whau (Hooker 1997). These provided connections between the Kaipara and the Waitemata Harbours, and the Waitemata and Manukau Harbours respectively.

Historical

The soils in Hobsonville were not fertile, and not conducive to agricultural settlement. The one advantage of the land was that the soils were suitable for the development of a heavy clay industry. This was first exploited by R.O. Clark, the first European settler in the area, during the 1850s. After attempting to get a farm established, he experimented with using the clay to make crude field tiles to drain his land. These proved effective and helped make the land workable. As demand for his field tiles grew, his focus moved from farming and after importing machinery he established a pottery in Limeburners Bay in 1864 – Clark's pottery was the ancestor of Crown Lynn and Ceramco (Clough et al. 2008). Other clay manufacturers were established in Hobsonville, and the industry became one of the main employers in Hobsonville in the 19th and early 20th centuries. There were workers cottages built in the area, including an experimental lime-concrete duplex on Sinton Road, made with locally produced lime and using pottery fragments as aggregate (Jones 2001).

In the first half of the 20th century, the Royal New Zealand Air Force developed two airfields, one at Hobsonville, and another on the other side of the Waiorahia inlet at Whenuapai, which led to an increased population and housing developments for the military personnel (Morris 1995). Although the military influence in the area has decreased in the past few decades, the expansion of Auckland, including the installation of the Upper Harbour Motorway, has increased housing, converting the area into an outer suburb of the city.

Most of the archaeological work that has been carried out in Hobsonville is limited to development mitigation. Works carried out in Limeburners Bay by Bickler et al. (2011) and Clough et al. (2008) were associated with housing developments, and Clough and Prince (2001) assessed the now decommissioned Hobsonville Air Force base for subdivision.

Other archaeological work done in the area was associated with the development of the Upper Harbour Highway. Three reports, Jones (2001), Foster (2007) and Foster and Felgate (2011) were all associated with buildings that were built during the 19th century and related to the accommodation of the pottery workers and farming families in the area.

Jones (2001) conducted an assessment on the concrete duplex located on Sinton Road. Although information is scarce on this structure, it appears as if it was a prototype to see if locally sourced material could be used to build workers accommodation. There were several workers' cottages located nearby associated with R.O. Clark's pottery and the use of clinker and discarded pottery sherds as aggregate in the construction of the duplex indicates it is likely associated with those workers' cottages.

Foster (2007) investigated the purported location of the original Sinton store and house, supposedly built around 1875. Although a structure was located, the materials were more recent and were probably associated with later use of the land by the Sinton family. The Sintons owned a number of stores in the area and an assessment of 120 Hobsonville Road indicated that an existing historic structure was probably once a store owned by William Sinton's son-in-law, Charles Hutchinson (Campbell and Cruickshank 2015). In 2011 Foster and Felgate investigated Ockleston House which sat in the path of the Upper Harbour Highway. The Ockleston family had been an important local family, owning a pottery on the Waiorahia Creek. The investigation mapped the phases of house construction, which demonstrated it had started as a small cottage, and had been extended and added to as needed. The house was in a state of decay – it was unable to be relocated and was demolished.

Most pertinent to this project, an archaeological assessment was conducted by Farley and Clough (2009) in the neighbouring section at 102–104 Hobsonville Rd. This study found no unrecorded archaeological sites or deposits during a field survey. Additionally, Shakles et al. (2010) conducted a survey of archaeological and heritage values within Whenuapai and Hobsonville as part of the Whenuapai Development Area Stage 2 project for Waitakere City Council. The scope of that survey included 80 Hobsonville Rd, which borders the proposed development for this assessment. There were no unrecorded archaeological sites found within 80 Hobsonville Rd or on neighbouring properties to the west.

History of land ownership

Lots 39, 40, 43, 44 and 45 were granted to Henry Chamberlain on 2nd July 1862 (Figure 3). Chamberlain had come to New Zealand in 1853 (*Auckland Star*, 17 October 1929: 11) with £20,000 which he "expended with great care, principally in land" (*Auckland Star*, 16 April 1888: 5). He initially invested in the Drury and Raglan areas. On a trip back to England in 1859 he married his wife Elizabeth and after visiting Palestine they returned to New Zealand. In July 1862 he was granted a large amount of land at Hobsonville (*Auckland Star*, 17 October 1929: 11). The lots were spread across five grants Lots 33–35, 37 and 38 (Auckland Deed Index 11A.26), Lots 39, 40, 43, 44 and 45 (Auckland Deed Index 11A.30), Lots 46–50 (Auckland Deed Index 11A.29), Lots 51–57 (Auckland Deed Index 11A.28) and Lots 60, 63 and 64 (Auckland Deed Index 11A.27) (Figure 4).

Figure 3. Plan of Lots 39, 40, 43 and 45 from Auckland Deed Index 11A.30.

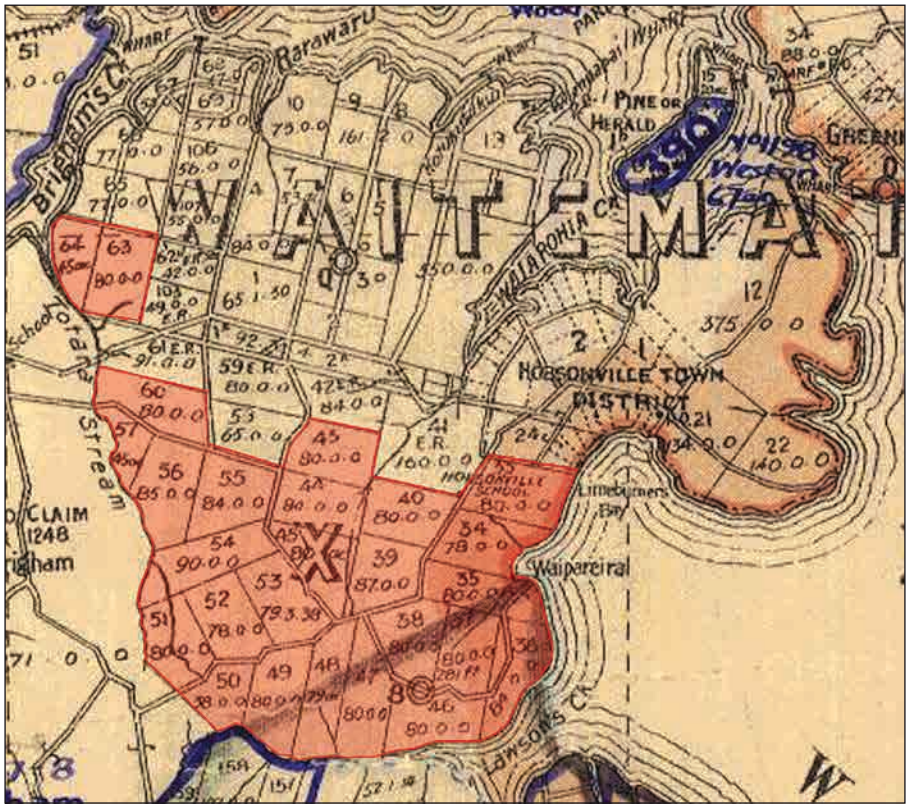

Figure 4. Chamberlain's 1862 Land Grants.

He was most likely in possession of the land earlier than July as he is listed as the owner of them for voting purposes in the district in April 1862 (*New Zealander*, 9 April 1862: 7). Although he was called to the Upper House in 1869 his political career was "not particularly brilliant. Annually the honourable gentleman introduced a motion prohibiting the employment of females behind the bars of hotels, and just as regularly did the members of the House cast it out" (*Auckland Star*, 16 April 1888: 5). He was very keen on using his 2000 acres "up the river" for growing flax to be processed and offered the "flax growing" on it, as well as a £10 subscription towards an association that would help people buy flax hackles to process the fibre (*New Zealand Herald*, 5 August 1867: 3, 17 August 1867: 4). In April 1888 he was accidentally drowned in a water hole at Drury while prospecting on his land for coal and his land passed to his wife. The Lots were caught up in some controversy involving the sale of some of his other land (Lots 34 and 35) across Hobsonville Road from Lots 39 and 40 and which was in the process of being sold at the time of his death. It ended up in the Supreme Court and subject to an Order in 1889 and two Orders in 1890 (Auckland Deed Index 11A.30).

In March 1894 Lot 39 (along with Lots 34, 35, 37 and 38) was sold to J.A. Laing (Auckland Deed Index 11A.29 & 30), who was married to the Chamberlains' daughter. At the time of the sale he was a medical student in Edinburgh, and he passed his final exams in August of that year (*New Zealand Herald*, 20 August 1894: 4). This was also the year the Hobsonville Primary School was built on the south east corner of Lot 41 (not one of Chamberlain's lots). Laing subsequently practiced in Gisborne (*New Zealand Herald*, 31 July 1897: 5) and was living in Devonport when he sold all of the lots back to Elizabeth Chamberlain in April 1901. In June of that year Chamberlain took out a mortgage on Lots 39, 40 and 43–45 from Kissling. In November 1901 Kissling & ors (presumably Elizabeth Chamberlain) sold Lot 39 to E.S. Midgley (Auckland Deed Index 11A.406) and Lot 40 to A.C.F. Bernecker the next month (Auckland Deed Index 21A.528). She retained the remainder of the Lots until 1911 when she sold Lots 44 and 45 to Bernecker, as well as Lot 53 in 1912 (Auckland Deed Index 11A.28). She died in 1926 (*Auckland Star*, 17 October 1929: 11).

Lot 39 Parish of Waipareira

Edgar Sager Midgley was originally from Yorkshire and arrived in New Zealand in 1879. He married Ellen Clark who was the daughter of R.O. Clark, one of the first settlers in the area and founder of the highly successful R.O. Clark potteries (Bickler et al. 2011). After their marriage in 1890 they moved to Hobsonville and lived on 80 acres that R.O. Clark gifted them (North 2000). Both Laurel North's map and DP 961 (1891) show Midgley as the owner of Lot 21 and a portion of Lot 12 immediately to the north (Figure 5). DP 961 also shows a 'residence' on the northern edge of Lot 21. The portion of Lot 12 is shown as 80 acres. North's map has a house at the Hobsonville Road frontage of the property (#10) and labels it as "Midgley."

Edgar sold Lot 39 to Ellen Midgley in 1912, who took out a mortgage on it from another Midgley, presumably from Edgar, at the time of purchase. Ellen died in 1923 and the land presumably passed to her son Sager. He took out a mortgage from Margaret Midgley in 1927. The property was transferred on to NA578/67 in 1934. Sager Midgely took out at least two more mortgages on the property over the years. The property stayed in the family and was transferred to T.L. Midgley Co. Ltd. in 1966 and subdivided in 1971.

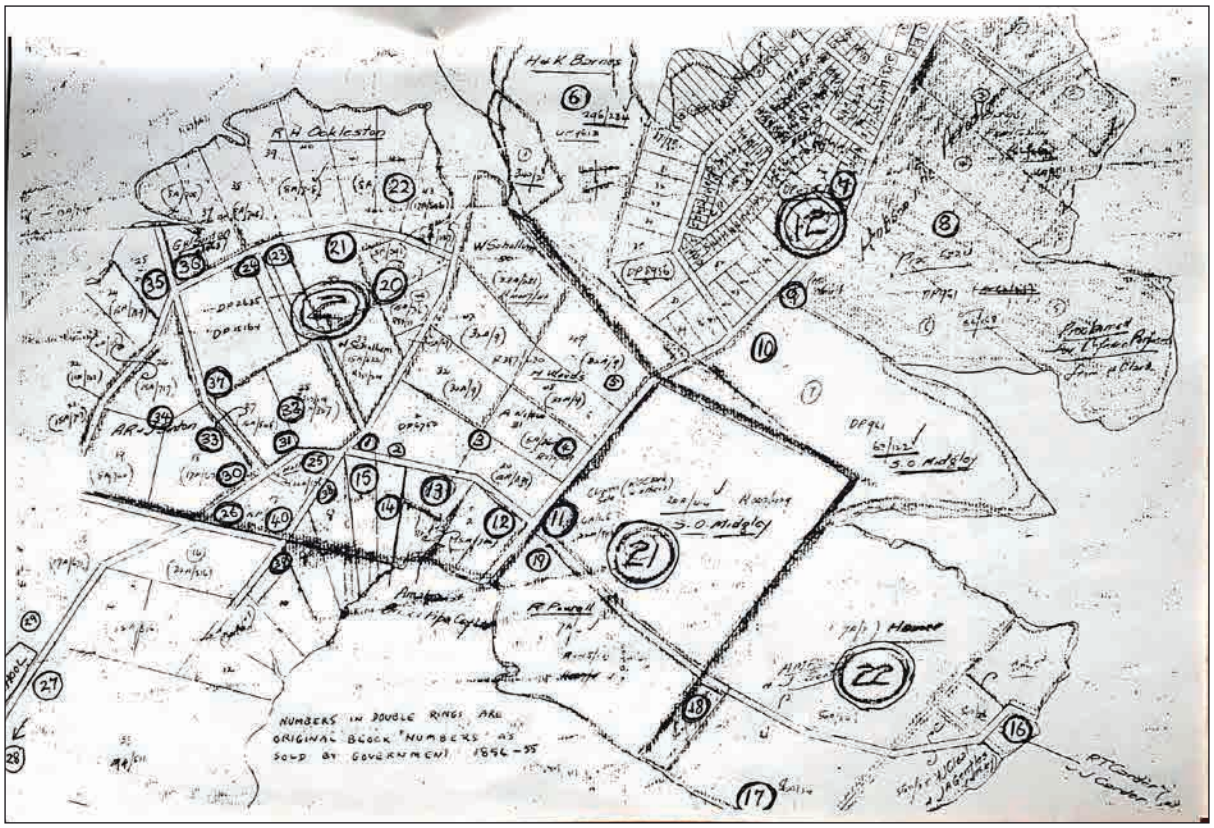

Figure 5. Laurel North's map showing the two Midgley sections (2000).

Lot 40 Parish of Waipareira

Augustus Carl Ferdinand von Bernecker had been an officer in the Austrian navy. He and his wife Elizabeth met in Brisbane and they moved to Hobsonville in 1884 where they bought 80 acres. This was Lot 33 (80 acres), which was directly across Hobsonville Road from the Primary school. The house was called "Belmont Park" (North 2000):

> I remember as a child about 1906, probably about eight years old, going to Mrs. Bernecker's house across the Hobby road from our school to buy arrowroot. This product was grown, dried and grated at their oen [sic] home. Mrs Bernecker had a certificate and a gold medal from the Dunedin exhibition for making it.
>
> They had a beautiful garden containing every imaginable kind of flower and fruit, and berry trees and bushes. Also they had a lovely old parrot, very colourful and talkative that came from Australia. Mrs. Bernecker was also responsible for making the first school gardens and even sent her elder daughter up to water the gardens in the hot summer school holidays (Hobsonville Primary School Centennial 1875–1975)

Augustus died in the San Francisco earthquake in 1906 but Elizabeth stayed in the area and continued to be heavily involved in community life. In 1921 she sold the southern half of the Lot to her son in law Havard (Auckland Deed Index 31A.330, NA578/69) and in 1922 the northern half to Allen. Elizabeth died at her "late residence" at Hobsonville in 1924 (*New Zealand Herald*, 27 September 1924: 1). Allen sold a half share in the northern half to Reeve in

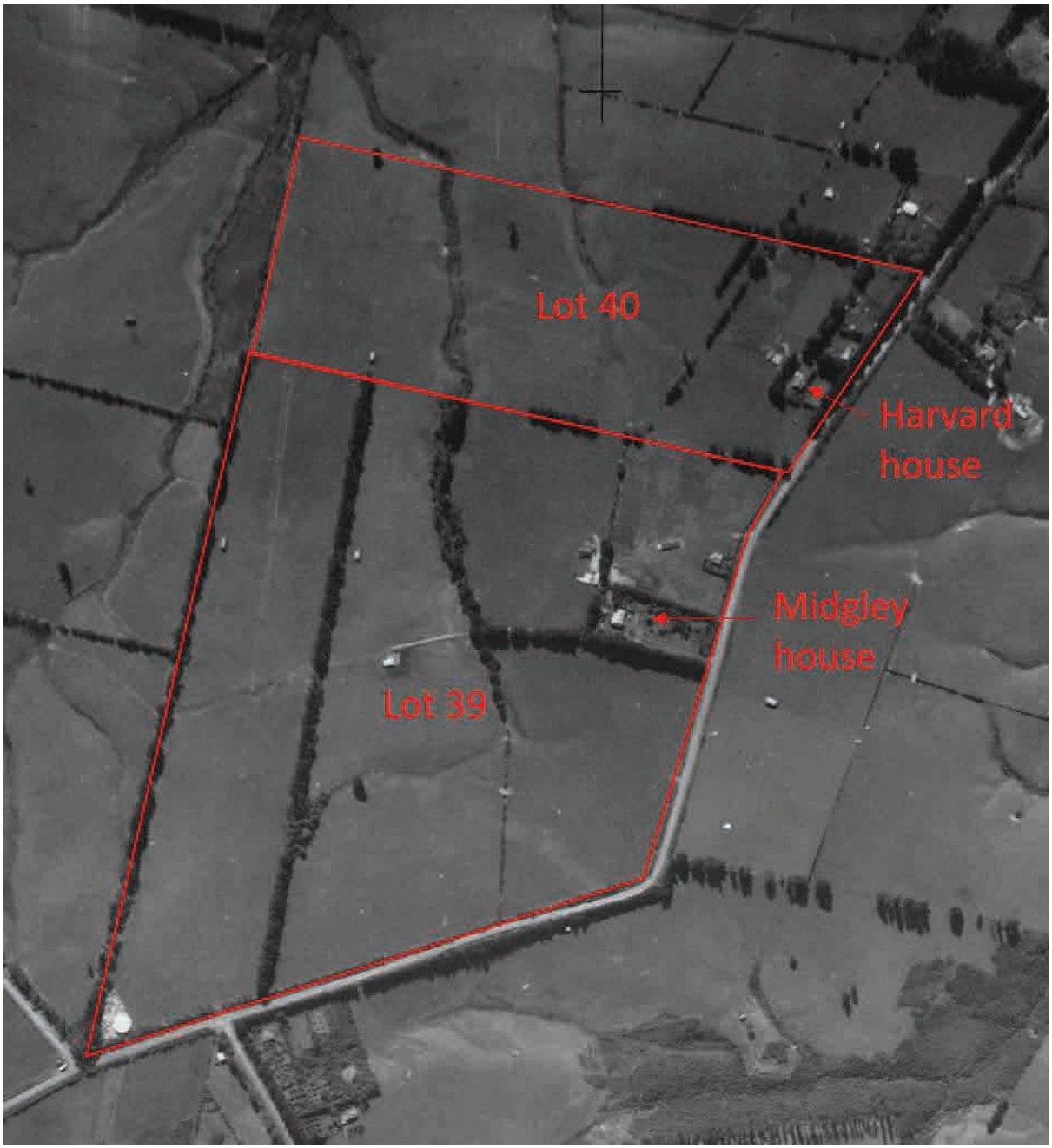

Figure 6. Detail from aerial photograph of the Hobsonville area, dated 22/04/40. Retrolens/LINZ.

1924 and took out several mortgages until he and others sold the property to Speed in 1933. It was moved onto NA578/68 in 1934. Havard subdivided the southern portion in 1954.

There doesn't appear to be a house on Lot 33 in the 1940 aerial photograph but there is a cluster of larger trees and an outbuilding at the end of a road in the middle of the Lot which may be hiding the pre-1900 house, or the remains of one. In Laurel North's document on the location of old Hobsonville houses she says there was a "sweeping driveway from top Wiseley Rd past house and on to main Rd, opposite school. Remember old house very weathered covered in wisteria." The location on the rough hand drawn map is on Lot 33. Wisely Road now runs parallel to Hobsonville Road for quite a distance but on Roll 30 and on the 1940 aerial

it is a small road that ends at the edge of Lot 33. The photo shows a thin track running from part way across Lot 24 and ending at the edge of Lot 33. It is in line, though, to join up with the driveway from Hobsonville Road in the cluster of trees and is probably what remains of the sweeping drive. There are mentions in the papers of a dispute Bernecker had with Mr. Wisely, who put a gate on a road through his property that Bernecker used to access his land. Presumably this was the forerunner of Midgely Road crossing Lot 24 (New Zealand Herald, 3 October 1891, p.3). There is a Railway style cottage (CHI ID 3700) on Lot 40 in a 1940 aerial photograph, but it is likely that this was built by Havard after he acquired the land in 1921 (Figure 6).

Summary

Although two well known local families, the von Berneckers and the Midgleys, owned much of development properties in the late 19th century, they did not live on them until the early 20th century. There may be archaeological evidence of 19th century farm structures relating to their ownership, but no evidence of domestic structures.

Field Survey

The development footprint within 86, 88, 90, 92, 98 and 100 Hobsonville Road was surveyed on foot to document any visible archaeological remains and assess the potential for sub-surface archaeology. These properties are now primarily open paddocks (some very over-grown)

Figure 7. Typical open paddock currently grazed at 92 Hobsonville Road.

Figure 8. Typical over-grown paddocks at 88 Hobsonville Road.

Figure 9. Disused glasshouses at 100 Hobsonville Road.

Figure 10. Typical vegetation along Council-owned riparian sections.

(Figure 7 and Figure 8), out-of-use commercial gardening structures (Figure 9), orchards, and houses that are both in use or unoccupied. Ground surface visibility was often poor. A creek runs through all of these sections and the gully is very deep in some areas. It is planted with established wetland (e.g., flax and lilies) and conifers (e.g., pine and macrocarpa) boundary vegetation on both sides (Figure 10). All observed structures and horticultural areas within these properties were thought to be related to post-1900 occupation of these properties. There were no unrecorded archaeological sites or deposits recorded during this survey, although it should be noted that archaeological survey techniques based on visual inspection of these properties cannot necessarily identify subsurface remains that present no surface evidence.

Assessment

The following assessments of significance relate only to archaeological values. Other interested parties, in particular mana whenua, may hold different values regarding the proposed development. This assessment applies to potential archaeology that may be found during development, both pre-European Maori and historic. The following assessment of archaeological values is based on the criteria set out in the NZHPT (2006).

Assessment of values

Condition	The condition of any sites in unknown.
Rarity	Any sites/features if identified during works will likely share characteristics similar with sites found elsewhere in the area.
Context	The history of Hobsonville is well known but the context for any finds is being progressively destroyed through urbanisation.
Information	Should sites be identified during works there will be potential for scientific information related to the pre-European Maori and early European occupation of Hobsonville to be recovered by archaeological means.
Amenity	Any sites are not currently visible and on private land.
Cultural	Sites may be pre-European Maori or historic European sites.

Assessment of effects

A new access road and residential/light industrial subdivision are proposed which pass through the northern end of the creek and surrounding paddocks, requiring earthworks. This potentially may expose subsurface archaeological features within the open paddocks that slope towards the creek or midden near the banks of that waterway. Any such evidence is likely to be destroyed by earthworks.

Recommendations

These recommendations are only made based on the archaeological potential that has been outlined above. Any other values associated with special interest groups, including tangata whenua, can only be determined by them. It is recommended 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.

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APPENDIX 5
CULTURAL IMPACT ASSESSMENT

CULTURAL IMPACT ASSESSMENT

FOR

HOBSONVILLE ROAD
PROPOSED PLAN CHANGE

PREPARED FOR

AUSTINO

AUGUST 2024

This report takes into account the particular instructions and requirements of our client. it is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party. The cultural information in this report is the intellectual property of Te Kawerau ā Maki. Express permission is required to use its content for any other purpose.

Ref. TKITT000329

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TE KAWERAU IWI
TIAKI TRUST

Report No.	TKITT000329		
Prepared by:	Ashleigh McDonald	Kaiārahi Taiao Environment Lead	
Reviewed and approved by:	Edward Ashby	Pou Tiaki CEO	
Date of issue:	12/08/2024		
Revision:	V2		

PEPEHA

Ko Hikurangi te maunga

Ko ngā Rau Pou ā Maki ngā tohu whakahī

Ko te Wao Nui ā Tiriwa te ngahere

Ko te Manukanuka ā Hoturoa me te Waitematā ngā moana

Ko Waitākere te awa

Ko Tainui te waka

Ko Tawhiakiterangi te tupuna

Ko Te Kawerau ā Maki te iwi

Hikurangi is the mountain

The many posts of Maki (Waitākere Ranges peaks) are the markers

Te Wao nui ā Tiriwa is the forest

Manukau and Waitematā are the harbours

Waitākere is the river

Tainui is the canoe

Tawhiakiterangi is the person

Te Kawerau ā Maki is the tribe

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1. INTRODUCTION

1.0 Project Background

Te Kawerau Iwi Tiaki Trust ('the Trust') have been commissioned by Austino (hereafter the Client) to prepare a Cultural Impact Assessment (CIA) for the proposed Private Plan Change at 84 and 1/100 Hobsonville Road, Hobsonville, Auckland. Sections 1 & 2 [SO 509537] which is approximately 2.13ha (however the PPC only applies to 1.36ha) and Section 1 [SO 511858], Section 1 [SO 490597] and Section 6 [SO 490597] which is approximately 9.34ha.

The Client seeks to rezone land that was part of the Council initiated Whenuapai Structure Plan (WSP) area. This PPC seeks to rezone 10.7ha of its landholding at 84 and 100 Hobsonville Road from Future Urban to:

- Business – Light Industry zone at 84 Hobsonville Road (Block 1) and
- Residential – Terraced Housing and Apartment Building (THAB) and Residential – Mixed Housing Urban (MHU) zones at 1/100 Hobsonville Road (Block 2).

The proposed rezoning of Block 1 aims to provide an extension to the existing industrial area in the Westpoint Drive area and the Hobsonville Corridor Precinct of the AUP 2016 – Operative in Part (AUP(OP)). The plan change also seeks to rezone land within Block 2 to create a walkable community which will eventually be able to connect with the future development of adjacent land that is also zoned for 'Future Urban' under the AUP(OP). In the PPC, the Block 2 land is proposed to be Residential – (MHU) and Residential (THAB) with site-specific precinct provisions that would ensure it is developed and used in a manner that is consistent with the WSP 2016.

This CIA report has been prepared by the Trust as a legal entity of Te Kawerau ā Maki who are a mana whenua iwi of wider Tāmaki Makaurau (Auckland). 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.

Te Kawerau ā Maki engagement in statutory processes including provision of technical advice for impact assessments is guided by our tikanga (customs and protocols) and mātauranga (tribal knowledge) and framed by Te Tiriti ō Waitangi, our Te Kawerau ā Maki Claims Settlement Act 2015, our Iwi Management Plan (IMP), and our organisational strategic values: Mana Motuhake (independence); Kaitiakitanga (guardianship and sustainable management); Whānaungatanga (people focused); Auahatanga (innovation); Mātauranga Māori (culture-driven).

2.0 Site Description

The project is located in the upper harbour area of West Auckland near West Harbour and Hobsonville. The Waitematā Harbour is several kilometres to the north and east. State Highway 16 runs to the west, while SHW 18 runs to the north. The RNZAF Whenuapai Airbase is approximately 2.2km north. The site sits within a landscape of some significant awa and streams with Te Waiarohia o Ngariki (Waiarohia Stream) to the west, the Rawiri stream near the boundary of the site to the east, Wai ō Pareira (Waipareira Stream) approximately 500m to the south east and Mānutewhau 1.1km directly south.

The wider proposed project area (hereafter the Study Area) includes the surrounding Hobsonville-West Harbour area within a 3km radius of the project. This radius is considered necessary given the scale and nature of the proposal in order to better provide the cultural landscape context. For the purposes of this report, the proposed project site (hereafter the Site) includes the 11.5ha made up of the properties 84 Hobsonville Road (Block 1) and 1/100 Hobsonville Road (Block 2). The majority of these sites is vacant land and were previously used for small scale horticultural uses, pastural farming and associated residences. These previous uses are reflected by the existing, unoccupied dwelling and disused glasshouses that are located within 1/100 Hobsonville Road.

As seen in Figure 1 below, the land that is subject to this PPC is made up of two geographical locations in Hobsonville being:

- Block 1 – vacant land with an area of 1.36ha with frontage to Hobsonville Road, held in two records of title – RT:1046709 which is owned by the applicant and and RT:798035 which is zoned for open space purposes and is currently owned by Auckland Council.
- Block 2 – vacant farmland which is generally bound by Rawiri Stream to the east, vacant land to the south and the Waiarohia Stream to the west, and Council-owned land to the north. This block has a land area of approximately 9.3ha. This block has no frontage to a public road, and the northern portion of this block is affected by the Spedding Road Notice of Requirement (NoR).

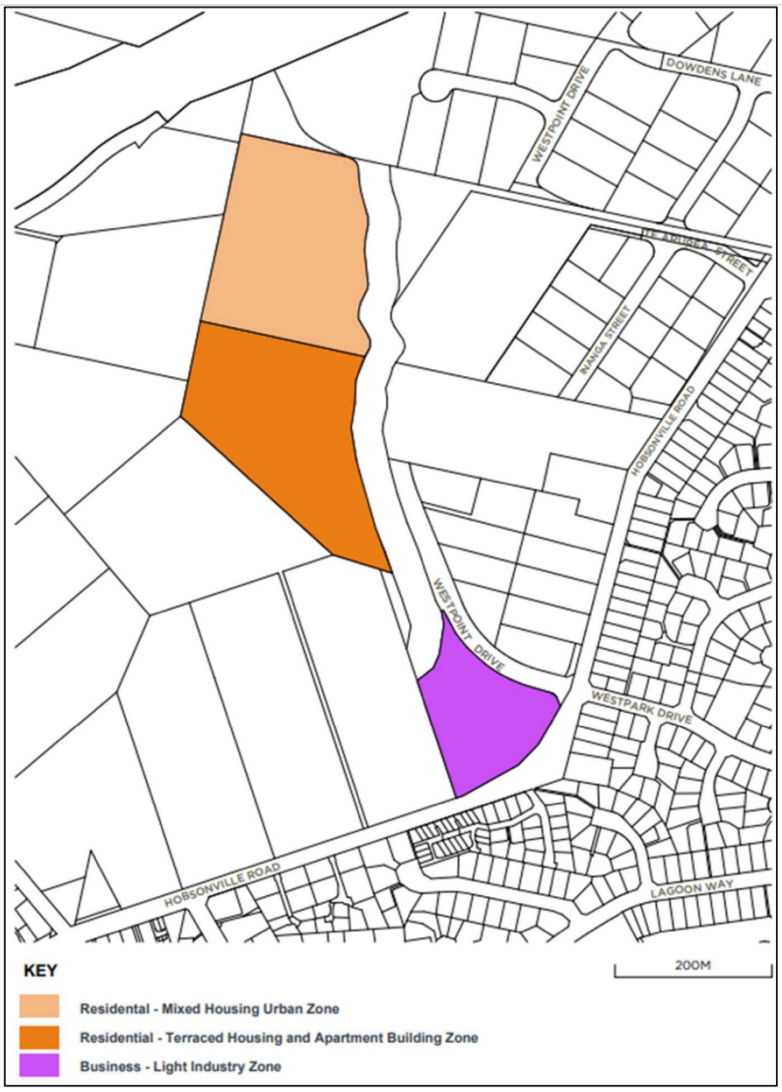


Figure 1: Proposed Zoning in the Private Plan Change Request (source: Harrison Grierson)

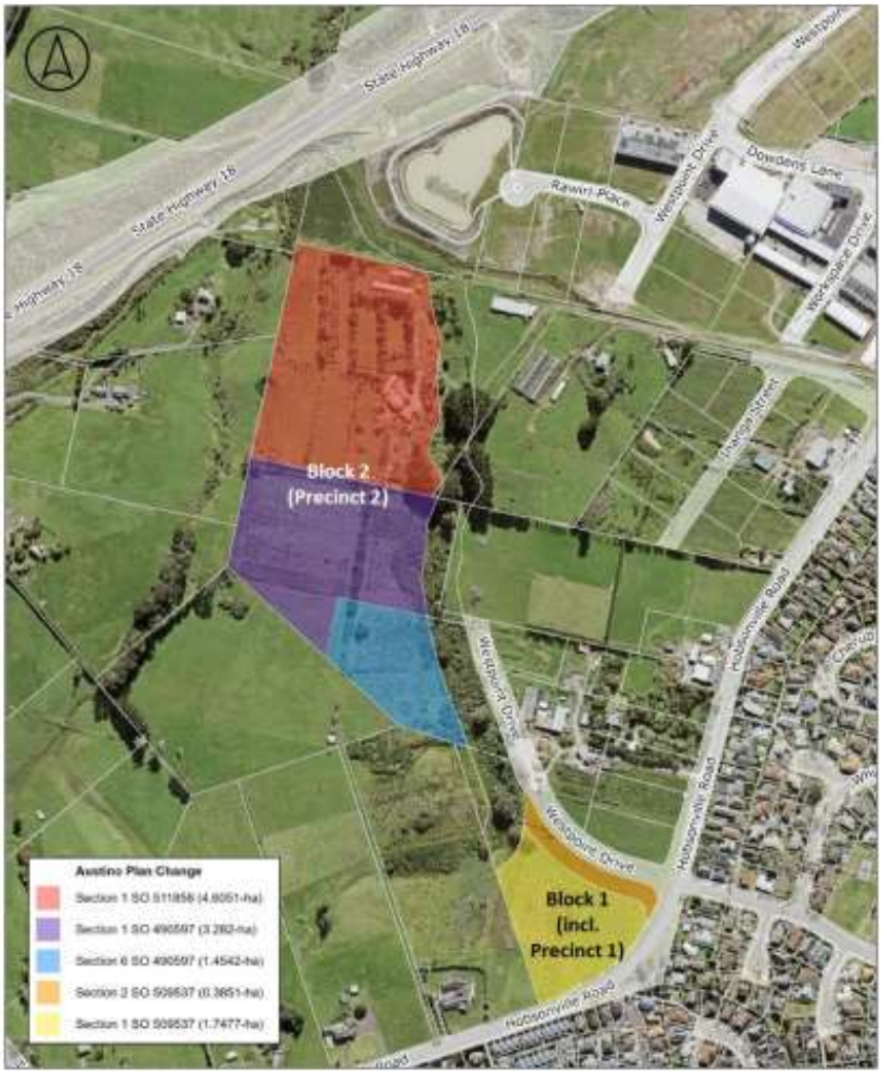


Figure 2: Land subject to the PPC request (supplied by Harrison Grierson)

The land is subject to the following Auckland Unitary Plan (OP) overlays, controls and designations:

- Block 1 (84 Hobsonville Road): Hobsonville Corridor Precinct, sub precinct C; High-Use Acquifier Management Areas overlay [rp] – Kumeu Waitemata Aquifier; Macroinvertebrate Community Index – Rural; Stormwater Management Area Control – Flow 1 (only the Business-Light Industry); Designations – 1467 Road widening Hobsonville Rd, Auckland Transport; and Airspace Restriction Designations – ID 4311, Defense purposes, Minister of Defence.
- Block 2 (100 Hobsonville Road) - High-Use Acquifier Management Areas overlay [rp] – Kumeu Waitemata Aquifier; Macroinvertebrate Community Index – Rural; Designations – 1467 Road widening Hobsonville Rd, Auckland Transport; and Airspace Restriction Designations – ID 4311, Defense purposes, Minister of Defence.

3.0 Aims and Objectives

The aim of this CIA report is to document Te Kawerau ā Maki's cultural values, interests, and associations with the Site; identify specific cultural sites and resources; assess the values of these sites and resources; identify the potential impacts that arise from project activities and assess the significance of effect; and provide recommendations as to how to avoid, remedy or mitigate the potential effects to Te Kawerau ā Maki.

This impact assessment will:

- provide a baseline of known environmental or natural features and resources that may hold cultural values;
- provide a statement of cultural association Te Kawerau ā Maki has with the Site and Study Area;
- identify any known cultural sites and resources within the Site or Study Area;
- describe the value or significance of such sites and resources;
- identify the potential for unrecorded cultural sites (i.e. buried Māori archaeology);
- identify the cultural constraints and risks associated with the Site and the potential significance of effects;
- provide recommendations for further assessment where necessary and/or measures to avoid, remedy or mitigate adverse effects upon Te Kawerau ā Maki.

2. METHODOLOGY

4.0 Statutory Context

Te Tiriti o Waitangi

The key guiding document in any consideration of planning or practice that may impact upon the cultural values or wellbeing of Mana Whenua is Te Tiriti o Waitangi. The principles of the Treaty are recognised and provided for in the sustainable management of ancestral lands, water, air, coastal sites, wāhi tapu and other taonga, and natural and physical resources. The Treaty is articulated in law through an evolving set of principles. These include:

a. reciprocity
b. rangatiratanga
c. partnership
d. shared decision-making
e. active protection
f. mutual benefit
g. right of development
h. redress.

While Article 1 of the Treaty enables the Crown to govern and make laws, Article 2 guarantees Māori rangatiratanga over their people, lands and taonga (things of value). Māori values, associations and interests with their taonga applies regardless of property titles or other constructs, and the Treaty requires that the Crown actively protect these associations and interests (including through but not limited to statutes). Article 3 provides for equality and equity of citizenship and outcome.

Te Kawerau ā Maki Claims Settlement Act 2015

Te Kawerau ā Maki Claims Settlement Act (TKaMCSA) records the acknowledgements and apology given by the Crown to Te Kawerau ā Maki for historic grievances and breaches of Te Tiriti ō Waitangi and gives effect to provisions of the Deed of Settlement that settles the historical claims of Te Kawerau ā Maki. The Act binds the Crown to Te Kawerau ā Maki to work together in accordance with Te Tiriti. The Settlement as delivered through the Act provided both cultural and commercial redress to Te Kawerau ā Maki. This includes binding protocols between Government Ministries and Te Kawerau ā Maki (Part 2, s21 to s26), a recognised and agreed area of interest (Part 1, s12(2b), Part 1 of attachments to Act), and statutory acknowledgements and deeds of recognition (Part 2, s27 to s40, and Schedule 1).

Statutory acknowledgements require relevant consent authorities, the Environment Court, and Heritage New Zealand Pouhere Taonga to: (a) have regard to the statutory acknowledgement; (b) require relevant consent authorities to record the statutory acknowledgement on statutory plans and to provide summaries of resource consent applications or copies of notices of applications to the trustees; and (c) enable the trustees and any member of Te Kawerau ā Maki to cite the statutory acknowledgement as evidence of the association of Te Kawerau ā Maki with a statutory area. The statutory acknowledgement supports Te Kawerau ā Maki trustees being considered as affected persons in relation to an activity within the area under s95E and s274 of the Resource Management Act (1991), and s59(1) and 64(1) of the Heritage New Zealand Pouhere Taonga Act (2014).

Te Kawerau ā Maki Statutory Acknowledgement Areas of relevance to this project are:

- Coastal statutory acknowledgement
- Kumeū River and tributaries
- Rangitōpuni Stream and tributaries
- Te Wai-ō-Pareira / Henderson Creek and tributaries

Heritage New Zealand Pouhere Taonga Act 2014

Statutory protection of Māori archaeology and wāhi tapu is provided for under the Heritage New Zealand Pouhere Taonga Act 2014 (HNZPTA), which is administered by Heritage New Zealand Pouhere Taonga (HNZPT), an autonomous Crown Entity. Under the Act all *in situ* materials, sites, and features older than 1900AD are considered archaeological sites whether previously recorded or not and are afforded automatic protection from damage, modification, or destruction without first obtaining an Archaeological Authority from HNZPT. Moveable objects and artefacts that are not *in situ* but that are from an archaeological context, or are of Māori origin, are controlled under the Protected Objects Act (1975). The HNZ Act S45(2)b stipulates that works on sites of interest to Māori can only occur if (a) the practitioners can demonstrate they have the requisite competencies for recognising and respecting Māori values, and (b) the practitioners undertaking the works have access to appropriate cultural support. Under the Act Mana Whenua are enabled to provide advice or assessment regarding the management or decision taking arising from impacts to their cultural sites, provided these meet the Act's criteria. It is noted that Te Kawerau ā Maki never ceded our sovereignty to govern our taonga to HNZPT and view the HNZPTA as overstepping its authority or role as the decision-maker over the taonga of Te Kawerau ā Maki, thus being in direct breach of Article II of Te Tiriti ō Waitangi.

Resource Management Act 1991

The Resource Management Act (RMA) 1991 provides statutory recognition of the Treaty of Waitangi and the principles derived from the Treaty. It introduces the Māori resource management system via the recognition of kaitiakitanga and tino rangatiratanga and accords Territorial Local Authorities with the power to delegate authority to iwi over relevant resource management decisions. The Act contains over 30 sections, which require Councils to consider matters of importance to tangata whenua. Some of the most important of these are:

- Take into account principles of the Treaty of Waitangi and their application to the management of resources (Section 8).
- Recognition and provision for, as a matter of national importance, the relationship of Māori and their culture and traditions with their ancestral lands, water, sites, wāhi tapu and other taonga (Section 6(e)).
- Having particular regard to the exercise of kaitiakitanga or the iwi's exercise of guardianship over resources (Section 7(a)).
- Requiring the Minister for the Environment to consider input from an iwi/hapū authority when preparing a national policy statement (Section 46).
- The ability for local authorities to transfer their functions, powers or duties under the Act to iwi authorities (Section 33).
- Development of joint management agreements between councils and iwi/hapū authorities (Section 36B to 36E).
- Having regard to any relevant planning document recognised by an iwi/hapū authority (sections 35A(b), 61.2A(a), 66.2A(a), 74.2A).
- The obligation to consult with iwi/hapū over consents, policies and plans. (Combination of all the sections above and Clause 3(1)(d) of Part 1 of the first schedule of the Resource Management Act).

An assessment of impacts on cultural values and interests (CIA) can assist both applicants and the council in meeting statutory obligations in a number of ways, including:

- preparation of an Assessment of Environmental Effects (AEE) in accordance with s88(2)(b) and Schedule 4 of the Resource Management Act 1991 (RMA)
- requests for further information under s92 of the RMA in order to assess the application
- providing information to assist the council in determining notification status under ss95 to 95F of the RMA
- providing information to enable appropriate consideration of the relevant Part II matters when making a decision on an application for resource consent under s104 of the RMA, or when undertaking a plan change

- consideration of appropriate conditions of resource consent under s108 of the RMA.

It is noted that Te Kawerau ā Maki never ceded our sovereignty to govern our taonga to local authorities and view the RMA as enabling councils to overstep their authority or role as the decision-maker over the taonga of Te Kawerau ā Maki, thus being in direct breach of Article II of Te Tiriti ō Waitangi.

Reserves Act 1977 and Conservation Act 1987

Section 4 of the Conservation Act, which is invoked by the Reserves Act, states that the Act must be interpreted and administered as to give effect to the principles of the Treaty of Waitangi.

5.0 Planning Policy Context

UN Declaration on the Rights of Indigenous Peoples

New Zealand supported the UN Declaration on the Rights of Indigenous Peoples (2007) in 2010. This support was an affirmation of fundamental rights and the aspirations of the Declaration. Article 11 states that indigenous peoples have the right to practise and revitalise their cultural traditions and customs, including the right to maintain, protect and develop the past, present and future manifestations of their cultures, such as archaeological and historical sites, artefacts, designs, ceremonies, technologies and visual and performing arts and literature (clause 1). States shall provide redress through effective instruments, which may include restitution, developed in conjunction with indigenous peoples, with respect to their cultural, intellectual, religious and spiritual property taken without their free, prior and informed consent or in violation of their laws, traditions and customs. (clause 2). Article 18 and 31 note that indigenous peoples have the right to participate in decision-making in matters which would affect their rights, through representatives chosen by themselves in accordance with their own procedures, as well as to maintain and develop their own indigenous decision-making institutions. Further that Indigenous peoples have the right to maintain, control, protect and develop their cultural heritage, traditional knowledge and traditional cultural expressions, as well as the manifestations of their sciences, technologies and cultures, including human and genetic resources, seeds, medicines, knowledge of the properties of fauna and flora, oral traditions, literatures, designs, sports and traditional games and visual and performing arts. They also have the right to maintain, control, protect and develop their intellectual property over such cultural heritage, traditional knowledge,
and traditional cultural expressions.

ICOMOS New Zealand Charter 2010

The International Council on Monuments and Sites (ICOMOS) is UNESCOs principal advisor in matters concerning the conservation and protection of historic monuments and sites and advises the World Heritage Committee on the administration of the World Heritage Convention (which includes provision of nationally significant heritage). The New Zealand National Committee (ICOMOS NZ) produced a New Zealand Charter in 2010 which has been adopted as a standard reference document by councils. The Charter sets out conservation purposes, principles, processes and practice. The scope covers tangible and intangible heritage, the settings of heritage, and cultural landscapes. Of particular relevance the Charter states that tangata whenua kaitiakitanga over their taonga extends beyond current legal ownership wherever such cultural heritage exists. The Charter also states that the conservation of Māori heritage requires incorporation of mātauranga and therefore is conditional on decisions made in association with tangata whenua and should procced only in this context.

National Policy Statement for Freshwater Management 2020

The NPS for freshwater management provides national policy settings that relevant statutory agencies including local authorities must comply with. Central to the NPS is the concept of Te Mana ō Te Wai set out in s1.3. This is an aspirational concept that means that the integrity (physical and spiritual) of all water is upheld to its highest possible quality or state. The Crown's interpretation of the concept is that the fundamental importance of water is recognised and that by protecting the health of freshwater we

protect the health and well-being of the wider environment, including by protecting wai mauri, and the restoration of the balance between water, the environment, and communities. It provides six principles for the management of water (s1.3(4)). Relevant to tangata whenua are: (a) Mana whakahaere: the power, authority, and obligations of tangata whenua to make decisions that maintain, protect, and sustain the health and well-being of, and their relationship with, freshwater; (b) Kaitiakitanga: the obligation of tangata whenua to preserve, restore, enhance, and sustainably use freshwater for the benefit of present and future generations; (c) Manākitanga: the process by which tangata whenua show respect, generosity, and care for freshwater and for others. Policy 2.2(2) states that tangata whenua are actively involved in freshwater management (including decision-making processes), and Māori freshwater values are identified and provided for. Policy 2.2(3) requires that freshwater is managed in an integrated way that considers the effects of the use and development of land on a whole-of-catchment basis, including the effects on receiving environments. Section 3.4 sets out how councils must actively involve tangata whenua in the management of fresh water.

National Policy Statement for Indigenous Biodiversity 2023

The NPSIB provides national policy around biodiversity that statutory agencies must comply with or reflect in decision-making. The overall objective s2.1(1) is to maintain indigenous biodiversity across Aotearoa New Zealand so that there is at least no overall loss in indigenous biodiversity. Section 2.1(1)(b) states that in doing this decision-makers must recognise the mana of tangata whenua as kaitiaki of indigenous biodiversity. Policy 1 states indigenous biodiversity must be managed in a way that gives effect to the decision making principles and takes into account the principles of the Treaty of Waitangi. Policy 2 supports the role of tangata whenua in excercising their kaitiakitanga for biodiversity. The implementation of the NPSIB requires a partnership approach with tangata whenua.

Auckland Unitary Plan

At a Local Government level, the Auckland Unitary Plan (AUP) provides for the protection and management of matters of importance to Mana Whenua including the environment and cultural heritage. These matters are set out in the Regional Policy Statement Chapter B6, but are also embedded in the lower-order policies and rules throughout the Plan.

Policy B6.2.2 provides for the recognition of Treaty of Waitangi/Te Tiriti ō Waitangi partnerships and participation. This includes Policy B6.2.2(1) that provides for Mana Whenua to actively participate in the sustainable management of natural and physical resources including ancestral lands, water, sites, wāhi tapu and other taonga.

Policy B6.3.2 deals with recognising Mana Whenua values and includes clause (1) that enables Mana Whenua to identify their values associated with ancestral lands, freshwater, biodiversity, and cultural heritage places and areas, and clause (2) that requires the integration of Mana Whenua values, mātauranga and tikanga in the management of natural and physical resources within the ancestral rohe. Clause (3) ensures that any assessment of environmental effects for an activity that may affect Mana Whenua values includes an appropriate assessment of adverse effects on those values. Clause (6) of the policy requires resource management decisions to have particular regard to potential impacts on: the holistic nature of the Mana Whenua world view; the exercise of kaitiakitanga; mauri; customary activities; sites and areas with significance spiritual or cultural heritage value; and any protected customary right under the Takutai Moana Act (2011).

Policy B6.5.2 provides for the active protection of Mana Whenua cultural heritage. Clause (2) sets out a framework for identifying and evaluating Mana Whenua cultural heritage using the assessment factors of: mauri; wāhi tapu; kōrero tūturu; rawa tūturu; hiahiatanga tūturu; and whakaaronui o te wā. Clause (4) requires the protection of places and areas listed in Schedule 12 Sites and Places of Signifiance to Mana Whenua from adverse effects. Clause (7) provides for the inclusion of a Māori cultural assessment in structure planning and plan change processes, and clause (9) encourages appropriate design, materials and techniques for infrastructure in areas of known historic settlement and occupation.

Iwi Management Plan

Te Kawerau ā Maki Resource Management Statement (1995) was lodged with Council explicitly as an iwi authority planning document under sections 66(c) and 74(b) of the RMA 1991 (since repealed). The IMP describes the continuing role of Te Kawerau ā Maki as kaitiaki (guardians) and provides policies to guide statutory authorities and applicants. Policy 2.2(2) promotes the integration of Te Kawerau ā Maki tikanga in resource management, while clause (3) requires engagement by all agencies within the rohe to help give effect to the kaitiaki role of the iwi. Policy 4.1.2(3) requires that cumulative effects upon Te Kawerau ā Maki are fully recognised and provided for. Policy 4.2.2 concerns Te Kawerau ā Maki cultural heritage and requires the protection of all heritage sites including access requirements (s4.2.2(1)); the involvement of Te Kawerau ā Maki in all instances where potential effects may arise (s4.2.2(2)); and the recognition of Te Kawerau ā Maki cultural and spiritual values (s4.2.2(3 and 4)). Policy 4.3.2 concerns the management of kōiwi, while s4.4.2 regards the management of water. Activities in the Coastal Marine Area are covered by s4.5.2. Waste management policies are described in s4.6.2 and land and landscape policies are set out in s4.7.2. Indigenous flora and fauna policy settings are described in s.4.8.2 including opposition to all destruction of native flora and fauna without Te Kawerau ā Maki written consent. Policy 4.9.2 concerns Te Kawerau ā Maki participation in design of the built environment and interpretation of heritage. The IMP also details formal support and adoption of the 1993 Matātua Declaration on cultural and intellectual property rights of indigenous peoples.

6.0 Te Ao Māori

Our worldview is the framework by which we understand and navigate our physical and metaphysical environment. A full account of the cosmological underpinnings of Te Ao Māori is not offered here but in brief it recognises both the spiritual and the physical, is guided by different domains governed by atua or distinct spiritual entities, and involves several core concepts including whakapapa, mana, wairua, mauri, tapu, and noa. Te Ao Māori places emphasis on the holistic link between people and the environment. Mātauranga is the knowledge or wisdom about the world developed over generations and passed down from tūpuna, while tikanga is the evolving set of principles and customary practices by which Māori give effect to this knowledge to navigate the world safely.

Papatūānuku

The primordial goddess embodying the whenua or land. She is the earthmother to all living things. This whakapapa is one of the reasons why whenua is the name for placenta as well as land, and why in Te Ao Māori tangata whenua belong to the whenua and not the other way around. Papatūānuku is a source of rejuvenation and life.

Ranginui

The primordial god embodying the sky or heavens. He is the skyfather to all living things. When he was separated from his wife Papatūānuku by their children, his tears became the rain which is considered tapu until it reaches the ground (wai Māori).

Tūmatauenga

The god of war and human activities and a progenitor of humanity.

Tāwhirimātea

The god of weather including thunder, lightning, wind, clouds and storms. He was opposed to the forced separation of his parents Papatūānuku and Ranginui and therefore he wars with his brothers and their descendants to this day.

Tāne

The god of forests and animals and an originator and protector of humans. Responsible for separating the embrace of his parents and ushering in Te Ao Marama (the age of light).

Tangaroa

The god of the sea, lakes, rivers and animals that live in them. There is a close and sometimes contentious relationship between Tangaroa and Tāne reflected in creatures such as reptiles and whales and in the dynamic between the sea and the coastline.

Rongo

The god of cultivated plants and agriculture also associated with peace.

Haumia-tiketike

The god of uncultivated plants and wild foraging.

Matā-oho

The local god of volcanic activity and earthquakes that formed the Tāmaki volcanic field.

Whakapapa

The sacred genealogy linking all things. Humans whakapapa not only to human tūpuna (ancestors), but also to the whenua, atua and their respective lineages. All indigenous animals and plants have an interconnected whakapapa. Whakapapa is a prerequisite of mana whenua, whānaungatanga, and kaitiakitanga.

Mana

A core metaphysical concept regarding the inherent authority or power of people, places or objects. Mana is derived or delegated from atua and, in the case of humans, is both inherited and earned through actions. Everything including people has an element or degree of mana. A person or tribe's mana can increase or decrease depending on the success, failure or nature of actions (or inactions) and is directly tied to their wellbeing. Undertaking the responsibilities of manakitanga and kaitiakitanga successfully are examples of maintaining or enhancing mana and contribute to cementing mana whenua.

Tapu

A core metaphysical concept regarding a state or degree of sacredness, prohibition, being set apart or forbidden. Tapu is a state where a person, place or thing is under the protection of or dedicated to an atua and is thus removed from profane or normal or common things and uses. Tapu is closely linked to mana and governs the behaviour of individuals and the wider society. Everything including people has an element or degree of tapu that must be preserved and respected. It is a priority of rangatira, tohunga and kaitiaki to maintain tapu and to ensure it is not diluted by common things. As with mana, the maintenance of tapu is directly linked to the wellbeing of both individuals and the tribe.

Noa

A core metaphysical concept regarding a normal or common (and sometimes profane) state that is in essence the opposite of tapu. Noa actions and things (whakanoa) can dilute tapu.

Wairua

A core metaphysical concept regarding the immortal spiritual or non-physical element of people, places or things.

Mauri

A core metaphysical concept regarding the essence that binds the physical and the spiritual together to enable life to exist and to thrive. Mauri is a sacred element and can be weakened or enhanced. When damaged or diluted the binding between the physical and the spiritual realms is weakened and life begins to falter and fail. It is the sacred obligation of mana whenua, through the act of kaitiakitanga, to maintain the balance of mauri within people, places, objects, ecosystems, and the hapū or iwi.

Mātauranga

The body of knowledge or customary wisdom and skill embedded within the tohunga, whānau, hapū and iwi. Mātauranga is passed down the generations from tūpuna but is also added onto through successive generations of uri, and culturally encodes hundreds of years of observations, measurements, theory, and custom regarding Te Ao Māori and the environment.

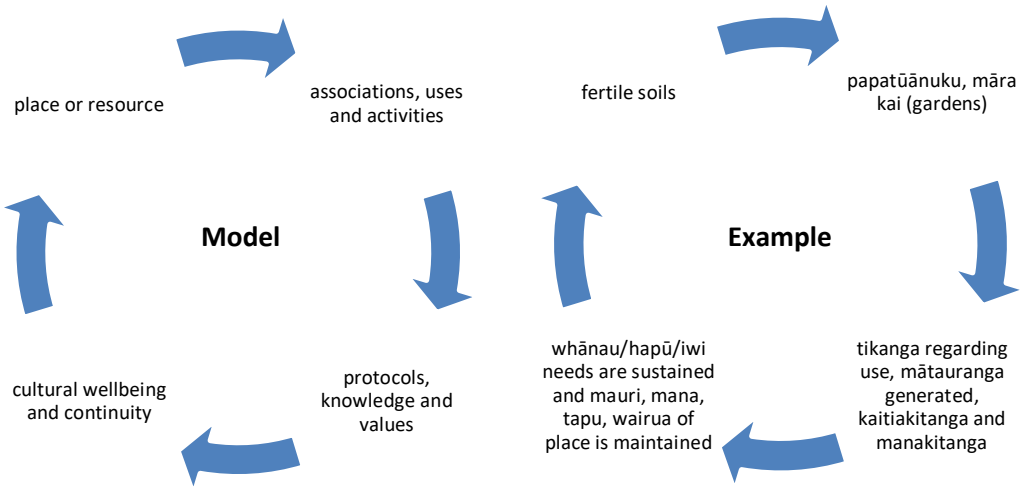
Tikanga

The lore, customs, practices, protocols, rules and methods that give effect to the application of mātauranga in navigating the natural and social world. There are different tikanga for different contexts and in different domains.

Cultural Values

Cultural values are the shared norms that govern the continuation of culture and provide the framework for social and individual actions. Key values include: rangatiratanga (chiefly authority or self-governorship), whānaungatanga (kinship and reciprocal connection through shared whakapapa), wairuatanga (spirituality), manakitanga (hospitality and showing care), and kaitiakitangata (guardianship or stewardship).

A model of how cultural values function is provided below.



7.0 Scoping and Consultation

The Study Area comprises a 3000m radius from the centre of the Site. This radius is considered appropriate given the large scale of the Site and presence of significant cultural sites in the vicinity that could have setting or indirect impacts. Within this area all appropriate and known cultural sites, areas, landscapes and resources have been identified. Te Kawerau ā Maki however reserve the right to withhold certain information regarding wāhi tapu or sites that are culturally and spiritually sensitive to the iwi.

This report includes all known or appropriate-to-report elements of the natural and cultural environment within the Site and Study Area considered to hold cultural value for Te Kawerau ā Maki. This information forms the baseline of the assessment. This includes native biodiversity and ecology, geological and topographic features, natural resources including water bodies, built heritage such as marae, socio-cultural features such as papa kāinga, cultural landscapes, historic or cultural sites, Māori archaeological sites, pou whenua and significant cultural public art.

Mātauranga/cultural knowledge of the Site and Study Area has been obtained, where appropriate, from Te Kawerau ā Maki kaumatua, kuia and other holders of knowledge within the iwi. Readily available published and unpublished written records, illustrations, maps, archaeological and geological records were reviewed during preparation of this cultural assessment. Spatially referenced heritage asset data was reviewed from the Auckland Council Cultural Heritage Inventory (CHI) and the New Zealand Archaeological Association (NZAA) recording scheme database (ArchSite). Other information, reports, and impact assessments available for the Site that have been provided by the Client have been reviewed including:

- 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 opinions contained within this document may change and/or develop as new information is released.

This Cultural Impact Assessment involved a desktop study based on review of technical information, cultural knowledge of the area, and research as well as a site visit to assess and confirm site condition

8.0 Assessment Approach

Following standard Environmental Impact Assessment (EIA) methodologies and planning terminology, but adapted for CIA purposes, this report will:

a. **Identify** the cultural sites, areas and resources (defined as both tangible and intangible cultural heritage, natural resources of cultural interest, and socio-cultural features) within a Study Area encompassing the proposed Site and a wider area that may be directly or indirectly impacted. The Study Area is defined as approximately 3000m radius of the Site to correspond with a likely area of setting impacts (e.g. noise, visual), indirect impacts, and a logical catchment of the cultural landscape.

b. Provide comment on the cultural **value** of the identified cultural sites, areas and resources. Māori cultural value is not derived from national or local policy but is defined and determined by tangata whenua and their particular world view and culture. Māori values are distinct from historic, archaeological or other value-systems, and are recognised by the courts and statute as their own legitimate knowledge-system with tangata whenua being the experts. Māori values are informed by whakapapa and guided by tikanga and kawa, with emphasis placed on the associative and living connection to places and resources which sustain cultural knowledge (mātauranga), practices, and spiritual and physical wellbeing. All cultural sites, areas and resources are of value to Te Kawerau ā Maki, who hold a holistic view of the environment and the unique relationship of the iwi to the whenua. It is difficult to apply a Western paradigm of value hierarchy or significance ranking (i.e. 'low, medium, high') when using a Te Ao Māori lens. Nevertheless, the methodology here attempts to distinguish the relative importance of matters as determined by a number of criteria, including the degree of mana, tapu or mauri, the degree to which a resource has specific kōrero or mātauranga, its sensitivity to changes (ability to absorb impacts), and its relative scarcity. This approach recognises that a matters' value is intrinsic but relative to context.

This approach is supported by RMA Part II matters noting the relationship of tangata whenua with their lands, waters, and taonga as nationally significant. The approach is set out below:

- high: cultural sites/areas/resources that retain their integrity overall, are either rare or are common but hold specific customary uses or mātauranga, are considered a wāhi tohu or landscape indicator, or have a high sensitivity to change.
- medium: cultural sites/areas/resources that retain the key elements of their integrity, are either uncommon or are common but hold specific customary uses or mātauranga, or have a moderate sensitivity to change.
- low: cultural sites/areas/resources that have been significantly degraded or damaged, are common and do not hold specific current customary uses or mātauranga, or have a low sensitivity to change.

Value is also assigned against the cultural values identified in the AUP Policy B6.5.2(2):

i. Mauri: the mauri (life force and life-supporting capacity) and mana (integrity) of the place or resource holds special significance to Mana Whenua;
ii. Wāhi Tapu: the place or resource is a wāhi tapu of special, cultural, historic, metaphysical and or spiritual importance to Mana Whenua;
iii. Kōrero Tūturu: The place has special historical and cultural significance to Mana Whenua;
iv. Rawa Tūturu: the place provides important customary resources for Mana Whenua
v. Hiahiatanga Tūturu: the place or resource is a repository for Mana Whenua cultural and spiritual values; and
vi. Whakaaronui o te Wa: the place has special amenity, architectural or educational significance to Mana Whenua.

c. Identify the potential **impacts** to cultural resources and elements. Only Mana Whenua can define the impact to their cultural values, but guidance is noted below. Cultural impacts can be:

- no change
- negligible: changes result in small impacts on integrity of the site/area/resource such that their function is reduced but not notably diminished, ability to understand/appreciate/use/access is impacted to a inconsequential degree, the ability to interpret the cultural landscape or setting is impacted but the change can easily be absorbed.
- minor: changes result in small impacts on integrity of the site/area/resource such that their function is reduced but not significantly diminished, ability to understand/appreciate/use/access is impacted to a small degree, the ability to interpret the cultural landscape or setting is impacted to a small degree or change can otherwise be largely absorbed.
- moderate: changes result in appreciable/significant impacts on the integrity of the site/area/resource such that their function is impeded, ability to understand/appreciate/use/access is impacted to a notable degree, the ability to interpret the cultural landscape or setting is impacted to a notable degree or change can otherwise not be absorbed.
- major: changes result in large scale/total impacts on the integrity of the site/area/resource such that their function is effectively destroyed, ability to understand/appreciate/use/access is impacted to a significant degree/is no longer possible, the ability to interpret the cultural landscape or setting is impacted to a significant degree or change can otherwise not be absorbed and the landscape or setting is no longer recognisable/able to function.

Impacts can be either adverse or beneficial. Impacts can also be temporary or permanent. They can occur during the construction or the operational phase of a development. Impacts can be:

i. direct (i.e. physical impacts resulting from a development, impacts to the settings of cultural sites or the character of cultural landscapes, visual, noise, odour, or culturally inappropriate land use activities).
ii. indirect (i.e. traffic congestion, erosion due to vegetation loss, or other secondary impacts that occur over time or in a secondary location to the original activity).
iii. cumulative (i.e. impacts which are caused by the combined result of past, current and future activities, or in-combination impacts).

d. Define the **significance of effect** resulting from combining the value of a cultural site, area or resource and the level of potential impact to that site, area or resource. Significance of effect is assessed pre-mitigation but can also be assessed again post-mitigation to ascertain the *residual effect* and effectiveness of any proposed mitigation. Significant effects (within a planning framework) are those with moderate or large effects (either adverse or beneficial). This method is outlined below in Table 1. Note that positive effects will be coloured green.

Table 1: Significance of effect

		LEVEL OF IMPACT				
		No Change	Negligible	Minor	Moderate	Major
CULTURAL VALUE	High	Neutral	Minor	Moderate	Large	Large
	Medium	Neutral	Negligible	Minor	Moderate	Large
	Low	Neutral	Negligible	Negligible	Minor	Moderate

9.0 Assumptions and Limitations

Te Kawerau ā Maki are the experts of our own culture and tikanga. This expertise and the equal weighting of mātauranga Māori evidence is accepted in the courts and by statute. Through a necessity to work within a Western planning framework we utilise planning language where possible to aid in mutual understanding, however there is difficulty in the translation and application of some core cultural concepts to such a framework. This is particularly an issue when segmenting or demarcating value spatially, when ascribing a type of significance hierarchy, and when limiting value to tangible elements, whereas Māori hold a holistic perspective that operates differently to typical Western paradigms. This means that where there is doubt or confusion over a term or point of discussion, readers should contact Te Kawerau ā Maki directly for clarification.

Due to the sensitive nature of certain cultural knowledge, areas and sites (e.g. burial grounds), Te Kawerau ā Maki reserves the right not to identify the exact spatial extents or provide full information of such areas to retain and protect this knowledge within the iwi. In other situations, while a general area may be known to be of cultural significance the exact spatial extent or location of the site may have been lost over successive generations. Where possible and appropriate, sites are described and defined to enable discussion of the impacts while acknowledging these limitations.

The environmental and archaeological data relied upon for elements of this report are derived from secondary sources and it is assumed the data and opinions within these and other secondary sources is reasonably accurate.

The CHI and ArchSite databases are a record of known archaeological and historic sites. They are not an exhaustive record of all surviving historic or cultural sites and resources and do not preclude the existence of further sites which are unknown at present. The databases also utilise a site location point co-ordinate system rather than detailing site extents or cultural landscapes.

3. ENVIRONMENTAL BASELINE

10.0 Topography and Geology

The underlying geology of 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.

The site itself comprises gently sloping land that has historically been used for agricultural and horticultural activities. According to the Geotechnical Assessment undertaken by GeoSciences, the land is considered to be stable with acceptable levels of post-development residual risk from natural hazards that would prevent future development.

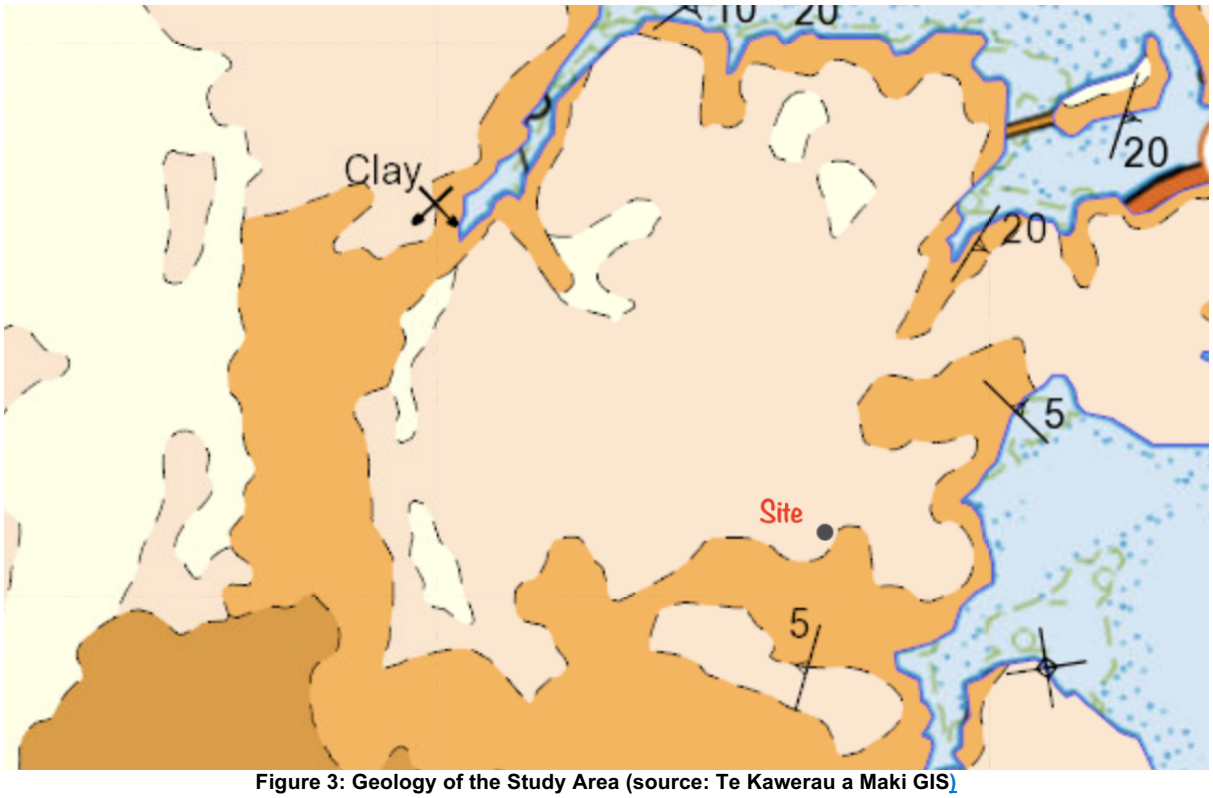


Figure 3: Geology of the Study Area (source: Te Kawerau a Maki GIS)

Block 1 is located on the banks of a wide natural gully which drains down to Rawiri Stream. The high point of the precinct is located on Hobsonville Road (approximately 62m AVD1946) to the west of the site and the low point is the northern most corner (approximately 43m AVD1946).

Block 2 is bounded by streams with steep areas occurring in the vicinity of the upper reaches of the Rawiri stream and tributary of Waiarohia ō Ngariki (Trig) stream. The centre of the site is relatively flat with the high point located on the southwestern boundary (approx., 46m AVD1946) and the low point is located in the northeastern boundary (approx. 25m AVD1946).

11.0 Natural Resources and Ecology

The relatively productive soils and the stream systems are the main natural resources of cultural relevance to note. The PPC area and land immediately adjacent to it, do not contain any Significant Ecological Areas (SEAs) and is not within a Natural Stream Management Area, however it is worth noting that the nearest SEA is located downstream (Brigham Creek), almost 1km from Block 2. Beyond this, the ultimate receiving environment of the Upper Waitemata Harbour is identified as an SEA. There are also no Notable Trees within the PPC area.

According to the Bioresearches report (2024), historically (pre-1900s) the area would have comprised the forest ecosystem type 'Pūriri forest' (WF7) and therefore would have supported a diverse range of invertebrates, amphibians, reptiles, birds and bats. It has been devoid of such native habitat for at least most of the 20th century – Bioresearches (2024) noted that by the 1940s mature vegetation had been largely cleared, as indicated by the earliest historic aerial imagery of the site. Typical shelterbelts and scrub vegetation were observed along the property boundaries and for the most part, it seems the site was used for agricultural purposes up until recently.

In terms of freshwater habitat, there are no watercourses within the PPC area, however the Bioresearches (2024) report notes that there are freshwater watercourses near the site that could be affected by indirect effects related to earthworks and or from the diversion and discharge of stormwater one the land is developed for urban purposes. These freshwater features (which are also permanent streams) are the Rawiri Stream and a tributary of the Trig Stream, which converge downstream to form the Waiarohia ō Ngariki (Waiarohia) Stream that flows underneath the Upper Harbour Highway (SH16) via 3 culverts owned by Waka Kotahi (Culvert D 1950mm, Culvers C2 & C3 2100mm). The report also notes that the lower reaches of the Trig and Rawiri streams meet the definition of a natural wetland, which is located approximately 10m from the PPC area and sits within land that is zoned Open Space – Informal Recreation. Biosearches assessed the Rawiri Stream and the wetland as having 'moderate' ecological value due to its potential to provide freshwater fish habitat.

In terms of native fauna the ecological report (Biosearches, 2024) identified the presence of North Island Fernbird within the vicinity of the site, but considers it highly unlikely the fernbird would be present within the site due to its low suitability and its position near roadways. The site is expected to support a range of common, non-threatened native bird species. Bats (pekapeka) have been recorded within the vicinity of the site and therefore, future bat surveys will be necessary to determine potential presence.

Biosearches (2024) noted that the habitat pertaining to native geckos was considered low and that they are highly unlikely to be present – however, the site could support native skinks, in particular the copper skink which are known to persist in modified, edge habitats. The report also noted that it is unlikely that native lizards would inhabit the area due to lack of suitability within the Northern portion of the site, however grassland is present within the Southern portion of proposed Precinct 2 and within proposed Precinct 1.

Figure 4: Image of the PPC and surrounding area (source: Google Earth)

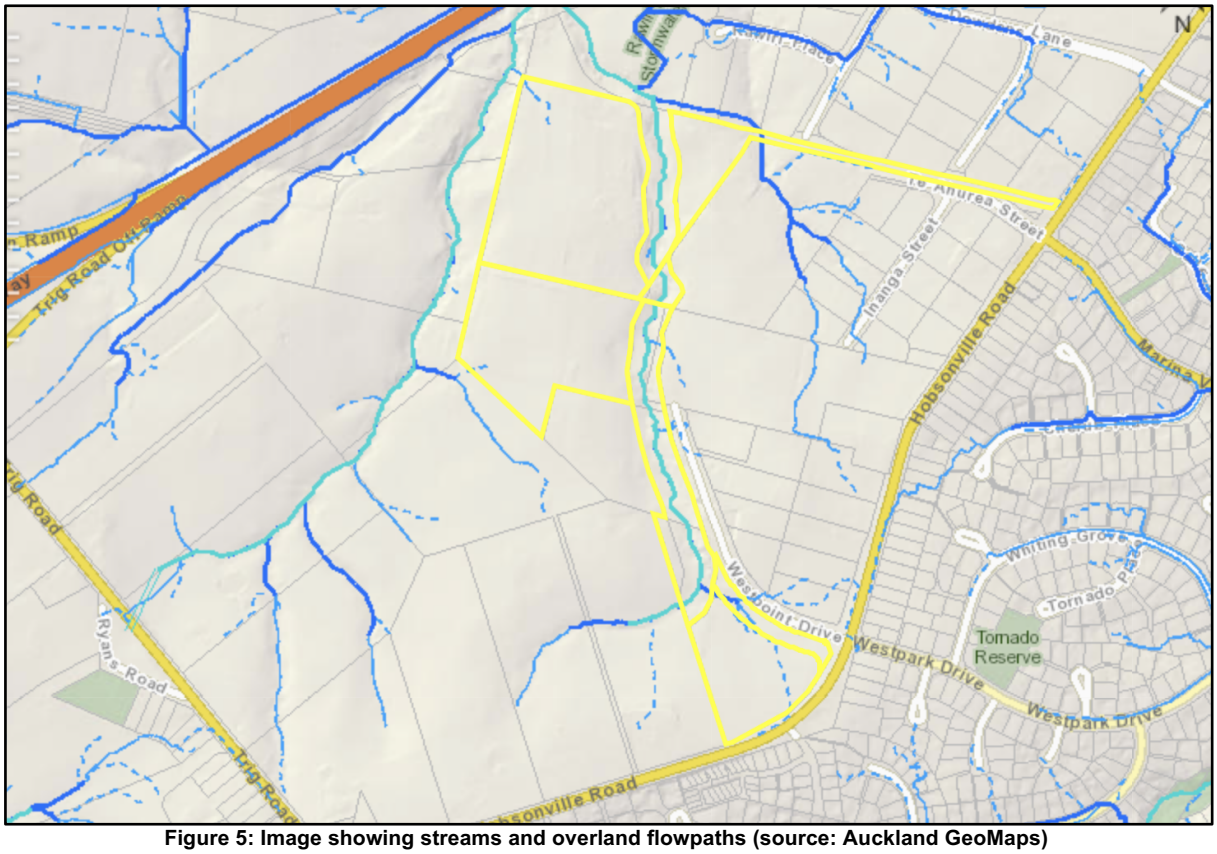


Figure 5: Image showing streams and overland flowpaths (source: Auckland GeoMaps)

13.0 Māori Archaeology

The known archaeological record (surmised from NZAA and CHI databases) within the Study Area can be typified as predominantly coastal middens evidencing seasonal resource use and occupation on the coastline of the wider area. According to CFG Heritage (2019) Hobsonville is located between two important pre-European portages which provided connections between the Kaipara and the Waitemata Harbours and the Waitemata and Manukau harbours – they were the Ngongitepata (which is actually Ngongetepara) and the Whau, which sit to the northeast and the southwest respectively.

According to the report (CFG Heritage, 2019) there were no unrecorded archaeological sites or deposits recorded during the survey. The report also references an archaeological assessment conducted by Farley & Clough (2009) in the neighbouring section 102-104 Hobsonville Road that also found no results. It is worth noting that the nature of archaeology means that the total resource of an area is not known until it is either fully investigated by exploratory means prior to works or uncovered during project earthworks. While there is a low likelihood for potential unrecorded archaeology there remains a possibility. Finally, it must be understood that absence of archaeology does not necessarily equate to absence of cultural activity and cultural value (as shown in the earlier section).

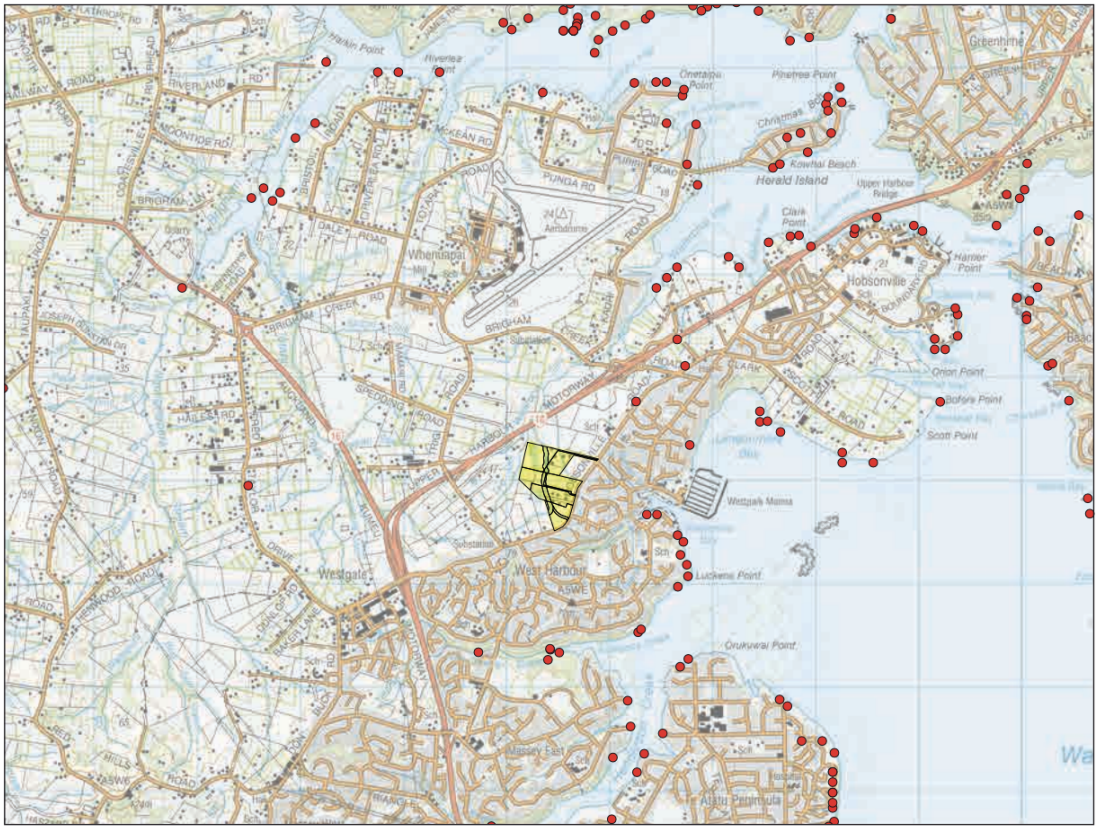


Figure 8: Map showing PPC area showing archaeological sites recorded in the vicinity (source: CFG Heritage, 2019)

14.0 Cultural Sites and Resources

For Te Kawerau ā Maki the entire West Harbour-Hobsonville area is a cultural landscape, embedded with identity, meaning, and significance. The character and integrity of the whole is made up of its constituent parts, such as the upper Waitematā harbour setting, the numerous awa that flow near or adjacent to the site, the coastal kāinga sites, and the wider historic transport networks that run through important sites such as Pukewhakataratara. The land on which the project is proposed is significant

5. IMPACT ASSESSMENT

15.0 Potential Direct Impacts

The Proposed Plan Change will have a range of potential adverse and beneficial direct impacts (arising from both construction and operation phases). These include from earthworks, stormwater, removal of vegetation, disturbance to fauna, light pollution and visual or setting impacts arising from bulk of structures within the landscape.

Direct adverse construction impacts will likely include future bulk earthworks that will remove topsoils, alter the contours of Papatūānuku, require the removal of soil from the site and contribute to the risk of sediment runoff (permanent adverse). Impacts will also arise from installation of infrastructure including drainage pipes and crossings (temporary adverse), using existing utilities in the reticulated water network once the Northern Interceptor is operational in 2025-2026 (permanent adverse), discharge of stormwater to the waterways (permanent adverse), minor vegetation and habitat loss through site clearance and earthworks (temporary adverse), direct mortality or injury to less mobile species during site works (temporary adverse), light pollution (permanent adverse), and (low) potential to destroy or modify Māori archaeological sites. Potential direct adverse impacts from the construction of proposed road bridge that will connect the sites to Westpoint Drive on north-east corner of Block 2 (permanent adverse) and the proposed future extension of the wastewater pipe which would be incorporated into the roading link bridge over Rawiri Stream (permanent adverse).

Potential direct beneficial impacts can arise from the retention and enhancement of watercourse (Rawiri and Trig Streams) and small wetland area through a 10m riparian yard, protected by land covenants after being re-planted with native vegetation (permanent beneficial), and from provision of pedestrian access through the site to support a walkable catchment concept (permanent beneficial).

16.0 Potential Indirect Impacts

Potential indirect impacts (arising from both construction and operation phases) include displacement of native fauna (temporary and permanent adverse), construction related noise and vibrations or dust (temporary adverse), construction related sediment and stormwater contaminants (temporary adverse), and plastic particulates, organics or heavy metal contaminants entering waterways from domestic and vehicular activities (permanent adverse).

Potential indirect beneficial impacts include attracting new avian individuals to the area (assuming ecological enhancement works), and thus overall fitness, through weed and pest management and enhancement planting, particularly as trees mature (permanent beneficial). Other potential indirect positive effects could arise from place-naming that could contribute to a growth in understanding of the cultural history of the area.

17.0 Potential Cumulative Impacts

Potential cumulative adverse impacts (arising from both construction and operation phases) include the removal of further productive soils from the landscape (permanent adverse), loss of potential habitats for lizards and bats (permanent adverse), a net increase in urban discharges to the streams and eventually the harbour (permanent adverse), increase in net light pollution (permanent adverse), and slight changes to the character of the cultural landscape through further urbanisation (permanent adverse).

Potential cumulative beneficial impacts include contributing to weed and pest control combined with stream and vegetation enhancement that contribute to the net ecological outcome for the catchment (permanent beneficial), and from reintegrating Māori place names, the PPC could support a walkable catchment concept and the development of a neighbourhood centre (within 400-600m of land).

18.0 Summary of Effects

Specific potential impacts identified as relating to the proposed project are included in Table 2 below:

Table 3: Summary of potential cultural impacts

Name	Summary of impact	Level of Impact	Significance of effect	Proposed mitigation	Residual effect	Offsetting
Te Wai te matā	Direct, indirect, and cumulative temporary and permanent adverse from stormwater discharge carrying sediments and contaminants Potential combined neutral-beneficial impact if stream and ecological enhancement works undertaken and robust stormwater systems in place	Moderate Adverse	Large Adverse	At source options (private tanks or bioretention devices). Communal device options (public bioretention devices outside road reserve). End of pipe options (public wetland or raingarden providing treatment of each stage)	Moderate Adverse Or Neutral Beneficial **if proposed and suggested mitigations agreed**	Could be reduced or mitigated through setback of 30m from the Trig and Rawiri Streams (Waiarohia ō Ngariki awa). Enhancement planting, stream restoration works and robust stormwater systems.
Whenua (Soils)	Direct and cumulative permanent adverse from bulk earthworks and land-use change	Minor	Minor Adverse		Minor Adverse Or Negligible Adverse **if suggested mitigation is agreed**	Could be reduced or mitigated through achieving a cut-fill balance, reusing soil within the development, ensuring any soil removed from site is redeposited as close as possible within the rohe. Avoiding bulk earthworks in winter. Cultural monitoring opportunities.
Te Waiarohia o Ngariki (and tributaries)	Direct, indirect, and cumulative temporary and permanent adverse from installation of drainage	Moderate Adverse	Large Adverse	At source options (private tanks or bioretention devices).	Moderate Adverse **if proposed and suggested**	Confirmation of proposed mitigation is required, but 30m setbacks

Name	Summary of impact	Level of Impact	Significance of effect	Proposed mitigation	Residual effect	Offsetting
	pipes/infrastructure, discharge of stormwater, construction disturbance to instream features while installing outfalls/infrastructure, new bridge, sediment discharge during construction, increased impervious surfaces and domestic contaminant discharges			Communal device options (public bioretention devices outside road reserve). End of pipe options (public wetland or raingarden providing treatment of each stage)	**mitigations agreed**	from the streams combined with a treatment-train approach that does not mix waters/including soil or bio filtration. Stormwater devices be located outside of delineated extent of streams and wetlands. Discharge be first to land, or raingarden and not directly into natural wetland or stream. Ensure well designed erosion control measures.
Rawiri Stream	Direct, indirect, and cumulative temporary and permanent adverse from installation of drainage pipes/infrastructure, discharge of stormwater, construction disturbance to instream features while installing outfalls/infrastructure, sediment discharge during construction, increased impervious surfaces and domestic contaminant discharges	Large Adverse	Large Adverse	Avoidance of any structures within the stream channel, implementation of sound erosion and stormwater management devices, fish passage	Moderate Adverse **if proposed and suggested mitigations agreed**	An updated ecological assessment of the Rawiri Stream and assessment of effects of the proposed access road crossing should be undertaken. Confirmation of proposed mitigation is required, but 30m setbacks from the streams combined with a treatment-

Name	Summary of impact	Level of Impact	Significance of effect	Proposed mitigation	Residual effect	Offsetting
						train approach that does not mix waters/including soil or bio filtration. Stormwater devices be located outside of delineated extent of streams and wetlands. Discharge be first to land, or raingarden and not directly into natural wetland or stream. Ensure well designed erosion control measures. The use of a short-span bridge structure to avoid any stream works and maintain flow within the stream and ensure ongoing fish passage
Flora	Direct, indirect, and cumulative temporary adverse from site clearance and earthworks. However, the majority of vegetation to be cleared is pasture grass and occasional cabbage trees on Block 1 with various exotic vegetation along the road. Block	Minor Adverse	Negligible Adverse	In 2020-2022 the riparian yard along Rawiri Stream has undergone native revegetation (by Healthy Waters) as part of the industrial development	Neutral - **if suggested mitigations are agreed**	Ongoing weed and pest management and native enhancement planting, habitat enhancement, avian fitness.

Name	Summary of impact	Level of Impact	Significance of effect	Proposed mitigation	Residual effect	Offsetting
	2 is pasture grass with shelter belts consisting of large Pine and fejoa trees and the only *native* vegetation being māhoe, cabbage trees and pōnga and a few mamaku and karamū.			situated along Westpoint Drive.		
Fauna	Direct and indirect adverse impact through earthworks and construction that could include physical harm resulting in injury or death (e.g native lizards during earthworks, birds during earthworks, birds during nesting season) or dislocation via construction disturbance such as noise or removal or trees. Increased (eventual) residential lighting could adversely impact night life and animal activity/behaviour.	Minor Adverse	Negligible Adverse		Neutral - **if suggested mitigations are agreed**	Light pollution sensitive design should be incorporating into consent conditions, a lizard, bird and bat management plan should be in place during construction, avoidance of removing trees or where possible, replacing these, and cultural monitoring opportunity needed as part of consent conditions
Aquatic Fauna	Direct, indirect and cumulative temporary and permanent adverse from construction disturbance to instream features while installing outfalls/infrastructure, sediment discharge during construction, stormwater and contaminant discharge from roading and private activities (e.g. washing vehicles, spraying round-up) Potential direct and cumulative permanent	Minor Adverse	Minor Adverse		Neutral - **if suggested mitigations are agreed**	Adoption of stream mitigations above Cultural monitoring and fish relocation plan if needed

Name	Summary of impact	Level of Impact	Significance of effect	Proposed mitigation	Residual effect	Offsetting
	beneficial from riparian yard protection and enhancement					
Māori occupation and use (archaeology)	Direct permanent adverse arising from earthworks or landscape planting removing part or all material of a site, noting however that the likelihood of this occurring is low	Negligible Adverse	Negligible Adverse	Apply Accidental Discovery protocols during earthworks, if discovered works will cease to enable cultural & archaeological investigation and recording	Negligible	
Northwest Waitematā Cultural Landscape	Cumulative permanent adverse arising from further urbanisation, noting however that in this section of the landscape the sensitivity to change is low	Negligible Adverse	Minor Adverse		Minor Adverse Or Neutral **if suggested mitigations/ offsetting agreed**	Enhancement planting will reduce impact by 'softening' the visual impact. Cultural design framework for urban development may also reduce impact. Light pollution sensitive design should be incorporated into consent conditions. Cultural monitoring opportunity needed as part of consent conditions.
Wai-ō-Pareira kāinga	The are no anticipated impacts.	Neutral	Neutral	N/A	Neutral	N/A
Kōpupāka	The are no anticipated impacts.	Neutral	Neutral	N/A	Neutral	N/A
Te Onekiritea	The are no anticipated impacts.	Neutral	Neutral	N/A	Neutral	N/A
Tahingamanu	The are no anticipated impacts.	Neutral	Neutral	N/A	Neutral	N/A

Name	Summary of impact	Level of Impact	Significance of effect	Proposed mitigation	Residual effect	Offsetting
Ngongetepara	The are no anticipated impacts.	Neutral	Neutral	N/A	Neutral	N/A
Treaty settlement redress	The are no anticipated impacts.	Neutral	Neutral	N/A	Neutral	N/A

6. CONCLUSION

The private plan change proposal relates to two separate blocks of land parcels that are legally described as 84 Hobsonville Road (Block 1) and 100 Hobsonville Road (Block 2). The proposal asserts that the rezoning of Block 1 provides an extension to the existing industrial area in the Westpoint Drive area and the Hobsonville Precinct of the AUP(OP). In regard to block 2, the proposal seeks to rezone the land to create a walkable community that will connect with the future development of adjacent land that is also zoned for 'Future Urban' purposes under the AUP(OP). It is noted that future subdivision and development of the Plan Change area will be proposed to yield up to 800m2 of retail, 1.33ha of light industrial land and up to 335 additional dwellings.

The site itself comprises gently sloping land that has historically been used for agricultural and horticultural activities and sits within a cultural landscape that is focused on resource extraction and mahinga kai – due to the productive soils in the area. The site and study area are particularly associated with our ancient princess Pareira of whom the bay and kāinga Wai-ō-Pareira (Waipareira Bay) to the east is named, along with the large river Wai ō Pareira, also known today as Henderson Creek. Block 1 is located on the banks of a wide natural gully which drains down to Rawiri Stream. Block 2 is bounded by streams with steep areas occurring in the vicinity of the upper reaches of the Rawiri stream and tributary of Waiarohia ō Ngariki (Trig) stream.

As the proposal is for a plan change, it must give effect specifically to AUP B6.5.2(7) which requires structure plan and plan change proposals to include a cultural assessment that identifies cultural sites and values in the landscape including those that may be suitable for scheduling, and incorporate these values into the plan change.

This report has identified the Site sits within a highly significant cultural landscape of Hikurangi (West Auckland) with a number of sensitive features including the Trig and Rawiri Streams, Waiarohia ō Ngariki awa, Wai ō Pareira awa and kainga and the Waitemata Harbour which is the ultimate receiving environment. Three (3) significant adverse effects have been identified (3 large adverse. These adverse effects relate to earthworks, water sensitivity, native flora and fauna, archaeology, and further urbanisation of the cultural landscape. Where significant adverse effects are identified, particularly in relation to RMA Part II matters, plan change and consenting applications should be declined unless the effects can be reduced to non-significant (e.g. minor or less).

It is noted that at this stage information or detail is limited about the contents of a subsequent resource consent(s) which could address some the above matters. However, we consider it appropriate that spatial and outcome-level concerns should be dealt with at the plan change level.

Without further avoiding, remedying, mitigating, offsetting or compensating the significant cultural effects we have identified the application should be declined. However, we recognise the pattern of development in the area has shifted to a largely urbanised form, and our position is not that a medium-density development cannot happen here, but rather that it must happen in a way that reduces the cultural impacts to minor (or hopefully beneficial) and maintains the overall intent and settings of the existing Precinct, namely the protection and enhancement of the natural environment. To this end, in the absence of existing proposed mitigation, we have offered recommended mitigation and offsetting for each of the impacts.

Our proposed mitigations/offsets 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.

7. RECOMMENDATIONS

Table 3: Recommendations and outcome alignment

No.	Recommendation	TKaM Strategic Value alignment	IMP policy alignment	Legislative alignment	AUP policy alignment	Other policy 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	2.2, 4.1.2, 4.2.2, 4.4.2 4.5.2, 4.7.2, 4.8.2, 4.9.2	RMA Part 2, RMA s88(2)(b), HNZPTA s45, TKAMCSA s12(2b), Te Tiriti Active Protection	B6.2.2(1), Policy B6.3.2(2), B6.3.2(3), B6.3.2(6), B6.5.2(9)	UNDRIP, NPSFW, NZCPS, ICOMOS
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	4.1.2, 4.4.2	RMA Part 2	B6.2.2(1), B6.3.2(2), B6.3.2(3), B6.3.2(6)	NPSFW, NZCPS
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	4.1.2, 4.7.2	RMA 6(e), 7(a), 8	B6.3.2(1), B6.3.2(2), B6.3.2(6)	UNDRIP
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	Kaitiakitanga, Mātauranga	4.8.2	RMA 6€, 7(a), 8	B6.2.2(1) (participation), B6.3.2(1),	UNDRIP

No.	Recommendation	TKaM Strategic Value alignment	IMP policy alignment	Legislative alignment	AUP policy alignment	Other policy alignment
	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					
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	4.8.2	RMA 6€, 7(a), 8	B6.2.2(1) (participation), B6.3.2(1)	UNDRIP
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	4.8.2	RMA 6(e), 7(a)	B6.2.2(1), B6.3.2(2), B6.3.2(3)	NZCPS
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	2.2, 4.9.2	RMA Part 2 (6(e)), HNZPTA 45	B6.2.2(9)	UNDRIP, ICOMOS
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	2.2, 4.9.2	RMA Part 2 (6(e)), HNZPTA	Policy B6.5.2(9)	UNDRIP, ICOMOS
9	Te Kawerau ā Maki are afforded the opportunity (and resourced) to undertake a site visit during the construction phase to examine controls	Kaitiakitanga	(s4.2.2(2))	RMA 6(e), 7(a)	B6.2.2(1), B6.3.2(2), B6.3.2(3)	
10	Opportunity for cultural ceremonies (e.g. sod-turning) should be provided at the expense of the Client	Kaitiakitanga	2.2	RMA 6(e), 7(a), 8	B6.2.2(1) B6.3.2(1)	UNDRIP
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					

No.	Recommendation	TKaM Strategic Value alignment	IMP policy alignment	Legislative alignment	AUP policy alignment	Other policy alignment
	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.					

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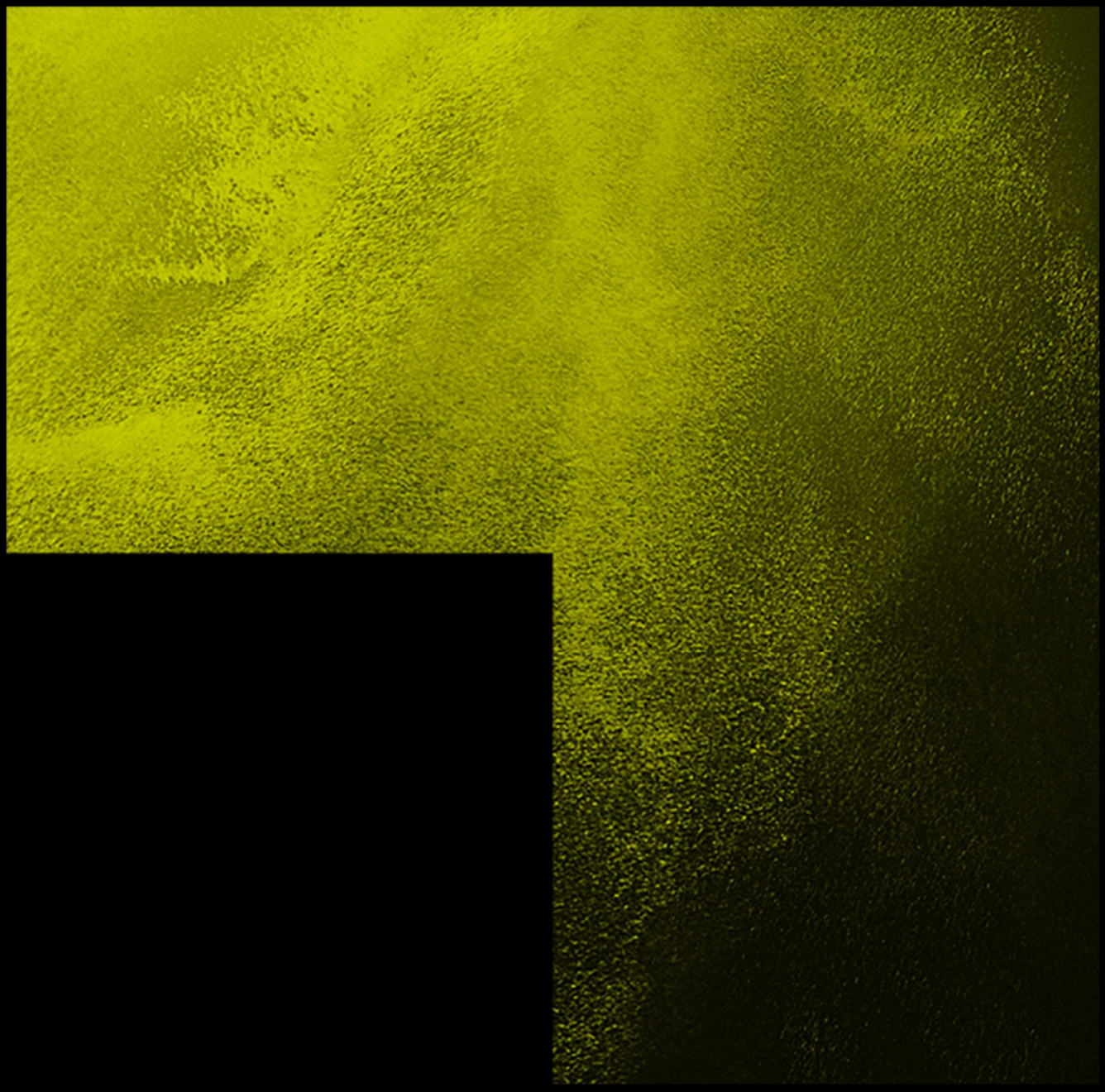
APPENDIX 6
STORMWATER MODELLING FLOOD ASSESSMENT

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

Stormwater Modelling and Flood Risk Assessment Report

Austino New Zealand Limited



DOCUMENT CONTROL RECORD

CLIENT	Austino New Zealand Limited
PROJECT	Austino Blocks 1 and 2 Investigations – 84, 88, 90 and 100 Hobsonville Rd
HG PROJECT NO.	A2212330.03
HG DOCUMENT NO.	R001- A2212330.03- Hobsonville Grove PPC-SW Modelling Flood Assessment
DOCUMENT	Stormwater Modelling and Flood Risk Assessment Report

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APPENDICES

Appendix 1	Maps
Appendix 2	Stormwater Modelling Methodology

1.0 INTRODUCTION

Harrison Grierson (HG) was commissioned by Austino to provide a Stormwater Management Plan (SMP) to support Hobsonville Grove Private Plan Change (PPC). The draft SMP was submitted in December 2023, and a Clause 23 Request for further information comments were provided by Healthy Waters.

In the Clause 23 report (May 2024), Healthy Waters (HW) raised concerns about the potential flood hazard to the Upper Harbour Motorway and the properties located at 27 Trig Road, 161 Brigham Creek Road, and 162 Brigham Creek Road.

HG built a hydraulic model and conducted a flood risk assessment to provide answers to the Clause 23 Request for further information comments provided by Healthy Waters.

InfoWorks ICM software (version 2024.2) was used to build models for pre-development and post-development scenarios using a 2D rain-on-grid approach. The 2D rain-on-grid model includes approximately 603 ha of the Whenuapai catchment, which drains into the Waiarohia Inlet. The catchment contributes to generating runoff in the model by using a 'net' rainfall directly applied to the flexible mesh elements. Net rainfall is a technique that accounts for naturally occurring rainfall losses within the catchment, for example, due to soil moisture and infiltration. Figure 1 shows the overland flow path across the entire Whenuapai catchment, the site location and the 2D model boundary.

A number of development and climate change scenarios have been completed to assess the potential impacts of the PPC development on the downstream catchment.

The proposed modelling approach and scenarios undertaken in this assessment has been developed with input from Healthy Waters. The technical memo discussing the proposed modelling approach is presented in Appendix 2.

This report discusses the details of the hydraulic model build and presents the flood risk assessment results. It is intended to be read in conjunction with the Stormwater Management Plan (SMP) for the Hobsonville Grove PPC application.

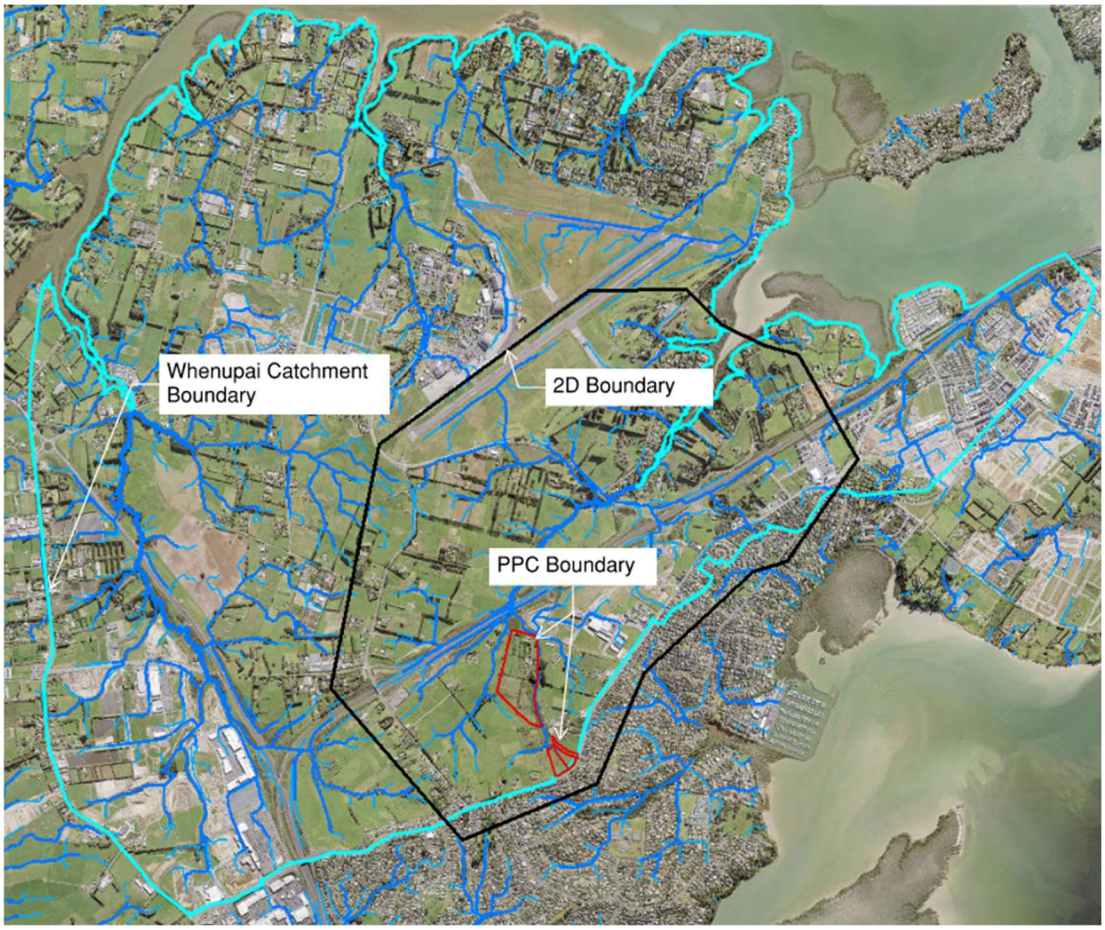

FIGURE 1. WHENUAPAI CATCHMENT, SITE LOCATION, AND MODEL BOUNDARY.

2.0 HYDRAULIC MODEL BUILD

2.1 2D MODEL BOUNDARY

The 2D model extent encompasses an area of 6 km², draining into the Waiarohia Inlet (Figure 1). The model boundary is extended further to ensure all contributing areas are captured in the model.

2.2 TIDE LEVEL

For the existing climate, a constant tide level of 1.39 m RL (vertical datum Auckland 1946) was assigned to the model as the downstream boundary condition, based on Auckland Stormwater Flood Modelling Specification (2011) for Waitemata Harbour tide level. For the future climate, a constant tide level of 2.89 m RL was assigned to the model. This tide level accounts for 3.8 degrees of climate change. It aligns with the latest Auckland Council Whenuapai RFHA model floodplains (2023) presented in GeoMaps and the "Coastal Inundation 1% AEP plus 1m Control" layer from the Auckland Unitary Plan.

2.3 LAND USE

The imperviousness across the catchment was calculated using the Auckland Council Open Data Impervious Surfaces layer (2017). The impervious data shows that approximately 19% of the

existing lands within the 2D boundary are covered by roads, driveways, roofs, and other impervious surfaces.

In the post-development scenarios, a maximum imperviousness of 90% for Precinct 1 and 70% for Precinct 2 is considered based on the proposed land use for the Hobsonville Grove PPC application.

The Hobsonville Corridor Precinct area (PC12) is considered a Business Light Industry Zone in both pre-development and post-development scenarios. It was assumed that Plan Change 12 has been fully developed and its maximum allowable impervious reached. An 90% imperviousness was applied to the PC12.

Based on land cover, Manning's n surface roughness values were estimated and assigned to the 2D model domain (Table 1 and Figures).

TABLE 1: SURFACE ROUGHNESS FOR DIFFERENT LAND COVER

PARAMETERS/METHODS	MANNINGS N
Roads	0.020
Brush	0.060
Stream	0.035
Green Spaces	0.041
Urban, Buildings, PC 12, Precinct1, and Precinct2	0.100

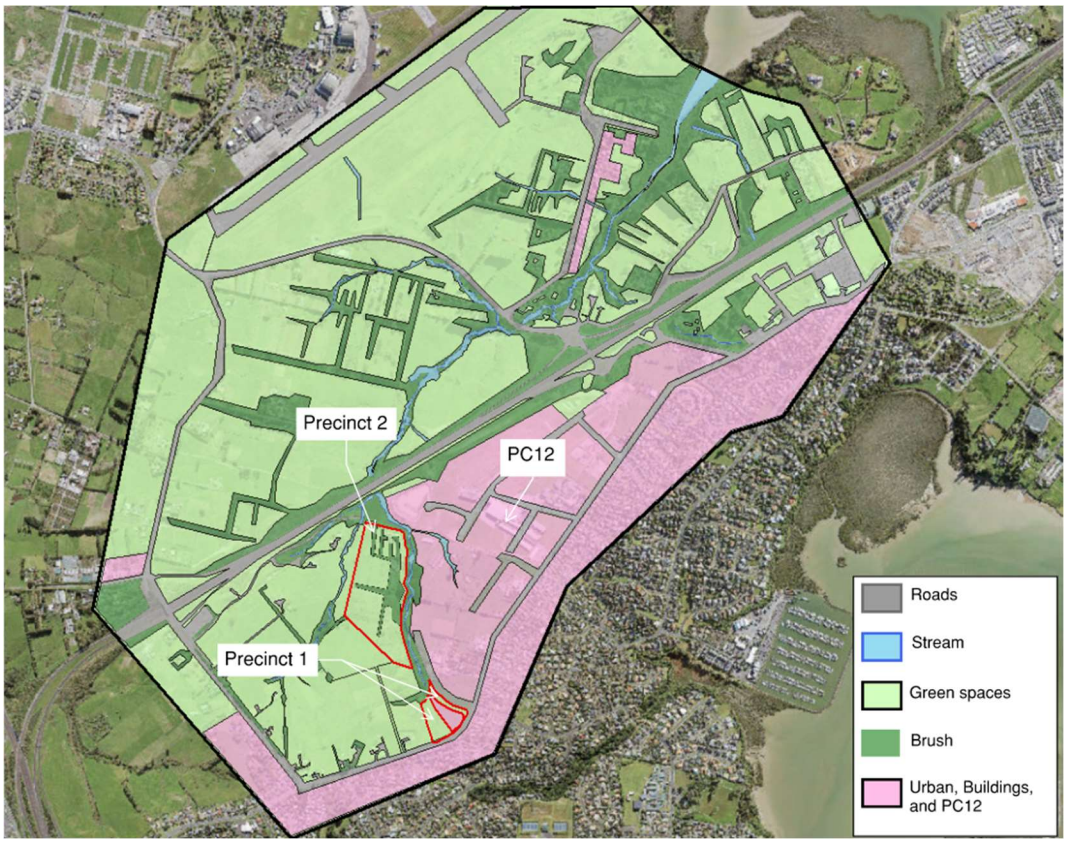

FIGURE 2. SURFACE ROUGHNESS IN THE PRE-DEVELOPMENT MODEL.

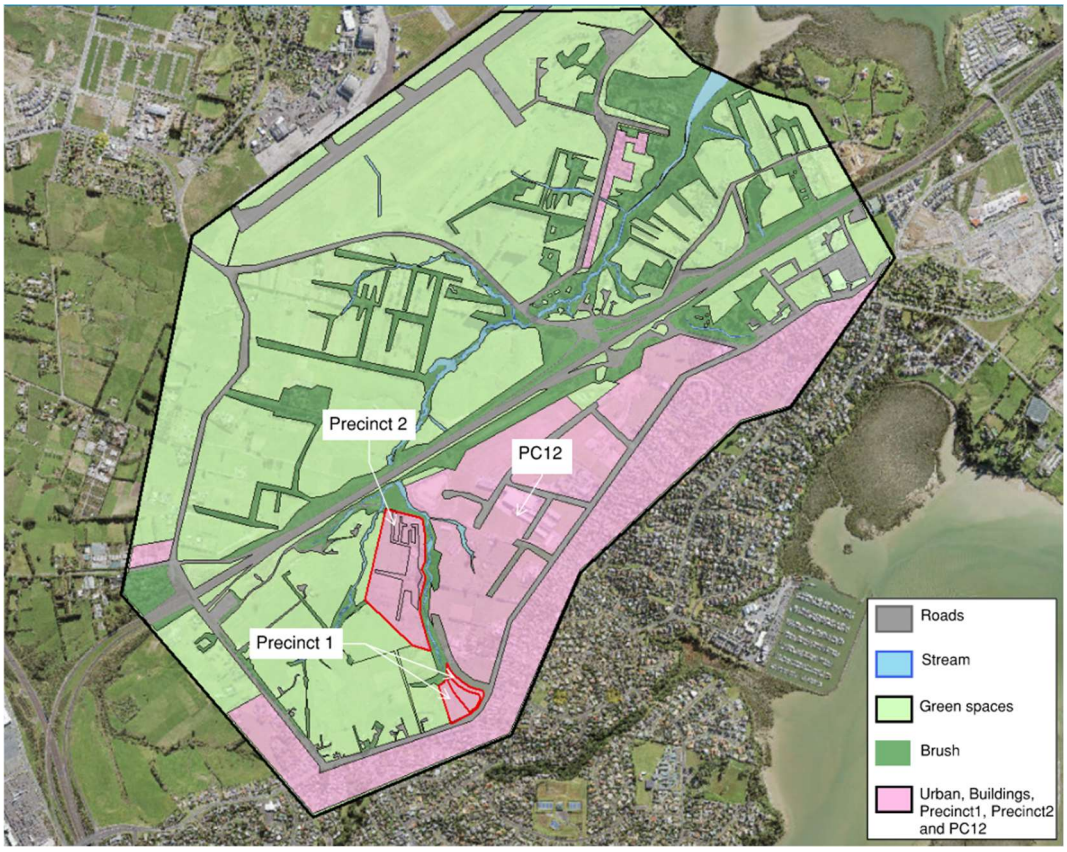

FIGURE 3. SURFACE ROUGHNESS IN THE POST-DEVELOPMENT MODEL.

2.4 GROUND MODEL AND MESH ZONES

A 1-meter resolution Digital Elevation Model (DEM) grid was derived from the Auckland North LiDAR data collected between 2016 and 2018, obtained from LINZ. Both the DEM grid and the flood model are referenced to the AKL 1946 vertical datum.

The surface was then used to generate a mesh in InfoWorks ICM. The model uses a mesh size of 2-4 m^2. To enhance the model's accuracy and precision, an increased mesh size of 8-16 m^2 was used in the culvert inlet and outlet areas.

2.5 SOIL TYPE AND CURVE NUMBERS

According to the Auckland Council soil type map, the 2D boundary includes Waitemata Residual and Alluvial soils (Figure 4). Based on the SCS hydrological soil classification, Alluvial soil is classified in Group B, while Waitemata Residual soil is classified in Group C. The SCS soil classification has four hydrological soil groups (i.e., A, B, C, and D). Group A acquires very high infiltration, while D has a very poor infiltration rate (TP108, 1999). Table 2 shows the soil type and associated CN across the catchment.

TABLE 2: ESTIMATED CN FOR EACH SOIL TYPE

SOIL TYPE	CN PERVIOUS	CN IMPERVIOUS
Alluvial Soils- B	61	98
Waitemata Residual Soils- C	74	98

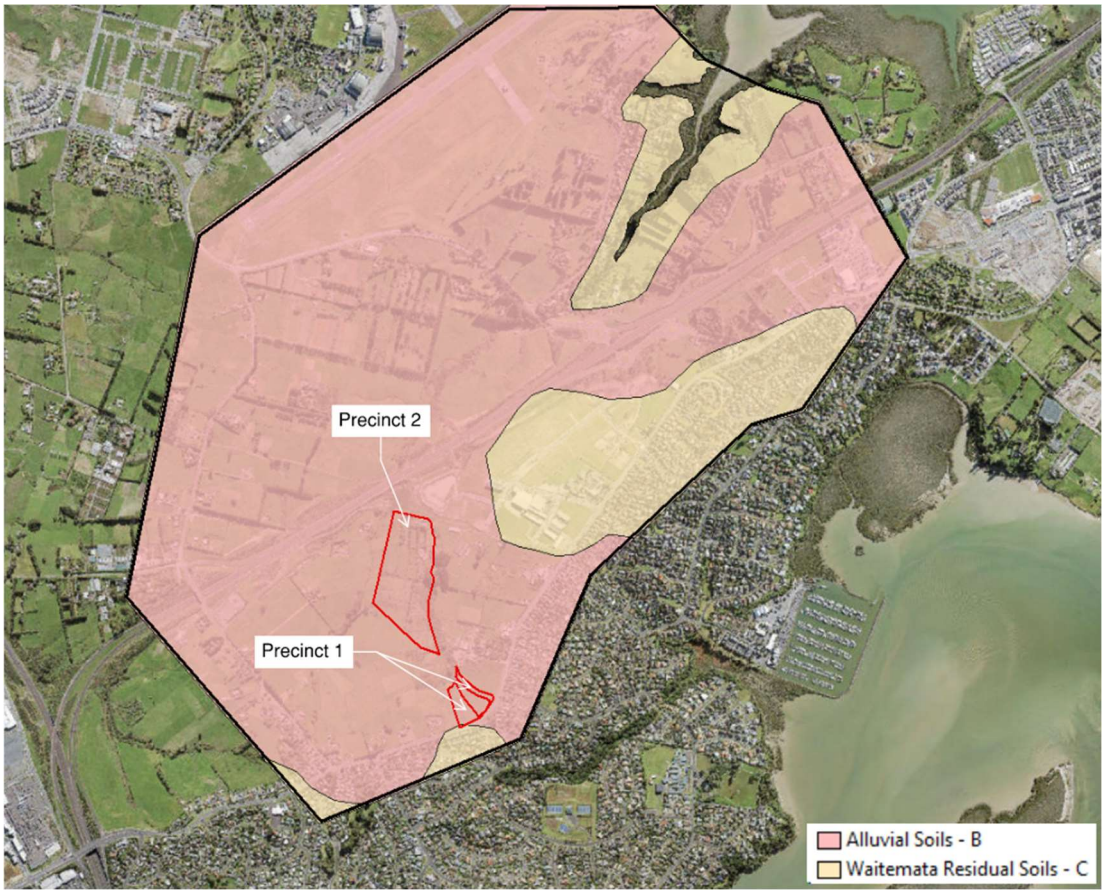

FIGURE 4: SOIL TYPE ACROSS THE CATCHMENT.

2.6 Rainfall Zones

Considering the catchment size (more than 6 km²) and the spatial variations of land use and soil type; the catchment was divided into six homogenous rainfall zones (Figure 5). This division can help estimate the net rainfall on the homogenous subcatchments more accurately.

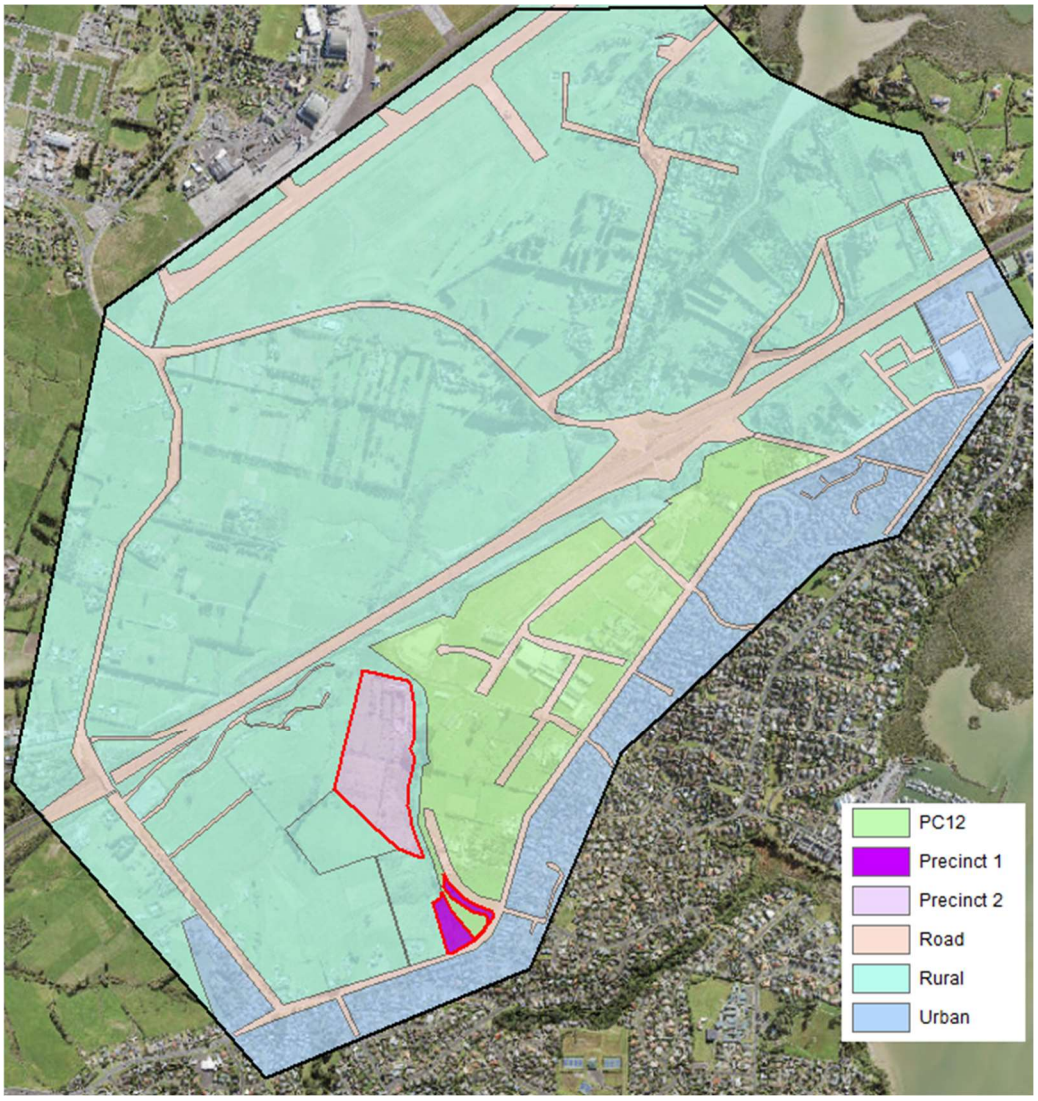

FIGURE 5: RAINFALL ZONES ACROSS THE CATCHMENT.

The rainfall depth was extracted from the raster map using ArcGIS, based on TP108 rainfall contours (Table 3).

TABLE 3: RAINFALL DEPTH

1% AEP EVENT (NO CLIMATE CHANGE)	1% AEP EVENT (3.8 DEGREES OF CLIMATE CHANGE)	10% AEP EVENT (NO CLIMATE CHANGE)	10% AEP EVENT (2.1 DEGREES OF CLIMATE CHANGE)
202 mm	268 mm	138 mm	161 mm

After adjusting the rainfall depths for climate change (3.8° for 100-year and 2.1° for 10-year storm events), the net rainfall for each subcatchment was calculated using a spreadsheet designed based on SWCoPv4 (Storm Water Code of Practice version 4). The spreadsheet calculates the net rainfall using weighted average CN (Curve Number) and Initial Abstraction (Ia).

The weighted CNs and Initial Abstractions were calculated for each rainfall zone based on the land use and soil types. Table 4 provides the weighted CN and estimated initial abstraction (Ia) values for different subcatchments.

TABLE 4: RAINFALL ZONE CHARACTERISTICS

RAINFALL ZONE	IMPERVIOUS PRE-DEVELOPMENTS (%)	IMPERVIOUS POST-DEVELOPMENTS (%)	CURVE NUMBER PRE-DEVELOPMENT	INITIAL ABSTRACTION PRE-DEVELOPMENT	CURVE NUMBER POST-DEVELOPMENT	INITIAL ABSTRACTION POST-DEVELOPMENT
Roads	100	100	98	0.00	98	0
PC12	90	90	94.90	0.50	94.90	0.5
Precinct 1	0	90	61.2	5.00	94.32	0.5
Precinct 2	2	70	61.83	4.89	86.90	1.5
Rural	6	6	64.15	4.71	64.15	4.7
Urban	59	59	85.74	2.0	85.74	2.0

2.7 1D CULVERTS

The scope of the present study is to model and assess culvert capabilities for the 10-year and 100-year ARI storm events with and without climate change. The model included nine 1D structures (culverts) under the Upper Harbour Motorway (Figure 6). The culvert design information (e.g. diameter, inverts, etc.) is obtained from the URS modelling report (August 2012) and Auckland Council GeoMaps. All the culvert entrances had vertical headwalls, and appropriate head losses to account for the walls were assumed. These coefficients are defined in the Culvert Design Manual (1997) published by CIRIA and available in the InfoWorks ICM help (Table 5).

TABLE 5: HEAD LOSS COEFFICIENTS FOR SQUARE HEADWALLS

MATERIAL	INLET TYPE/EDGE TYPE	PARAMETERS					
		TYPE	K	M	C	Y	K_I
Concrete	Headwall/Square edge	A	0.0098	2	0.0398	0.67	0.5

The Rawiri, Tirg and Waiarohia streams discharge to the north under the Upper Harbour Motorway via culverts C2, C3 and D (Figure 6). Culvert C (twin culverts C2 and C3) is located at the intersection between Trig Stream and Waiarohia Stream and culvert D is located at the intersection between Rawiri Stream and Waiarohia Stream.

Table 6 summarises the culvert information.

FIGURE 6: LOCATION OF UPPER HARBOUR MOTORWAY CULVERTS, SUBJECT SITE AND STREAMS.

TABLE 6: CULVERTS INFORMATION

CULVERT	CULVERT INVERT LEVEL INLET (MRL)	CULVERT INVERT LEVEL OUTLET (MRL)	CULVERT LENGTH (M)	DIAMETER (M)	SLOPE/GRADIENT (M/M)
B	25.57	24.02	130.3	1800	0.01
C2	15.07	14.29	69.8	2100	0.01
C3	15.05	14.26	69.9	2100	0.01
D	16.29	14.31	66.5	1950	0.03
E	15.91	15.68	75.1	2100	0.003
H	14.16	7.06	225.9	1600	0.03
I	18.30	16.36	175.4	1350	0.01
J	15.86	14.46	126.9	1350	0.01
K	20.63	19.41	63.4	1350	0.02

2.8 INTIAL CONDITION FOR PONDS

The constructed basins across the catchments are filled in the model to represent a worst-case scenario (Figure 7). Table 7 shows the initial water level applied in each basin.

FIGURE 7: LOCATION OF FILLED BASINS.

TABLE 7: 2D INITIAL CONDITION FOR PONDS (FILLING LEVELS)		
NAME	INITIAL WATER LEVEL (MRL)	AREA (HECTARE)
Basin B1	25.50	0.53
Basin B2	9.20	0.38
Basin B3	25.30	0.57
Basin B4	20.80	0.08
Basin B5	26.78	1.51
Basin B6	20.20	0.40
Basin B7	35.60	0.25

2.9 BRIGHAM CREEK ROAD BRIDGE CONVEYANCE

The Brigham Creek Road bridge, located directly to the west of 162 Brigham Creek Road, is assumed to have no impact on the conveyance capacity of the stream. The Waiarohia Stream channel was opened in the model at this location. The location of the Brigham Creek Road bridge is depicted in Figure 7.

3.0
MODEL SCENARIOS

Table 8 presents the scenarios undertaken to evaluate the flood impact of the Austino Block 2 PPC.

TABLE 8: MODELLING SCENARIOS

DEVELOPMENT SCENARIO	RAINFALL EVENT	CLIMATE CHANGE (CC)	FLOOD MANAGEMENT	COMMENT
Pre-development	10-year	Nil	Nil	Today's flood risk
	10-year	2.1°	Nil	Future flood risk assuming no development.
	100-year	Nil	Nil	Today's flood risk
	100-year	3.8°	Nil	Future flood risk assuming no development.
Post-development	10-year	Nil	Nil	Potential flood impact of the development under existing climate
	10-year	2.1°	Nil	Potential flood impact of the development under future climate
	100-year	Nil	Nil	Potential flood impact of the development under existing climate
	100-year	3.8°	Nil	Potential flood impact of the development under future climate

4.0
MODELLING RESULTS

4.1 FLOOD RISK ASSESSMENT

The proposed development of the PPC area will increase the runoff volume, which may result in adverse impacts downstream. Therefore, to demonstrate that the flood risk outside of the PPC area has not deteriorated because of the proposed development, a flood risk assessment was conducted on the properties that were suspected to be at risk downstream of the PPC.

The model was run for scenarios outlined in Table 8. The result maps are presented in Appendix 1. The maps include flood depth, water level difference and flood extent comparisons.

A comparison was undertaken of the post-development model (PC12, Precinct1, and Precinct2 modelled as MPD and elsewhere as ED) against the pre-development model (PC12 modelled as MPD and elsewhere as ED), both for 1% AEP 3.8° CC and 10% AEP 2.1° CC. This comparison has indicated that the flood impact of the Austino PPC on the downstream environment is negligible, with maximum flood level increases of less than 70mm in all scenarios (refer to the flood difference and flood extent maps in Appendix 1).

The following section assesses the flood impact of the development in more detail for the three subject sites identified in the Clause 23 report (May 2024).

4.2 IMPACTS OF FLOODING ON THE PROPERTIES DOWNSTREAM

Table 9 compares the maximum flood depth and flood level at 27 Trig Road, 161 Brigham Creek Road, and 162 Brigham Creek Road for different scenarios.

FIGURE 8: LOCATION OF SUBJECT PROPERTIES.

TABLE 9: MODEL RESULTS FOR THREE SUBJECT PROPERTIES

ADDRESS	RAINFALL EVENT AND CLIMATE CHANGE (CC)	FLOOD DEPTH PREDEVELOPMENT (M)	FLOOD DEPTH POSTDEVELOPMENT (M)	FLOOD DEPTH DIFFERENCE (M)	PEAK MODELLED WATER LEVEL PREDEVELOPMENT (MRL)	PEAK MODELLED WATER LEVEL POSTDEVELOPMENT (MRL)
27 Trig Road	10-year (No CC)	0.86	0.89	0.03	18.02	18.05
	10-year (2.1°CC)	1.01	1.04	0.03	18.16	18.19
	100-year (No CC)	1.35	1.39	0.04	18.51	18.55
	100-year (3.8°CC)	2.72	2.79	0.07	19.87	19.94
161 Brigham Creek Road (pump station)	10-year (No CC)	0.00	0.00	0.00	N/A	N/A
	10-year (2.1°CC)	0.00	0.00	0.00	N/A	N/A
	100-year (No CC)	0.00	0.00	0.00	N/A	N/A
	100-year (3.8°CC)	0.10	0.10	0.00	10.00	10.00
162 Brigham Creek Road	10-year (No CC)	0.18	0.18	0.00	9.04	9.04
	10-year (2.1°CC)	0.20	0.20	0.00	9.05	9.05
	100-year (No CC)	0.21	0.21	0.00	9.05	9.05
	100-year (3.8°CC)	0.48	0.49	0.01	9.07	9.08

4.2.1 27 TRIG ROAD

27 Trig Road is located immediately downstream of the PPC area and is surrounded by Trig Stream and local overland flow paths (OLFP), which run parallel to the Upper Harbour Motorway. Currently, there are no buildings at 27 Trig Road.

Comparing the post-development model with the pre-development model revealed that the Austino PPC area does not significantly increase flood levels downstream, where the maximum flood depth increased by up to 70mm across different scenarios (Table 9).

Figure 9 shows the flood depth and depth difference in the 1% AEP 3.8° CC across 27 Trig Road.

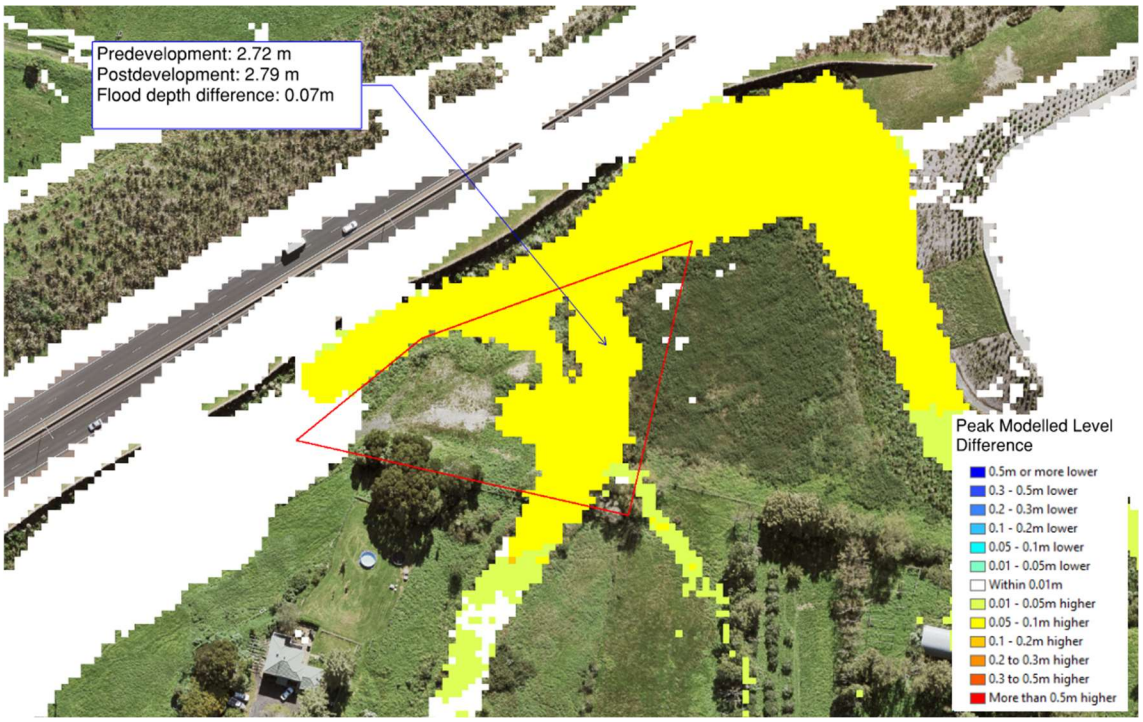

FIGURE 9: FLOOD DEPTH DIFFERENCE AT 27 TRIG ROAD IN THE 1% AEP 3.8º CC.

4.2.2 161 BRIGHAM CREEK ROAD

The flood difference maps show that the Austino PPC does not impact flooding at the 161 Brigham Creek Road pump station, located next to a local OLFP. The maximum water depth in the building does not exceed 100mm in 1% AEP 3.8° CC, and there is no flooding in 1% AEP in the existing climate (Figure 10).

4.2.3 162 BRIGHAM CREEK ROAD

Like 161 Brigham Creek Road, Austino PPC does not significantly affect 162 Brigham Creek Road. The flood level slightly increased by approximately 10mm in a 1% AEP 3.8° CC (Figure 10).

FIGURE 10: FLOOD DEPTH DIFFERENCE AT 161 & 162 BRIGHAM CREEK ROAD IN THE 1% AEP 3.8º CC.

4.3 IMPACTS OF FLOODING ON THE CULVERTS DOWNSTREAM AND THE UPPER HARBOUR MOTORWAY

A flood risk assessment was conducted on three culverts downstream of the Austino PPC as follows:

- Twin culverts C2 and C3, located at the Trig Stream and Waiarohia Stream confluence. Both culverts have a diameter of 2100 mm.
- Culvert D, located at the confluence of the Rawiri Stream and the Waiarohia Stream. Culvert D has a diameter of 1950mm.

Figures 11 and 12 show culvert locations and the flood level difference between the post-development and pre-development for 1% AEP no CC and 1% AEP 3.8º CC storm events scenarios around the subject culverts. Tables 10 and 11 summarise the culvert results.

The motorway crest level is around 20.6 mRL. The maximum flood level in upstream culverts C2 and C3 is 19.80 and 19.76, respectively, for the 1% AEP 3.8º CC storm event. Thus, there is approximately an 800mm freeboard above the twin culverts. The freeboard is around 640mm for culvert D. The flood does not overtop the motorway in 1% AEP 3.8°CC and flows freely through the culverts.

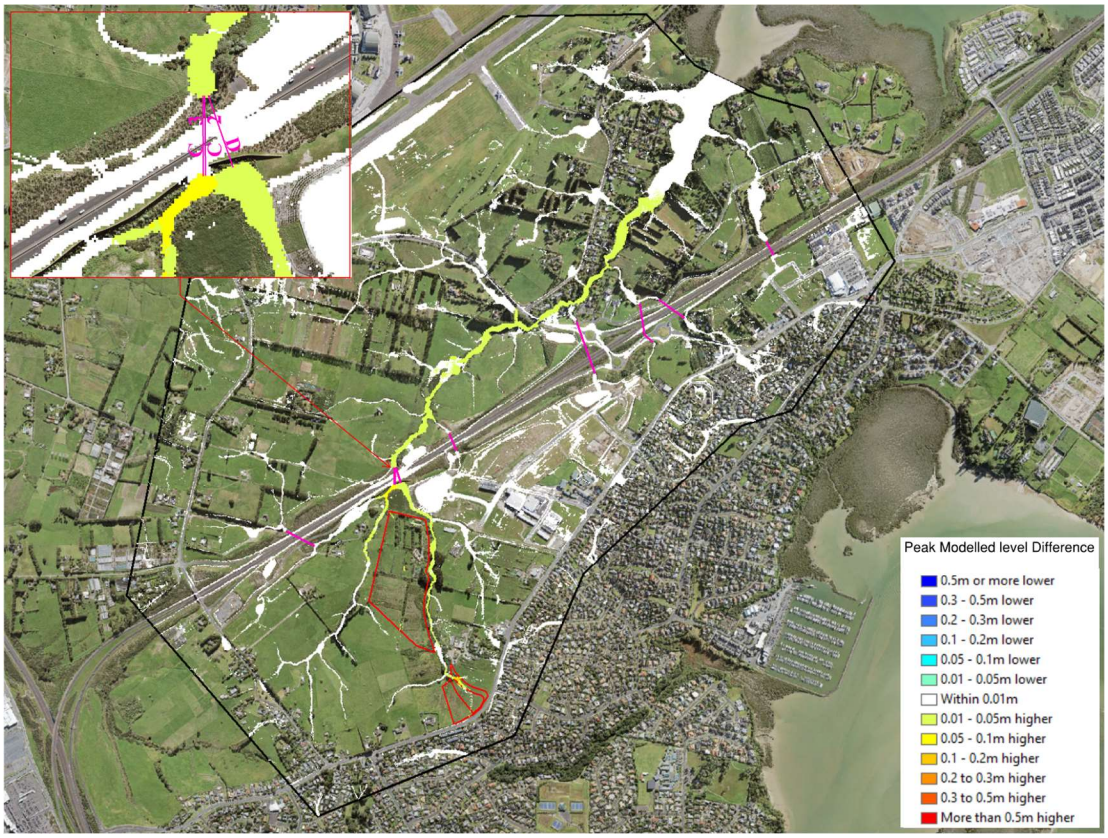

FIGURE 11: FLOOD LEVEL DIFFERENCE AT CULVERTS IN 1% AEP NO CC.

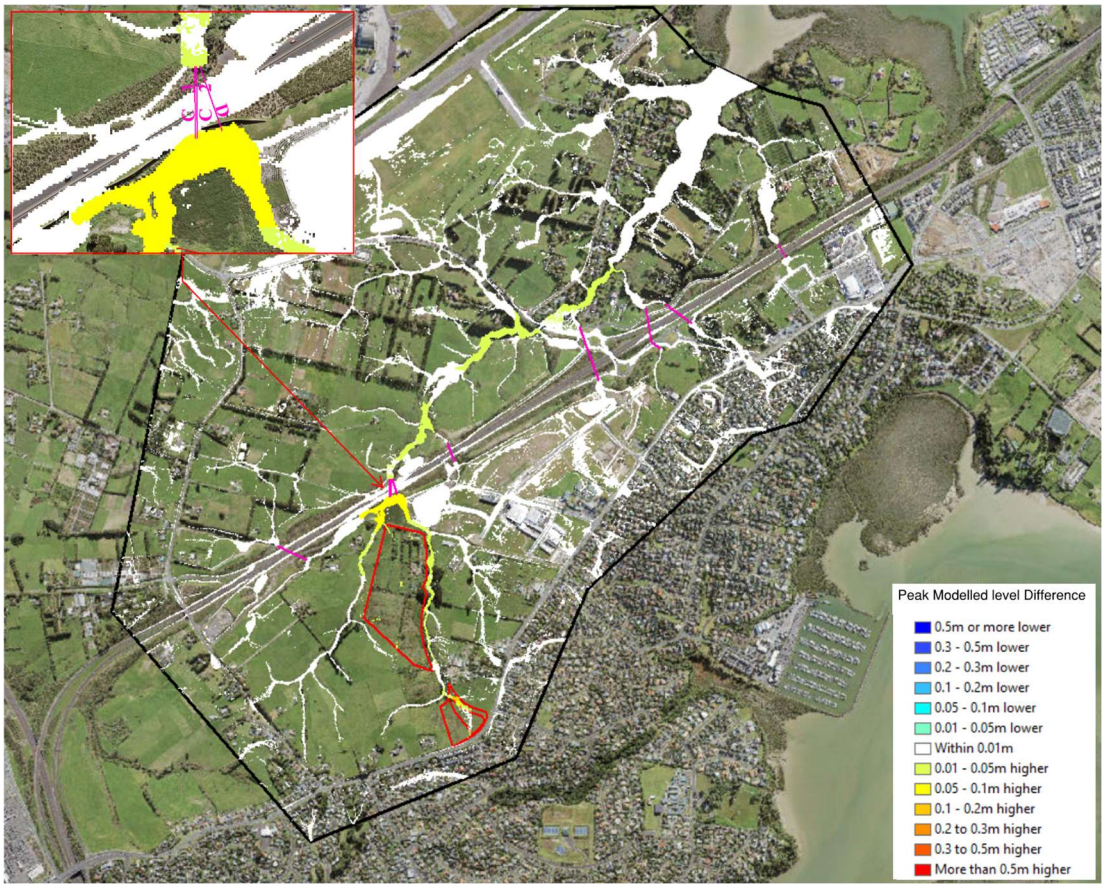

FIGURE 12: FLOOD LEVEL DIFFERENCE AT CULVERTS IN 1% AEP 3.8º CC.

TABLE 10: CULVERT RESULT INFORMATION

CULVERT	RAINFALL EVENT AND CLIMATE CHANGE (CC)	MAXIMUM FLOOD LEVEL UPSTREAM (MRL)	PIPE FULL CAPACITY (M^3/S)	DOWNSTREAM FLOW (M^3/S)	DOWNSTREAM VLOCITY (M^3/S)
Maximum road crest above culverts C2 and C3	20.60 m RL				
C2	Pre-development 10-year (No CC)	16.63	18.33	3.21	0.90
	Pre-development 10-year (2.1°CC)	17.13	18.33	5.79	1.60
	Post-development 10-year (No CC)	16.68	18.33	3.38	0.94
	Post-development 10-year (2.1°CC)	17.20	18.33	6.14	1.70
	Pre-development 100-year (No CC)	18.25	18.33	10.30	2.84
	Pre-development 100-year (3.8°CC)	19.72	18.33	17.08	4.67
	Post-development 100-year (No CC)	18.34	18.33	10.74	2.96
	Post-development 100-year (3.8°CC)	19.80	18.33	17.28	4.73
C3	Pre-development 10-year (No CC)	16.59	18.43	2.67	0.74
	Pre-development 10-year (2.1°CC)	17.09	18.43	5.45	1.51
	Post-development 10-year (No CC)	16.64	18.43	2.84	0.79
	Post-development 10-year (2.1°CC)	17.016	18.43	5.85	1.62
	Pre-development 100-year (No CC)	18.12	18.43	11.82	3.26
	Pre-development 100-year (3.8°CC)	19.69	18.43	17.03	4.66
	Post-development 100-year (No CC)	18.21	18.43	12.15	3.35
	Post-development 100-year (3.8°CC)	19.76	18.43	17.24	4.72
Maximum road crest above culvert D	20.50 m RL				
D	Pre-development 10-year (No CC)	18.56	24.55	7.52	2.42
	Pre-development 10-year (2.1°CC)	18.97	24.55	9.49	3.04

	Post-development 10-year (No CC)	18.65	24.55	7.93	2.55
	Post-development 10-year (2.1°CC)	19.01	24.55	9.64	3.09
	Pre-development 100-year (No CC)	19.12	24.55	10.12	3.23
	Pre-development 100-year (3.8°CC)	19.79	24.55	12.11	3.84
	Post-development 100-year (No CC)	19.15	24.55	10.23	3.26
	Post-development 100-year (3.8°CC)	19.86	24.55	12.32	3.90

TABLE 11: FLOOD LEVEL DIFFERENCE UPSTREAM OF CULVERTS

CULVERT	RAINFALL EVENT AND CLIMATE CHANGE (CC)	PRE-DEVELOPMENT FLOOD LEVEL UPSTREAM (M RL)	POST-DEVELOPMENT FLOOD LEVEL UPSTREAM (M RL)	DIFFERENCE (M)
C2	10-year (No CC)	16.63	16.68	0.05
	10-year (2.1°CC)	17.13	17.20	0.07
	100-year (No CC)	18.25	18.34	0.09
	100-year (3.8°CC)	19.72	19.80	0.08
C3	10-year (No CC)	16.59	16.64	0.05
	10-year (2.1°CC)	17.09	17.16	0.07
	100-year (No CC)	18.12	18.21	0.09
	100-year (3.8°CC)	19.69	19.76	0.07
D	10-year (No CC)	18.56	18.65	0.09
	10-year (2.1°CC)	18.97	19.01	0.04
	100-year (No CC)	19.12	19.15	0.03
	100-year (3.8°CC)	19.79	19.86	0.07

It should be noted that the Austino PPC does not impact on flooding on the Upper Harbour Motorway in all simulated scenarios.

The maximum flood depth on the motorway varies from 300mm in 10% AEP no CC to approximately 500mm in 1% AEP 3.8° CC in the existing development sceanrio. The culverts were not overtopped in any scenarios, and the location where the flood depth is taken is a localised depression point for the Upper Harbour Motorway.

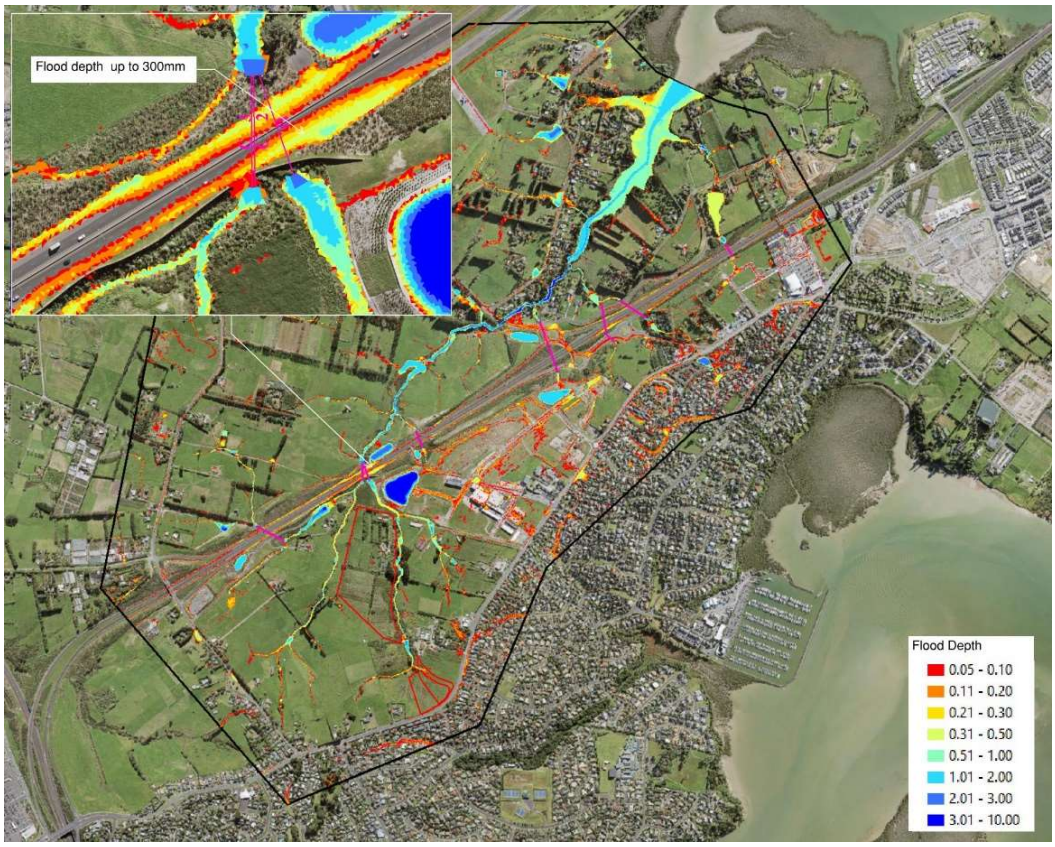

FIGURE 13: PRE-DEVELOPMENT FLOOD DEPTH IN 10% AEP NO CC.

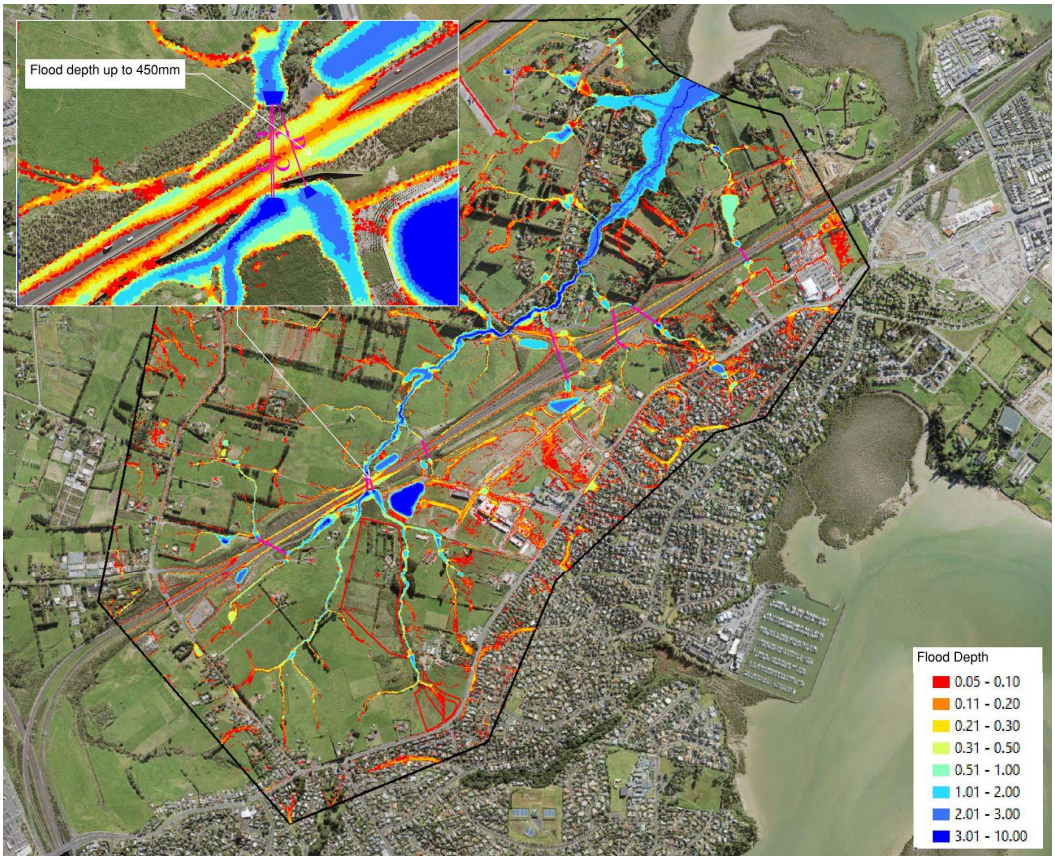

FIGURE 14: PRE-DEVELOPMENT FLOOD DEPTH IN 1% AEP 3.8º CC.

5.0 CONCLUSIONS

Harrison Grierson (HG) built a hydraulic model to assess the flood impact of Hobsonville Grove Private Plan Change (PPC) on the downstream environment. This helped to answer the Clause 23 request for further information comments provided by Healthy Waters.

The model was run for pre-development and post-development under different climate change scenarios.

All the model runs considered filled basins in the catchment, providing a worst-case floodplain.

The modelling results demonstrate that:

- The water level increase due to the PPC development at 161 Brigham Creek Road and 162 Brigham Creek Road was less than minor (0 and 10mm, respectively).
- The water level increases at 27 Trig Road within the Trig Stream up to 70mm. However, there is no property at this address.
- The flood level upstream of the culverts C2, C3, and D increased by 30-90mm in different scenarios. The development does not add additional risk to the Upper Harbour Motorway since the maximum flood level in all scenarios is below the motorway crest level at the lowest point.

6.0 LIMITATIONS

6.1 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.

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APPENDIX 7 STORMWATER FLOOD ASSESSMENT MAPS

HARRISON GRIERSON

Legend

- Austino Block 2 PPC
- Model 2D Extent

Flood Depth (m)

- 0.05 - 0.10
- 0.11 - 0.20
- 0.21 - 0.30
- 0.31 - 0.50
- 0.51 - 1.00
- 1.01 - 2.00
- 2.01 - 3.00
- 3.01 - 10.00

Eagle Technology, Land Information New Zealand, GEBCO, Community maps contributors

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REV	ISSUE STATUS	DATE
A	FOR INFORMATION	240826

DESIGNED:	FAM	DATE:	26/08/2024
DRAWN:	FAM	DATE:	26/08/2024
CHECKED:	SXG	DATE:	26/08/2024
APPROVED:	SXG	DATE:	26/08/2024

N

Scale: 1:12,000 (A3 Size)

0 0.05 0.1 0.2 0.3 Kilometers

Austino Block 2 Plan Change
Flood Hazard Assessment

Predevelopment Peak Depth
1% AEP 3.8° CC

MAP NO:

A2212330.03-001

HARRISON GRIERSON

Legend

- Austino Block 2 PPC
- Model 2D Extent

Flood Depth (m)

- 0.05 - 0.10
- 0.11 - 0.20
- 0.21 - 0.30
- 0.31 - 0.50
- 0.51 - 1.00
- 1.01 - 2.00
- 2.01 - 3.00
- 3.01 - 10.00

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APPROVED:	SXG	DATE:	26/08/2024

N

Scale: 1:12,000 (A3 Size)

0 0.05 0.1 0.2 0.3 Kilometers

Austino Block 2 Plan Change
Flood Hazard Assessment

Postdevelopment Peak Depth
1% AEP 3.8° CC

MAP NO:

A2212330.03-002

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HARRISON GRIERSON

Legend

- Austino Block 2 PPC
- Model 2D Extent

Peak Modelled Water Level Difference

- 0.5m or more lower
- 0.3 - 0.5m lower
- 0.2 - 0.3m lower
- 0.1 - 0.2m lower
- 0.05 - 0.1m lower
- 0.01 - 0.05m lower
- Within 0.01m
- 0.01 - 0.05m higher
- 0.05 - 0.1m higher
- 0.1 - 0.2m higher
- 0.2 to 0.3m higher
- 0.3 to 0.5m higher
- More than 0.5m higher

Note 1 : Results shown are post-development minus pre-development. "Lower" shows where post-development peak water level is lower than pre-development. "Higher" shows where post-development peak water level is higher than pre-development.

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APPROVED:	SXG	DATE:	26/08/2024

N

Scale: 1:12,000 (A3 Size)

0 0.05 0.1 0.2 0.3 Kilometers

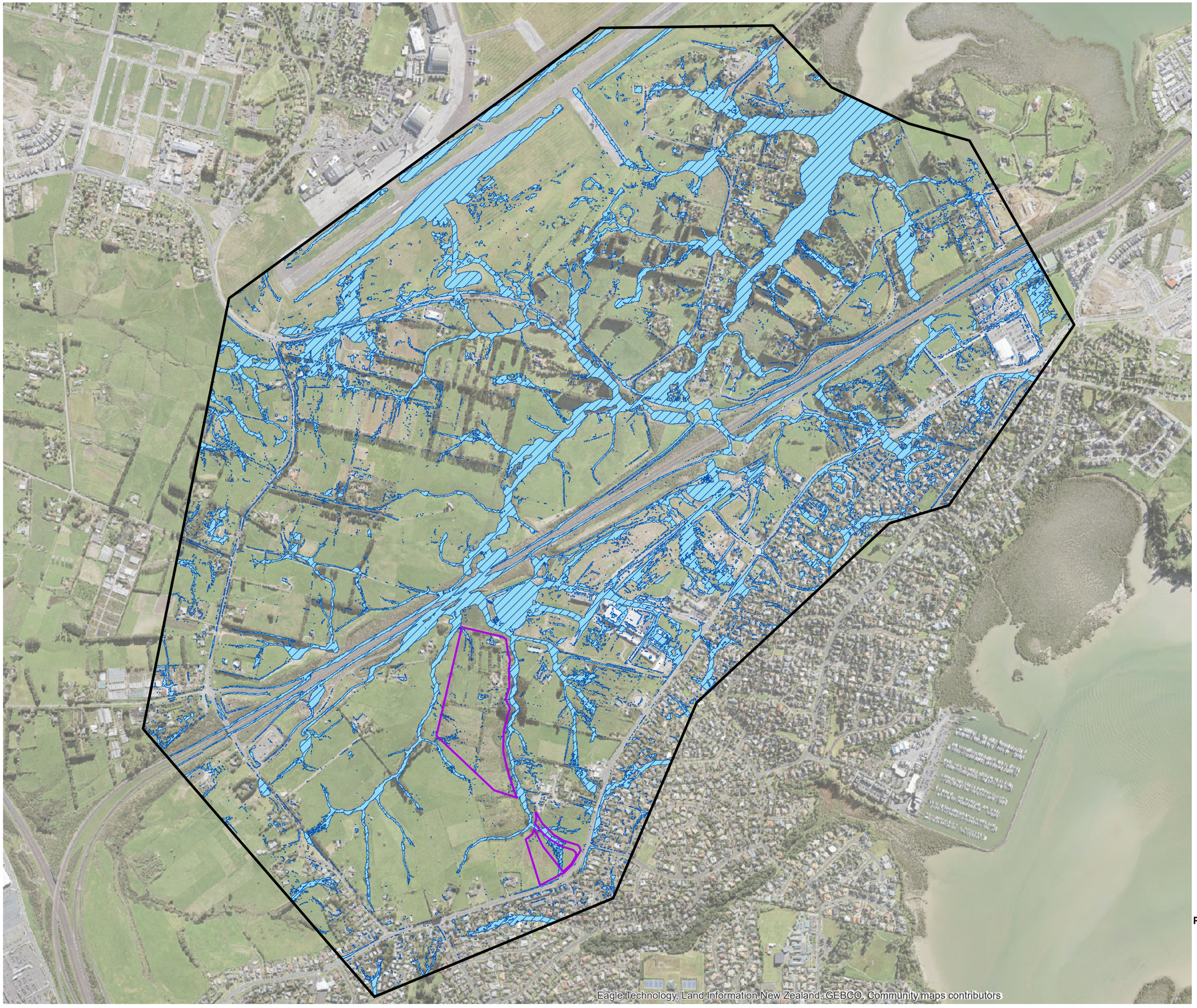
Austino Block 2 Plan Change
Flood Hazard Assessment

Postdevelopment minus Predevelopment, Peak Water Level, 1% AEP 3.8° CC

MAP NO:

A2212330.03-003

Eagle Technology, Land Information New Zealand, GEBCO, Community maps contributors



HARRISON GRIERSON

Legend

- Austino Block 2 PPC
- Model 2D Extent
- FloodExtend, Postdevelopment
- Flood Extent, Predevelopment

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APPROVED:	SXG	DATE:	26/08/2024

N

Scale: 1:12,000 (A3 Size)

0 0.05 0.1 0.2 0.3 Kilometers

Austino Block 2 Plan Change
Flood Hazard Assessment

Postdevelopmen vs Predevelopment, Flood Extent 1% AEP 3.8° CC

MAP NO:

A2212330.03-004

HARRISON GRIERSON

Legend

- Austino Block 2 PPC
- Model 2D Extent

Flood Depth (m)

- 0.05 - 0.10
- 0.11 - 0.20
- 0.21 - 0.30
- 0.31 - 0.50
- 0.51 - 1.00
- 1.01 - 2.00
- 2.01 - 3.00
- 3.01 - 10.00

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N

Scale: 1:12,000 (A3 Size)

0 0.05 0.1 0.2 0.3 Kilometers

Austino Block 2 Plan Change
Flood Hazard Assessment

Predevelopment Peak Depth
1% AEP No CC

MAP NO:

A2212330.03-005

File Path:G:\WR_PROJECTS_SHARE_FOLDER\59_Austino_PPC\01GIS\01MAP_REPORT\05_AustinoPPC_100yrNoCC_Pre_Depth.mxd

Last saved by: FAM 2024-08-26 Last Plotted: 2015-11-27

HARRISON GRIERSON

Legend

- Austino Block 2 PPC
- Model 2D Extent

Flood Depth (m)

- 0.05 - 0.10
- 0.11 - 0.20
- 0.21 - 0.30
- 0.31 - 0.50
- 0.51 - 1.00
- 1.01 - 2.00
- 2.01 - 3.00
- 3.01 - 10.00

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N

Scale: 1:12,000 (A3 Size)

0 0.05 0.1 0.2 0.3 Kilometers

Austino Block 2 Plan Change
Flood Hazard Assessment

Postdevelopment Peak Depth
1% AEP No CC

MAP NO:

A2212330.03-006

HARRISON GRIERSON

Legend

- Austino Block 2 PPC
- Model 2D Extent

Peak Modelled Water Level Difference

- 0.5m or more lower
- 0.3 - 0.5m lower
- 0.2 - 0.3m lower
- 0.1 - 0.2m lower
- 0.05 - 0.1m lower
- 0.01 - 0.05m lower
- Within 0.01m
- 0.01 - 0.05m higher
- 0.05 - 0.1m higher
- 0.1 - 0.2m higher
- 0.2 to 0.3m higher
- 0.3 to 0.5m higher
- More than 0.5m higher

Note 1 : Results shown are post-development minus pre-development. "Lower" shows where post-development peak water level is lower than pre-development. "Higher" shows where post-development peak water level is higher than pre-development.

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APPROVED:	SXG	DATE:	26/08/2024

N

Scale: 1:12,000 (A3 Size)

0 0.05 0.1 0.2 0.3 Kilometers

Austino Block 2 Plan Change
Flood Hazard Assessment

Postdevelopment minus Predevelopment, Peak Water Level, 1% AEP No CC

MAP NO:

A2212330.03-007

HARRISON GRIERSON

Legend

- Austino Block 2 PPC
- Model 2D Extent
- FloodExtend, Postdevelopment
- Flood Extent, Predevelopment

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N

Scale: 1:12,000 (A3 Size)

0 0.05 0.1 0.2 0.3 Kilometers

Austino Block 2 Plan Change
Flood Hazard Assessment

Postdevelopmen vs Predevelopment, Flood Extent 1% AEP No CC

MAP NO:

A2212330.03-008

HARRISON GRIERSON

Legend

- Austino Block 2 PPC
- Model 2D Extent

Flood Depth (m)

- 0.05 - 0.10
- 0.11 - 0.20
- 0.21 - 0.30
- 0.31 - 0.50
- 0.51 - 1.00
- 1.01 - 2.00
- 2.01 - 3.00
- 3.01 - 10.00

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N

Scale: 1:12,000 (A3 Size)

0 0.05 0.1 0.2 0.3 Kilometers

Austino Block 2 Plan Change
Flood Hazard Assessment

Predevelopment Peak Depth
10% AEP 2.1° CC

MAP NO:

A2212330.03-009

HARRISON GRIERSON

Legend

- Austino Block 2 PPC
- Model 2D Extent

Flood Depth (m)

- 0.05 - 0.10
- 0.11 - 0.20
- 0.21 - 0.30
- 0.31 - 0.50
- 0.51 - 1.00
- 1.01 - 2.00
- 2.01 - 3.00
- 3.01 - 10.00

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APPROVED:	SXG	DATE:	26/08/2024

N

Scale: 1:12,000 (A3 Size)

0 0.05 0.1 0.2 0.3 Kilometers

Austino Block 2 Plan Change
Flood Hazard Assessment

Postdevelopment Peak Depth
10% AEP 2.1° CC

MAP NO:

A2212330.03-010

HARRISON GRIERSON

Legend

- Austino Block 2 PPC
- Model 2D Extent

Peak Modelled Water Level Difference

- 0.5m or more lower
- 0.3 - 0.5m lower
- 0.2 - 0.3m lower
- 0.1 - 0.2m lower
- 0.05 - 0.1m lower
- 0.01 - 0.05m lower
- Within 0.01m
- 0.01 - 0.05m higher
- 0.05 - 0.1m higher
- 0.1 - 0.2m higher
- 0.2 to 0.3m higher
- 0.3 to 0.5m higher
- More than 0.5m higher

Note 1 : Results shown are post-development minus pre-development. "Lower" shows where post-development peak water level is lower than pre-development. "Higher" shows where post-development peak water level is higher than pre-development.

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N

Scale: 1:12,000 (A3 Size)

0 0.05 0.1 0.2 0.3 Kilometers

Austino Block 2 Plan Change
Flood Hazard Assessment

Postdevelopment minus Predevelopment, Peak Water Level, 10% AEP 2.1° CC

MAP NO:

A2212330.03-011

HARRISON GRIERSON

Legend

- Austino Block 2 PPC
- Model 2D Extent
- FloodExtend, Postdevelopment
- FloodExtend, Predevelopment

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N

Scale: 1:12,000 (A3 Size)

0 0.05 0.1 0.2 0.3 Kilometers

Austino Block 2 Plan Change
Flood Hazard Assessment

Postdevelopmen vs Predevelopment, Flood Extent 10% AEP 2.1° CC

MAP NO:

A2212330.03-012

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HARRISON GRIERSON

Legend

- Austino Block 2 PPC
- Model 2D Extent

Flood Depth (m)

- 0.05 - 0.10
- 0.11 - 0.20
- 0.21 - 0.30
- 0.31 - 0.50
- 0.51 - 1.00
- 1.01 - 2.00
- 2.01 - 3.00
- 3.01 - 10.00

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N

Scale: 1:12,000 (A3 Size)

0 0.05 0.1 0.2 0.3 Kilometers

Austino Block 2 Plan Change
Flood Hazard Assessment

Predevelopment Peak Depth
10% AEP No CC

MAP NO:

A2212330.03-013

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HARRISON GRIERSON

Legend

- Austino Block 2 PPC
- Model 2D Extent

Flood Depth (m)

- 0.05 - 0.10
- 0.11 - 0.20
- 0.21 - 0.30
- 0.31 - 0.50
- 0.51 - 1.00
- 1.01 - 2.00
- 2.01 - 3.00
- 3.01 - 10.00

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APPROVED:	SXG	DATE:	26/08/2024

N

Scale: 1:12,000 (A3 Size)

0 0.05 0.1 0.2 0.3 Kilometers

Austino Block 2 Plan Change
Flood Hazard Assessment

Postdevelopment Peak Depth
10% AEP No CC

MAP NO:

A2212330.03-014

File Path:G:\WR_PROJECTS_SHARE_FOLDER\59_Austino_PPC\01GIS\01MAP_REPORT\14_AustinoPPC_10yrNoCC_Post_Depth.mxd

Last saved by: FAM 2024-08-27 Last Plotted: 2015-11-27

HARRISON GRIERSON

Legend

- Austino Block 2 PPC
- Model 2D Extent

Peak Modelled Water Level Difference

- 0.5m or more lower
- 0.3 - 0.5m lower
- 0.2 - 0.3m lower
- 0.1 - 0.2m lower
- 0.05 - 0.1m lower
- 0.01 - 0.05m lower
- Within 0.01m
- 0.01 - 0.05m higher
- 0.05 - 0.1m higher
- 0.1 - 0.2m higher
- 0.2 to 0.3m higher
- 0.3 to 0.5m higher
- More than 0.5m higher

Note 1 : Results shown are post-development minus pre-development. "Lower" shows where post-development peak water level is lower than pre-development. "Higher" shows where post-development peak water level is higher than pre-development.

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APPROVED:	SXG	DATE:	26/08/2024

N

Scale: 1:12,000 (A3 Size)

0 0.05 0.1 0.2 0.3 Kilometers

Austino Block 2 Plan Change
Flood Hazard Assessment

Postdevelopment mnus Predevelopment, Peak Water Level, 10% AEP No CC

MAP NO:

A2212330.03-015

Eagle Technology, Land Information New Zealand, GEBCO, Community maps contributors

HARRISON GRIERSON

Legend

- Austino Block 2 PPC
- Model 2D Extent
- FloodExtend, Postdevelopment
- FloodExtend, Predevelopment

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N

Scale: 1:12,000 (A3 Size)

0 0.05 0.1 0.2 0.3 Kilometers

Austino Block 2 Plan Change
Flood Hazard Assessment

Postdevelopmen vs Predevelopment, Flood Extent 10% AEP No CC

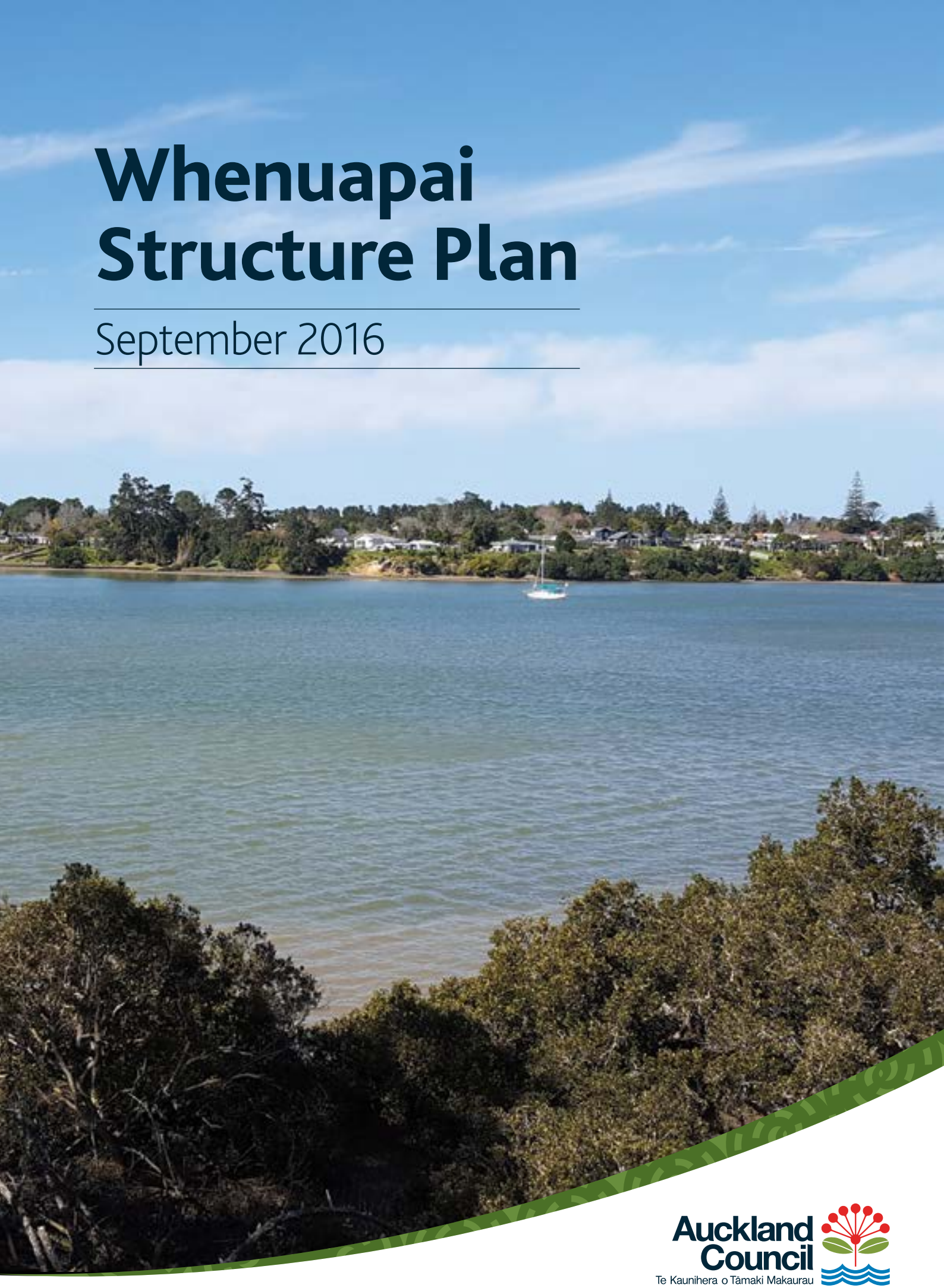
MAP NO:

A2212330.03-016

APPENDIX 8 WHENUAPAI STRUCTURE PLAN

Whenuapai Structure Plan

September 2016



Auckland Council
Te Kaunihera o Tāmaki Makaurau

He mihi

Tuia ki te rangi

Tuia ki te whenua

Tuia ki te moana

Tuia te here tangata

E rongo te pō e rongo te ao.

Bind the domain of the upper realm

Bind the domain of the land

Bind the domain of the ocean

Bind the tapestry of life affirming our connection to the natural world and to one another

Ngā mihi

View of Whenuapai from Paremoremo

Whenuapai
Structure Plan
September 2016

Whenuapai in 2046

> Whenuapai is a liveable, compact and accessible place with a mix of high quality residential and employment opportunities. It makes the most of its extensive coastline, is well connected to the wider Auckland Region, and respects the cultural and heritage values integral to its distinctive character.

This vision for Whenuapai is supported by key objectives covering seven themes - sustainable urban development, a quality built urban environment, a well-connected Whenuapai, the national significance of the Whenuapai Airbase, the provision of infrastructure, an enhanced natural environment and protection of heritage, and the provision of quality open spaces.

Structure Plan Area

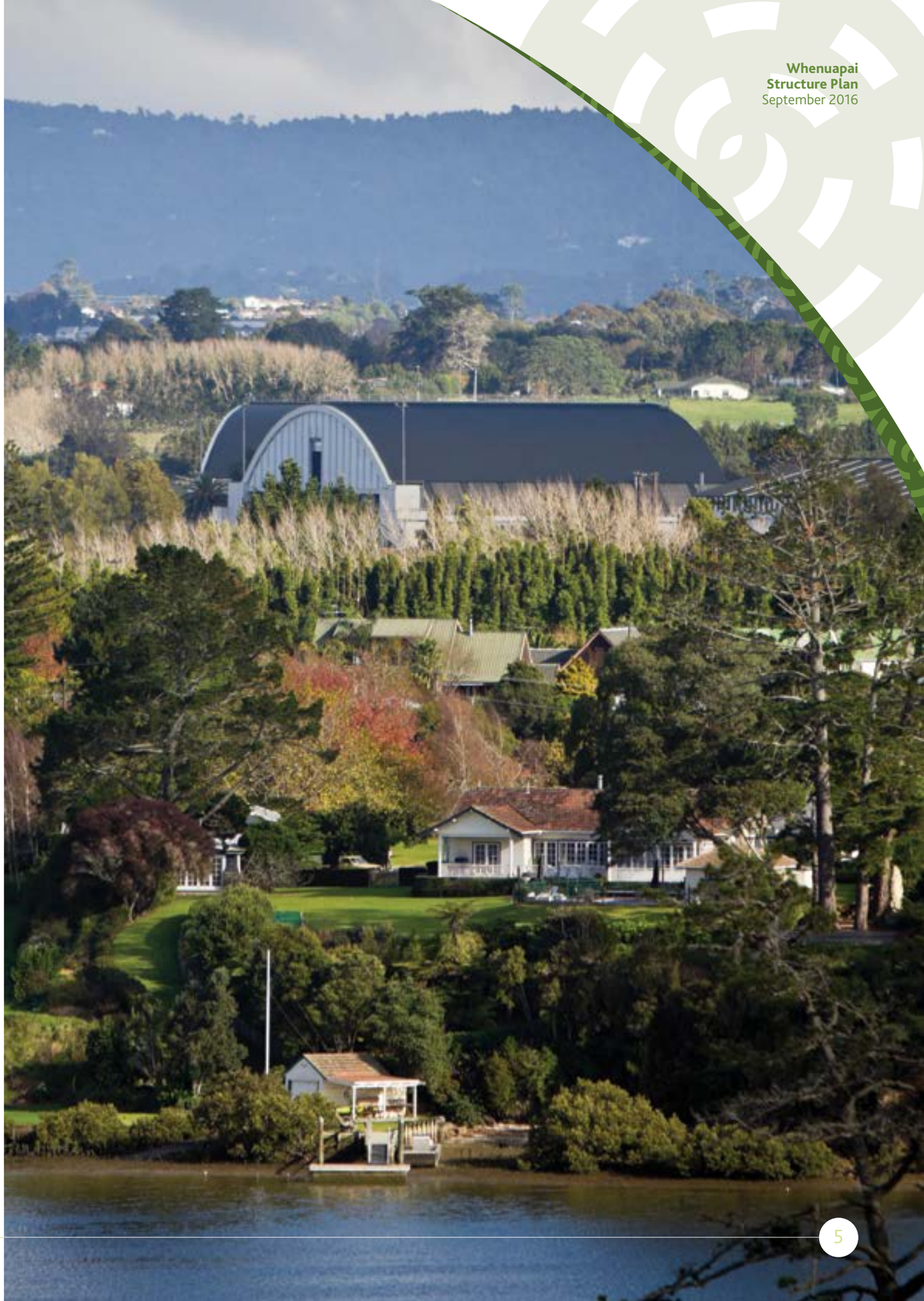
Covering approximately 1500 hectares, Whenuapai is located 23km northwest of Auckland's central business district, at the fork of State Highway 16 (SH16) and State Highway 18 (SH18). SH16 connects Auckland to Whenuapai, Kumeu, Huapai and northwest Auckland. SH18 connects Whenuapai to Albany, the North Shore and State Highway 1.

The coastline of the Upper Waitematā Harbour, an area ranked highly in terms of vulnerability and ecological value, forms Whenuapai's northern boundary. Whenuapai is largely severed from surrounding areas by SH16 and SH18 and its northern coastline. The closest metropolitan centre is Westgate, located close by on the western side of SH16. The structure plan area does not include Herald Island which is linked to Whenuapai via Kingsway Road.

The Whenuapai Airbase has been established on site since 1937 and is a significant land use of approximately 300 hectares located in the middle of the area. The airbase is not proposed to be developed as part of the Structure Plan and New Zealand Defence Force (NZDF) operations at the airbase will continue for the foreseeable future.

Whenuapai Village and Whenuapai Centre currently exist inside the structure plan area. Whenuapai Village is located north of the airbase and has a focal point of the Whenuapai Village Hall and the Malcolm Hahn Memorial Reserve. Whenuapai Centre is located on Brigham Creek Road and provides the key retail hub for the area and serves the convenience retail needs of the current population.

Whenuapai
Structure Plan
September 2016



Key elements of the Structure Plan to be considered (see Section 8 for further details)

Development of the Structure Plan has considered the constraints and opportunities in the area. The following key elements have been explored to ensure sustainable development in the structure plan area. See page 8 for the Structure Plan map.

Land use and activities – the Structure Plan identifies low, medium and high density residential land development areas taking into account the airbase and other constraints, and following the Neighbourhood Design Statement.

Transport – higher residential densities are located in proximity to Rapid Transit Network stations and park and ride facilities. Whenuapai will have a well-connected cycling and pedestrian network.

Infrastructure – significant upgrades to existing water supply and waste water networks are required as well as stormwater management is needed to manage these effects of growth. Development has to take into account the noise contours and flight paths of Whenuapai Airbase as well as the National Grid Corridor.

Natural environment and heritage – retention of permanent and intermittent streams is crucial and will help determine where roads, open space and residential development will be located. Significant Ecological Areas and riparian margins are to be enhanced while existing archaeological and built heritage sites are to be protected.

Open space and recreation – esplanade reserves, a sports field, three suburban parks, a network of 14 neighbourhood parks and a civic space are to be provided in the structure plan area.

The structure plan map on the following page shows the land uses and their relationship to infrastructure and other key elements of the structure plan area.

Implementation and staging (see Section 9 for further details)

It is anticipated the structure plan area will provide somewhere between 8100 to 10,700 dwellings (depending on the density of development), 8600 jobs and over 300 hectares of new business land over the next 10 to 20 years. Development will be built out in stages as the provision of infrastructure allows and taking into account the growth identified in the whole of the northwest.

Stage 1 of the development of the structure plan area is split into six phases. These include areas of residential and business land that can be development ready within the next 2-10 years. Some land is being developed already and it has been identified that up to 1800 dwellings can be built in Stage 1 during the period from 2017-2021.

Stage 2 comprises the remainder of the land that requires further investment in new infrastructure and will be built out from 2021 onwards.

Whenuapai
Structure Plan
September 2016

Example of the type of medium density housing we expect in Whenuapai

Whenuapai Structure Plan September 2016

Structure Plan Map

- Potential Multi-purpose Community Facility
- Ferry terminal
- RTN Station
- RTN Station - Park and Ride
- Proposed Civic Space
- Existing Neighbourhood Park
- Proposed Neighbourhood Park
- Proposed Sports Park - location undetermined
- Proposed Suburb Park
- Whenuapai Structure Plan Boundary
- NZDF Property
- NZDF Designation
- Rapid Transit Network (RTN)
- Potential Brigham Creek Bypass
- Proposed Roads
- Permanent and Intermittent Streams
- School
- Local Centre
- Neighbourhood Centre
- Mixed use
- Business
- Low Density
- Medium Density
- High Density

Scale @ A3 = 1:25,000

0 250 500 750 1,000

Meters

Date Printed: 13/09/2016

N

Coatesville

Totara Road

Ferry Parade

Kauri Road

Upper Harbour Motorway

Sh 16

Brigham Creek Road

Trig Road

Hobsonville Point Road

North Western Motorway

Fred Taylor Drive

Wiseley Road

Hobsonville Road

Marina View Drive

Luckens Road

DISCLAIMER: This map should be read in conjunction with the associated classification methodology outlined in 'Whenuapai Stream Classification Survey Methodology' (Morphum Environmental, 2016). Please be aware that the data contained in this map is provisional only as it was produced at a catchment modelled scale and not at an individual development scale. Auckland Council and its employees, while providing this data in good faith, accept no liability from any use of the data provided. Additionally there may be some changes in the future to this map once more detailed data becomes available Users are therefore cautioned in the use of this data for decisions of public or personal safety, and/or the or operational condult of business that involves substantial money or operational consequences.

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Whenuapai
Structure Plan
September 2016

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1 Introduction

The purpose of this document is to outline the structure plan for Whenuapai. This structure plan follows the requirements of Appendix 1 of the Auckland Unitary Plan Operative in Part. It is the product of analysis of technical reports from numerous Auckland Council departments and infrastructure providers, community feedback received during the engagement process, and feedback from key stakeholders within the structure plan area. Whenuapai is part of the solution to Auckland's growth challenge; this document sets out how the structure plan area is to be developed from now and over the next 10-20 years and how Whenuapai will integrate with wider Auckland.

1.1 Structure plan area

Covering approximately 1500 hectares, Whenuapai is strategically located 23km northwest of Auckland's central business district, at the fork of State Highway 16 (SH16) and State Highway 18 (SH18). SH16 connects Auckland to Whenuapai, Kumeu, Huapai and northwest Auckland. SH18 connects Whenuapai to Albany, the North Shore and State Highway 1. Figure 1 shows the wider context of Whenuapai within the Auckland region. Figure 2 is a detailed aerial photograph showing the extent of the Whenuapai Structure Plan area.

The coastline of the Upper Waitematā Harbour, an area ranked highly in terms of vulnerability and ecological value, forms Whenuapai's northern boundary. Whenuapai is largely severed from surrounding areas by SH16 and SH18 and its northern coastline. Access is limited to three key connections – Brigham Creek Road/SH16 interchange, Brigham Creek Road/SH18 interchange and Trig Road. The closest metropolitan centre is Westgate which is located close by on the western side of SH16. The structure plan area does not include Herald Island which is linked to the Whenuapai area via Kingsway Road.

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Figure 1: The Whenuapai Structure Plan area in Auckland context

Figure 2: Extent of the Whenuapai Structure Plan area

The Whenuapai Airbase has been established on site since 1937 and is a significant land use of approximately 300 hectares located in the middle of the Whenuapai Structure Plan area. On the western side of the runways, the airbase includes land used for personnel, servicing aircraft operations, weapons preparation areas and ancillary support to aircraft operations and/or defence use. The airbase is not proposed to be developed as part of the Structure Plan and New Zealand Defence Force operations at the airbase will continue for the foreseeable future.

Whenuapai Village and Whenuapai Centre currently exist inside the structure plan area. Whenuapai Village is located north of the airbase and has a focal point of the Whenuapai Village Hall and the Malcolm Hahn Memorial Reserve. Whenuapai Centre is located on Brigham Creek Road and provides the key retail hub for the area and serves the convenience retail needs of the current population. The centre includes a number of convenience shops and a petrol station. Whenuapai Primary and Timatanga Schools are located near the centre, as is Pinepac Whenuapai ITM.

1.2 The growth challenge

The population of Auckland was 1,493,200 people at the time of the 2013 Census. At 30 June 2015 the population was estimated to be 1,569,900 people[1]. By 2043 the population is projected to grow to between 2,028,300 (low) and 2,432,800 (high) people as shown in Figure 3[2]. The challenge for Auckland is how to accommodate this growth with housing and jobs.

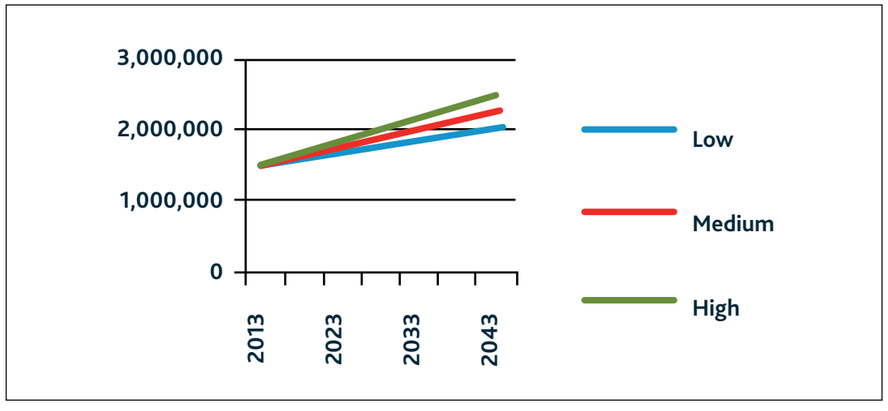

Figure 3: Auckland population projections
Source: Statistics NZ 2015

[1] Statistics NZ, Estimated resident population for regional areas at 30 June
[2] Statistics NZ, Subnational population projections, 2013(base)-2043

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Approximately 400,000 new dwellings and 277,000 additional jobs will be needed to accommodate the growing Auckland population. As part of a quality compact approach to growth, the Auckland Plan anticipates that up to 160,000 dwellings and 1400 hectares of business land will be required outside the existing urban area. In addition, up to 240,000 dwellings are anticipated within the existing urban area.

The council's Future Urban Land Supply Strategy sets out a programme for sequencing future urban land over 30 years across Auckland. It identifies Whenuapai as able to supply 1800 dwellings between 2017 and 2021. In the 30 years to 2041, Whenuapai is anticipated to have between 8100 to 9600 dwellings and approximately 8600 jobs.

The structure plan area is identified within the Rural Urban Boundary and zoned Future Urban in the Auckland Unitary Plan Operative in Part.

1.2.1 Housing demand

Based on historical trends in Auckland, there is likely to be considerable demand for releasing land in Whenuapai for housing due to its proximity to the coast, Westgate Centre and accessibility to the state highway network.

The greatest pressure for housing is likely to be for low to medium density residential development which, by itself, would result in Whenuapai becoming a dormitory, car-based, commuter suburb. However, the opportunity to provide for higher densities around an emerging local centre and planned rapid transit stops will enable Whenuapai to accommodate a significant population.

Whenuapai would benefit from an appropriate mix of residential and employment densities which will, in turn, support more amenity and services in the area as its population grows. Over time, an increasing proportion of residents' daily needs will be able to be met within Whenuapai or nearby in Westgate or Hobsonville.

1.2.2 Business demand

State Highways 16 and 18 provide good accessibility to the area making Whenuapai a prime location to accommodate a significant proportion of future industrial growth in the northwest. Additional retail and other services will also be required in the area to match the residential growth and supplement the offerings at Westgate.

1.3 What is a structure plan?

A structure plan is a high level plan for a large area that shows the arrangement of various land uses (e.g. centres, housing, employment and parks) and infrastructure (e.g. transport and stormwater), and how the area connects to adjacent urban areas and wider infrastructure networks. It identifies public infrastructure such as streets, rail, stormwater, natural features, schools and community facilities. A structure plan guides future development by coordinating and defining the land use patterns and the location, distribution and integration of this infrastructure. A structure plan forms the basis of changes to the Auckland Unitary Plan Operative in Part through the plan change process.

Structure planning of the Whenuapai area has been undertaken as the first stage of the plan change process to rezone land from the Future Urban zone to an urban zone in accordance with the requirements as set out in Appendix 1 of the Auckland Unitary Plan Operative in Part (for more information see Appendix 3).

Appendix 1 of the Auckland Unitary Plan Operative in Part sets out what must be considered when structure planning, the content of the structure plan, and the supporting information that is required. The outcome of the structure planning phase is the production of a structure plan map that can be readily converted into a statutory planning format, producing zones and designations, as well as timing of development.

Consultation documents from the Draft Whenuapai Structure Plan

2 Structure Plan Process

2.1 Background

Planning for the future urban growth of Whenuapai began in the 1990s. Various council planning documents identified the potential of the area for future urban growth and contained background work for the structure planning process. Various key infrastructure projects have also been proposed over the intervening time to support growth, some of which are now operational or in progress, such as the Northwestern Busway to Westgate.

2.1.1 Background planning documents

The Auckland Regional Growth Strategy: 2050 was prepared in 1999 to help plan growth and reduce unmanaged urban development throughout the region. Land immediately to the south of Whenuapai, along Hobsonville Road and to the west at Westgate, was identified for growth.

The Northern and Western Sectors Agreement 2001 outlined how growth would be implemented to accommodate future growth in the west. This strategy focused new development along the Massey – Hobsonville corridor over a 20-year period (2001–2021) and was referred to as the Northern Strategic Growth Area.

Plan changes were approved in 2010 to extend the Metropolitan Urban Limits (MUL) at Hobsonville Point, Hobsonville Road and Westgate to rezone rural land to urban zones for development. These areas are currently under development. Whenuapai and Trig Road were not included in these changes and remained outside the MUL.

Prior to amalgamation Waitākere City Council completed a growth strategy - Best for the West Growth Management Strategy (2010) - which provided for staged new urban development at Redhills, Trig Road and Whenuapai. Waitākere City Council prioritised structure planning of the Whenuapai Industrial Area and Hobsonville Corridor West. Considerable analysis and research was undertaken to support future plan changes. A 2010 report to Waitākere City Council summarises the outcome of that structure planning work and provided a draft concept plan for Whenuapai.

2.2 The structure plan process

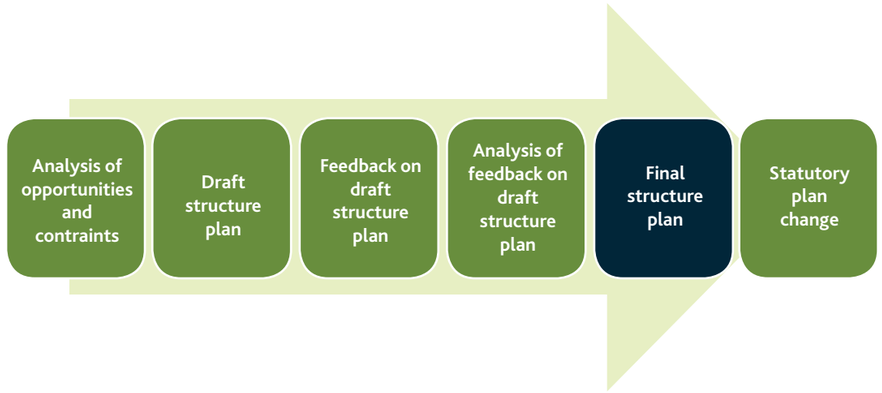

Figure 4: Structure planning process

The structure planning process started in January 2016. A series of technical reports were commissioned by the council to understand the opportunities and constraints for development within Whenuapai. The reports and previous research that had been undertaken in the area over the past decade were analysed. New and updated information gathered as part of phase one includes:

- Biodiversity Assessment
- Business Land Assessment
- Community Facility Provision Report
- Cultural Values Assessment (Te Kawerau ā Maki)
- Integrated Transport Assessment
- Natural Character, Landscape and Visual Assessment
- Neighbourhood Design Statement
- Noise Assessment
- Parks and Open Space Report
- Preliminary Aboricultural Assessment
- Preliminary Coastal Habitat Assessment
- Preliminary Contamination Assessment
- Preliminary Geotechnical and Coastal Erosion Assessment Report
- Preliminary Historic Heritage Assessment
- Preliminary Lighting Assessment
- Stormwater Management Plan
- Wastewater Servicing Strategy.

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A summary of the opportunities and constraints identified by these technical reports is provided in Section 7 and full copies of the technical reports are available on the Auckland Council website.

The second phase of the process involved developing a draft structure plan. Key elements were put together to form the draft document based on a synthesis of the technical assessments. Public engagement on the draft plan was held in June-July 2016.

Following this the feedback was analysed and the Structure Plan refined. For more information on the feedback see Section 6 of this report.

The final structure plan represents an integrated land use and infrastructure plan to guide statutory and non-statutory processes in the future. The Structure Plan complements and builds on the nearby developments of Westgate, Hobsonville Corridor and Hobsonville Point, bringing further housing and employment opportunities to Auckland's northwest.

The next step is to prepare a plan change to the Auckland Unitary Plan Operative in Part to change the current Future Urban zone to appropriate urban zones. The plan change will be prepared in accordance with the first schedule of the Resource Management Act 1991 (RMA). During the plan change process finer details will be determined and there will be opportunity for residents and other stakeholders to have their say.

Bristol Road

3 Vision and Key Objectives

3.1 Vision for Whenuapai

Whenuapai is a liveable, compact and accessible place with a mix of high quality residential and employment opportunities. It makes the most of its extensive coastline, is well connected to the wider Auckland Region, and respects the cultural and heritage values integral to its distinctive character.

3.2 Key objectives

1. Sustainable urban development in Whenuapai

- Whenuapai is an exemplar for a sustainable green fields development
- high quality development takes place that supports sustainable, low carbon and healthy communities and workplaces
- Whenuapai has a strong community focus with local and neighbourhood centres, community facilities, primary and secondary schools, and public open space
- Whenuapai's development is designed to mitigate the effects of climate change and coastal hazards
- communities, development and infrastructure take an adaptive approach to respond to the effects of climate change and coastal hazards
- economic prosperity is fostered through the provision of future-focused, local business development opportunities to create local jobs
- social infrastructure is provided to support the needs of the community and contribute to liveability.

2. Quality built urban environment

- a range of quality housing choices are provided to meet the needs of a growing and diverse community
- Whenuapai has a quality compact urban form with increased residential densities close to public transport services and amenities
- Whenuapai is a place that respects and celebrates its relationship with mana whenua and its Māori and European heritage and character

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- the street network enhances Whenuapai's sense of place by favouring pedestrians, cyclists and public transport modes.

3. A well-connected Whenuapai

- the transport network responds to anticipated growth and maximises connectivity for commuters and freight within Whenuapai and to surrounding areas
- frequent, attractive public transport options are supported by greater density along key routes, and good local and regional connections exist
- dedicated cycle and pedestrian footpaths provide safe, connected and high amenity linkages between areas of activity at a local scale.

4. The national significance of Whenuapai Airbase

- development around the airbase recognises its national significance and strategic importance
- Whenuapai Airbase continues to positively contribute to the character and sense of place in Whenuapai.

5. The provision of infrastructure

- timely public water, waste water and transport network infrastructure meets the growing needs of Whenuapai
- a water-sensitive design approach manages stormwater and utilises the existing stream network.

6. Enhance the natural environment and protect natural heritage

- freshwater quality throughout the catchment is enhanced over time
- scheduled natural heritage is protected
- the overall biodiversity of the area is improved over time
- environmental constraints, such as coastal erosion and contaminated land, are adequately managed
- sedimentation of the Upper Waitematā Harbour is carefully managed through subdivision and development processes.

7. The provision of quality open spaces

- a network of high-quality open spaces and recreation areas meet the needs of the growing Whenuapai community
- there are ample opportunities for cycling, sport, passive recreation and social interaction
- stream networks are utilised as recreational routes and connections between open spaces and the coast where practicable
- public access to, and along, the coast is enhanced where practicable.

4 Local context

4.1 Site description

The Whenuapai Airbase is a significant land use of approximately 300 hectares located in the middle of the structure plan area. The airbase provides a unique sense of place to Whenuapai. The New Zealand Defence Force (NZDF) considers that the airbase will continue to positively contribute to the character and amenity of the area. NZDF has indicated that it wishes to build on its association and connections with Whenuapai and to build and enhance positive relationships with the new and existing community.

Surrounding the airbase is a mixture of rural activities and countryside living including low density housing, green houses, equine uses, orchards and crops.

Whenuapai Village is located north of the airbase and is an established residential neighbourhood of single-detached housing on a range of lot sizes, lots of around 1000m^2 on Puriri and Waimarie Roads and larger properties adjoining the coastline (generally between 2000m^2 and 7000m^2). A small area of commercial activity exists on the corner of Puriri and Waimarie Roads (940m^2) with a takeaway restaurant and a convenience store. The Whenuapai Village Hall is located on Waimarie Road and is a valued community asset. It is the only community facility in the structure plan area.

Whenuapai Centre is an established centre on Brigham Creek Road. It is immediately west of the airbase and Whenuapai Primary School which is located on Airport Road. The current centre provides the key retail hub for the area and includes a number of convenience shops and a petrol station on the southern side. Commercial activities include Pinepac Whenuapai ITM, a major saw milling industry. To the south of the retail centre is the residential neighbourhood of airbase housing. Nearby is the privately owned and operated Timatanga School.

The northern part of Whenuapai is closely associated with the coastal inlets and waterways of the Upper Waitematā Harbour. The Auckland Unitary Plan Operative in Part acknowledges the importance of this sensitive coastal environment by identifying it as a Significant Ecological Area – Marine. Houses here are typically large, orientated towards the water and vegetated by mature trees, as is evident along Bristol and Totara Roads. There are smaller concentrations of higher density housing set among mature vegetation, especially around Waimarie, Puriri and Pohutukawa Roads which are part of Whenuapai Village. There are also numerous horticultural and equine-based activities in this part of the structure plan area contained by mature trees.

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Current Whenuapai Centre

Almost all roads in the structure plan area are single-lane and have a predominantly rural character with hedgerows, post and railing fencing and limited lighting. Some roads, including parts of Totara Road, are currently being upgraded to facilitate future development needs.

Public open space comprises of pockets of esplanade reserve around the coastline and neighbourhood parks located in Whenuapai Village and on Ryans Road (off Trig Road). A new neighbourhood park and town square are currently being constructed as part of the Special Housing Area off Totara Road.

Two Special Housing Areas exist on the northern side of Brigham Creek Road, adjoining the centre, and will provide approximately 1000 dwellings together with a playground and an area of commercial land. Development is currently underway within the western part of the Special Housing Area. A third Special Housing Area at 1 Ockleston Landing is located to the southeast, adjacent to State Highway 18. At the time of writing this report, no application to develop that Special Housing Area had been lodged with Auckland Council.

4.2 Whenuapai Airbase

The airbase is used by the New Zealand Defence Force (NZDF) for military aviation and related military activities. The site can accommodate all types of fixed wing military aircraft up to a C17 size. The airbase has two runways which currently service:

- No. 6 Squadron – Naval Support Flight
- No. 5 Squadron (Orion)
- No. 40 Squadron (Hercules and Boeing 757)
- RNZAF Parachute Training Support Unit.

As well as the runways, there are related buildings and facilities on the site including a small cluster of dwellings and ancillary recreational activities. The airbase is the largest air force base in the country, with personnel strength of around 1100.

The NZDF has advised the airbase will continue to operate at a similar scale and intensity to its current operation for the foreseeable future and is not available for non-military uses. Potential impacts on the safe and effective current and future operation of the airbase need to be considered and avoided, remedied or mitigated by any new development. All new development needs to be in accordance with the Auckland Unitary Plan Operative in Part requirements for the airbase, as well as Civil Aviation Authority requirements.

Refer to Section 5.3.1 for commentary on the airbase designation in the Auckland Unitary Plan Operative in Part.

4.3 Westgate Centre

Westgate Centre is the closest major centre to Whenuapai and, as an emerging metropolitan centre, it will be the principal centre for the Whenuapai community. Currently access to Westgate Centre from Whenuapai is via Brigham Creek Road and Fred Taylor Drive, Trig Road and Hobsonville Road, or westbound from SH18. Westgate is approximately 7km from the existing Whenuapai Centre on Brigham Creek Road.

Westgate will, when completed, cover an area of 56 hectares and create 10,000 new jobs and housing for 4000 residents.

The NorthWest Shopping Centre, to the north of Fred Taylor Drive, was opened in late 2015 along with the town square. This mall is supported by approximately eight hectares of commercial land, 12 hectares of large-format retail and home improvement stores around the periphery, and a further eight hectares of employment land. Six hectares of open space and walkways are proposed, along with a new 3500m^2 library.

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4.4 Surrounding land use

With the exception of Westgate Centre, Whenuapai is primarily surrounded by established low-density residential neighbourhoods at Herald Island, West Harbour, Massey and Hobsonville (refer to Figure 5).

Hobsonville Point is currently being redeveloped from a former airfield to a mixed residential and commercial/industrial area. This area also has new primary and secondary schools and extensive areas of open space. A ferry service connects Hobsonville Point to central Auckland.

Special Housing Areas have been established at Scott Point, parts of Hobsonville Point (The Landing and Catalina), Redhills and Westgate, with applications for plan changes to the Auckland Unitary Plan Operative in Part to enable urban development at varying stages. At the time of writing this report only Scott Point and Catalina at Hobsonville Point are operative.

The area known as Redhills has been given a live zoning under the Auckland Unitary Plan Operative in Part. This enables the development of approximately 600 hectares of land for residential development with a Local Centre west of Westgate. The council has, however, rejected the infrastructure staging provisions provided by the Independent Hearings Panel, replacing those provisions with more refined provisions to assist with the timing and sequencing of development in that area.

In close proximity to Whenuapai is a local centre, Hobsonville Village, at the eastern end of Hobsonville Road comprising a supermarket, shops, a gym and offices. This area is accessible from Whenuapai for pedestrians via the Clarks Lane footbridge. An area of business land, Hobsonville Corridor, is now available for development immediately south of Whenuapai between Hobsonville Road and SH18. Hobsonville Primary School is also located within this area.

To the north of Whenuapai are the rural-residential areas of Coatesville and Riverhead. Coatesville is zoned as a Local Centre under the Auckland Unitary Plan Operative in Part and is surrounded by Countryside Living and Rural Production Zones. Riverhead is a Local Centre and is predominantly a low density residential neighbourhood to the east of the Coatesville-Riverhead Highway with an area of Future Urban Zone to the west of the Highway.

To the northwest of Whenuapai are the settlements of Kumeu and Huapai which have been zoned as Town Centres in the Auckland Unitary Plan Operative in Part and are surrounded by large areas of Future Urban Zone. To the east of Whenuapai along State Highway 18 is the residential suburb of Greenhithe and the metropolitan centre of Albany. Albany has large areas of Light Industry zone. For more information on these zones see Chapter D of the Auckland Unitary Plan Operative in Part.

Figure 5: Surrounding area

4.5 Landform and features

Land within Whenuapai is predominantly low-lying and flat to undulating, with the lowest elevated areas to the north and adjacent to the harbour, the land gently rising to the south as it joins Hobsonville Road. At the lowest points, elevation barely gets higher than the Mean High Water Spring but reaches between 18-25 metres above sea level across the majority of the northern part of the structure plan area. Further south the land rises to approximately 70 metres above sea level along the West Harbour residential area and Hobsonville Road.

The majority of the land has been cleared and replaced with exotic pasture, grasses, crops, buildings and roads. Shelterbelts often demarcate field boundaries and comprise predominantly evergreen species, such as pine or macrocarpa. Other exotic tree species that are evident in the structure plan area are poplar, oaks, plane trees, and individual and groups of willows.

Very little native vegetation remains in the structure plan area. However, extensive native plantings have been integrated along State Highway 16 and State Highway 18 to form an important ecological corridor extending southeast to southwest between Hobsonville and Brigham Creek.

Significant tracts of forest vegetation associated with the steep escarpment banks of Riverhead, Lucas Creek and Hellyers Creek form the northern outlook for residents in Whenuapai and Herald Island.

There are numerous creeks and streams along the northern part of the structure plan area, including Brigham Creek that forms the area's northwestern boundary and the Waiarohia Inlet which forms the area's northeastern boundary. These watercourses vary in quality, with the majority being cleared of vegetation or containing predominantly exotic species.

The structure plan area has two primary stream catchments, Totara Stream flowing northwest to Brigham's Creek and Waiarohia Stream flowing northeast to the Waiarohia Inlet. An extensive network of intermittent and permanent streams traverse the area, feeding into the Riverlea Stream, Ratara Stream and Orchard Stream in the north, and Brigham Creek, Waiarohia Stream and Totara Creek in the south. These streams feed into the Upper Waitematā Harbour via Brigham and Totara Creeks and other tidal inlets.

The coastal area is tidal and fringed by mangroves with the coastal edge comprising steep cliffs to moderate slopes and gentle slopes grading down to the tidal zone. The enclosed coastal landscape is not ranked as outstanding but it does have natural character and recreation value.

The coastal marine area largely consists of mud flats created by slow moving waters and mangrove swamps which feature a variety of invertebrate fauna, bottom-feeding fish and coastal birds. Waiarohia inlet is considered to be a valuable roosting habitat for wading birds, such as the threatened banded dotterel (Charadrius bicinctus). Brigham Creek is known to contain the greatest area of mangroves in the Upper Waitematā Harbour and substantial areas of jointed rushes in the salt marshes located in its upper reaches, the latter of which are considered of regional and national significance.

View of Whenuapai

5 Strategic Context

This section sets out the relevant statutory and non-statutory plans and strategies that must be considered in the development of structure plans, in accordance with Appendix 1 of the Auckland Unitary Plan Operative in Part. The key outcomes sought by each document, where relevant to the structure plan, are summarised in this section.

5.1 The Auckland Plan

The Auckland Plan sets the long-term strategic direction for Auckland and integrates social, economic, environmental and cultural objectives.

A key component of the Auckland Plan is the high-level Development Strategy[3] for accommodating future growth until 2040, with the aim to provide for up to 70 per cent of growth within existing urban areas (defined by the 2010 Metropolitan Urban Limit) and up to 40 per cent outside of these areas, including in greenfield areas, satellite towns and rural and coastal towns.

The Auckland Plan aims to provide sufficient capacity for up to 160,000 dwellings outside the 2010 Metropolitan Urban Limit, including new greenfield areas. Whenuapai is identified as one of the greenfield areas for investigation along with nearby Redhills. Approximately 95,000 dwellings are identified to be provided for within greenfield areas for investigation, with approximately a quarter of this growth anticipated in the northwest areas of Whenuapai/Redhills and Kumeu/Huapai/Riverhead.

The Development Strategy also identifies approximately 1400 hectares of Group 1 business land[4] will be required across Auckland in new greenfield areas over the next 30 years. This structure plan provides an opportunity to provide for over 300 hectares of new business land to contribute to this requirement.

[3] Section D, Auckland Plan
[4] Land Extensive Industrial Activities

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5.2 National policy statements and national environmental standards

This section outlines the Resource Management Act 1991 documents that are relevant to the Structure Plan. The council gives effect to these documents through provisions in the Auckland Unitary Plan Operative in Part.

The Proposed National Policy Statement on Urban Development Capacity has not been considered in the development of this structure plan as it is still in preparation.

5.2.1 New Zealand Coastal Policy Statement 2010

The New Zealand Coastal Policy Statement sets out the policies for sustainably managing the coastal environment. It is a relevant consideration as Whenuapai is bounded in the north by the coastal waters of the Upper Waitematā Harbour and Brigham's Creek. The New Zealand Coastal Policy Statement sets the direction for balancing the unique challenges associated managing uses within the coastal environment, including effects on natural character and landscapes, the dynamic nature of the coast, competing uses, coastal hazard risks, effects on coastal biodiversity and declining water quality.

The policies recognise and provide for appropriate use and development in the coastal environment while seeking to protect natural values and enhance water quality. Coastal hazard risks are to be identified and appropriately managed. There is also a need to adopt a precautionary approach to the use and management of coastal resources in areas potentially vulnerable to effects from climate change. The New Zealand Coastal Policy Statement promotes public access to areas in and near the coast.

In order to achieve the objectives of the New Zealand Coastal Policy Statement, this structure plan proposes to maintain setbacks from the coast and a water-sensitive design approach to stormwater management will help to address potential coastal hazard risks and water quality issues. Maintaining and enhancing public access to, and along, the coast is also a key part to the Structure Plan.

5.2.2 National Policy Statement for Freshwater Management 2014

The National Policy Statement for Freshwater Management (Freshwater NPS) provides direction for the council on the management of freshwater. The council must give effect to the Freshwater NPS through the provisions of the Auckland Unitary Plan Operative in Part; notably through the Regional Policy Statement and the Auckland-wide provisions[5].

Identification of ephemeral, intermittent and permanent streams, and freshwater wetlands has been undertaken as part of the structure planning process. The proposed approach to managing freshwater is provided in Section 7.6 of this document.

5.2.3 National Policy Statement on Electricity Transmission 2008

The National Policy Statement on Electricity Transmission is relevant because high-voltage electricity transmission lines, as part of the National Grid Corridor, traverse the northwestern part of the structure plan area. This National Policy Statement recognises the national significance of the electricity transmission network by enabling its operation, maintenance, and upgrade, and establishing new transmission resources to meet future needs.

The council gives effect to the National Policy Statement on Electricity Transmission through the National Grid Corridor overlay provisions in the Auckland Unitary Plan Operative in Part. Land use activities in the vicinity of the National Grid Corridor will need to be considered carefully in the Structure Plan.

5.2.4 National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health 2011

Under the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NES) any sites where activities on the Hazardous Activities and Industries List have occurred must be identified. This NES provides a nationally consistent set of controls and soil contaminant standards to ensure land affected by contaminants in soil is appropriately identified and assessed before it is subdivided or developed.

A preliminary site investigation of contaminated land has been undertaken as part of the structure plan process and a summary is provided in Section 7.17.

[5] Including E1 Water quality and integrated management and E2 Water quantity, allocation and use

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5.3 Auckland Unitary Plan Operative in Part

The Auckland Unitary Plan Operative in Part provides the regulatory framework for managing Auckland's natural and physical resources while enabling growth and development and protecting matters of national importance. It is the principal statutory planning document for Auckland.

The Auckland Unitary Plan Operative in Part replaces the operative Auckland Council District Plan (Waitākere Section). The operative plan identifies Whenuapai as Countryside Human Environment which enables rural activities and limited subdivision via a four-hectare minimum lot size. Unique features such as the timber mill are identified as a Special Area with their own policy and rule framework.

The Regional Policy Statement within the Auckland Unitary Plan Operative in Part sets out the overall strategic framework and is intended to give effect to the Auckland Plan. It includes objectives, policies and methods to achieve a quality compact urban form through the implementation of a Rural Urban Boundary to define the extent of urban growth to 2040.

In addition to the objectives and policies for urban growth, the Regional Policy Statement also sets the framework for enabling economic growth, protecting historic and natural heritage, addressing issues of significance to mana whenua, sustainably managing our natural resources and coastal environment, and responding to climate change.

The Auckland Unitary Plan Operative in Part establishes a zoning pattern for all land in Auckland with important natural and historic values identified as overlays. The majority of the land within the structure plan area is zoned as Future Urban, a transitional zone which is applied to greenfield land suitable for urbanisation. Land may be used for a range of general rural and other existing activities but cannot be used for urban activities until the site is rezoned for urban purposes through a plan change process. This rezoning occurs following a structure planning process as informed by Appendix 1 of the Auckland Unitary Plan Operative in Part.

The operations portion of Whenuapai Airbase covering the runways and associated buildings is zoned Special Purpose – Airports and Airfields. This zone does not include the areas of New Zealand Defence Force (NZDF) housing. There are small pockets of zoning that is not Future Urban in the area to reflect key existing activities including Residential - Single House at Whenuapai Village, existing NZDF housing south of Brigham Creek Road, and the Business - Neighbourhood Centre, Business - Light Industry and Open Space zones at Whenuapai Centre. The two Special Housing Areas on Brigham Creek and Totara Roads are zoned Residential - Mixed Housing Urban and Business - Local Centre. Whenuapai Primary School is included in the Future Urban zone while the state integrated Timatanga Community School on Mamari Road is zoned Special Purpose – School. Figure 6 shows the existing zones under the Auckland Unitary Plan Operative in Part.

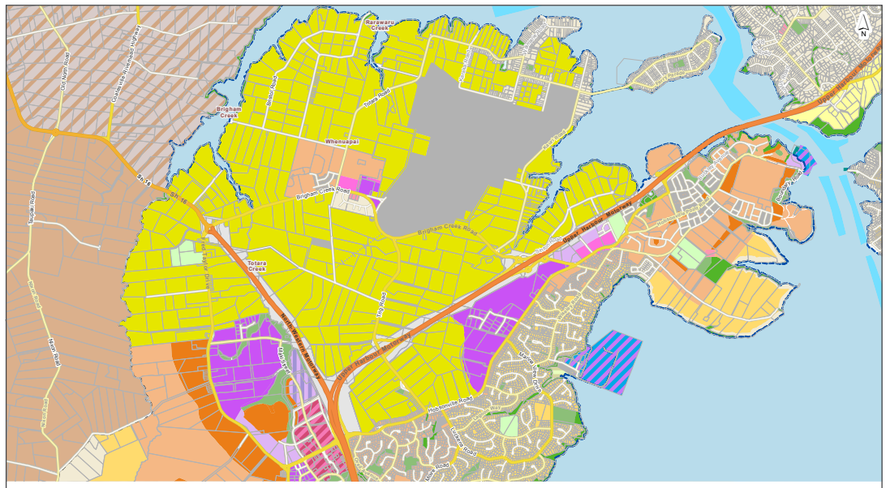

Figure 6: Zoning under the Auckland Unitary Plan Operative in Part

A number of overlays and controls apply to the structure plan area, including:

- Significant Ecological Areas Overlays – Terrestrial and Marine 2
- High-use Aquifer Management Areas Overlay
- Aircraft Noise Overlay, Obstacle Limitation Surface Overlay
- National Grid Corridor Overlay
- Stormwater Management Area Control – Flow 1
- Macroinvertebrate Community Index.

The Significant Ecological Areas Overlay – Marine 2 applies to the Upper Waitematā Harbour. Small portions of land within the structure plan area are covered by the Significant Ecological Areas Overlay – Terrestrial[6]. The High-use Aquifer Management Areas Overlay applies across the structure plan area to ensure aquifers are carefully managed to meet demands while maintaining base flows for surface streams[7].

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The purpose of the Aircraft Noise Overlay is to manage the subdivision of land and sensitive activities around airports and airfields to enable their continued operation[8]. The overlay is in the form of noise contours which limit airbase activities but also indicate where noise sensitive land uses such as residential activity could be adversely affected by airbase activities. The provisions generally seek to avoid activities sensitive to noise within the 65dB Ldn noise contour and to ensure any noise effects on residential and noise-sensitive activities between the 55dB Ldn and 65dB Ldn noise contours are adequately remedied or mitigated. Conditions on aircraft noise are also included in Designation 4310, as outlined in Section 5.3.1.

High-voltage transmission lines traverse the western part of the structure plan area. The National Policy Statement on Electricity Transmission applies as well as the National Grid Corridor Overlay provisions in the Auckland Unitary Plan Operative in Part to enable the efficient development, operation, maintenance and upgrading.

Stormwater is managed predominantly through E1 Water quality and integrated management, E8 Stormwater – Discharge and diversion and E10 Stormwater management area – Flow 1 and Flow 2. The Stormwater Management Area Control – Flow 1 include catchments which discharge to sensitive or high value streams that have relatively low levels of existing impervious area and applies to the airbase, the established NZDF housing south of Brigham Creek Road and the two Special Housing Areas on Brigham Creek and Totara Roads.

The Macroinvertebrate Community Index is a policy layer that provides data on the health of streams which will need to be considered when carrying out activities that discharge to freshwater and works around streams.

Appendix 1 of the Auckland Unitary Plan Operative in Part sets out the guidelines for developing structure plans as a precursor to plan changes, documents to be considered, matters the Structure Plan must identify, investigate and address, and specialist documents required to support the Structure Plan. These requirements ensure that all the effects of development are addressed in advance of development occurring. A summary of how Appendix 1 requirements have been addressed in this document is provided in Appendix 3.

[6] Refer to D9 Significant Ecological Areas Overlay
[7] Refer to D1 High-use Aquifer Management Areas Overlay
[8] Refer to D24 Aircraft Noise Overlay
[9] Refer to D26 National Grid Corridor Overlay
[10] Refer to policies E1.3

5.3.1 Airbase designations

The Whenuapai Airbase is designated under the Auckland Council District Plan (Waitākere Section) and there are also rollover designations in the Auckland Unitary Plan Operative in Part. Designation 4310 covers the operations of the airbase and includes conditions on aircraft noise.

Noise control areas cover the structure plan area in northeast to southwest directions with a 65dBA noise contour around the approach and take-off flight path and a 55dBA noise contour covering a larger area around this.

Designation 4311 contains restrictions for development under the airbase approach and departure paths. These include:

1. The consent of the Minister of Defence shall be obtained in writing prior to any works or lodgement of building consents or resource consents where it is proposed to erect any building, change the use of any land or building or carry out any subdivision of land directly beneath and within the boundaries of the approach surfaces.
2. No part of any building, structure, mast, tree or other object shall penetrate any of the obstacle limitation surfaces, climb surfaces, transitional surfaces, horizontal surfaces or conical surfaces associated with the Whenuapai Airfield without written consent of the Minister of Defence, prior to carrying out any works or lodging a building consent or resource consent.

Land subject to Ministry of Defence Approval is generally within 1000 metres of the main runways and 500 metres from the end of subsidiary runways. The land most affected is located immediately at either end of the main runway.

5.4 Auckland Council Long-term Plan 2015-2025

The council's Long-term Plan 2015-2025 was adopted in June 2015 with three overarching issues identified:

- the desire for an outstanding transport system
- quality affordable housing close to centres
- limiting further rates increases.

The Long-term Plan anticipates large-scale greenfield development in the northwest and identifies the following projects which will have a direct impact on the development of Whenuapai:

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- the Northern Interceptor wastewater project
- route protection and enabling works for the Northwestern Busway
- implementation of road network improvements in the Northern Strategic Growth Area (which includes Whenuapai).

Funding for new projects identified through the structure plan process as necessary to support urban growth at Whenuapai will be considered in the next rounds of the Annual Plan (2017-18) and Long-term Plan (2018-2028).

5.5 Local board plans

Whenuapai is located predominantly within the Upper Harbour local board area, with a small portion of land in the Henderson-Massey local board area. The local board plans for both are therefore relevant. There are no area plans for these local board areas.

Specific aspirations of the Upper Harbour Local Board Plan (2014) and initiatives relevant to Whenuapai include:

- quality developments are built using great design, including advocating to ensure open space and public facilities are considered with all developments
- a range of sport and recreation facilities are available with capacity to meet growing demands
- plan for economic development and growth
- access to public open spaces, including the development of a greenways network plan in conjunction with Auckland Transport
- well-connected and easily accessibly public transport network
- road network and access improvements, including collaborating with Auckland Transport to upgrade Brigham Creek Road, advocating for cycle ways along Trig Road and Kauri Road and road improvements around Whenuapai School
- advocate for a busway between Westgate and the North Shore via State Highway 18.

The Henderson-Massey Local Board Plan (2014) includes the following aspirations relevant to the structure plan:

- allowing for growth that can help support the Westgate Centre
- increasing local employment and business opportunities
- creating a new community, particularly by increasing housing choice, opportunities for new schools and open space and community facilities.

5.6 Integrated catchment management plan

There is currently no integrated catchment management plan for the proposed land use changes in the structure plan area. Integrated catchment management plans have been provided to support previous plan changes to the Auckland District Plan Waitākere Section 2003 for areas adjoining the structure plan area. While those plans included downstream catchments that encroach into the structure plan area, the area itself was modelled as countryside living which is a rural zone.

A stormwater management plan has therefore been prepared to support urban development as set out in this structure plan. This is further discussed in Section 7.6.

5.7 Future Urban Land Supply Strategy

The overarching purpose of the Future Urban Land Supply Strategy is to identify the sequencing and timing of future urban land for development over a 30-year timeframe (2012-2042) to assist with the provision of an ongoing integrated supply of greenfield land for development and associated infrastructure. It is a live document with a process to review and monitor the strategy to respond to changing population growth demands, market conditions and infrastructure delivery.

Infrastructure funding priorities across the region are informed by the Future Urban Land Supply Strategy which feeds directly into future council long-term plans, annual plans, the Auckland Unitary Plan Operative in Part and other strategic documents. The major infrastructure components in areas of greenfield growth include transport facilities, water, wastewater, stormwater and community facilities (such as libraries and parks).

Whenuapai is identified in the Future Urban Land Supply Strategy as being development ready between 2017 and 2021, recognising the significant work by the former Waitākere City Council and the number of infrastructure projects that are already in place or funded. However, it also indicates that only a limited supply of houses will be available within this early timeframe due to the need to provide infrastructure in stages. Consequently the development of Whenuapai will continue past 2021. The proposed timing for development of nearby greenfield areas such as Kumeu, Huapai and Redhills is 2022-2026 to allow adequate time for infrastructure planning and investment.

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5.8 Infrastructure strategies and plans

5.8.1 Transport for Future Urban Growth Project

An effective transport system is imperative to support the future urban growth of Whenuapai. The Transport for Future Urban Growth project is being undertaken jointly by the New Zealand Transport Agency, Auckland Transport and Auckland Council. It will determine the key strategic transport infrastructure required to implement the Future Urban Land Supply Strategy over the next 30 years. Following consultation, a preferred network has been adopted as the starting point for the structure plan transport network. However, the project is still under development with a final report expected in November 2016.

The following transport requirements over the coming 30 years have been identified relevant to Whenuapai:

- upgraded state highway connections, including a direct State Highway 16 (north) to State Highway 18 (east) connection and interchange upgrades at Brigham Creek Road, Northside Drive and Squadron Drive
- improvement of existing networks
- a rapid transit network (RTN), most likely a busway along State Highway 16 and State Highway 18 with three stations in the structure plan area, to be complemented by frequent transit network (FTN) services linking to destinations such as Westgate and local ferry terminals
- an arterial road network (both east-west and north-south links) utilising both existing and new corridors
- provision of walking and cycling infrastructure at a local scale.

Funding for the regional scale projects identified above requires further assessment through the New Zealand Transport Agency's business case process. Only when this business case process has concluded can funding be sought as part of the next National Land Transport Programme. The Transport for Future Urban Growth projects that fall into Auckland Transport's remit (arterial and local roads) are similarly reliant upon the outcome of the business case process given that Auckland Transport's activities are jointly funded from the National Land Transport Programme and the council's Long-term Plan.

5.8.2 Regional Land Transport Plan 2015-2025

The Regional Land Transport Plan sets out the funding programme for Auckland's transport services and activities over a 10-year period. Planned transport activities for the next three years are provided in detail while proposed activities for the following seven years are outlined. The Regional Land Transport Plan is jointly delivered by Auckland Transport, the New Zealand Transport Agency and KiwiRail, and forms part of the National Land Transport Programme.

Growth in the northwest is anticipated and provided for in the Regional Land Transport Plan through the following projects:

- bus priority improvements and transit lanes (2015-2025)
- walking and cycling programme – Auckland Transport (2015-2025)
- walking and cycling programme – Transport Agency (2015-2025)
- safety programmes including safety and minor improvements, safety around schools, crash reduction implementation, regional safety programme and safety speed management (2015-2025)
- State Highway 16/State Highway 18 intersection
- Brigham Creek Road corridor road improvements (2018-2025).
- Funding of additional transport initiatives identified through the Transport for Future Urban Growth project and the subsequent business case programmes to service the new Whenuapai urban area will need to be considered as part of the next Regional Land Transport Plan.

5.8.3 Regional Public Transport Plan 2015

The future public transport network is identified in the Regional Public Transport Plan which identifies services over the next 10 years. To achieve its focus on enhancing network performance and earning higher value from existing investments, the Regional Public Transport Plan proposes a New Network built around a core network of Rapid Transit Network (RTN) services (15-minute frequency with dedicated right of way such as the Northern Busway) and Frequent Transit Network (FTN) services (15 minute frequency with priority measures). These are complemented by a network of connector routes and local, peak-only targeted services. The focus will be on integration and transferring between services to streamline services and increase their efficiency.

Currently, none of the routes servicing the northwest meet the definition of a RTN or FTN. The Regional Public Transport Plan provides for the upgrade of State Highway 16 services between Auckland's Central Business District and Westgate to FTN status by 2018, and services between Westgate and the North Shore and along Hobsonville Road to be upgraded to FTN status by 2022. These routes will be supported by all-day services through West Harbour and north to Kumeu and Huapai.

Routes along State Highway 16 (to Westgate initially and subsequently Kumeu and Huapai) and State Highway 18 will be upgraded to RTN status as dedicated bus rights-of-way are built. The Transport for Future Growth project has made broad recommendations as to what form these RTN corridors will take in future and how they interact with Whenuapai. Consideration of the future public transport network is a key consideration for the structure plan to determine appropriate land uses and housing densities.

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5.8.4 Watercare Asset Management Plan 2016-2036

Watercare's Asset Management Plan shows how the Council Controlled Organisation will operate, maintain and renew existing water and wastewater assets, and provide new assets to meet future demand as Auckland grows. The Asset Management Plan covers the period from 1 July 2016 to 30 June 2036.

The location, size and timing of new development directly influence the infrastructure required to service that development. The council has worked closely with Watercare throughout the structure planning process to ensure development in Whenuapai is aligned with the timing of water and wastewater infrastructure provision.

The Asset Management Plan identifies significant work programmes to growing demands. The projects that will directly impact the structure plan area are:

- construction of the North Harbour 2 water main to convey water to Albany and the north
- construction of the first two stages of the Northern Interceptor, connecting Whenuapai and Hobsonville to the Rosedale Wastewater Treatment Plan
- construction of the wastewater transmission assets for the Waitākere North and Kumeu, Huapai and Riverhead wastewater servicing which includes the Whenuapai structure plan area.

Further detail of the water and wastewater strategy for the structure plan area is provided in Section 7.7 of this report.

5.9 Iwi planning documents

Te Kawerau ā Maki and Ngāti Whātua o Kaipara have been involved in the development of the Structure Plan. Accordingly, the relevant iwi management plans are considered to be:

- Kawerau ā Maki Trust: Resource Management Statement (1995)
- Te Wahapū o Kaipara Manaakitanga – South Kaipara Takiwa: Environmental Protection and Management Plan (2009).

The Resource Management Statement by the Kawerau ā Maki Trust provides a framework for the sustainable management of the taonga within the tribal area of Te Kawerau. Te Kawerau ā Maki holds mana whenua within the area of Whenuapai. The plan has a specific focus on the management of water bodies, acknowledging the importance of protecting the mauri of waterways.

In addition, the plan provides direction for the social, economic and cultural wellbeing of Te Kawerau and recognises the role of Te Kawerau in the protection and management of all things related to the environment. This includes the protection of heritage, management of the coastal marine area, the appropriate management of waste disposal, the protection of landscapes, and the appropriate management of native flora and fauna.

Te Wahapū o Kaipara Manaakitanga – South Kaipara Takiwa: Environmental Protection and Management Plan by Ngāti Whatua Ngā Rima o Kaipara Trust is a plan that encompasses the areas from Wellsford in the north to Taupaki in the northwest. The vision noted in the document is "to protect and uphold customary cultural rights and ownership of our protocols, values and beliefs of the five marae of southern Kaipara". The plan also outlines the key environmental issues of concern for the iwi as well as processes for engagement with the group. Whenuapai is identified as a priority area for protection in the plan. Ngāti Whātua o Kaipara also holds mana whenua within the area of Whenuapai.

Whilst the values identified in the Iwi Management Plans have been considered, ongoing discussions with the iwi aim to identify cultural values specific to the area of Whenuapai in order to understand how the Structure Plan can protect and enhance these values.

Te Kawerau ā Maki has provided a cultural value assessment for the Structure Plan and Ngāti Whātua o Kaipara will provide theirs as part of the plan change process. This is discussed in Section 7.11.

5.10 Treaty settlement legislation

5.10.1 Ngāti Whātua o Kaipara Claims Settlement Act 2013

The Ngāti Whātua o Kaipara Claims Settlement Act 2013 acknowledges the cumulative effects of breaches of the Treaty of Waitangi and its principles on the economic, social, physical, cultural and spiritual wellbeing of Ngāti Whātua o Kaipara. The Act provides Ngāti Whātua o Kaipara with exclusive rights of first refusal over areas of land in the northwest, including land within the structure plan area.

5.10.2 Te Kawerau ā Maki Claims Settlement Act 2015

The Te Kawerau ā Maki Claims Settlement Act 2015 recognises the customary interests Te Kawerau ā Maki have from the Tāmaki Isthmus northwards to Hikurangi (West Auckland), the Upper Waitematā Harbour and North Shore and into the southern Kaipara and Mahurangi. The Act requires the relevant authorities to have regard to the views of Te Kawerau ā Maki in all matters affecting these areas, amongst other things.

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5.11 Other Auckland Council plans and strategies

5.11.1 Parks and Open Spaces Strategic Action Plan 2013

The Parks and Open Spaces Strategic Action Plan identifies the focus and priorities for parks and open spaces as well as the actions to implement it. The strategic approach to planning and developing parks and open spaces is summarised by the following four areas of focus:

- improving opportunities for people to learn about the special features of the parks and open space network
- expanding and developing the parks and open space network to accommodate more uses and activities
- visually and physically connecting Auckland's network of parks, open spaces and streets to create opportunities for people to move around the city and to enhance biodiversity
- recognise the integral role the parks and open space network plays in making Auckland a successful city, in particular maximising synergies between open spaces and creating a green, resilient and prosperous city.

The open space requirements in Whenuapai have been considered in the context of the Parks and Open Spaces Strategic Action Plan and are discussed in Section 7.5.

5.11.2 Auckland Design Manual

The Auckland Design Manual (an online tool) is a non-statutory best practice guide for designing Auckland's neighbourhoods, buildings and spaces. It is a valuable tool for identifying appropriate typologies that can be utilised within Whenuapai. The Neighbourhood Design Statement, discussed further in Section 7.14, refers to best practice examples provided by the Auckland Design Manual. The plan change process that follows the structure plan will consider more specific provisions required to implement a quality built environment in Whenuapai.

5.11.3 Indigenous Biodiversity Strategy 2012

Key objectives and performance measures on how to achieve the biodiversity goals established in the Auckland Plan are set out in the Indigenous Biodiversity Strategy. This strategy sets out the council's vision for indigenous biodiversity including:

- healthy and diverse ecosystems of plants and animals
- engagement, understanding and guardianship of Auckland's indigenous biodiversity
- ecosystem services provided by indigenous biodiversity
- integrated management producing biodiversity gains.

The overarching objective seeks to "conserve the greatest number and most diverse range of Auckland's indigenous ecosystems and sequences"[11]. The strategy also provides guidance on the development and implementation of the council's plans and strategies to achieve biodiversity objectives as well as in the provision and maintenance of infrastructure.

The structure plan represents an opportunity to implement projects to improve biodiversity linkages throughout the area. There are also opportunities to extend region-wide initiatives such as the Greenways Project and the North-West Wildlink to Whenuapai.

5.11.4 Code of Practice for Land Development and Subdivision

The Code of Practice for Land Development and Subdivision, or any subsequent updates of that document, will be a relevant consideration at the time of subdivision and development.

5.11.5 Low Carbon Auckland 2014

Low Carbon Auckland sets out a 30-year pathway and a 10-year plan of action to transform to a greener, more prosperous, liveable, low carbon city. A city that is powered by efficient, affordable, clean energy and using resources sustainably.

The plan focuses on five key areas of transformation:

1. the way we travel
2. the way we generate energy
3. our built environment and green infrastructure
4. zero waste
5. forestry, agriculture and natural carbon assets.

[11] *Objective 1, p.20*

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6 Responses to the Draft Whenuapai Structure Plan

Discussions and feedback on the structure plan has been an ongoing process in the development of this structure plan. It started against the backdrop of a series of public meetings undertaken by the council in relation to the Rural Urban Boundary investigations, the Future Urban Land Supply Strategy, and more recently (in collaboration with the New Zealand Transport Agency and Auckland Transport) the Transport for Future Urban Growth project (refer to Section 5.8.1). In addition, previous work was undertaken by the former Waitākere City Council through the Northern Strategic Growth Area project that involved extensive engagement with the local and northwest region communities.

The purpose of such engagement is to inform the public and stakeholders about the project and provide opportunities to understand their views. Information on the draft structure plan, including supporting technical documents, was available to the public on the Shape Auckland website from 24 June 2016. The public was provided with opportunities to help shape the Structure Plan through a series of open days and drop-in sessions.

Engagement that has occurred to date includes:

- In March 2016 a request was sent to a number of iwi groups that had a potential interest in the Whenuapai area. Te Kawerau ā Maki and Ngāti Whātua o Kaipara indicated their interest as mana whenua and responded with a desire to kōrero and provide cultural value assessments to inform the Structure Plan.
- Three meetings were held on 16 February, 22 April and 11 July 2016 with landowners and developers to discuss the Special Housing Area and structure plan process.
- An open day on 30 April 2016 for the Transport for Future Urban Growth project at the Whenuapai Village Hall included a display of preliminary information on the Structure Plan. Verbal feedback from the public was recorded.
- A meeting was held 17 May 2016 with the committee of the Whenuapai Ratepayers and Residents Association who provided feedback with ideas for preserving Whenuapai's uniqueness.
- A meeting was held 3 August 2016 with the committee of the Herald Island Ratepayers and Residents Association who provided feedback on how the implementation of the Structure Plan could impact upon their coastal community.

- Several discussions with the New Zealand Defence Force to understand the implications of designations relating to noise contours, the obstacle limitation surfaces and their concerns about potential bird strike.

During the engagement period (24 June to 21 July 2016), the following open days and drop-in sessions were attended by approximately 410 people who wanted to seek further clarification, ask questions or provide feedback on the draft structure plan:

- Whenuapai Primary School
- Whenuapai Village Hall
- Hobsonville Point Landing
- Luckens Reserve sausage sizzle and drop in
- Developer representative meeting at Henderson
- Massey Library drop-in
- Northwest Mall.

One hundred and seventy-one pieces of feedback were received during the feedback period, as well as some late feedback. The feedback has been reviewed by council's technical specialists and the draft structure plan revised, where appropriate, to respond to the matters raised by submitters.

A summary of the feedback received on the Draft Whenuapai Structure Plan is available on the Shape Auckland website.

6.1 Key themes from public engagement

Of the 171 pieces of feedback received, 1033 points of feedback have been identified and responded to by various technical specialists from Auckland Council, Auckland Transport and Watercare.

Key themes that emerged from public consultation include:

- people want to see more schools, both primary and secondary, to provide for a growing community
- residents want to ensure that the village feel that is based around the existing shops is retained, while providing more shops and services for future population growth
- health and management of the waterways in Whenuapai and the upper reaches of the Waitematā Harbour is important
- some residents are opposed to the coastal park proposed on Riverlea Road and a coastal walkway in Whenuapai; a large number of respondents, however, are in strong support of the provisional allocation of parks and open spaces
- people would like to see the footpaths in Whenuapai be upgraded to an urban standard, with the added provision of cycle ways and improved public transport frequency; people are in strong support of the proposed new roading network with greater transportation options
- respondents want to ensure that there will be employment opportunities in the local area close to where people are living; there was strong support of the allocation of business land in the Structure Plan
- respondents would like a new sewerage system in place for the Whenuapai Village area and for new infrastructure to connect into existing developments easily and at a manageable cost
- noise issues caused by the Whenuapai Airbase has been identified as a significant factor for some residents and the New Zealand Defence Force has requested a no complaints covenant on residential development to protect its operations
- respondents would like to see trees, wildlife and the environment protected, and the Structure Plan's commitment to the North-West Wildlink has been applauded.
- further analysis and consideration of all community feedback has been undertaken by technical specialists and, where appropriate, amendments and changes to the final structure plan have been applied.

6.2 You spoke, we listened

Following the technical analysis and consideration of the community feedback, the structure plan map has been revised. Not all matters raised through the consultation process have been agreed with and/or actioned by the council in the final structure plan.

The key features that are retained from the draft structure plan are:

- the use of high, medium and low density residential areas. The plan change that follows the approval of the Structure Plan will define the residential zones that apply, according to zones in the Auckland Unitary Plan Operative in Part, and their exact boundaries
- the indicative location of local and neighbourhood centres
- the general location of the Rapid Transit Network stations and park and ride
- the location of the approved Special Housing Areas
- the location of the potential esplanade network.

The key features that have changed from the draft structure plan are:

- the structure plan boundary has been amended to remove the land formerly known as Monterey Park which is geographically separate to Whenuapai and has been zoned Mixed Housing Urban in the Auckland Unitary Plan Operative in Part; consequently it does not need to be part of the Structure Plan or the future plan change.
- the extent and location of the areas identified as high, medium and low density residential areas
- the extent and location of the business land
- the relocation of some potential parks and inclusion of indicative locations for new parks
- Timatanga School is identified
- the extent of land either designated or owned by the New Zealand Defence Force is identified
- the location of proposed arterial and local roads has been refined.

7 Opportunities and constraints

The Whenuapai Structure Plan has been informed by a series of technical reports. This section provides a summary of the opportunities and constraints present within Whenuapai in relation to each technical discipline. The relevant reports may be revised as part of the process to finalise the Structure Plan. A list of the technical reports is provided in Appendix 2.

7.1 Sustainability

The structure plan represents an opportunity to implement sustainable urban development and to establish Whenuapai as a model for future greenfield development. This aligns with the council's aspiration for a prosperous, resilient, low carbon Auckland as outlined in the Auckland Plan and detailed in Low Carbon Auckland (2014). Expanding the boundaries of sustainable design and development will stimulate innovative thinking and collaborative action that results in vibrant, attractive and sustainable urban communities that will make Whenuapai a world class example of an enticing place to live, work and visit. This has been applied in the council's response to all of the opportunities and constraints discussed in this section. The following initiatives are integral to the Structure Plan.

Transport

A key transport objective is to provide a network that puts pedestrians, cyclists and public transport in the context of vehicular traffic, and delivers a safe and connected network that provides for all transport modes. This will include connectivity to neighbouring areas such as Hobsonville Village, Hobsonville Point, Westgate and Greenhithe, and the development of walking, cycling and bus options to connect Whenuapai residents to the ferry services at Hobsonville Point and Hobsonville Marina (formerly Westpark Marina).

Public transport will be developed as a mode choice at an appropriate stage when the population can support the services, including ensuring access to the Rapid Transit Network to other areas. This will require the provision of residential densities that are concentrated in close proximity along the public transport corridors and around Whenuapai Centre. Please refer to Section 7.3 for further details about the transport network.

Sustainable energy

The council will work with infrastructure providers where possible to deliver resource management systems based on resource efficiency, reuse, renewable energy and district-scale smart grid power networks. The council will also advocate for energy efficiency and energy conservation.

Built environment

The council will continue to advocate for sustainable building design and development, including providing green infrastructure such as rain gardens and green walls where possible. Local urban agriculture such as community gardens will be encouraged, located in community meeting spaces and utilise new technologies where possible.

7.2 Land tenure

Land tenure within the Whenuapai structure plan area reflects the historic pattern of use and development with fragmented land holdings and multiple land ownership, the majority of landowners own a single site. Established residential sites in Whenuapai Village average about 1000m^2 while large pastoral lots averaging three to six hectares remain outside of the Whenuapai Village area and northwest and west of the Whenuapai Airbase.

While the existing large sites are an opportunity to enable larger development areas to occur, the fragmented ownership pattern presents a challenge for providing an integrated response to the structure plan, particularly in regard to the provision of infrastructure. The council will work closely with landowners, the community and developers to ensure development proposals meet the outcomes of the structure plan, including encouraging landowners to coordinate infrastructure provision (and the funding of that infrastructure) with each other.

There are some areas of land where multiple sites are within single ownership. In addition, the council is aware that some landowners have begun to coordinate with each other and/or land developers to consider development options for multiple sites. This was demonstrated by the number of requests the council received to establish Special Housing Areas in Whenuapai and, while two Special Housing Areas were approved within the Whenuapai structure plan area, the unsuccessful developers have remained engaged in the structure plan process.

New Zealand Defence Force (NZDF) owns approximately 300 hectares of land being the airbase, including land that has been developed in the past for housing (around Ngahue Crescent). NZDF also has land that is currently undeveloped at 131-137 Brigham Creek Road.

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7.3 Transport

The existing transport environment in Whenuapai can be summarised as follows:

- the road network is supported by five key roads: Brigham Creek Road, Trig Road, Totara Road, Puriri Road and Kauri Road
- there are limited pedestrian facilities (footpaths and crossings) throughout most of the area
- access to the area is currently via Brigham Creek Road (from both State Highway 16 and State Highway 18) and Trig Road
- a shared walking and cycling path is currently provided over a portion of Brigham Creek Road adjacent to the Whenuapai Airbase
- two bus routes currently service the area (093 and 095).

The Integrated Transport Assessment considers the transport planning and traffic-related matters relating to the Whenuapai structure plan area. A number of land use assumptions were made to enable the assessment to be carried out (Figure 7). It is anticipated that new growth outside of Whenuapai, in Kumeu, Huapai and Redhills will occur concurrently with Whenuapai. The modelling has accounted for an assumed rate of growth in these surrounding areas. Transport modelling considers traffic scenarios in 2021, 2026, 2036 and 2046 to assess the various stages of development within Whenuapai.

The assessment considers the transport network within Whenuapai and in the wider area, and the road network improvements required for the northwest of Auckland as broadly addressed in the Transport for Future Urban Growth project. Connections across State Highway 16 and State Highway 18 will be crucial for the viability of Whenuapai in terms of ensuring integration with the wider area, given Whenuapai is bounded by these two state highways and the Upper Waitematā Harbour.

The assessment undertaken to date finds that the land use activities proposed by the Structure Plan can be accommodated with a satisfactory level of service. This is achievable if the recommended transport network and services are provided in a timely manner to manage travel demands within and to Whenuapai. The post-consultation preferred Transport for Future Urban Growth network has been used as the starting point for the Whenuapai assessment.

A number of planned and funded projects are proposed outside of the structure plan area through other planning programmes that are considered important to support development in Whenuapai. A number of these projects are included in the post-consultation preferred Transport for Future Urban Growth network which provides the most up-to-date transport analysis for the northwest future urban areas as a whole.

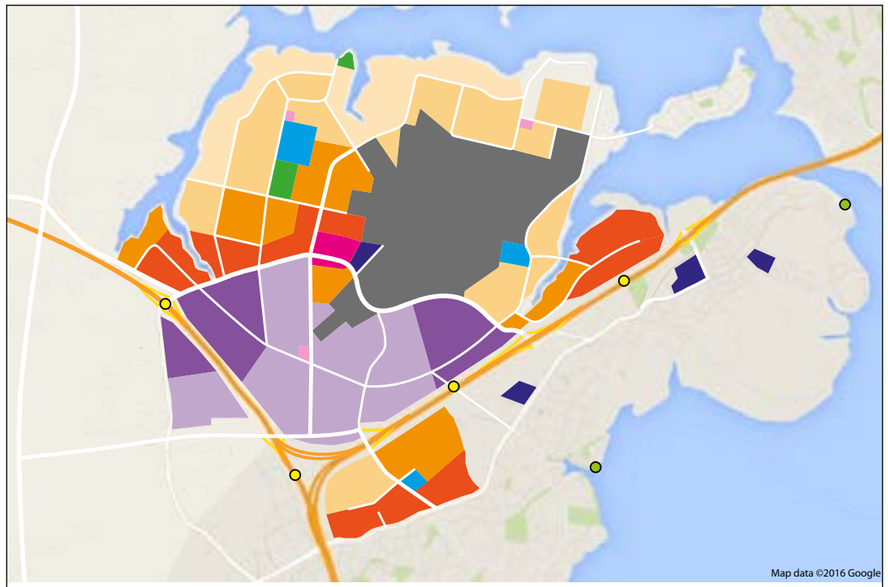

Figure 7: Land use scenario utilised in the Integrated Transport Assessment

By way of summary, these projects include (but are not limited to) the following:

- completion of the Western Ring Route to provide an alternative route to State Highway 1
- extension of the North Western Cycleway to Westgate
- a new interchange at the State Highway 16/Brigham Creek Road roundabout
- a new bus interchange and park and ride facility at Westgate
- bus shoulder lanes on State Highway 16 south of Westgate
- additional lanes along parts of State Highway 18
- Brigham Creek Road improvements including realignment
- Improvements to State Highway16 between Brigham Creek Road and Waimauku
- State Highway 16 and State Highway 18 busways.

In addition to the projects identified for the wider area, the key transport infrastructure responses required to the support the Whenuapai Structure Plan are summarised below. These recommendations used the preferred Transport for Future Urban Growth network as the starting point to which further connections were added and refinements made. A more detailed list of requirements is provided in Appendix 4.

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Pedestrian and cycle network

- a network of pedestrian footpaths and cycling infrastructure, including separated cycle lanes on key roads
- buffered cycle lanes and shared paths, as appropriate, particularly on roads that link to Rapid Transit Network stations and within residential catchments that are close to schools.

Public Transport

- Rapid Transit Network services along State Highway 16 from Kumeu to Auckland Central and along State Highway 18 from Westgate to the North Shore
- frequent, connector and local bus services providing linkages from the Whenuapai structure plan area to Rapid Transit Network stations, Westgate, Hobsonville and West Harbour
- more frequent ferry services from Hobsonville Point and Hobsonville Marina
- a park and ride Rapid Transit Network station in the vicinity of the State Highway 16 / Brigham Creek Road interchange
- Rapid Transit Network stations at Westgate, adjacent to State Highway 18 between Trig Road and Brigham Creek Road and adjacent to State Highway 18 close to Hobsonville Village
- connections for all modes of travel at the proposed Rapid Transit Network stations
- bus priority measures along key routes.

Road Network

- upgrading of Brigham Creek Road between State Highway 16 and State Highway 18
- a potential new bypass diverting Brigham Creek Road, west of Trig Road, towards the State Highway 16 / State Highway 18 interchange to address the temporary closure of that stretch of Brigham Creek Road when large planes are landing or taking off from the Whenuapai Airbase
- utilising existing roads and adding new connections/extensions to create a connected and accessible network of north-south and east-west arterials and collector roads
- traffic signals and capacity improvements at key intersections along Brigham Creek Road and in the southern portion of the Whenuapai structure plan area
- diversion of the western end of Sinton Road so that it joins with Kauri Road rather than Brigham Creek Road
- a new bridge over State Highway 18 between Trig Road and Brigham Creek Road adjacent to the new proposed Rapid Transit Network station
- a new bridge over State Highway 16 at Northside Drive.

The road network within and connecting to the Whenuapai structure plan area will need to consider the various movement and place functions of roads, as well as accommodating water supply and waste water, stormwater, landscaping, street furniture and facilities for different transport modes. Road typology classifications are being developed by Auckland Transport; these will address the outcomes sought for the road network by having appropriate road layouts that meet the land use and transport requirements.

Timing for the delivery of the identified transport projects is particularly relevant to the Structure Plan in terms of the staging of development but the transport network is not the only contributor to the staging considerations. The assessment identifies a number of scenarios which indicate that between 2017 and 2021 approximately 1800 dwellings could be provided in Stages 1(a) to 1(e) subject to the identified improvements to the transport network (see Section 9.1).

7.4 Business demand

7.4.1 Industrial

Whenuapai's strategic location adjacent to State Highways 16 and 18 provides good accessibility to the area. This is an important consideration for industrial businesses and makes southern Whenuapai a natural candidate to accommodate a significant proportion of future industrial growth in the northwest.

Business demand is considered in terms of retail and industrial activities. Group 1 business land refers to land extensive activities such as manufacturing, transport and storage, logistics, construction and wholesale trade. These are industrial land uses that are not easily intensified so large tracts of land are required to accommodate them.

The development of Whenuapai creates the opportunity to provide over 300 hectares of business land to meet demand for future industrial activities. It is anticipated that with improvements to infrastructure, such as the completion of the Western Ring Route, upgrades to State Highway 16 and 18, and Westgate becoming fully developed, this area will become more market attractive.

The need to provide greenfield business land, particularly for land extensive industrial activities, has been identified as necessary for at least the last decade. Waitākere City Council identified the importance of providing for employment opportunities within the city to reduce the need to commute to work. The need for business land will become important as residential areas such as Scott Point and Redhills are developed.

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Recent modelling and analysis on the regional business land demand, projects demand for light industry land in the urban west and urban north to be between six hectares and nine hectares per annum (net) respectively over the next 30 years, or 243 hectares in the west and 350 hectares in the north (gross)[12]. Locations such as Whenuapai are expected to become more attractive as supply in central locations is exhausted.

It is recognised that nearby business areas at Kumeu, Silverdale, Westgate and Hobsonville currently have vacant land available. However, there is very little land available for development in the North Shore.

Providing for a large amount of industrial land in one location to enable surety of supply and efficient operation of the industrial land market is important. Not all of the projected industrial land will be taken up by the market immediately; it is likely to take two to three decades before the supply it offers is exhausted taking into account the location options and business demand elsewhere in Auckland. Identifying business land now that will not be developed for some time ensures future proofing of the economy in the northwest of Auckland and provides a strategically valuable amount of land that will generate an economically efficient and attractive destination for industrial businesses.

7.4.2 Retail and services

Strong residential growth in the structure plan area will support a significant increase in the amount of retail and services spending by residents in the area. Despite the large proportion of this spending naturally leaving Whenuapai for other nearby centres (especially Westgate), increased retail and services floor space will be required in the structure plan area to cater for the demands of the local population.

Given the composition of other similar centres around Auckland and the Auckland Unitary Plan Operative in Part activity rules, the activities that establish in the Whenuapai Centre are likely to include:

- a small (approximately 1500-2500m^2) supermarket and some specialty fresh food retailers (butcher, fruit shop, fish shop, etc.)
- a small number of comparison retail stores (notwithstanding that most comparison retail spend would be directed to Westgate) with a convenience retail focus
- cafes, restaurants and takeaway outlets
- service-oriented businesses such as mechanics, hairdressers, real estate, medical practices and drycleaners.

[12] *Market Economics, PAUP Business Land: Land Demand by Activity and PAUP Supply (2016), prepared as evidence for the council to the hearings on the Proposed Auckland Unitary Plan Topic 081a*

7.5 Open space and recreation

To support future communities within the Whenuapai structure plan area it is important the area has access to a quality open space network for informal recreation, organised sport, civic amenity and conservation purposes.

The existing network of open space in the structure plan area comprises 23 disjointed coastal esplanade reserves and five neighbourhood parks ranging from 0.4 to 0.6 hectares (Figure 8). The neighbourhood parks are primarily concentrated in the northeastern part of Whenuapai in close proximity to the coast within the predominant existing residential area.

Figure 8: Existing open spaces in Whenuapai

With an additional 8100 to 9600 houses anticipated within the structure plan area, approximately 26 hectares of additional open space will be required to meet the recreational needs of the population. This amount of additional open space excludes esplanade reserves (around the coastline) and vegetated ecological protection buffers (around stormwater management areas and on either side of the banks of a permanent/intermittent stream and/or wetland). The amount of open space and its location is indicative only at this stage and subject to the final density and distribution of development as determined through the plan change process. In addition to the existing open spaces, a network of approximately 14 neighbourhood parks of around 0.3 to 0.5 hectares will be required to meet the council's open space provision guidelines. The proposed parks should be accessible by most residents within a 400 metre walk.

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Three suburban parks of approximately three hectares each will also be required to meet the council's guidelines, two in the northwestern part of Whenuapai and one in the south of the structure plan area adjacent to, and extending, Trig Reserve.

The neighbourhood and suburban parks should be adjacent to esplanade reserves and protected stream margins where practicable to create an interconnected open space network. Off-road walking and cycling networks should be developed where this will not unduly compromise ecological values.

A local sports park of approximately 10 hectares with multi-use sports fields, and potentially indoor recreation facilities, is identified as being required to accommodate the future active recreational demand arising from the proposed development. This park should ideally be located within the proposed business area in close proximity to a Rapid Transit Network station and with easy access to the state highway network.

A 0.5 hectare neighbourhood park/civic space for meeting, socialising, play and events is currently being developed within the Whenuapai 1 Precinct at the western end of the Whenuapai Centre. This space will act as a gateway to signal the transition from the commercial activities of the centre to the surrounding residential area. A second small gateway, civic open space is proposed at the eastern entrance to the Whenuapai Centre to complement it.

The above proposals for enhancing the open space network in Whenuapai will contribute to delivering the objectives of the council's Parks and Open Spaces Strategic Action Plan, the Sport and Recreation Strategic Action Plan, and the requirements of the Auckland Unitary Plan Operative in Part.

7.6 Stormwater and management of the freshwater environment

The appropriate management of stormwater and freshwater is integral to a liveable city. The issues Auckland faces in stormwater can be grouped into three core categories:

- **safe communities** – flooding, health and safety risks to our communities, including people, property and infrastructure is managed and reduced
- **supporting growth** – growth through water sensitive development and provision of quality stormwater infrastructure is enabled
- **healthy and connected waterways** – stream, groundwater and coastal water values are maintained and enhanced and communities are connected with them.

To address these issues Auckland needs to achieve a Water Sensitive Community. The water sensitive design (WSD) approach aspires to ensure multiple public benefits from stormwater management and to develop a unique sense of place for the community.

The Whenuapai Stormwater Management Plan (WSMP) was prepared to support and promote the sustainable long-term urban development of Whenuapai based on WSD principles. The catchment has a significant number of permanent and intermittent watercourses throughout and also has existing natural wetland features.

The stormwater management methods in the WSMP seek to protect and promote the enhancement of streams and the harbour to mitigate the potential negative effects of development. These methods broadly address two main issues:

- water quality and healthy waterways
- flood risk management and protection of people, property and waterways.

The recommended stormwater management infrastructure approach includes the provision of decentralised at source (or close to source) bio-retention devices (e.g. rain gardens, swales and green roofs) to service the built environment and minimise adverse effects on the receiving environment through WSD processes. Where site specific activities identify the potential for High Contaminant Generating Activities, there will be a requirement for additional targeted treatment to be provided, further protecting the receiving environment.

A rapid flood hazard model has indicated that there is minimal risk associated with flooding in the catchment. Therefore it is not proposed that flood flows will be detained but rather passed forward along the network of protected streams and associated riparian management reserves which will form the trunk stormwater system. Development will be excluded from these floodplains and overland flow paths. The local public conveyance network will be primarily constructed by developers in accordance with the relevant version of council's Code of Practice for Land Development and Subdivision and vested to council.

The stormwater management methods assist in the protection and enhancement of the natural stream environment and include environmental, ecological and amenity aspects to provide greater connection to the community. It also seeks to deliver low risk and better returns on investment for developers and ratepayers.

The Auckland Unitary Plan Operative in Part acknowledges the importance of riparian margins, not only for their role in stormwater management but also in terms of stream health, biodiversity and natural character values. A 10 to 20 metre minimum yard setback from the edge of permanent and intermittent streams is required.

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7.7 Water and wastewater servicing

7.7.1 Water supply

The transmission network servicing the Whenuapai area has good capacity to service the forecast growth in the short term but will require upgrading to meet the long term growth forecast. A second North Harbour water main, planned for completion in 2028, will provide the additional capacity necessary to service the ultimate development.

Three transmission bulk supply points (the three bulk water supply water mains), located at the Brigham Creek Road/Hobsonville Road intersection, Trig Road/Hobsonville intersection and the Fred Taylor Drive/Don Buck Road intersection feed the existing local network. These bulk supply points will continue to supply the area in the long term.

New local network infrastructure will be provided by developers as part of their subdivision works to extend the existing local network into currently unserviced areas. The existing local network, comprising fibre cement pipes constructed in the 1960s, is reaching the end of its expected life. Where appropriate, Watercare will take the opportunity to collaborate with developers to renew and replace existing local network infrastructure. A newly-installed 315mm water main to service the Whenuapai 2 Special Housing Area has some latent capacity to easily service area within close proximity.

From a water supply perspective, growth would ideally be staged radially outwards from the existing bulk supply points and heading north towards the outer reaches of the catchment, and be aligned with the wastewater servicing strategy.

7.7.2 Wastewater servicing

The trunk and branch wastewater network servicing the Whenuapai catchment is shown in Figure 9. Three new pump stations at Hobsonville, Whenuapai and Massey North were commissioned between 2011 and 2013 to service growth along the southern part of the catchment adjacent to each side of State Highway 18. NZDF owns and operates its own wastewater network which is pumped directly to Hobsonville; the rest of Whenuapai is currently serviced by private on-site disposal systems.

The public wastewater network currently drains south to the Whenuapai branch sewer which has limited capacity for growth. The capacity will be enhanced when the first stage of the Northern Interceptor, which will divert flow north east to the Rosedale Wastewater Treatment Plant, is completed (2021).

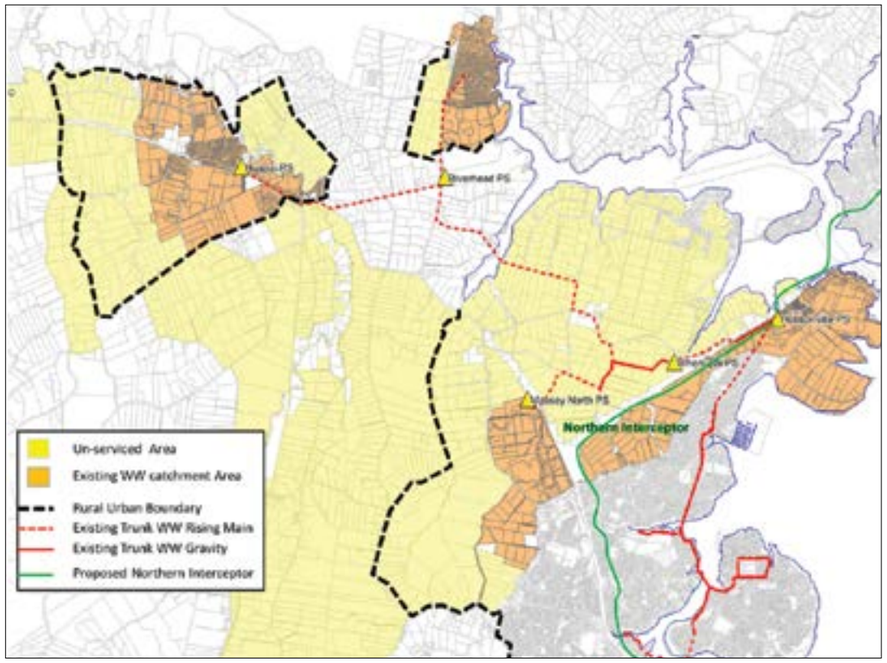

Figure 9: Existing northwest wastewater trunk network

Future stages of the Northern Interceptor, including a large spine gravity main running west to east along State Highway 18 (2025), boost pumping of the pipeline to Rosedale (2027) and duplication of the rising main to Rosedale (2035) will provide the additional trunk capacity necessary to service the ultimate development.

Two large catchments along the northern half of Whenuapai drain to two discrete locations, one along Totara Road and another along Brigham Creek Road. These two localities have been identified as potential future major pump station locations. Parts of the northern area slope towards the coastal edge. The local wastewater network will ideally follow the contours of the land and should flow to the lowest points on the coast and then be pumped back to the branch and trunk network. A series of small developer-provided local pump stations will therefore be required at intervals along the coast.

From a wastewater servicing perspective, growth would ideally be staged around the existing branch sewers, extending northwards once the large spine gravity main of the Northern Interceptor is completed.

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7.8 Ecology

A desktop ecological assessment of the structure plan area was undertaken by the council's Environmental Services team. The assessment included a review of previous reports and council biodiversity records, including ecological assessments as part of the Transport for Future Urban Growth project.

Historic rural uses of the structure plan area have resulted in a poorly defined and poorly connected network of natural systems, and removal of native vegetation to enable farming and horticulture. At present, the structure plan area provides little habitat or connective corridors for native terrestrial fauna and forest birds. The coastal areas are significant for shore birds and areas of salt-marsh wetlands.

A coastal habitat assessment of the structure plan area has been undertaken to identify opportunities for ecological enhancement, mainly focusing on coastal vegetation. The assessment found that much of the available habitat areas are dominated by weed species, particularly privet. Despite this, the presence of regenerating native species indicates potential for restoration of coastal areas with benefits for both the ecological and amenity values of the area.

Figure 10: Auckland Unitary Plan Operative in Part Significant Ecological Areas (shown in hatching)

A number of Significant Ecological Areas (SEA) are identified in the Auckland Unitary Plan Operative in Part, including the Upper Waitematā Harbour, Brigham and Totara Creeks, and small areas of land at stream mouths as they enter inlets to the harbour (Figure 10). There are opportunities to leverage off these existing SEAs and other nearby sites, such as Lucas Creek and other large areas of reserve land, through the potential to develop corridors of natural habitat by extending Waitākere's Green Network to connect into the North-West Wildlink between the Waitākere Ranges and the Hauraki Gulf islands. Whenuapai would be an important stepping stone in this corridor. These corridors seek to achieve a network of habitats and ecological conduits for the safe migration of indigenous fauna and flora, enhance stream habitat and freshwater quality, and contribute towards the conservation of threatened species and habitats of interest.

Extensive work has been carried out since 2006 to link up regional biodiversity hotspots across Auckland. This has included a pest control project from Paremoremo to Albany Heights to restore native forest and shrub land and extensive road-side plantings along State Highways 16 and 18 to link natural spaces and restore waterways.

There are opportunities to further enhance the green network within Whenuapai through the plan change process, primarily through riparian and esplanade restoration to create linkages giving effect to the Indigenous Biodiversity Strategy. The extensive network of streams (and small amount of wetlands) could form the basis of restoration efforts to connect habitats and enhance habitats for a range of fauna and flora. The areas of green open space, streams, forests, street trees, residential gardens, stormwater devices (rain gardens) that could potentially support plants and animals would combine and contribute to the green network. Options for future roading corridors identified as part of Transport for Future Urban Growth included the creation of ecological linkages along both state highways, through existing and future drainage ways.

Similarly, there is potential to facilitate ecological restoration alongside future development and with future communities. Stream restoration initiatives will be considered in the context of the broader goals set out by the National Policy Statement for Freshwater Management.

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7.9 Natural character, landscape and visual

An assessment of natural character, landscape and visual amenity values of Whenuapai has been carried out which identifies any potential landscape and visual effects that may result from future land use activities.

The landscape assessment identifies that while there are no areas of high natural character or landscape, the structure plan area retains relatively high levels of amenity because of its largely open rural nature, mature trees, and proximity to the Upper Waitematā Harbour. The surrounding landscape is undergoing significant change with new areas of housing, commercial and retail development at Hobsonville, Hobsonville Point and Westgate.

The predominantly rural related character to the structure plan area is further enhanced by the large number of mature trees that form paddock boundaries and line many roads and gardens. Mangroves associated with the coastal waters and inlets also enrich the rural and coastal characteristics.

While there will inevitably be a level of adverse effects on the landscape and visual amenity from changing land uses, it also presents opportunities to enhance some landscape outcomes. The following recommendations are made to mitigate the likely landscape and visual effects:

- maintain and enhance areas of high visual amenity, especially around the northern part of the structure plan area with appropriate built form, open space and plantings
- restore and enhance biodiversity through planting, and weed and pest control
- connect habitats along coastal and stream networks
- improve the quality of stormwater entering the Upper Waitematā Harbour
- create integrated networks of public open space
- introduce appropriate plantings in new development
- provide landscape variety to build on existing characteristics of different parts of the structure plan area.

A preliminary arboriculture assessment has also been undertaken. The survey method included a desk-top review, identification of existing scheduled trees and site visits to areas of interest (public roads and reserves only; the New Zealand Defence Force Airbase was excluded) to identify trees with landscape, botanical or other values. A number of trees and groups of trees have been identified as being worthy of further consideration. However, as the trees were chosen for inclusion based predominantly on their visibility, a more detailed inspection is required to confirm the qualities and characteristics that they and other trees may have.

7.10 Heritage and archaeology

7.10.1 Built heritage

A built heritage assessment identifies 11 scheduled Historic Heritage Places in Whenuapai that are protected under the Auckland Unitary Plan Operative in Part, as listed below:

- Duke House and Servants' Quarters - 2 Squadron Drive, Hobsonville
- Whenuapai Village Hall - 41-43 Waimarie Road, Whenuapai
- Residence - 11 Punga Road, Whenuapai
- Worker's Residence - 5 Clarks Lane, Hobsonville
- Former Church - 7 Clarks Lane, Hobsonville
- Worker's Residence - 9 Clarks Lane, Hobsonville
- Worker's Residence - 4 Clarks Lane, Hobsonville
- Worker's Residence - 6 Clarks Lane, Hobsonville
- Worker's Residence - 10 Clarks Lane, Hobsonville
- Whenuapai RNZAF Base Bristol Block Barracks - Tainui Crescent, Whenuapai Airbase
- Whenuapai RNZAF Base Officers' Mess - Kupe Avenue, Whenuapai Airbase.

The Clarks Lane Worker's Residence sites are all privately owned and are covered by the Historic Heritage Extent of Place overlay in the Auckland Unitary Plan Operative in Part.

In addition, the assessment identifies a further 24 sites that are listed on the council's Cultural Heritage Inventory but are not scheduled. A site visit was conducted to locate the structures but only places visible from public sites were able to be located. Further investigation will be required to determine the potential heritage values of these places. In particular, the assessment identifies that the Royal New Zealand Air Force housing area, south of Brigham Creek Road, as distinctive in the context of Whenuapai and should be further assessed.

7.10.2 Archaeology

A desktop study of archaeological values within Whenuapai confirms that the area is not considered to be of high archaeological significance. Most of the recorded sites relating to Māori and early European occupation are located in coastal areas, with potential for future protection within esplanade reserves.

In view of the limited number and coastal distribution of known archaeological sites, future development is likely to have only a relatively minor adverse effect on archaeological values. However, the assessment did identify an unrecorded archaeological site at 2-4 Spedding Road which consists of infilled World War II gun emplacements. As part of the plan change, further investigation and assessment of the site may be required to ensure the values of this site are adequately protected in the future.

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Future development within Whenuapai will need to take into account the locations of recorded archaeological sites and other historic heritage sites identified as having archaeological value.

It is likely that additional unrecorded sites are present because the structure plan area has not been extensively surveyed. These are most likely to be midden sites along the coast and river banks, though sites related to unrecorded European settlement may also be present. These will be managed by the application of the Auckland Unitary Plan Operative in Part.

7.11 Cultural values

Te Kawerau ā Maki has provided a Cultural Values Assessment report and Ngāti Whātua o Kaipara has indicated they wish to provide an assessment as part of the plan change process. The relationship between iwi and the council is enduring and the significance of the environment to iwi has been considered throughout the development of the Structure Plan.

Along with responsibilities to protect the mauri of all things in a way which ensures that the quality of tribal taonga is passed on to future generations, the council understands the importance of involving iwi in the development of the Structure Plan and integration of the protection and enhancement of hau (air), whenua (land), wai (water), biodiversity, and wāhi tapu and taonga throughout Whenuapai.

The Cultural Values Assessment from Te Kawerau ā Maki indicates that the people of Te Kawerau ā Maki are inextricably linked through ancestral rights and ahi kaa to Whenuapai dating as far back as the 14th century. The area is identified as a cultural landscape that has been occupied over many centuries, which is reflected by the numerous place names, landmarks, and recorded archaeological sites that dominate the wider area. The following excerpt from the cultural values report summarises the particular values of Whenuapai:

> *The area is associated with important tupuna and significant battles, as well as a network of kainga (open settlements), gardens, pā, walking tracks, wāhi tapu, and resource gathering areas. Landscape features such as Ngongetepara (Brigham's Creek) and Manutewhau (Lawson's Creek), were significant transport routes and food gathering areas, while the ridgelines along the coast and peninsula were used as walking tracks and also for gardening using terraces and pits. The land in this area was generally infertile and not used extensively for cultivation. However, the kainga in the area were used in conjunction with fishing and the harvesting of shellfish, seabirds, and tuna (eels). Maraeroa and Taurangatira also gave access to Te Toangaroa (the Kaipara Portage).*

Te Kawerau ā Maki and Ngāti Whātua o Kaipara have indicated that they each have a spiritual and cultural connection to the area of Whenuapai and its surrounds. Both iwi are mana whenua of the area and, as such, have kaitiaki and other obligations and responsibilities to the land and its cultural and natural resources.

Te Kawerau Iwi Tribal Authority is positive about the notions of joint management, joint advocacy, and local participation and engagement through the process of developing the Structure Plan.

7.12 Community facilities

The council has an obligation under the Local Government Act 2002 to meet the current and future needs of communities for good quality local infrastructure in a way that is most cost-effective for households and businesses.

The council's Community Facilities Network Plan (the Network Plan) provides direction for how the council will invest in community facilities over the next 20 years. The Network Plan includes provision guidelines that indicate the type of community facility that should serve a particular population by outlining the function of the facility, the type of facility (small or large) and the provision approach, as shown in Table 1. A holistic, community led approach to the planning and provision of community facilities will ensure facilities are suitable for use and that they are integrated, for example a library is connected to a multi-use centre, to ensure there are not multiple facilities across the area.

The existing community facilities network in Whenuapai consists of two community halls, churches, schools and Te Piringatahi Marae just outside of the structure plan area on Luckens Road. A number of other facilities are located in the neighbouring areas of West Harbour and Hobsonville. A new multi-purpose centre at Westgate, including a library and community spaces, is due to be completed in 2017. This facility is less than a 4km drive from Whenuapai and is expected to serve the wider catchment.

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Table 1: Provision guidelines for community facilities

Facility	Functions	Rural provision approach
Community centre		
Small facility	Community development activities including small meetings, co-located working spaces, clubs and social gatherings with activated programming and services.	• Target population threshold 5000 – 10,000. • Servicing a walking catchment of up to 15 minutes or 30 minute drive of rural and coastal villages.
Large facility	Community development activities including small and large meetings, social gatherings, recreation local arts and culture, health and wellbeing with activated programming.	• Target population of 20,000 plus. • Serves a catchment of up to 15 minute driving time. Located in town centres and satellite towns. Desirably located within the centre of town.
Venues for hire	Bookable space for the community to book and run their own activities.	• Access to bookable space within 15 minute walk from local or town centres or 30 minute drive from rural centres.
Libraries	Access to information and technology.	• Respond to population growth of 10,000 in a rural area and 30,000 in a metropolitan centre. Capacity tests based on 33m2/ 1000 population.
Community centre		
Local facility	Free play, fitness, learning, relaxation, casual-play, community programmes.	• Pools target population threshold of 35,000 to 50,000. Leisure target population thresholds of 18,000 to 40,000. • Network to service local catchments of up to 5 km. • Within 30 minute drive-time of a rural satellite town, target population of 9000 people or more, consider partnerships.
Destination facility	Aquatic entertainment, pools sports training, indoor sports leagues, special leisure activities and possible local functions.	• Limited number of facilities based on evidence of need and assessment of viability to service a catchment of 10km plus.
Regional facility	Aquatic entertainment both indoor and outdoor, pools sports training, indoor sports leagues.	• One to three facilities to service the region. • Assessed on case-by-case basis, based on clear evidence of demand and viable business case. • Recognise national facility strategy.
Arts and culture space		
Local facility	Provide space for local community arts activity such as community drama, dance, local art classes and presentations.	• Provide space, opportunities and programmes through existing and new multi-use community facilities.
Destination facility	Provides specialised space for emergent, semi-professional and professional artists.	• Assessed on an as-needed basis to meet identified sector and audience demand.

Whenuapai Village Hall

The Community Facilities Network Action Plan (the Action Plan) is a companion document to the Network Plan. It identifies actions to address gaps and issues across the region's community facilities network. The Action Plan identifies three actions that may impact affect the structure plan area.

Immediate actions	1. Upgrading the Hobsonville Community House in the old Forces Headquarters building in Buckley Avenue. The Long-term Plan has capital expenditure for this action in 2015/16 and the upgrading is currently underway. 2. Investigating the need for pool and leisure space in the northwestern area to address potential gaps in provision and projected population growth recognising opportunities for co-location with other community and sport facilities. There is currently no capital expenditure allocated to this action. Investigations will commence in 2016/17.
Future action	3. Investigating the provision of library facilities in the wider Hobsonville Point, Glenfield and Greenhithe areas.

Applying the principles and provision guidelines under the Network Plan to the structure plan area and taking into account the additional 8100 to 9600 dwellings anticipated over the next 30 years, the following provision is likely to be required:

- a large community facility incorporating community, arts and space for hire
- 891m^2 of library space, potentially as part of the above or within the wider catchment
- pool and leisure space within the northwest corridor (which covers Westgate, Hobsonville and Kumeu).

Ideally the community facility would be located within Whenuapai Centre, close to Brigham Creek Road and near to the airbase and Whenuapai Primary School. This location is central, easily accessible and opportune for developing partnerships with other service providers or existing infrastructure. Investigations on community need and land procurement is to commence once the emerging population reaches 10,000. However investigations on need and general location for a new pool and leisure space across the northwest will commence in 2016/17.

In respect of the provision of schools, existing schools (Whenuapai School, Hobsonville Primary School, Hobsonville Point Primary School, Hobsonville Point Secondary School and other schools in the Massey area) will have capacity to service the first five years of urban development within Whenuapai. New schools will be required, including two additional primary schools and a new secondary school located within the vicinity of Whenuapai. The council will continue discussions with the Ministry of Education on the provision of new schools throughout the plan change process; it is understood that the Ministry has land in Trig Road that may be used for the development of a school.

7.13 Health

The urban environment is a key determinant of health and wellbeing. Decisions made through the structure plan will fundamentally direct and frame the way people live, travel, play and work in this emerging urban area. It is important that health and wellbeing considerations are included at the forefront of the structure planning process, particularly when considering residential intensification.

Discussions were held with policy advisors of the Auckland Regional Public Health Service. Their top considerations in creating healthy places or healthy communities include:

Accessibility - promoting accessibility to services and amenities is critical while ensuring some groups, such as those with disabilities, the elderly, and families with young children, are not disadvantaged. Areas identified as residentially intensive would need to include areas for service access, community activities, sporting and recreational pursuits and pedestrian access. The structure plan provides for such areas.

Connectivity and public transport - residential intensification can flourish through well designed neighbourhoods that have street and other public space connections that ensure future residents are still easily connected to people, facilities and services and are not isolated from each other. The potential for a cycle and pedestrian link along the Whenuapai coastline that connects to a stream esplanade and the street network will provide a basis for healthy community outcomes. Good public transport services and facilities will also be provided in Whenuapai.

Safety - ensuring that residential intensification builds in safe residential design (such as through informal surveillance), well-lit streets and pathways and safe traffic flows will be developed as the urban fabric and population increases in the structure plan area.

Housing - housing quality (such as sound and heating insulation), diversity in size and configuration to meet a range of family types, and privacy are key attributes to the health of this future urban area.

Community facilities - existing community facilities, such as the Whenuapai Village Hall and playground area, the public boat ramp at Waimarie Road and existing open space facility amenities will remain. Improvements to some of these facilities (if required) and the creation of new community facilities will benefit the social health of existing and future residents.

Community cohesion - interagency cooperation should be part of the intensification process to promote community cohesion. As Whenuapai grows, ongoing liaison with the Ministry of Health, Ministry of Education and Ministry of Social Development will assist this process.

Public and open space - the Parks and Open Space report is a strategic framework that will create the opportunity for attractive open spaces with a variety of uses. These can be enjoyed by all and will benefit the health of the whole community.

Māori heritage and cultural identity - Whanau Ora Health Impact Assessment is another tool used when developing policy that affects Māori. Mana whenua have been involved in the structure plan process advising where urban design could be utilised to better represent the Māori history and identity of the area. Taking this work into a health context can be established through ongoing engagement with mana whenua as the structure plan area develops.

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7.14 Neighbourhood Design Statement

The aim of the neighbourhood design statement is to describe how the mix and patterns of distinctive neighbourhoods can be developed as part of the Structure Plan. These neighbourhoods would respond to:

- the heritage of both mana whenua and European settlement and the community recognition of this history
- the character and context of the existing environment for example contours, existing natural features including streams, wetlands, vegetation, habitat, mature trees, views and vistas, proximity to the existing centre, parks, community facilities and school, respecting existing residential neighbourhood character lot and built form
- opportunities and constraints outlined in Section 7 will have to be resolved or prioritised to assist in the avoidance or mitigation of potential adverse effects.

Example of high density housing

Example of low density housing

The design rationale and principles that have informed the proposed neighbourhoods is one of creating a new urban environment with a sense of place woven into the existing urban structure, topography, natural features and landscape. These neighbourhoods are able to:

- create a legible urban form with environmental features and strong relationship to major infrastructure including roads and New Zealand Defence Force land
- create multi-modal streets and roads connecting key public and civic places in the community
- create connections to and along the coastline and design for potential coastal erosion and inundation issues
- provide nodes (centres) where movement connections will help grow public transport provision (bus, connections to ferries and rapid transit) for both the residential and business neighbourhoods
- enhance open space urban form legibility for recreation, play and contact with nature for residents
- encourage sustainable land use with blocks, lots and dwellings orientated to maximise solar gain
- provide choice with different land uses, densities, block types and sizes, building sizes and designs, and connections to social infrastructure and public open space
- strengthen the urban resilience and reduce carbon emissions of the community.

The Neighbourhood Design Statement has been considered in the development of the structure plan, particularly in the location of appropriate land uses. The location of appropriate land uses have then been further balanced and refined with the need to achieve other objectives, greater choice and improved flexibility.

The structure plan accommodates growth and also provides an appropriate amount of flexibility that can achieve the best outcomes and allow ongoing urban design innovation.

Example of medium density housing

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7.15 Affordability Assessment

An adequate supply of a variety of dwelling types and sizes located near jobs and transport links is an important component of a functioning society and economy, and provides a good quality of life for everyone.

The provision of a wide variety of housing types is expected in the structure plan area to meet the needs of people and communities, including:

a. households on low to moderate incomes
b. people with special housing requirements.

There is an immediate need for housing to rent and purchase at a variety of price points to meet the needs of Aucklanders. The following initiatives have been identified as opportunities which could be explored to help deliver more housing choices:

- enable a range of dwelling types
- locate dwellings close to transport hubs and corridors
- encourage good quality dwellings which exceed environmental minimums and provide more comfortable homes for Aucklanders
- apply universal design principles to buildings to make them usable for people of all ages.

This coupled with accessibility for the new local workforce will support Whenuapai to become a more liveable suburb. Living and working locally, with well-connected community facilities and social infrastructure reduces dependence on private vehicle journeys, particularly across the city to work places at peak times. It also helps to prevent the development of a largely absent resident population in Whenuapai during usual business hours.

In the Whenuapai 1 and 2 Special Housing Area Precincts, these developments are required to provide a percentage of affordable housing for all residential developments containing 15 or more dwellings, or the creation of 15 or more vacant sites. This requirement will not apply to the remaining land in the structure plan area that will be given a zone through the plan change process.

7.16 Natural Hazards

7.16.1 Geotechnical and coastal erosion

A preliminary geotechnical and coastal erosion assessment identifies the geotechnical and coastal hazards, and associated constraints to future development within Whenuapai. The main geotechnical hazards identified are:

- slope stability and coastal erosion
- compressibility of soil
- liquefaction during an earthquake.

In addition, the council's Engineering and Technical Services team has also identified acid sulphate soils as a potential geotechnical hazard for the structure plan area. Further work is currently being undertaken by the council in respect of this matter.

The majority of the structure plan area has a low risk of slope instability, with a small area of medium to high risk zones along the upper reaches of creeks flowing into the Upper Waitematā Harbour. Kauri Road is an area with slope instability with cracking and incremental creep has been observed.

Based on a regional assessment of coastal erosion undertaken for investigation of the Rural Urban Boundary, a 100m building restriction line from the toe of cliffs is recommended. For proposed building within the 100m zone, a site-specific coastal erosion study will be required to confirm an appropriate building setback on a case-by-case basis.

Whenuapai has medium to high soil compressibility, with low compressibility only expected on coastal and stream margins. Further work should be undertaken when assessing individual site developments.

There have been limited investigations around the coastal margin of the structure plan area and further assessments may be required to better understand the underlying geology and associated geotechnical risks of the structure plan area.

Soils in the structure plan area are identified as difficult to earthwork, in addition high groundwater levels mean that ground settlement as a result of dewatering due to construction is a potential issue. Where reworking of soils or dewatering occurs, there is a potential for acid sulphate soils to create acidic conditions, particularly near the coast and in soils deposited in swampy environments which tend to coincide with the high development premium land shown in Figure 11.

Overall, land within the structure plan area therefore generally has a medium development premium, with a high development premium along steep slopes. Development premium relates to the costs of developing land subject to geotechnical constraints, where land with a medium development premium is more economical to develop than land with a high development premium.

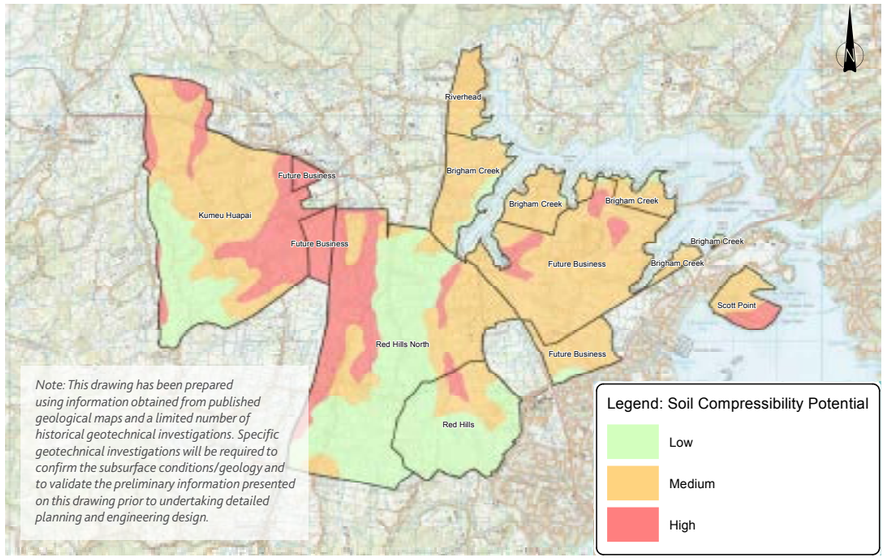

Figure 11: Northwest areas of low, medium and high development premium
Source: Tonkin & Taylor, 2013

7.17 Contamination

The health and wellbeing of any future communities is a key objective of this plan. To ensure that this objective is met, the Whenuapai Structure Plan was prepared with consideration of the contamination risks associated with some historic land uses (aviation and agriculture).

A preliminary desktop contamination assessment has been prepared which collates and reviews existing information about potentially contaminated land in the structure plan area and identifies known or potential areas of contamination.

A previous study for the Northern Strategic Growth Area in 2001 identified the Whenuapai Airbase, uncontrolled landfills, timber treatment and storage as having the most likelihood of contamination with the highest potential magnitude of contamination. The level of contamination associated with rural-residential and horticultural land uses was identified as likely to be low and dispersed and therefore represents minimal constraints to land development.

The timber treatment site is also considered a high risk site and a detailed site investigation would be required if the timber treatment site is to be redeveloped. This would be managed by the Auckland Unitary Plan Operative in Part provisions. The remainder of the structure plan area is currently horticultural and residential with potentially low and dispersed contamination.

There are opportunities to address contaminated sites as part of the plan change process. Guidance from the National Environmental Standard for Soil Contaminants and future clean-up funding from the government's Contaminated Sites Remediation Fund are possible avenues to explore when land uses are being changed. These sites can also be seen as possible locations for creation of wildlife habitat which may direct birds away from the airbase.

7.18 Noise

The noise constraints to future urban development within the structure plan area are informed by a noise assessment. The main sources of noise within the structure plan area are from the airbase and state highways. A review of the Auckland Unitary Plan Operative in Part Aircraft Noise provisions[13] (refer to section 5.3.1) was undertaken to determine the most appropriate criteria to address noise matters in the structure plan.

In summary the following was recommended:

- development within the 65 dB Ldn Airport Noise Boundary should be restricted to non-sensitive activities such as light industry or commercial
- development should be limited as much as possible between the 55 dB Ldn and 65 dB Ldn Airport Noise Boundaries, particularly sensitive activities such as schools and preschools

[13] The provisions as presented to the Independent Hearings Panel in April 2015; note the Independent Hearings Panel has since released their recommendations and the High Land Transport Noise overlay is recommended to be deleted

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- new noise sensitive activities within the Aircraft Transport Noise Overlay are avoided particularly where mechanical ventilation is going to be required to achieve the internal noise criteria of 40dB LAeq(24hr). If land within the Aircraft Noise Overlay is used for noise sensitive activities effective barriers should be installed along the boundary with the State Highway where there is no existing noise barrier/bund or the existing barrier/bund is not effective
- development within the Aircraft Noise Overlay and between the 55 dB Ldn and 65 dB Ldn Airport Noise Boundaries should be restricted to non-sensitive activities
- noise-sensitive activities outside of the High Land Transport Noise Overlay and outside of 55 dB Ldn Airport Noise Boundary are unlikely to require mitigation.

The noise effects of engine testing and helicopter flights have also been identified as a potential issue. Further work will be required in regard to this matter with the opportunity to review the noise assessment in the plan change process.

7.19 Lighting

Development within the structure plan area will need to consider the effects of lighting on the safe and efficient operation of the airbase. A preliminary lighting assessment outlines the lighting requirements under the Auckland Unitary Plan Operative in Part as well as the lighting requirements of the airbase and lighting associated with roads.

Lighting requirements in relation to the airbase are identified as including the following:

- the details of approach lighting on the east-west runway
- the requirement to maintain clear operational view of the approach lights
- simulation of approach lights shall not be permitted in either the orientation of the runways or in the Whenuapai area.

Assessment of the lighting requirements for roads relied on the combination of M30 (Specification and Guidelines for Road Lighting Design) and Auckland Transport Code of Practice Section 19–Street Lighting. Other considerations include the effects of temporary structures, cranes, wind turbines, search lights and lasers. Further investigations may be required.

Overall the general lighting requirements of the Auckland Unitary Plan Operative in Part are considered appropriate for the structure plan area, apart from those additional requirements identified in relation to the airbase.

8 The Structure Plan

8.1 Development and design principles

The development of the Whenuapai Structure Plan has been informed by a number of development and design principles that are summarised as follows:

1. create a well-designed, sustainable quality compact form with a strong sense of place
2. recognise the presence and importance of Whenuapai Airbase while restricting residential development within areas of high airbase noise
3. recognise the presence and importance of large, long standing industries that are expected to remain in operation for the foreseeable future
4. capitalise on the existing coastline, waterways, landscape, amenity, to create a strong green and coastal public open space
5. expand the existing Whenuapai centres and develop complementary smaller centres
6. improve existing community facilities and new community facilities in centres
7. identify existing land owned by the Ministry of Education and private schools currently in operation while expecting that future schools within the proposed residential areas will be needed in future
8. provide choice of residential densities and future dwelling types throughout the structure plan area
9. concentrate higher density residential areas around centres and where future rapid transit network stops are being proposed
10. enable low density residential on the coastal edge given its isolated location and the complexity of coastal erosion
11. provide the foundation for the future residential block structure and site orientation to maximise solar gain
12. deliver local employment opportunities close to residential neighbourhoods and good transport connections
13. protect waterways and enable the improvement of water quality and restoration of vegetation and habitat
14. promote water sensitive design throughout the structure plan area, from site-specific features to infrastructure in the public realm
15. allow for the efficient provision of infrastructure on a staged basis
16. develop and maintain a well-connected transport network within Whenuapai and to the wider transport network
17. create a safe and well-connected network of open space and reserves
18. enable transport connections along and to the coastline where possible while recognising the sensitivity of the coast to erosion and inundation
19. provide a safe and well-connected network of streets that utilises existing roads where possible and enables multi-modal movement within the structure plan area
20. provide transport infrastructure and connections that enable increased provision of multi-modal transport for both residential and business neighbourhoods
21. Provide for the sustainable management of taonga (e.g. the importance of protecting the mauri of waterways, recognition of mana whenua culture, traditions, tikanga, place names, artefacts, wāhi tapu and historic places and areas) and how these elements can be incorporated into the structure plan and future plan change process as advanced by Te Kawerau ā Maki and Ngāti Whātua o Kaipara.

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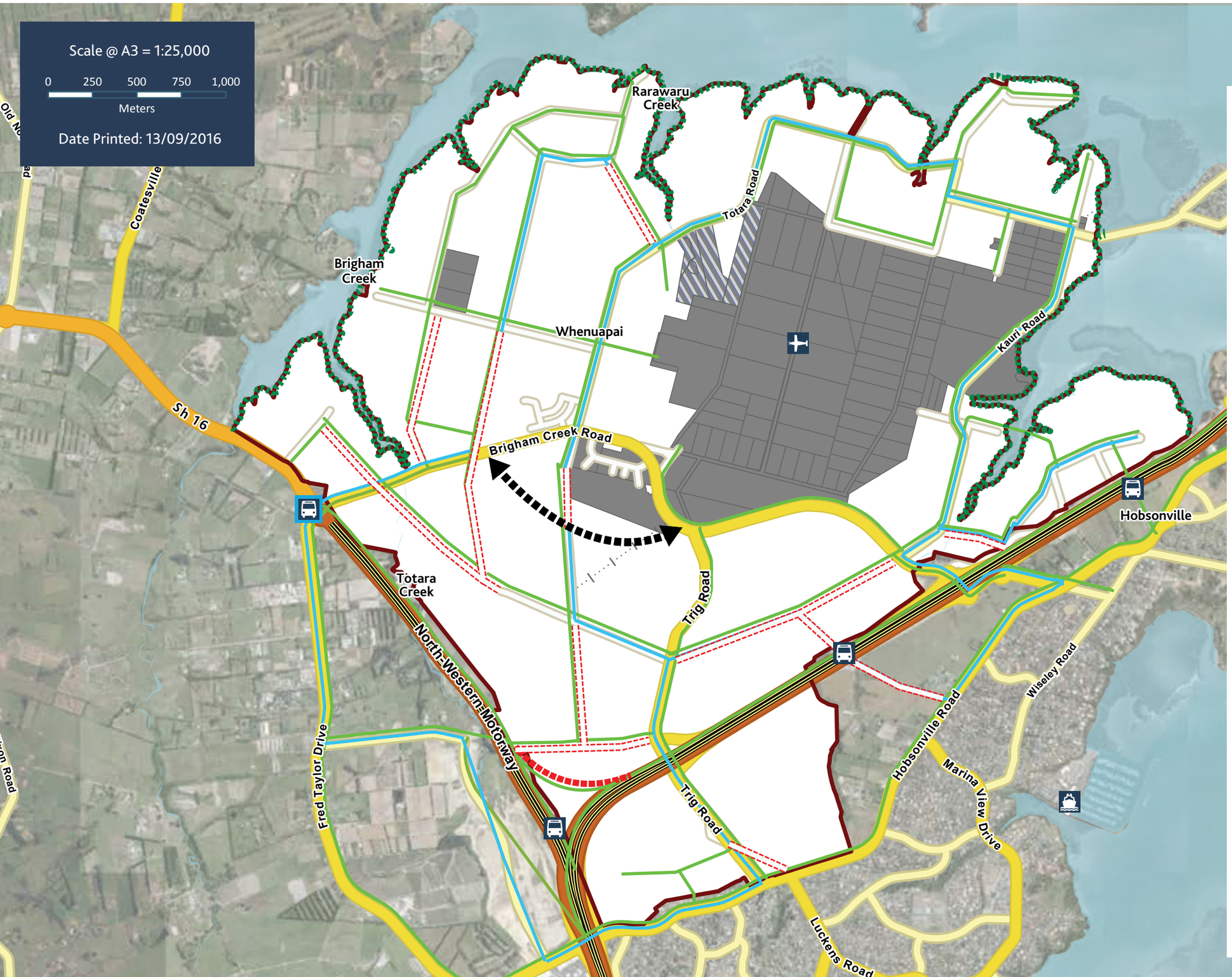
Transport Networks

Figure 12: Transport Networks map

RTN Station
RTN Station - Park and Ride
Ferry Terminal
Potential Brigham Creek Bypass
Future SH16/SH18 connection
Proposed Roads
Potential Future Bus Routes
Rapid Transit Network (RTN)
Whenuapai Structure Plan Boundary
NZDF Property
NZDF Designation
Indicative Coastal Edge Walkway/Cycleway
Potential Cycle Routes



8.2 Structure Plan elements

8.2.1 Transport

Development of the structure plan has considered the movement network features, opportunities and constraints discussed in Section 7 of the report and identified in Figure 12. Network features and opportunities include:

- a cycling network along local roads, around the coastal edge and connecting to the wider northwest area
- existing and future bus routes
- identification of four Rapid Transport Network stations (one of which includes a park and ride facility)
- proposed roads, including a Brigham Creek Road Bypass and the future State Highway 16/State Highway 18 connection.

The future transport network is integral to the achievement of a quality compact urban form. It is important to understand the number of significant transport upgrades and investment required by the New Zealand Transport Agency, Auckland Council, Auckland Transport and developers to support residential and business land uses. These transport upgrades and their appropriate staging are listed in Appendix 4. In particular the appropriate locations for intensive residential development should be integrated with the provision of high quality public transport; higher densities are therefore located in proximity to Rapid Transit Network stations and the park and ride facility.

A well-connected cycling and pedestrian network enables the future community to access employment, schools, shops, parks and recreation areas, and reduces reliance on private cars within the structure plan and wider area. This assists in facilitating sustainable growth within the northwest region.

Infrastructure

Figure 13: Infrastructure map

- Whenuapai Structure Plan Boundary
- NZDF Property
- NZDF Designation
- National Grid Corridor
- Permanent and intermittent streams
- Northern interceptor stage 1 and 2
- Obstacle Limitation Surfaces
- Wastewater Pipe (Transmission) - In Service
- Proposed branch sewers
- NZDF Noise contours
- Proposed Pump Station
- Existing wastewater pump station
- Bulk Water Supply Points

Scale @ A3 = 1:25,000

0 250 500 750 1,000

Meters

Date Printed: 13/09/2016

N

Rarawaru Creek
Totara Road
Brigham Creek
Whenuapai
Greenhithe
Ferry Parade
Kauri Road
Upper Harbour Motorway
Sh 16
Brigham Creek Road
Totara Creek
North-Western Motorway
Trig Road
Hobsonville Point Road
Wiseley Road
Hobsonville Road
Marina View Drive
Fred Taylor Drive
Luckens Road
Coatesville
710m
60m
40m
20m
65m

DISCLAIMER: This map should be read in conjunction with the associated classification methodology outlined in 'Whenuapai Stream Classification Survey Methodology' (Morphum Environmental, 2016). Please be aware that the data contained in this map is provisional only as it was produced at a catchment modelled scale and not at an individual development scale. Auckland Council and its employees, while providing this data in good faith, accept no liability from any use of the data provided. Additionally there may be some changes in the future to this map once more detailed data becomes available Users are therefore cautioned in the use of this data for decisions of public or personal safety, and/or the or operational condult of business that involves substantial money or operational consequences.

8.2.2 Infrastructure

Development of the structure plan has considered the infrastructure features, opportunities and constraints indentified in this section and in Figure 13.

Existing development is served by three transmission bulk water supply points to the south of the area. Renewal and upsizing of the network will be required to meet future urban intensification yields and fire-fighting requirements. The scale of upgrade required is significant as all pipework in the Whenuapai network is reaching the end of its expected life. New water lines will follow the proposed local roading network.

There are three pump stations in proximity to Whenuapai at Hobsonville, Whenuapai and Massey North. Two large catchments along the northern half of the structure plan area drain to two discrete locations, one along Totara Road and another along Brigham Creek Road. These two locations have been identified as potential future major pump stations. The capacity will be enhanced when the first stage of the Northern Interceptor, which will divert flow north east to the Rosedale Wastewater Treatment Plant, is completed in 2021. Future stages of the Northern Interceptor, including a large spine gravity main running west to east along State Highway 18 (to be completed in 2025), boost pumping of the pipeline to Rosedale (to be completed in 2027) and duplication of the rising main to Rosedale (to be completed in 2035) will provide the additional trunk capacity necessary to service the ultimate development.

A water sensitive design approach will be adopted for the management of stormwater, utilising the existing stream network (both permanent and intermittent streams).

Noise contours and height limitations (known as obstacle limitation surfaces) associated with the Whenuapai Airbase designation apply to the structure plan area, as well as the National Grid Corridor (incorporating electricity lines). The noise contours and height limitations associated with the airbase and the National Grid Corridor are particularly relevant to the consideration of appropriate land uses. For example, residential activities are sensitive to high aircraft noise and electrical transmission line activity and are not appropriate for them to be located in close proximity to these activities.

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8.2.3 Natural Environment and Heritage

Development of the structure plan has considered the existing natural environment and heritage features and the opportunities and constraints identified in Figure 14 which are summarised as follows:

- high levels of amenity exist because of proximity to the Upper Waitematā Harbour, the largely open rural nature, mature trees, and the areas of mangroves associated with the coastal waters and inlets
- significant marine and terrestrial ecological areas within the Upper Waitematā Harbour, Brigham Creek and Totara Creek
- intermittent and permanent streams should be retained with riparian planting to enhance freshwater quality
- protection is proposed of scheduled natural and built heritage including notable trees, Significant Ecological Areas, recorded archaeological sites, and buildings at Clarks Landing, Whenuapai Village and the Whenuapai Airbase
- recognition is given to the North-West Wildlink for creating biodiversity linkages
- development should take into account the need to manage environmental constraints such as coastal erosion, sedimentation and contaminated land.

The structure plan provides opportunities to identify options to restore and enhance the natural environment within the structure plan area to achieve environmental goals as part of urban development. In addition, urban development also provides opportunities to apply sustainability initiatives that will assist with the implementation of the council's Auckland Growing Greener principles related to urban transformation, zero waste, restoring nature and healthy waterways.

In particular, the retention of the permanent and intermittent streams creates a key structural element that largely determines where roads, open space and intensive residential development are located. Areas for ecological enhancement have been identified primarily in relation to riparian margins, state highways, existing Significant Ecological Areas, and Brigham Creek in relation to the North-West Wildlink. The protection of scheduled trees and the potential inclusion of additional trees or groups of trees that have stand out landscape, botanical or other values will also provide for the opportunity to retain a high level of amenity. However, further consideration will need to be given to the issue of avoiding potential bird strike affecting the airbase.

A number of archaeological and built heritage sites are identified within the structure plan area and further consideration will need to be given to protection and enhancement through the identification of suitable land uses and activities. For example, most archaeological sites are located around the coast and these can be protected through the provision of an esplanade reserve where the opportunity arises along with building line restrictions.

Natural Environment and Heritage

Figure 14: Natural Environment and Heritage map

- Notable Trees
- Contaminated Sites
- Cultural Heritage Index sites
- Wetlands
- Significant Ecological Areas - Terrestrial
- Significant Ecological Areas - Marine
- Whenuapai Structure Plan Boundary
- NZDF Property
- NZDF Designation
- Indicative Riparian Margins around Intermittent/Permanent Streams
- Coastal Costraints
- North-West Wildlink

Scale @ A3 = 1:25,000

0 250 500 750 1,000

Meters

Date Printed: 13/09/2016

N

Rarawaru Creek
Brigham Creek
Whenuapai
Totara Road
Ferry Parade
Greenhithe
Kauri Road
Upper Harbour Motorway
Sh 16
Brigham Creek Road
Totara Creek
Trig Road
North-Western Motorway
Hobsonville Point Road
Fred Taylor Drive
Wiseley Road
Hobsonville Road
Marina View Drive
Luckens Road

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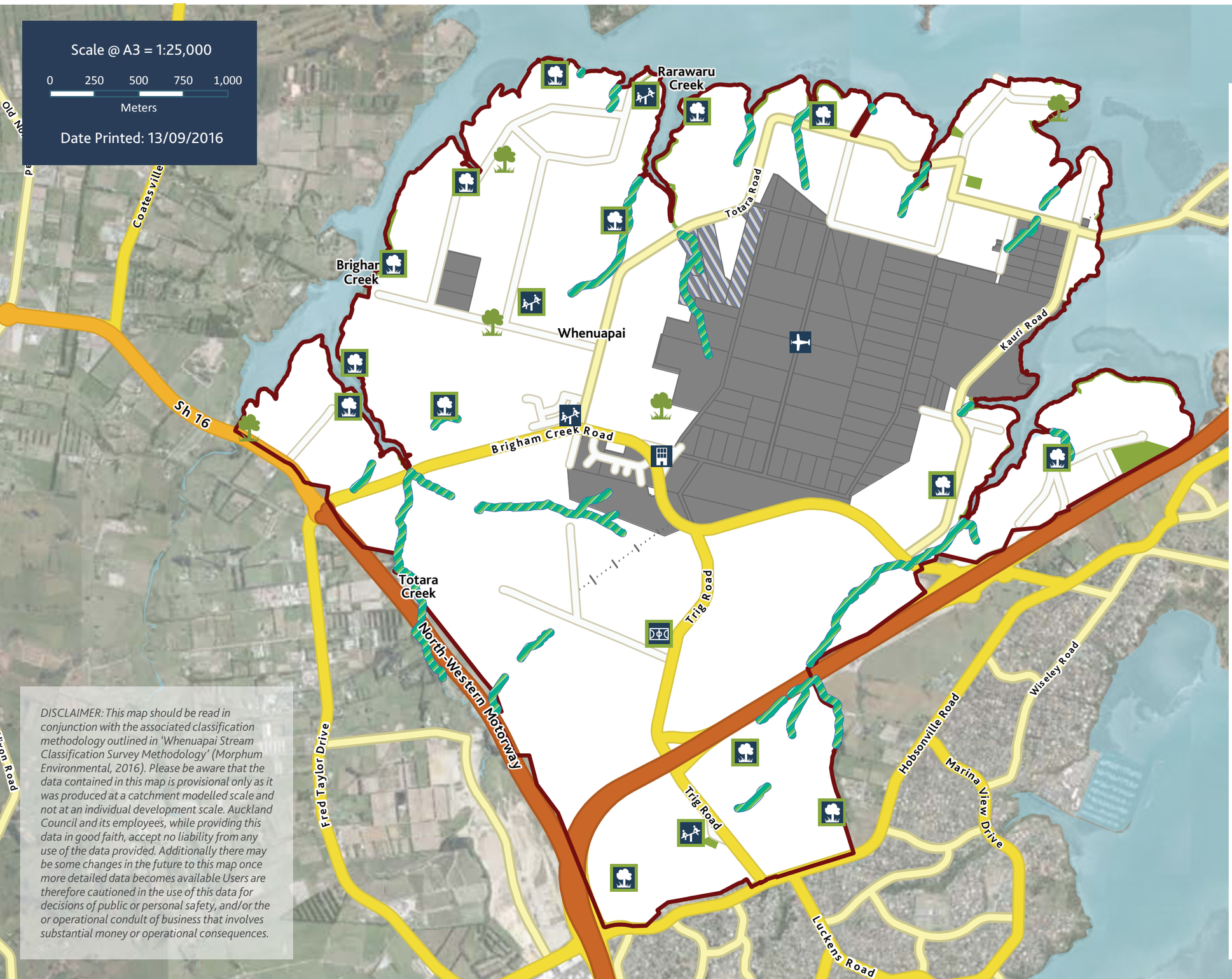
Open Space and Recreation

Figure 15: Open Space and Recreation map



8.2.4 Open Space and Recreation

The council's Open Space Provision Policy provides direction for how it will invest in open space and recreation. Applying the principles and provisions under the policy, the following open space and recreation facilities (indicated in Figure 15) are likely to be required:

- the creation of esplanade reserves of at least 20 metres in width where the opportunity arises for subdivisions along the coast and waterways
- the use of esplanade reserves and streamside conservation networks for the formation of recreational routes and connections between open spaces where practicable, without unduly compromising ecological values
- the provision of a range of open space and recreation areas including:
  - a suburb/sports field, of approximately 10 hectares in size, to accommodate sports fields and active recreation facilities, ideally located in the business area near future Rapid Transit Network
  - three suburban parks of 3 to 5 hectares in size
  - a network of approximately 14 neighbourhood parks (0.3 to 0.5 hectares in size) for passive recreation at appropriate locations within residential zones accessible by most residents within a 400 metre walk
  - a civic space at the eastern entrance of the Whenuapai Centre to complement the neighbourhood park/civic space currently being developed within the Whenuapai 1 Precinct.

Identification of the locations for open space are indicative on the structure plan map, recognising that this needs to be determined as part of future development proposals.

The importance of a good quality open space network is critical to the health and wellbeing of the future population at Whenuapai. Indicative locations for open space networks focused within residential neighbourhoods in proximity to the stream network, ensures that developers are aware of the need to provide for suitable open space across the wider area. The potential sports fields/facility should be located within the business area because of the light spill arising from flood lighting of fields and the facility should be easily accessible.

Enhancement of permanent and intermittent streams through riparian planting will provide ecological linkages, as well as opportunities for green corridors to link public open spaces and provide an extensive cycling and walking network.

Opportunities for greater public access to the coast and non-motorised watercraft launching facilities will be investigated as part of the plan change process.

8.3 The Structure Plan

The opportunities and constraints identified in Section 7 have informed the key elements as well as the development and design principles in Section 8.1. The final structure plan map in Figure 16 is a synthesis of all the key elements and represents the most appropriate mix of land uses and activities.

Residential

The residential densities envisaged by the structure plan are primarily low, medium and high. The Neighbourhood Design Statement provides analysis of potential yields across the neighbourhoods of the structure plan area. The applicable Auckland Unitary Plan Operative in Part zones will be detailed in the plan change.

The structure plan proposes low density residential activities under the northern approach to the airbase where height is limited and also in proximity to the coastline, recognising that further investigation is required to determine suitable building setbacks due to coastal hazards. The structure plan has not adopted the recommendation of the Neighbourhood Design Statement to include a buffer of industrial/horticultural land between residential activities and the airbase as a way to address potential reverse sensitivity effects. Instead, the structure plan seeks to balance the operations of the airbase with the local community's desire to retain a residential character within the established Whenuapai Village and the need to locate business activities in locations with good access to the state highways.

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The predominant level of residential density anticipated throughout the structure plan area is medium density. It has generally been applied to areas away from the coast and outside of Whenuapai Village. While the New Zealand Defence Force (NZDF) has signalled a preference for low density residential activities adjoining the airbase to limit reverse sensitivity effects, the structure plan identifies land owned by NZDF adjoining the airbase as medium density residential. This reflects existing development and the potential to implement no complaints covenants on titles.

High density residential is proposed in to the south of State Highway 18 along Trig and Hobsonville Roads and around the proposed Rapid Transit Network station at the State Highway 16 / Brigham Creek Road interchange.

Business

As outlined in Section 7.4, suitable business land is required in the northwest of Auckland. A large proportion of the structure plan area is identified as business land to take advantage of the proximity to the state highway network as well as taking into account the noise constraints associated with airbase operations. Proposed future transport improvements of the state highway network and rapid transit network stations further enhance the position of this business land.

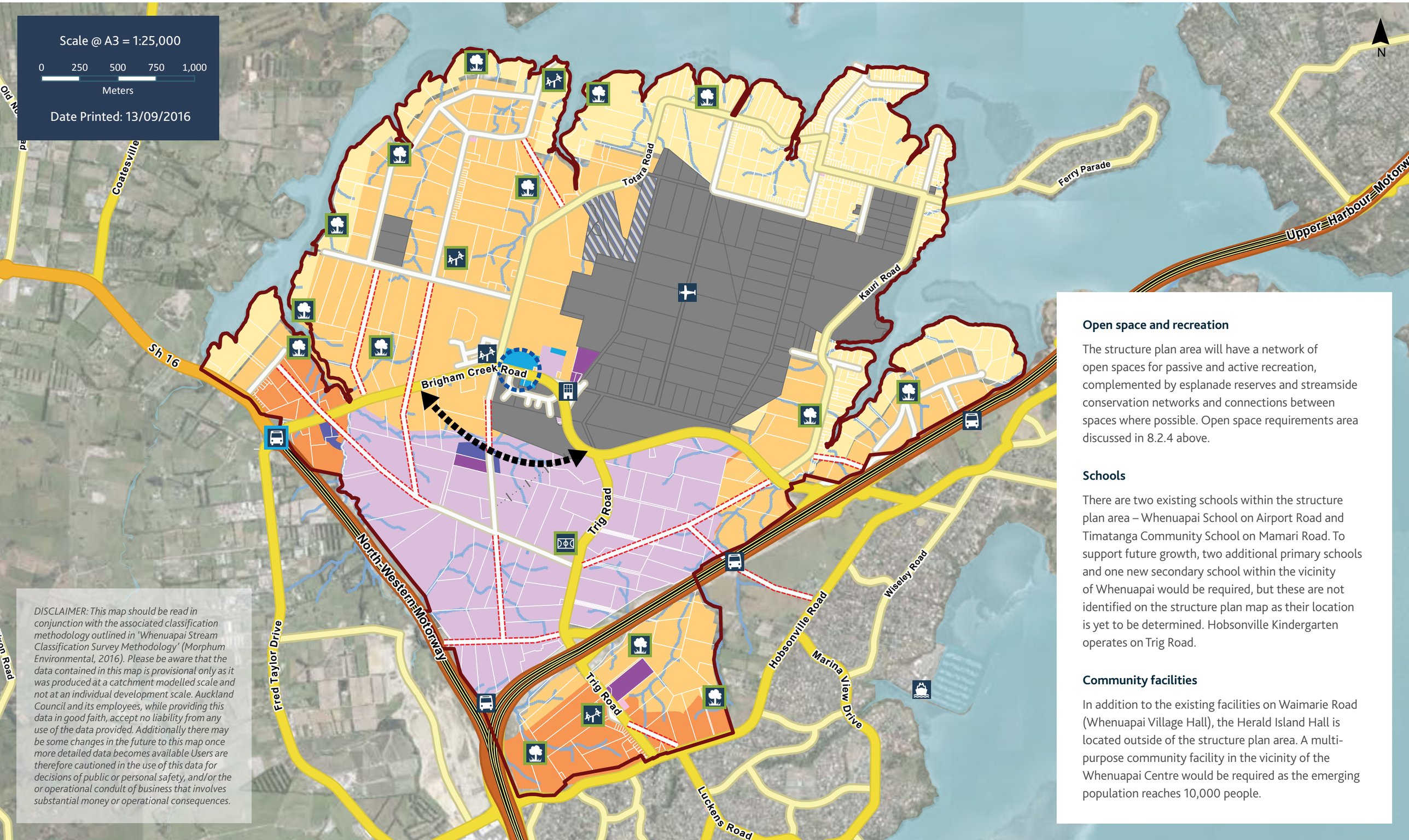
Potential issues associated with the interface between residential and business uses will be addressed through the plan change process. There are standards within the provisions of the business zones in Auckland Unitary Plan Operative in Part that address the treatment of the residential-business interface[14].

The structure plan also proposes to extend the local centre on Brigham Creek Road to the southern side (currently a neighbourhood centre), as well as introducing three additional neighbourhood centres throughout the area, to complement the existing centre in Whenuapai Village, which will provide for the convenience needs of residents and workers.

There are two Mixed Use areas identified on the structure plan map. The first is north of Timatanga School, which responds to their feedback seeking residential zoning around the school. The Mixed Use zone provides for residential activity as well as predominantly smaller scale commercial activity that does not cumulatively affect the function, role and amenity of centres. The second is an area south of Brigham Creek Road near its western intersection with State Highway 16, to foster a sense of gateway to Whenuapai.

Structure Plan

Figure 16: The Structure Plan map



Open space and recreation

The structure plan area will have a network of open spaces for passive and active recreation, complemented by esplanade reserves and streamside conservation networks and connections between spaces where possible. Open space requirements area discussed in 8.2.4 above.

Schools

There are two existing schools within the structure plan area – Whenuapai School on Airport Road and Timatanga Community School on Mamari Road. To support future growth, two additional primary schools and one new secondary school within the vicinity of Whenuapai would be required, but these are not identified on the structure plan map as their location is yet to be determined. Hobsonville Kindergarten operates on Trig Road.

Community facilities

In addition to the existing facilities on Waimarie Road (Whenuapai Village Hall), the Herald Island Hall is located outside of the structure plan area. A multi-purpose community facility in the vicinity of the Whenuapai Centre would be required as the emerging population reaches 10,000 people.

9 Implementation

> The The Whenuapai Structure Plan will be implemented over the next 10-20 years, starting in 2017 with a plan change.

The Future Urban Land Supply Strategy November 2015 (discussed in Section 5) proposes that growth start in the period 2017–2021. Construction will extend beyond 2021 because of the differing development aspirations and timelines that landowners and developers have, and the staging and sequencing requirements that are based on infrastructure funding provision in the structure plan area and its surrounds. Within the structure plan area two Special Housing Areas have been approved as part of Stage 1(a) and construction has started.

The structure plan is expected to be implemented initially by a plan change to the Auckland Unitary Plan Operative in Part. This plan change will re-zone the land currently zoned as Future Urban, so that the zoning aligns with the land use indications in the structure plan. Any overlays in the Auckland Unitary Plan Operative in Part will also form part of the plan change if they are relevant. The plan change may also include precincts if there are particular activities or resource management issues that are not able to be managed by the zones. Once the plan change is operative, subdivision and development is likely to start.

Requiring authorities may also issue notices of requirement to designate pieces of land to ensure that the correct pieces of land for their infrastructure requirements are secured, and in some circumstances routes may be protected. Requiring authorities may compulsorily acquire pieces of land, or purchase land that is available on the open market, if it meets a particular strategic need.

The council will need to consider the inclusion of budget provisions for land purchases and works in its Annual Plan processes. It will also identify larger projects that need to be included in the 2018-28 Long-term Plan. These additions to the Long-term Plan will largely be determined in the 2017 calendar year.

The council will provide guidance material for landowners and developers to help them understand the various processes that they are involved in. It will also engage with landowners and developers to help to ensure that development aligns to the structure plan and contributes to the sense of place that the council is seeking to create.

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9.1 Staging

Staging has been based upon consideration of the growth expected in the whole of the northwest that is Kumeu, Huapai, Redhills, Riverhead, Coatesville, Hobsonville Point, Scott's Point and Whenuapai. Consequently the growth in Whenuapai requires infrastructure provision both within and outside of its structure plan boundaries.

The staging has also been based on when infrastructure can be provided as not all land can be serviced at the same time in Whenuapai. There are known current infrastructure deficits that need to be addressed before some areas of land can be developed for urban purposes. The known transport projects are listed in Appendix 4. This should be read in conjunction with the staging map on page 94. Infrastructure provision needs to be carefully staged to ensure that it is provided on a timely basis and is able to be utilised once it is available.

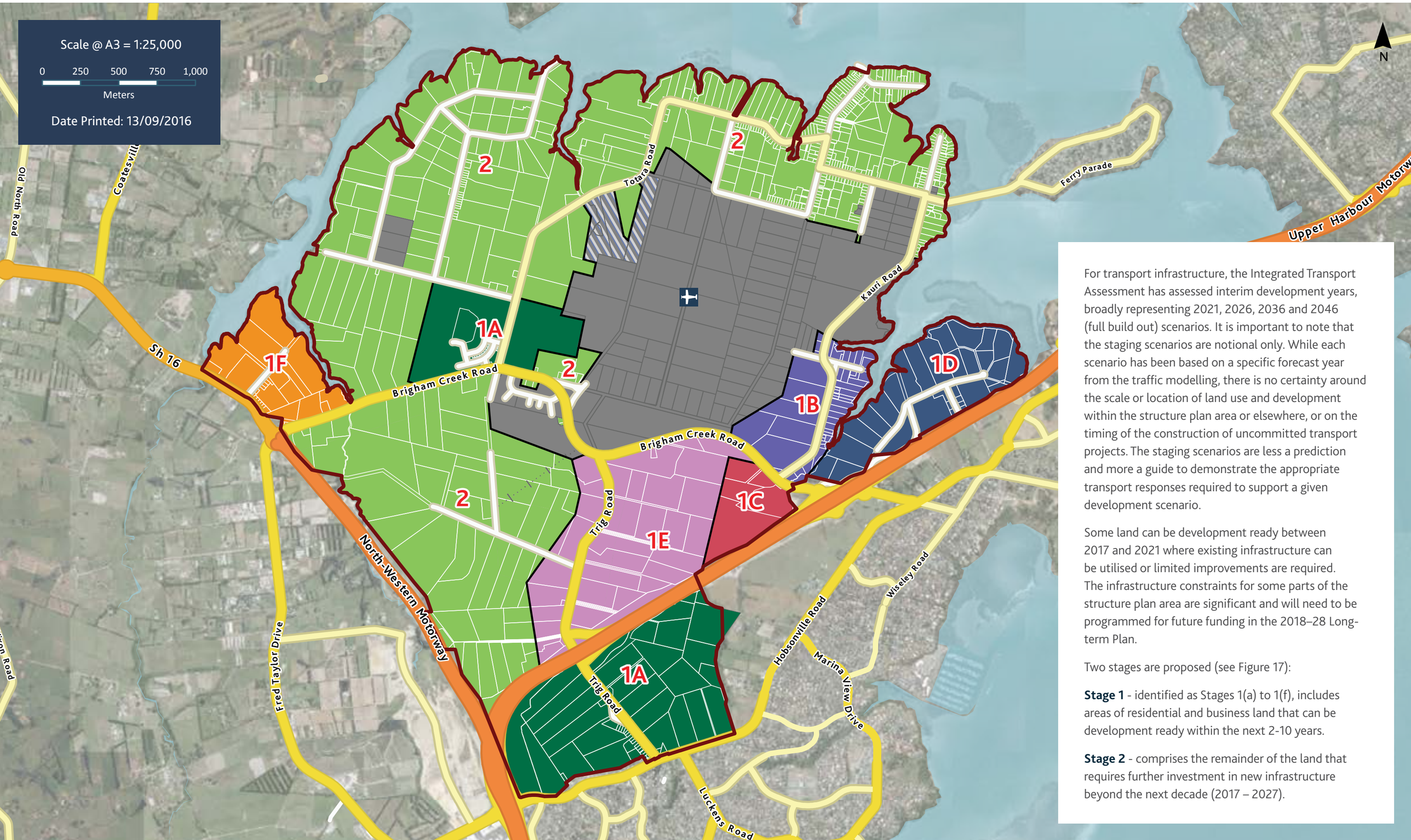
The council also considered feedback from several landowners and developers about staging during the feedback phase of the development of the structure plan. Most of that feedback requested that their land should be in Stage One of the structure plan staging plan. However, other feedback received indicated that not all landowners aspire to have their land developed for urban purposes.

The council has also reviewed the location of land that has previously been unsuccessful as an application for Special Housing Area status. In the limited time available, it has also met with some (but not all) individual landowners and/or land developers that have approached council to share their development concepts. Where the development concepts provided as part of feedback were self-explanatory, the council did not meet with those landowners.

The council has revised the staging plan to address the competing and complementary matters that need to be considered in the staging of urban development. It will include staging thresholds and triggers in the forthcoming plan change that will assist with the timing and sequencing of infrastructure that supports land development, providing for efficient and effective infrastructure provision. This includes consideration of infrastructure requirements that lie both inside and outside the Whenuapai structure plan area, as waste water and transport infrastructure provision are particularly but not solely reliant on infrastructure elsewhere.

Staging

Figure 17: Staging map



For transport infrastructure, the Integrated Transport Assessment has assessed interim development years, broadly representing 2021, 2026, 2036 and 2046 (full build out) scenarios. It is important to note that the staging scenarios are notional only. While each scenario has been based on a specific forecast year from the traffic modelling, there is no certainty around the scale or location of land use and development within the structure plan area or elsewhere, or on the timing of the construction of uncommitted transport projects. The staging scenarios are less a prediction and more a guide to demonstrate the appropriate transport responses required to support a given development scenario.

Some land can be development ready between 2017 and 2021 where existing infrastructure can be utilised or limited improvements are required. The infrastructure constraints for some parts of the structure plan area are significant and will need to be programmed for future funding in the 2018–28 Long-term Plan.

Two stages are proposed (see Figure 17):

Stage 1 - identified as Stages 1(a) to 1(f), includes areas of residential and business land that can be development ready within the next 2-10 years.

Stage 2 - comprises the remainder of the land that requires further investment in new infrastructure beyond the next decade (2017 – 2027).

It is anticipated that within these stages more fine-grained staging of development will occur reflecting when additional infrastructure capacity is available.

The stages identified for the structure plan indicate the council's current understanding in relation to areas that are more readily serviced with bulk infrastructure. In particular, the completion of the Northern Interceptor (Stage 1 to be completed in 2021 and Stage 2 by 2028) is critical to releasing additional capacity within the wastewater network and there are significant improvements required to the regional roading network that are currently not planned or funded.

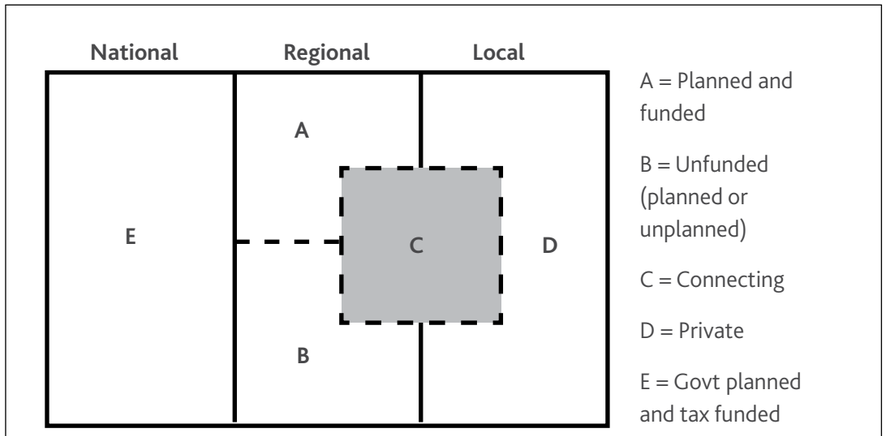


Figure 18: Funding for infrastructure

9.2 Funding

9.2.1 Funding mechanisms

The proposed public open space and infrastructure works, e.g. roads, depicts what Auckland Council considers to be an appropriate resource management outcome for the delivery of the Whenuapai Structure Plan as a whole. The primary responsibility for funding these outcomes lies with developers and not the council. The council is open to considering, on a case-by-case basis, whether some of the outcomes may be funded by the council using development contributions and other funding mechanisms. The council encourages developers to engage with its Development Programme Office so that these issues can be considered as early as is possible in the development project cycle.

The council funds and delivers public infrastructure projects through the collection of Development Contributions and Rates. There is a clear difference between the infrastructure provided and the ability to fund this. The council can, at times, work with developers to agree specific development funding agreements. The decision making for regional prioritisation of public projects is made by the asset owners. The prioritisation, delivery, timing and funding of public infrastructure projects are then set in the Long-term Plan. The Long-term Plan is reviewed every three years, with the next review scheduled for 2018. Work on this is expected to commence in 2017.

Figure 18 illustrates how infrastructure is funded. The council funds only A and may fund projects from B during the Long-term Plan processes. Generally, developers need to fund infrastructure in two cases – where it is local infrastructure, C or D, or where it is regional infrastructure out of sequence, A or B. Where infrastructure is out of sequence, developers will be expected to meet the cost of the infrastructure and ensure that the installed infrastructure is future proofed, i.e. the installed infrastructure does not need to be replaced when other in or out of sequence development occurs.

9.2.2 Infrastructure Funding Agreements

Infrastructure funding agreements assist to align and coordinate a developer's delivery requirements with Auckland's infrastructure providers. The council will work with developers, landowners and Council Controlled Organisations to enable development of public works (by all of these participants in the development process), that are fully integrated with all other infrastructure required to service the proposed development. This entails enabling private development by agreeing and facilitating timing, funding and delivery of all required public works.

Types of infrastructure agreements:

- when the council requires a developer to deliver a planned and funded public project acting as a delivery agent for the council
- when a council stakeholder (Development Programme Office, Parks, Community Facilities, Healthy Waters, Auckland Transport) has identified a local public project that is to be delivered and paid for by a developer, e.g. unplanned, unfunded works.
- growth projects required as a result of a development
- contribution arrangements for local public works, including defining who delivers the works.

The council can also facilitate commercial agreements between multiple landowners. These agreements include, but are not limited to, multiple party commercial agreements for cost sharing of public works.

10 Monitoring and Review

A monitoring and review framework to assess and evaluate the Whenuapai Structure Plan will be developed. This framework will set out the components required for an integrated monitoring strategy which can evaluate implementation and adequately fulfil reporting requirements under relevant legislation. It will also provide a reliable source of data to evaluate the delivering of objects both spatially and temporally, as well as information which can be drawn upon to review the plan's approach and progress. Ultimately this monitoring and review will inform future policy development and implementation.

10.1 How will it be implemented in the Whenuapai Structure Plan context?

The framework will be led by a small technical team to establish a baseline that will facilitate and guide discussions. The nature of engagement with internal and external stakeholders will be fluid to reflect the varying interests in how and what is to be evaluated; an oversight and guiding hand by a team responsible for implementation will be necessary to ensure delivery is practical, appropriate and achievable.

The monitoring and review framework for the structure plan will be based on the six step approach that has been used in the Long Bay Structure Plan Monitoring Framework[15].

10.2 How do we measure if this work has been successful?

Success will require the formulation of a suite of indicators with clear links to the environmental outcomes that are aspired to by the structure plan, e.g. measuring the amount of riparian planting is fruitless if the objective is to improve or maintain freshwater quality and biodiversity; the former does not necessarily lead to the latter.

[15] *Long Bay Structure Plan Monitoring Framework, Summary Report, July 2011, Landcare Research*

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Data collection and the evaluation of outcomes will need to be collated and reported on in a timely manner. They should be capable of influencing the development approach across the site if environmental outcomes are not being met.

The success of a monitoring programme relies not only on getting results but the process of getting useful results. This requires time and resources to achieve due to the long term inertia of early planning decisions and economic realities. However, a balance must be struck because with the absence of good monitoring information, there is an increase in the risk of failing to manage significant issues and effects, recognise opportunities for improvement, and assess the effectiveness of policy instruments, strategies and plans. The need to balance this risk carefully against the benefits of monitoring and associated costs will be a paramount factor when developing a monitoring framework to guide the prioritisation of issues and monitoring activities.

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Appendix 1

Glossary and abbreviations of terms

Airbase	Whenuapai Airbase.
ART model	Auckland Regional Transport (ART) model is a four stage transport demand model that determines trip generation, trip distribution, mode choice and traffic routing based on land use information provided by the Auckland Strategic Planning (ASP) land use model. The ART model assigns traffic volumes to a modelled roading network and provides demand flows that can be used in more detailed traffic models.
Cultural Values Assessment	A document which provides background information on the interests, issues and values which mana whenua associate with an area or resource to help inform the preparation of a plan.
Freshwater NPS	National Policy Statement for Freshwater Management 2014.
Frequent transit network (FTN)	A network of major bus and ferry corridors connecting the city centre, metropolitan centres, and other major centres, providing at least a 15 minute service all day (initially 7am to 7pm), with significant priority measures.
Future Urban zone	A zone used to identify rural land for urban development in the future. This zone will remain in place until a plan change re-zones the land to the appropriate urban zone (e.g. residential or business). Rural activities are able to continue on this land until the urban zone becomes effective.
Greenfield land	Rural or open land that is being developed for urban purposes for the first time.
Group 1 business land	Land extensive activities such as manufacturing, transport and storage, logistics, construction and wholesale trade.
Integrated Transport Assessment (ITA)	Assesses the transport effects of a development proposal including traffic related matters.
Kaitiaki	Guardian.
Long-term Plan	A 10-year plan prepared under the Local Government Act 2002 containing programmes for the council's priorities, activities and operating and capital expenditure.
Mana whenua	Māori with ancestral rights to resources in Auckland and responsibilities as kaitiaki over their tribal lands, waterways and other taonga. Mana whenua are represented by iwi authorities.
Mauri	Life force.
Metropolitan Urban Limit	A boundary which delineates the outside edge of metropolitan Auckland as at 2010.
NES	National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health 2011
New Network	A new Auckland-wide public transport network that will include frequent, connector, local and peak services. The New Network will be fully-implemented by 2018.
Noise contours / Airport Noise Boundary	The 55 dB L_{dn} and 65 dB L_{dn} lines on relating to the Whenuapai Airbase designation 4310 in the Auckland Unitary Plan Operative in Part for Whenuapai Airbase.
North-West Wildlife Link	A project begun in 2006 to create a green corridor that links habitats and communities from the Waitākere Ranges in the west to the Hauraki Gulf Islands in the east. This is a collaborative project between Forest and Bird and Auckland Council with support from Department of Conservation.
Northern Strategic Growth Area (NorSGA)	An area identified in the Auckland Regional Growth Strategy 1999 as the location for expansion in the northwest. The area includes Massey North, Hobsonville Corridor, Hobsonville Point, Scott Point, Whenuapai, and Redhills.
NZDF	New Zealand Defence Force.
Obstacle limitation surfaces	Defined surfaces in the airspace above and adjacent to the aerodrome necessary to enable an aircraft to maintain a satisfactory level of safety while manoeuvring at a low altitude in the vicinity of the aerodrome.
Auckland Unitary Plan Operative in Part	The council's regulatory land use planning document prepared under the Resource Management Act 1991. It provides guidance and rules on how land can be developed.
RMA	Resource Management Act 1991.
Rapid transit network (RTN)	Rail and busway corridors providing dedicated right-of-way connections between the city centre and other selected centres, providing frequent and reliable services (at least 15-minute service all day, initially from 7am to 7pm).
Rural Urban Boundary	The boundary which defines the maximum extent of urban development to 2040 in the form of a permanent rural urban interface.
SEA	Significant Ecological Area.
SH16, SH18	State Highway 16, State Highway 18.
Shape Auckland	The council's online platform for public engagement on council projects, plans and strategies.
Special Housing Area	A tool provided for within the council's agreement with the government, the Auckland Housing Accord under the Housing Accords and Special Housing Areas Act 2013 to boost Auckland's housing supply.
Structure plan area	The Whenuapai structure plan area shown in Figure 2 of this document.
Taonga	A treasured item (tangible or intangible).
Tipuna / tupuna	Ancestor; grandparent.
WSD	Water Sensitive Urban Design is an approach which integrates the urban water cycle, including stormwater, groundwater and wastewater management and water supply, into urban design to minimise environmental degradation and improve aesthetic and recreational appeal.
WSMP	Whenuapai Stormwater Management Plan.
Western Ring Route	A 48-kilometre motorway connecting Manukau, Auckland, Waitākere and the North Shore. It will be an alternative to State Highway 1 and the Auckland Harbour Bridge, bypassing the city to the west.
Whenuapai Centre	The area on Brigham Creek Road between Airport Road and Totara Road.
Whenuapai Village	The area around the Waimarie Road and Puriri Road intersection.

Appendix 2

List of supporting technical reports

Report Title	Author	Date
Biodiversity Assessment (memo)	Rue Statham, Auckland Council	June 2016
Business Land Assessment	Derek Foy, Market Economics Limited	May 2016
Community Facility Provision Report	Maclean Grindell, Auckland Council	August 2016
Cultural Values Assessment for Whenuapai Structure Plan	Scott Lomas, Te Kawerau Iwi Tribal Authority	June 2016
Integrated Transport Assessment Report	Rachel Gasson, Qing Li, Michael Jongeneel & Angie Crafer, Flow Transportation Specialists Ltd	July 2016
Landscape and Visual Supplement	Boffa Miskell	June 2016
Natural Character, Landscape and Visual Assessment	Tom Lines, Boffa Miskell	June 2016
Neighbourhood Design Statement	Yvonne Weeber, Auckland Council	June 2016
Noise Assessment	Claire Drewery, AECOM	June 2016
North-West Transformation Area (NWTA) Wastewater Servicing Strategy	Jay Burgess, MWH	November 2015
Parks and Open Space Report	Ezra Barwell, Auckland Council	August 2016
Preliminary Arboricultural Assessment	Jack Warden, GreensceneNZ Limited	July 2016
Preliminary Coastal Habitat Assessment	Angela Chaffe, AECOM	June 2016
Preliminary Contamination Assessment	Naomi Macorison, AECOM	June 2016
Preliminary Geotechnical and Coastal Erosion Assessment Report	Rhys Graafhui, AECOM	June 2016
Preliminary Historic Heritage Assessment	Simon Bickler, Sarah Macready, Rod Clough & Jane Matthews, Clough & Associates Ltd and Matthews & Matthews Architects Ltd	June 2016
Preliminary Lighting Assessment	Virgil Karan, AECOM	June 2016
Whenuapai Link: Heritage GIS Layers	Simon Bickler, Clough & Associates Ltd	May 2016
Whenuapai Stormwater Management Plan	Daniel Curtis and Angela Chaffe, AECOM	August 2016

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Appendix 3

Auckland Unitary Plan Operative in Part requirements

Auckland Unitary Plan Operative in Part Appendix 1 Structure Plan Guidelines		Structure Plan Section Reference
1.3	**External documents to be taken into account** When preparing structure plans, the external documents in the following list are to be considered where appropriate.	
(1)	Auckland Plan including the directions of the Auckland Plan to be considered as an integrated whole, Auckland's High-Level Development Strategy (refer to section D of the Auckland Plan), and any sub-regional analyses prepared by the Auckland Council.	5.1
(2)	National policy statements and national environmental standards including but not limited to the New Zealand Coastal Policy Statement, the National Policy Statement for Freshwater Management and the National Environmental Standards for Electricity Transmission Activities.	5.2
(3)	This Plan, in particular the regional policy statement.	5.3
(4)	Auckland Council's 10-year budget (the Long-term Plan) and implementation programmes.	5.4
(5)	Local board plans and area plans.	5.5
(6)	Existing integrated catchment management plans and associated network discharge consents.	5.6
(7)	Strategies, plans, codes of practice or programmes of economic, environmental, social and cultural infrastructure providers, with particular regard to the Regional Land Transport Plan, Auckland Transport's Integrated Transport Programme and Watercare's Asset Management Plan.	5.8
(8)	Iwi planning documents.	5.9
(9)	Treaty settlement legislation.	5.10
(10)	Auckland Council's Parks and Open Space Strategy Action Plan.	5.11.1
(11)	Auckland Council's Auckland Design Manual.	5.11.2
(12)	Auckland Council's Code of Practice for Land Development and Subdivision.	5.11.4

Auckland Unitary Plan Operative in Part Appendix 1 Structure Plan Guidelines		Structure Plan Section Reference
1.4	**Matters to identify, investigate and address** **A structure plan is to identify, investigate and address the matters set out below.**	
1.4.1.	**Urban growth**	
(1)	The future supply and projected demand for residential and business land in the structure plan areas to achieve an appropriate capacity to meet the sub-regional growth projections in the Auckland Plan adopted under the Local Government (Auckland Council) Act 2009.	1.2, 5.7, 7.4
(2)	The phases and timing for the staged release of greenfield land or the staged conversion of land within the existing urban area to a more intensive activity for urban development or for comprehensive redevelopment, in coordination with infrastructure.	9.1
(3)	The location, type and form of the urban edge, its appropriateness to the structure plan area and the surrounding area and how transitions between the area to be urbanised and other areas with different activities, building types and densities or levels of intensity are to be managed.	8.3 (structure plan map)
(4)	Linkages and integration with existing urban-zoned and/or rural-zoned land adjoining the structure plan area through careful edge or boundary treatment.	7.3 (ITA) 8.2.1 (Transport element) 8.3 (structure plan map)
(5)	Opportunities to improve access to landlocked parcels, including Māori land.	7.3
1.4.2.	**Natural resources**	
(1)	The protection, maintenance and enhancement of natural resources, particularly those that have been scheduled in the Unitary Plan in relation to mana whenua, natural resources, and the coastal environment.	7.8, 7.9, 7.10, 7.11, 8.2.4
(2)	Demonstrate how proposed subdivision, use, and development will protect, maintain and enhance the values of the resources identified in 1.4.2(1) above.	8.2.4, 8.2.5, 8.3
(3)	The integration of green networks (such as freshwater and coastal water systems, and ecological corridors) with open space and pedestrian and cycle networks, showing how they reflect the underlying natural character values and provide opportunities for environmental restoration and biodiversity.	8.2.3, 8.2.4, 8.2.5
(4)	Measures to manage natural hazards and contamination.	7.16, 7.17
(5)	The location of mineral resources and how access to regionally significant extractable deposits is to be managed.	N/A

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Auckland Unitary Plan Operative in Part Appendix 1 Structure Plan Guidelines		Structure Plan Section Reference
1.4.3.	**Natural and built heritage**	
(1)	The existence of natural and physical resources that have been scheduled in the Unitary Plan in relation to natural heritage, mana whenua, natural resources, coastal environment, historic heritage and special character.	7.8, 7.9, 7.10, 7.11, 8.2.4
1.4.4.	**Use and activity**	
(1)	Contribution to a compact urban form and the efficient use of land in conjunction with existing urban areas to give effect to the regional policy statement.	8.2.2, 8.3
(2)	The adoption of standard Unitary Plan methods and provisions where possible to ensure a consistent approach across the region by all of the following:	N/A – to come in the plan change process
(a)	seeking to avoid the introduction of additional zones;	
(b)	recognising the values of natural heritage, mana whenua, natural resources, coastal, historic heritage and special character through identification of sites or places to be scheduled and the use of existing overlays in the Plan; and	
(c)	recognising specific place-based provisions through the use of precincts.	
(3)	Establishment of new centres and the expansion of existing centres in ways that complement the hierarchy and network of existing centres. Centres should be located and designed to maximise access by walking, cycling and public transport.	8.1, 8.3
(4)	A mix of residential intensities sufficient to support the vitality of centres and communities and to provide housing and transport choice.	8.1, 8.3
(5)	A mix and distribution of land uses within the structure plan area to provide opportunities for business activities and employment, community facilities and open space close to where people live.	8.1, 8.3
(6)	The location and protection of infrastructure and management of reverse sensitivity effects on infrastructure from subdivision, use and development.	7.3, 7.7, 8.1, 8.2, 8.3
(7)	The location and protection of use and development and management of reverse sensitivity effects on use and development.	8.1, 8.2, 8.3

Auckland Unitary Plan Operative in Part Appendix 1 Structure Plan Guidelines		Structure Plan Section Reference
1.4.5.	**Urban development**	
(1)	A desirable urban form at the neighbourhood scale including all of the following:	
(a)	a layout providing pedestrian connectivity with a network of streets and block sizes which allow for a choice of routes, particularly near centres and public transport facilities;	7.14
(b)	provision of a diversity of site sizes within blocks to enhance housing choice, accommodate local small-scale community facilities and where appropriate enable a range of business activity and mixed use;	7.14, 8.3
(c)	provision of open spaces which are highly visible from streets and of a scale and quality to meet identified community needs;	7.5, 8.2, 8.3
(d)	appropriate transitions within and at the edge of the structure plan area between different land use activities, intensities and densities; and	7.5, 8.2, 8.3
(e)	the application of an integrated storm water management approach within developments to reduce impacts on the environment while enhancing urban amenity.	7.6, 8.1, 8.2
1.4.6.	**Transport networks**	
(1)	Integration of land use and development with the local and strategic transport networks.	
(2)	Layout of the transport network and facilities in a manner that is safe, attractive, efficient, and resilient to hazards, well connected to local facilities and integrated with land uses, the surrounding area and the wider transport network.	7.3, 8.1, 8.2, 8.3
(3)	Support for transport and accessibility that is multi-modal and interconnected with an appropriate number and location of access points.	7.3, 8.1, 8.2, 8.3
(4)	Transport effects on land uses and the management of these effects.	7.3, 8.1, 8.2, 8.3
1.4.7.	**Infrastructure**	
(1)	The location and protection of existing and planned infrastructure, including network infrastructure corridors.	7.6, 7.7, 8.1, 8.2
(2)	The location, scale and capacity of existing and new infrastructure to serve the structure plan area.	7.6, 7.7, 8.1, 8.2
(3)	The location, scale and function of stormwater management facilities based on the principles of an integrated stormwater management approach, including the retention of natural water systems and the primary use of onsite flow and quality controls (and related impervious area limits) to manage stormwater runoff from proposed sites and roads.	7.6, 8.1, 8.2
(4)	The location, scale, function and provision of community facilities, including educational, health, welfare and cultural facilities and open space to cater for the needs of communities in the structure plan area and neighbouring areas.	7.5, 7.11, 7.12, 7.13, 8.1, 8.3

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Auckland Unitary Plan Operative in Part Appendix 1 Structure Plan Guidelines		Structure Plan Section Reference
1.4.8.	**Feedback from stakeholders**	
(1)	Feedback from landowners, infrastructure providers, council controlled organisations and communities gained through consultation during the structure planning process.	6
1.5.	**Specialist documents to support the structure plan and plan changes process** The scale and detail of the investigation and reporting required needs to be at a level appropriate to the scale of the area subject to the structure planning process and the complexity of the issues identified by the process. Reports may be required on the matters listed below to support the structure planning and plan change process.	
(1)	**Land use:**	
(a)	evaluation of the identified role of and principal objectives for the structure plan area in terms of land uses and amenity values;	3.2, 8.1 and the Neighbourhood Design Statement (Auckland Council, 2016)
(b)	assessment against any relevant sub-regional spatial plan; and	5.1
(c)	analysis of anticipated land use supply and demand informing the spatial allocation of areas for different activities, intensities and densities.	1.2, 5.7, 7.4
(2)	**Infrastructure:**	
(a)	integrated catchment management plan - stormwater management plan, including network plans, updates to catchment or zone management plans and variations to existing or new network discharge consents, where relevant;	7.6 and Stormwater Management Plan (AECOM, 2016)
(b)	integrated transport assessment;	7.3 and Integrated Transport Assessment (Flow, 2016)
(c)	water and wastewater servicing plan; and	7.7 and North-West Transformation Area Wastewater Servicing Strategy (MWH, 2015)
(d)	other infrastructure plans.	5.8
(3)	**Impact on natural and cultural values:**	
(a)	landscape assessment;	7.9 and Natural Character, Landscape and Visual Assessment (Boffa Miskell, 2016)
(b)	assessment of effects on the cultural well-being of people and communities who have relationships with the area, including where appropriate mapping of local history and whakapapa;	5.9, 7.11 and Cultural Values Assessment for Whenuapai Structure Plan (Te Kawerau Iwi Tribal Authority, 2016)
(c)	archaeological, historic heritage and special character assessment;	7.10 and Preliminary Historic Heritage Assessment (Clough and Associates Ltd and Matthews and Matthews Architects Ltd, 2016)
(d)	natural heritage assessment; and	7.9 and Preliminary Arboricultural Assessment (GreensceneNZ Ltd, 2016)

Auckland Unitary Plan Operative in Part Appendix 1 Structure Plan Guidelines		Structure Plan Section Reference
(e)	freshwater and ecological assessment.	7.6, 7.8, Biodiversity Assessment (Auckland Council, 2016) and Whenuapai Stormwater Management Plan (AECOM, 2016)
(4)	**Environmental risk:**	
(a)	geotechnical assessment;	7.16 and Preliminary Geotechnical and Coastal Erosion Assessment Report (AECOM, 2016)
(b)	land contamination and remediation assessment; and	7.17 and Preliminary Contamination Assessment (AECOM, 2016)
(c)	health impact assessment.	7.13
(5)	**Implementation:**	
(a)	staging plan;	9.1
(b)	funding plan;	9.2
(c)	affordability assessment;	7.15
(d)	neighbourhood design statement; and	7.14 and Neighbourhood Design Statement (Auckland Council, 2016)
(e)	other documents depending on the characteristics of the land and water resources of the area.	Noise Assessment (AECOM, 2016) and Preliminary Coastal Habitat Assessment (AECOM, 2016)

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Appendix 4

Transport requirements

Notes:

- The transport staging scenarios below are notional only. While each scenario has been based on a specific forecast year from the ART model, there is not necessarily certainty on the scale or location of land use development within Whenuapai or elsewhere, or on the timings of uncommitted transport projects. The staging scenarios are less a prediction and more a guide to demonstrate the appropriate transport responses required to support a given development scenario.
- In the following table:
  - A 'regional' requirement generally denotes an item proposed through planning programmes other than the Whenuapai Structure Plan (WSP), but is required to support the WSP as well as other development areas.
  - A 'Structure Plan Area' requirement denotes an item generally internal to Whenuapai or directly bounding it, and required primarily to support the WSP area.
- The relevant programmes and documents use the following abbreviations:
  - Northern Strategic Growth Area = NORSGA
  - Transport for Future Urban Growth = TFUG
  - Western Ring Route = WRR
  - Whenuapai Structure Plan = WSP
  - Integrated Transport Assessment = ITA.
- The left hand column identifies two matters – the ITA Scenarios and the Staging numbering. Please refer to the Staging Map (Figure 17) to identify where each stage is located. Therefore in each row, the first number in the left hand column is the Scenario number, the second number in the same column is the Staging number.

ITA Scenario Council Staging	Regional or SPA requirement?	Associated Transport Infrastructure Items	Relevant Programme (if applicable)	Status
1a	**Regional**	FTN on Hobsonville Road which may require widening of Hobsonville Road to provide bus priority.	NORSGA	Upgrade is funded and planned for implementation 2020-22. Bus service to be upgraded to FTN standard by 2025.
		FTN from Brigham Creek Road to Kumeu.	TFUG	Identified in 'preferred' TFUG network. Implementation dates subject to business case outcome, future NZTA and Council funding allocations.
		Bus shoulder running Auckland CBD to Westgate.	WRR	Funded and underway.
		SH16 widening between Hobsonville Road and Lincoln Road.	WRR	Funded and underway.
		Realignment and urbanisation of Trig Road south of SH18 to connect to Luckens Road and traffic signals at the Trig Road / Hobsonville Road / Luckens Road intersection.	NORSGA / TFUG	Identified in 'preferred' TFUG network. Implementation dates subject to business case outcome, future NZTA and Council funding allocations.
		Widening of SH16 between Brigham Creek Road and Coatesville-Riverhead Highway to provide two lanes in each direction.	None – identified in the WSP ITA.	Not in current plans or funding programmes.
		SH16 / Brigham Creek Road roundabout capacity improvements comprising a signalised roundabout or three lanes on the SH16 northbound approach hand three lanes around the western side of the roundabout.	None – identified in the WSP ITA.	Not in current plans or funding programmes. Potential crossover with TFUG Brigham Creek Road upgrade.
		New roundabout at SH16 / Coatesville-Riverhead Highway intersection.	TFUG	Identified in 'preferred' TFUG network. Implementation dates subject to business case outcome, future NZTA and Council funding allocations.
		Traffic signals on Hobsonville Road at Brigham Creek Road, Sinton Road and Clark Road.	NORSGA	Upgrade is funded and planned for implementation 2020-22.

ITA Scenario Council Staging	Regional or SPA requirement?	Associated Transport Infrastructure Items	Relevant Programme (if applicable)	Status
1a	**Structure Plan Area**	A comprehensive network of pedestrian footpaths and appropriate cyclist infrastructure commensurate with development but in line with ultimate provisions.	None – identified in the WSP ITA.	Not in current plans or funding programmes.
		Bus connector network within Whenuapai connecting to Westgate FTN/RTN and FTN along Hobsonville Road.	None – identified in the WSP ITA.	Not in current plans or funding programmes.
		Brigham Creek Road urbanisation with 50km/h speed restriction between SH16 and SH18 interchanges.	TFUG	Identified in 'preferred' TFUG network. Implementation dates subject to business case outcome, future NZTA and Council funding allocations.
		Widening of Brigham Creek Road to four lanes between Totara and Tamatea Roads, and between Kauri Road and the SH18 / Brigham Creek Road interchange.	TFUG / Identified in the WSP ITA.	Four-laning of entire Brigham Creek Road identified in 'preferred' TFUG network. WSP ITA finding is that only localised widening is required. Implementation dates subject to business case outcome, future NZTA and Council funding allocations.
		Extension of Riverlea Road to meet Brigham Creek Road.	None – identified in the WSP ITA.	Not in current plans or funding programmes.
		Traffic Signals at Brigham Creek Road / Riverlea Road, Brigham Creek Road / Totara Road / Mamari Road; and Brigham Creek Road / Tamatea Avenue intersections.	None – identified in the WSP ITA.	Not in current plans or funding programmes. Potential crossover with TFUG Brigham Creek Road upgrade.
		New local road east of Trig Road between Trig Road and Hobsonville Road.	None – identified in the WSP ITA.	Not in current plans or funding programmes.
		New local road east of Trig Road south of SH16.	None – identified in the WSP ITA.	Not in current plans or funding programmes.
		Traffic signals at Trig Road / local road between SH18 and Hobsonville Road intersection.	None – identified in the WSP ITA.	Not in current plans or funding programmes.

ITA Scenario Council Staging	Regional or SPA requirement?	Associated Transport Infrastructure Items	Relevant Programme (if applicable)	Status
1b	**Regional**	As per 1a.		
1b	**Structure Plan Area**	As per 1a, plus:		
		Traffic signals at Kauri Road / Brigham Creek Road intersection.	None – identified in the WSP ITA.	Not in current plans or funding programmes. Potential crossover with TFUG Brigham Creek Road upgrade.
1c	**Regional**	As per 1a and 1b.		
1c	**Structure Plan Area**	As per 1a and 1b, plus:		
		Addition of fourth leg to Kauri Road / Brigham Creek Road intersection and inclusion of two right turn lanes from Brigham Creek Road to Kauri Road.	None – identified in the WSP ITA.	Not in current plans or funding programmes. Potential crossover with TFUG Brigham Creek Road upgrade.
1d	**Regional**	As per 1a-1c, plus:		
		RTN/FTN along SH18 with station in Sinton Road area.	TFUG	Identified in 'preferred' TFUG network. Implementation dates subject to business case outcome, future NZTA and Council funding allocations.
1d	**Structure Plan Area**	As per 1a-1c, plus:		
		Removal of existing Sinton Road connection to the Brigham Creek Road / SH18 northbound ramps intersection with a new local connection between Sinton Road and Kauri Road.	None – identified in the WSP ITA.	Not in current plans or funding programmes.
		Kauri Road widening may be required between Brigham Creek Road and Sinton Road.	None – identified in the WSP ITA.	Not in current plans or funding programmes.
1e	**Regional**	As per 1a-1d, plus:		
		RTN/FTN along SH16 with station at Brigham Creek Road interchange.	TFUG	Identified in 'preferred' TFUG network. Implementation dates subject to business case outcome, future NZTA and Council funding allocations.

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ITA Scenario Council Staging	Regional or SPA requirement?	Associated Transport Infrastructure Items	Relevant Programme (if applicable)	Status
		Capacity improvements at SH16 / Brigham Creek Road roundabout comprising signalising the roundabout and increasing the number of lanes on the SH16 approaches and around the roundabout.	None – identified in the WSP ITA.	Not in current plans or funding programmes. Potential crossover with TFUG Brigham Creek Road upgrade.
1f	**Structure Plan Area**	As per 1a-1d, plus:		
		Signals at the intersection of Brigham Creek Road and the local road serving the Kennedys Road development.	None – identified in the WSP ITA.	Not in current plans or funding programmes. Potential crossover with TFUG Brigham Creek Road upgrade.
		Widening of Brigham Creek Road between SH16 and Riverlea Road.	TFUG / identified in WSP ITA.	Four-laning of entire Brigham Creek Road identified in 'preferred' TFUG network. WSP ITA finding is that only localised widening is required. Implementation dates subject to business case outcome, future NZTA and Council funding allocations.
2	**Regional**	Capacity improvements at the SH16 / Brigham Creek Road roundabout comprising signalising and increasing the number of lanes on all approaches and around the roundabout.	None – identified in the WSP ITA.	Not in current plans or funding programmes. Potential crossover with TFUG Brigham Creek Road upgrade.
		Hobsonville Road widening between Trig Road and Marina View Road.	NORSGA	Upgrade is funded and planned for implementation 2020-22.
		Traffic signals on Hobsonville Road at Marina View Road, Westpark Drive and Suncrest Drive.	NORSGA	Upgrade is funded and planned for implementation 2020-22.

ITA Scenario Council Staging	Regional or SPA requirement?	Associated Transport Infrastructure Items	Relevant Programme (if applicable)	Status
Partly 1e and Partly 2	**Structure Plan Area**	FTN bus routes to service Whenuapai Structure Plan area.	None – identified in the WSP ITA.	Not in current plans or funding programmes.
		Additional fourth leg at signalised intersection at Brigham Creek Road / Spedding Road Extension / Kennedys Road link intersection.	None – identified in the WSP ITA.	Not in current plans or funding programmes. Potential crossover with TFUG Brigham Creek Road upgrade.
		Extend / widen Mamari Road to provide access to industrial area.	None – identified in the WSP ITA.	Not in current plans or funding programmes.
		Construct new road opposite Riverlea Road south of Brigham Creek Road into industrial area.	None – identified in the WSP ITA.	Not in current plans or funding programmes.
		Upgrade existing sections of Spedding Road and Mamari Road and their intersections to be suitable for industrial traffic including footpaths and cyclist facilities.	None – identified in the WSP ITA.	Not in current plans or funding programmes.
		Construct Spedding Road Extension south from Brigham Creek Road, east of SH16 into industrial area.	None – identified in the WSP ITA.	Not in current plans or funding programmes. Potential crossover with TFUG Brigham Creek Road upgrade.
		Construct new road into industrial area from Brigham Creek Road east of Trig Road.	None – identified in the WSP ITA.	Not in current plans or funding programmes.
		Urbanisation of Trig Road between Brigham Creek Road and SH18 Interchange.	TFUG	Identified in 'preferred' TFUG network. Implementation dates subject to business case outcome, future NZTA and Council funding allocations.
		Widen Fred Taylor Drive between SH16 / Brigham Creek Road and Northside Drive.	None – identified in the WSP ITA.	Not in current plans or funding programmes.
		Traffic signals at the Brigham Creek Road / Trig Road intersection.	None – identified in the WSP ITA.	Not in current plans or funding programmes. Potential crossover with TFUG Brigham Creek Road upgrade.

ITA Scenario Council Staging	Regional or SPA requirement?	Associated Transport Infrastructure Items	Relevant Programme (if applicable)	Status
3	**Regional**	As per Stages 1a-e and 2, plus:		
		RTN from Westgate to the North Shore (as per Scenario 1d) with an additional station along SH18 at a new bridge over SH18 between Trig Road and Brigham Creek Road interchange.	TFUG	Identified in 'preferred' TFUG network. Implementation dates subject to business case outcome, future NZTA and Council funding allocations.
		New arterial road alternative to SH16 between Brigham Creek Road and Kumeu (initially two lanes).	TFUG	Identified in 'preferred' TFUG network. Implementation dates subject to business case outcome, future NZTA and Council funding allocations.
		Interchange at realigned SH16 / Brigham Creek Road with signalised intersections.	TFUG	Identified in 'preferred' TFUG network. Implementation dates subject to business case outcome, future NZTA and Council funding allocations.
		Investigation of realignment of 'old' SH16 to provide appropriate separation from new SH16 / Brigham Creek Road interchange, and future Kennedys Road link intersection with Brigham Creek Road. Traffic signals would be required on Brigham Creek Road if intersection is feasible.	TFUG	Identified in 'preferred' TFUG network. Implementation dates subject to business case outcome, future NZTA and Council funding allocations.
		Traffic signals at SH18/Trig Road interchange.	TFUG	Identified in 'preferred' TFUG network. Implementation dates subject to business case outcome, future NZTA and Council funding allocations.
		Northside Drive connection to Trig Road interchange and SH16 / Northside Drive south-facing ramps with four lanes between Northside Drive and Mamari Road.	TFUG	Identified in 'preferred' TFUG network. Implementation dates subject to business case outcome, future NZTA and Council funding allocations.

ITA Scenario Council Staging	Regional or SPA requirement?	Associated Transport Infrastructure Items	Relevant Programme (if applicable)	Status
		SH16 / SH18 motorway connections.	TFUG	Identified in 'preferred' TFUG network. Implementation dates subject to business case outcome, future NZTA and Council funding allocations.
		Additional lane SH18 eastbound between Trig Road and Brigham Creek Road.	None – identified in the WSP ITA.	Not in current plans or funding programmes.
		Additional lane SH18 westbound between Tauhinu Road and Squadron Drive.	None – identified in the WSP ITA.	Not in current plans or funding programmes.
		Traffic signals at the SH18 / Brigham Creek Road interchange.	TFUG	Identified in 'preferred' TFUG network. Implementation dates subject to business case outcome, future NZTA and Council funding allocations.
2	**Structure Plan Area**	As above, plus:		
		Additional lanes at the Brigham Creek Road / Totara Road / Mamari Road intersection.	None – identified in the WSP ITA.	Not in current plans or funding programmes.
		Upgrades to existing roads within industrial areas and provision of new roads as necessary to avoid driveways onto Brigham Creek Road, Mamari Road and Northside Drive.	None – identified in the WSP ITA.	Not in current plans or funding programmes.
		Local road connection between Riverlea Road and Totara Road near Rarawara Creek.	None – identified in the WSP ITA.	Not in current plans or funding programmes.
		Capacity improvements at the Brigham Creek Road / Totara Road / Mamari Road intersection.	None – identified in the WSP ITA.	Not in current plans or funding programmes.
		Mamari Road extension to Northside Drive plus traffic signals at the Mamari Road / Northside Drive intersection and the Mamari Road / Spedding Road intersection.	None – identified in the WSP ITA.	Not in current plans or funding programmes.

ITA Scenario Council Staging	Regional or SPA requirement?	Associated Transport Infrastructure Items	Relevant Programme (if applicable)	Status
		Spedding Road connection between Brigham Creek Road and Trig Road.	None – identified in the WSP ITA.	Not in current plans or funding programmes.
		Signals at Totara Road / Dale Road intersection.	None – identified in the WSP ITA.	Not in current plans or funding programmes.
		Traffic signals at Spedding Road / Trig Road / Spedding Road extension intersection.	None – identified in the WSP ITA.	Not in current plans or funding programmes.
		A new bridge between Marina View Drive and Spedding Road extension, with signals on Spedding Road extension.	TFUG	Identified in 'preferred' TFUG network. Implementation dates subject to business case outcome, future NZTA and Council funding allocations.
		Extension of Bristol Road to meet Brigham Creek Road and traffic signals at the intersection of these roads.	None – identified in the WSP ITA.	Not in current plans or funding programmes. Potential crossover with TFUG Brigham Creek Road upgrade.
4	**Regional**	As above, plus:		
		SH18 Squadron Drive interchange west facing ramps.	TFUG	Identified in 'preferred' TFUG network. Implementation dates subject to business case outcome, future NZTA and Council funding allocations.
		SH18 eastbound widening between Brigham Creek Road and Squadron Drive.	None – identified in the WSP ITA.	Not in current plans or funding programmes.
		SH18 westbound widening between Squadron Drive and Trig Road.	None – identified in the WSP ITA.	Not in current plans or funding programmes.
		Four laning of the new arterial to Kumeu (alternative to SH16).	TFUG	Identified in 'preferred' TFUG network. Implementation dates subject to business case outcome, future NZTA and Council funding allocations.
1b	**Structure Plan Area**	As per above.		

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