AURANGA B2 PRIVATE PLAN CHANGE, DRURY

Ecological Values Assessment

Report prepared for

Karaka & Drury Ltd, Auckland

Prepared by

RMA Ecology Ltd

Report number and date

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BETTER ECOLOGICAL OUTCOMES

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BETTER ECOLOGICAL OUTCOMES

Executive Summary

The proposed Auranga B2 development is located south-west of Drury and south of the existing Drury 1 Precinct (Auranga A) and is approximately 35.3 ha.

The site is proposed to be developed, by the Private Plan Change (PPC) applicant, Karaka & Drury Ltd (KDL), into predominately residential housing. The site will eventually be integrated with the adjoining Drury 1 Precinct.

Karaka & Drury Ltd has engaged RMA Ecology Ltd (REL) to undertake an assessment of the likely values of the development site in terms of aquatic and terrestrial ecology. This is to support the Structure Plan required by Appendix 1 of the AUP, and the PPC.

The approach included survey of terrestrial and freshwater areas. Site visits were undertaken on 9 & 10 February 2017, 21 June 2017 and 28 March 2019 to assess the variety of ecosystems and the ecological values present within the development footprint.

Overall aquatic ecology values range from low to moderate within the PPC area. All streams have been heavily modified by past farming activities and some continue to be degraded by lack of riparian cover and stock access. Observations of stream riparian cover and instream quality, supported by observations from streams within Auranga B, and biological and water quality information from Auranga A, reinforces our assessment that the streams at the site are heavily degraded.

Total waterway length within Auranga B2 is estimated to be 965 m, of which approximately 490 m comprises intermittent or permanent streams. Several ponds exist across the site, including a large 1.2 ha expanse as part of Stream H. One wetland is present – as part of the headwater margin to Ngakaroa Creek on the south-eastern part of the site. A portion of that wetland is within Auranga B2 and is influenced by overland flows from Auranga B2. The wetland is well vegetated, is not grazed by stock and is in good condition, although it is likely to have been induced/ created form past earthworks across this part of SH1/ Karaka Road.

There is no remnant or secondary regenerating native forest on this site and no listed SEAs, although the SEA associated with Ngakaroa Creek is adjacent to the northern/ eastern part of Auranga B2.

Most woody vegetation across the sites exist as exotic specimen trees, shelter belts or hedgerows. These provide limited and low quality nesting and food resources for birds, and at most benefit a few native birds that are neither threatened nor rare.

Due to the low diversity of native birds and native vegetation, and likely lack of native lizards, the overall indigenous ecological value of Auranga B2 is considered to be low.

1. The structure plan should identify the streams and wetlands as constraints in the analysis of the features of the PPC area; and
2. The Precinct Plan as part of the PPC should identify the streams recorded in this report (noting however that the stream classifications in some cases are indicative given the limitations identified in this report), and the wetland on the margins of Ngakaroa Creek.

The identification of the features identified in this report will assist in their recognition at the time of future resource consent applications.

The AUP includes a comprehensive set of rules relating to identified features (for example E3 for steams and E15 for vegetation). These are considered to be appropriate to address the potential for adverse effects in the same way they already apply to the area's Future Urban Zone or Auranga A's Drury 1 Precinct. From an ecological perspective, these rules are appropriate to address relevant effects that may be generated at the time of resource consent.

CONTENTS

1.0 Introduction

1.1 Background

The proposed Auranga B2 development is located south-west of Drury and south of the existing Drury 1 Precinct (Auranga A).

The area is approximately 35.3 ha and includes properties along either side of the southern and central portion of Burberry Road (numbers 5, 6, 14, 16, 18, 16A, 20, 24, 25, and 15 Burberry Road) (Figure 1).

The site is proposed to be developed, by the Private Plan Change (PPC) applicant, Karaka & Drury Ltd (KDL), into predominately residential housing. The site will eventually be integrated with the adjoining Drury 1 Precinct.

1.2 Purpose and scope

Karaka & Drury Ltd has engaged RMA Ecology Ltd (REL) to undertake an assessment of the likely values of the development site in terms of aquatic and terrestrial ecology. This is to support the Structure Plan required by Appendix 1 of the AUP, and the PPC.

Current land use is rural and dominated by farming and horticulture with rural lifestyle dwellings. The site is held within multiple titles, many of which have an occupied dwelling. Access to all parts of the site was not possible as landowner access was granted only to some properties. Therefore, we divided our proposed approach between desk-top review and site-based survey to obtain an accurate assessment of ecological values across the site.

I have been advised that the Council in the draft Whenuapai Structure Plan (and the future plan change) has relied upon desktop assessments to inform the structure plan process. This approach is generally acceptable to support rezoning, however in the case of Auranga B2 (and the earlier Plan Change 6, and Plan Variation 15 for Auranga B and A, respectively) the consultant team have sought to verify features and information through field assessments. This contributes to greater certainty regarding the PPC, along with future resource consent applications and designs for development. Not all sites were able to be visited, however in my opinion sufficient information was gathered from those sites where access was available to provide a significant degree of ground truthing of the available information and databases.

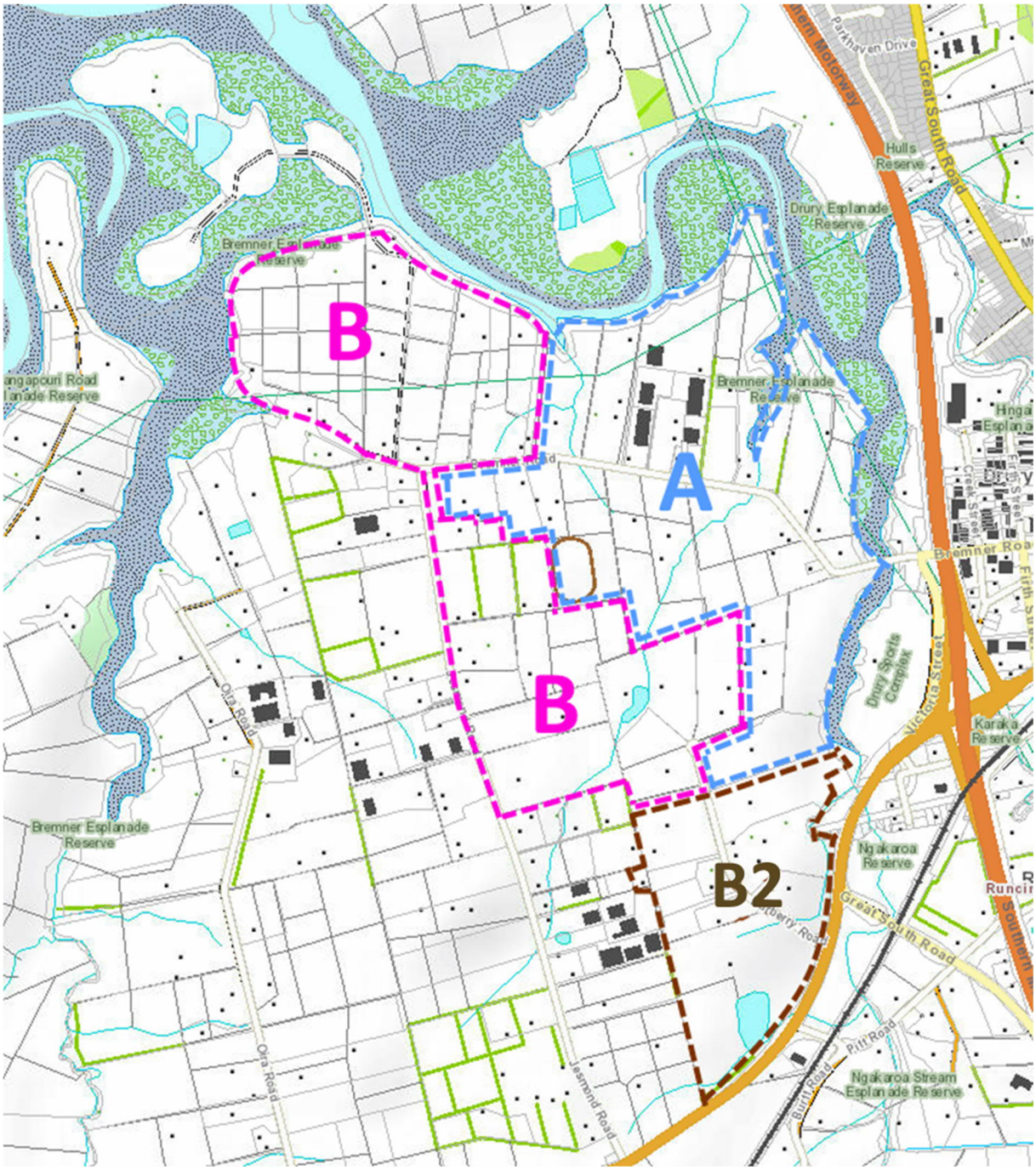

Figure 1. Auranga B2 in relation to approved Plan Change areas Auranga A (top right) and Auranga B.

The approach included survey of terrestrial and freshwater areas and provides the following:

- Identification of sites of particular ecological significance (Significant Ecological Areas; SEA);
- Review of databases to identify the likelihood of species of conservation significance being present, with an emphasis on freshwater fish, native lizards, and plants and birds;
- Walkover survey to identify or validate the presence of native vegetation, especially areas that meet criteria for assessing ecological significance under the Auckland Unitary Plan (AUP);
- Walkover and stream-specific sampling (where access is feasible and flow exists) to:
  - Determine stream values, using qualitative scoring methods along multiple reaches of all accessible, flowing streams;
  - Map the boundaries of stream types (permanent, intermittent and ephemeral);

  - Map wetlands, ponds, and potential barriers to stream functioning (e.g. culverts).

This report contains the following:

- An overview of the methods used to assess the ecological values and the ecological significance of areas potentially affected by the development;
- A description of ecological values within the development footprint and immediate surrounds;
- An assessment of ecological significance of the development footprint and immediate surrounds, based on assessing the ecological values of the development area against:
  - significance criteria in the AUP; and
  - based on the presence of listed Significant Ecological Areas and/or Natural Stream Management Areas (NSMAs) in the AUP;

The next phase of ecology reporting (not reported here) would normally include the following, once resource consent applications are being prepared to enable subdivision and land use development:

- An assessment of the type and magnitude of potential effects associated with the development, construction and operational activities, including potential habitat loss and degradation, and direct mortality or injury of indigenous fauna where the rules of the AUP, for example E3, E15, E16 or E38 are triggered by development; and
- Recommendations to address adverse effects.

2.0 Methods

Desktop analyses and field/site visits were used to determine the ecological values of terrestrial and freshwater areas within and surrounding the development footprint, as well as the significance of those values. This section of the report describes the methods used for desktop and field investigation locations.

2.1 Desktop assessment

A desktop assessment of the development footprint and surrounding area was undertaken to identify sites assessed as potentially having ecological values, as well as sites already listed as being ecologically significant based on a review of the AUP. Legacy District and Regional Plans were reviewed for completeness and to cross-verify against the descriptions and extents of features identified in the AUP.

These resources were also used, where available, to provide insight as to the reasons why areas were significant, and the ecological values they comprise. Areas with ecological values that were not identified or which were not listed as ecologically significant in the various reviewed documents, were assessed against the significance criteria of the AUP (Schedule 3 – Significant Ecological Areas: Terrestrial Schedule).

The Auckland Council GIS was reviewed to identify existing vegetation, streams and overland flow paths present on the site and to establish an understanding of the ecological status of the waterways present. Maps of these existing features (streams and overland flow paths (categories 4,000 m^2 to 3 ha and > 3 ha)) were then ground-truthed, where access was approved to individual properties.

The following documents and databases were reviewed for the ecological assessment:

- New Zealand Freshwater Fish Database;
- NIWA Freshwater Biodiversity Database;
- National Amphibian and Reptile Database System (Herpetofauna) to gather information on lizard species that have been recorded in proximity to the project site; and
- Auckland Unitary Plan.

Any threatened species found were recorded and their threat status checked against the relevant national threatened species classification lists (Hitchmough et al. 2015, Robertson et al. 2016 and Dunn et al. 2018).

2.2 Field assessment

Site visits were undertaken on 9 & 10 February 2017, 21 June 2017 and 28 March 2019 to assess the variety of ecosystems and the ecological values present within the development footprint.

2.3 Aquatic ecology

All waterways and flow paths were mapped as being permanent, intermittent or ephemeral based on the definitions in the AUP. Photographs were taken and a general description of the waterway was undertaken to note characteristics including riparian species and cover, and connectivity to other waterways. A characterisation assessment of the mapped stream reaches was also undertaken with key ecological features recorded.

One site (within the permanent part of Stream H) was assessed using the Stream Ecological Valuation (SEV) methodology on the 9 February 2017. The specific SEV methodology is detailed in the Auckland Council technical report 2011/009 (Storey et al. 2011). The SEV is used to determine the ecological functioning or quantify the ecological value of a waterway. The SEV assessment includes the sampling of periphyton, macrophytes, and macroinvertebrates, as well as morphological measurements of stream widths, depth and substrate, at ten equally spaced transects. Where flow was absent, the principles of SEV were applied to the waterways to obtain a qualitative assessment of state and condition.

2.4 Terrestrial ecology

Native and exotic vegetation types were mapped across the site with a focus on the presence of indigenous species. Birds identified visually and audibly were recorded across the site, including native and introduced species. Potential food sources and nesting habitat were noted throughout the site for the purpose of estimating the potential loss of resources associated with the planned development. The field survey included identification of habitats potentially occupied by native lizards. The ecological investigation used the AUP SEA criteria (Sawyer & Stanley, 2012) to assess the significance of ecology values recorded from the site.

The Peers Brown Miller Ltd arboricultural assessment dated March 2017 was also assessed.

2.5 AUP Requirements

Attachment A identifies the most relevant objectives and policies of the AUP, as they relate to terrestrial, aquatic and marine ecosystems.

3.0 Results

3.1 Ecological context

The PPC at Auranga B2 is located within a typical Auckland rural environment. Although the original natural ecology has been heavily modified or removed through past farming activities, the general area within the development site still contains some ecological values, albeit mostly freshwater.

The proposed development lies within the Manukau Ecological District (generally encompassing the former Franklin District Council spatial area) which is characterised as containing alluvial flats and terraces which in pre-human times supported stands of kahikatea swamp forest, freshwater wetlands and lowland conifer and podocarp/broadleaf forest (Auckland Regional Council 2004, Lindsay et al. 2009). The District is now highly modified with original ecosystems mostly drained and converted to farmland. Currently only 3 % of all indigenous ecosystems remain in the District with 0.4 % of freshwater wetlands and wetland forest remaining and 2 % of podocarp/broadleaf and kauri forest (Lindsay et al. 2009). Freshwater wetlands, kahikatea swamp forest, coastal estuarine habitat, shrublands and forest, and breeding habitat for grey duck (Anas supercilosa supercilosa) are currently recognised as priority protection areas within the Manukau Ecological District.

There are no Significant Ecological Areas (SEA) within the Auranga B2 area. The closest SEAs are a terrestrial SEA (SEA_T_530) and a marine SEA (SEA_M1_29b) located along the margins of the nearby Ngakaroa Stream (part of which borders the eastern part of Auranga B2; Figure 2) and Drury Creek estuary. Within both the marine and terrestrial SAE, there are considerable areas of saline-brackish saltmarsh plant communities within which banded rail, and other wader birds, have been recorded.

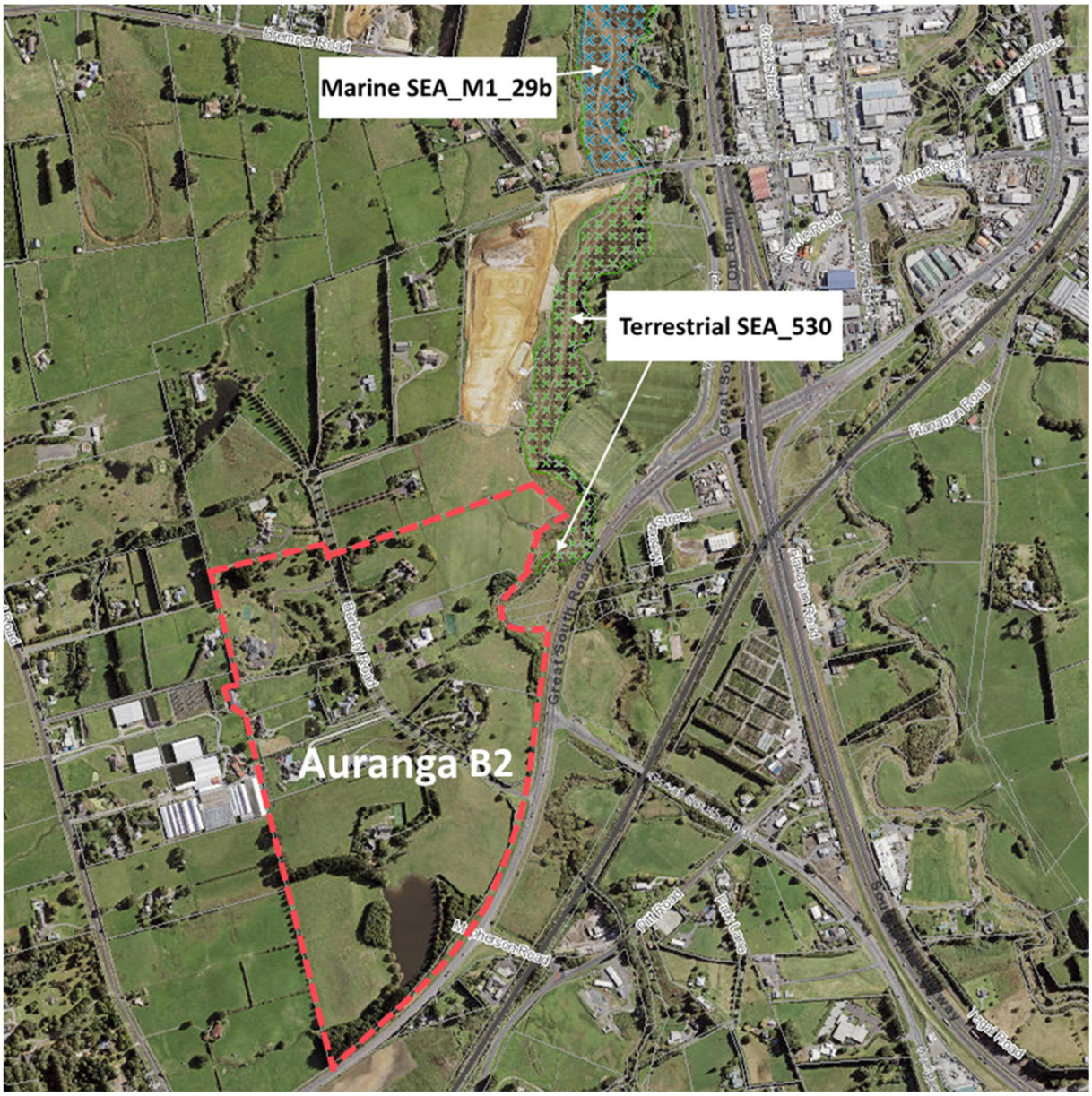

Figure 2. Auranga B2 (red dotted line) in relation to significant ecological areas mapped by Auckland Council on the Ngakaroa Stream.

3.2 Aquatic ecology

Burberry Road bisects Auranga B2 and forms a natural division between the sub-catchments that drain the site. The sub-catchment to the east of Burberry Road drains to the upper reaches of the Ngakaroa Stream estuarine portion (Figure 3). The sub-catchment to the north-west drains to Stream A, a major watercourse that works its way from the western side of Jesmond Road down through Auranga B and Auranga A to discharge into the Drury Creek. The sub-catchment to the south-west of the site drains an upper catchment comprising land around Jesmond Road (outside of the proposed Auranga B2 site), through the south-western part of Auranga B2 and into a highly modified section of roadside ditches, ponds, culverted reaches and diverted streams (as explained below).

The land is mostly in lifestyle blocks with a predominantly exotic grass pasture cover. Stock have access to all waterways and some watercourses or streams have been modified to create water supply or amenity ponds. In some cases, this has accentuated downstream overland flow paths or has resulted in the diversion of existing natural streams. Major construction works associated with

the upgrade of Karaka Road as part of the SH1 construction in the late 1960s resulted in the diversion of Stream H. The lower reaches of that stream have been diverted via culvert under the rail line to connect with the Ngakaroa Stream in its upper reaches (which differs from its presumed natural termination point; see Figure 4).

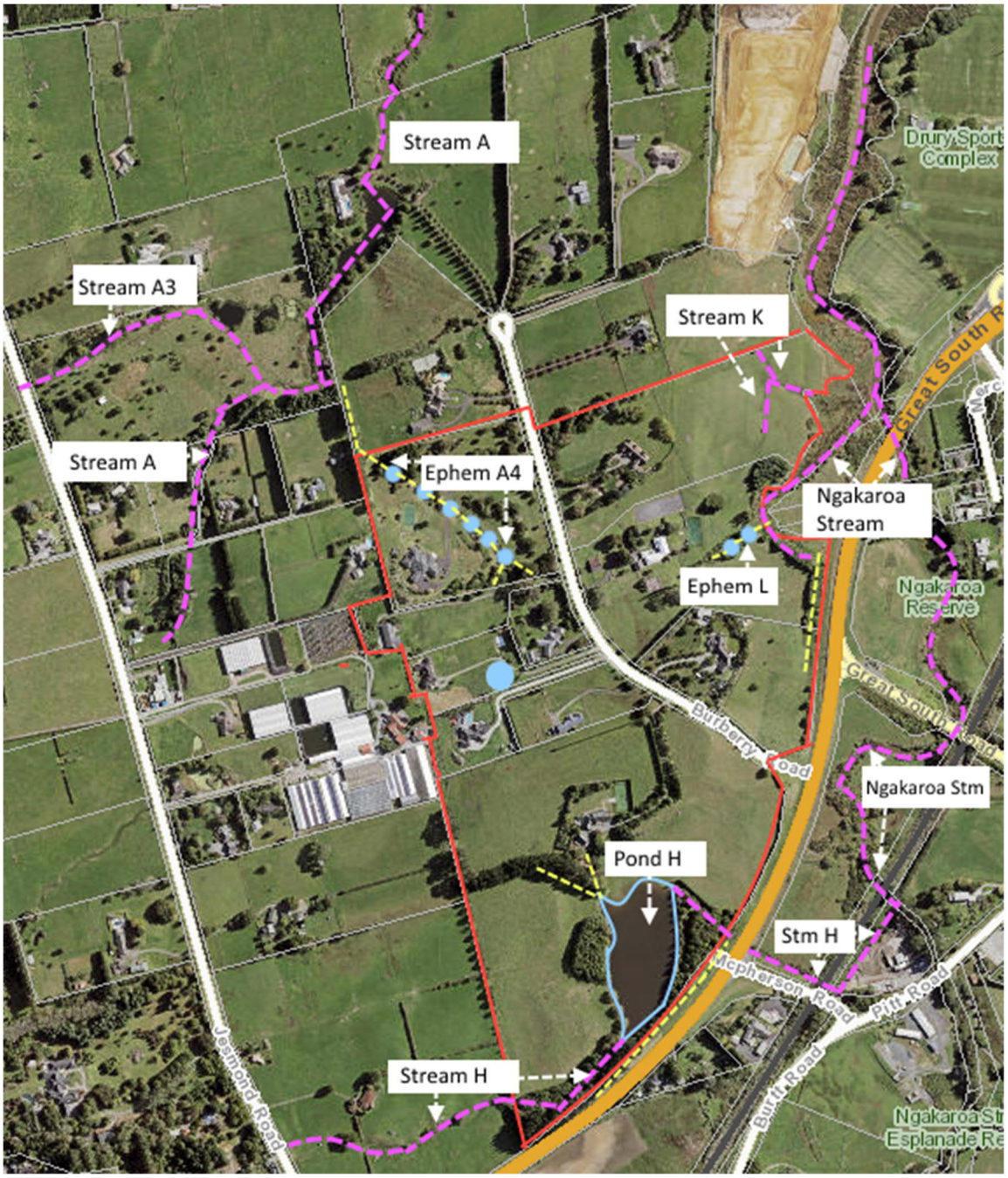

Figure 3. Watercourses within Auranga B2 and the major streams into which they flow. See Figure 4 for a more detailed description of watercourses in the vicinity of Karaka Road. Red line = Auranga B2 boundary; yellow line = ephemeral watercourse or drains; pink line = intermittent or permanent stream; turquoise polygon = pond.

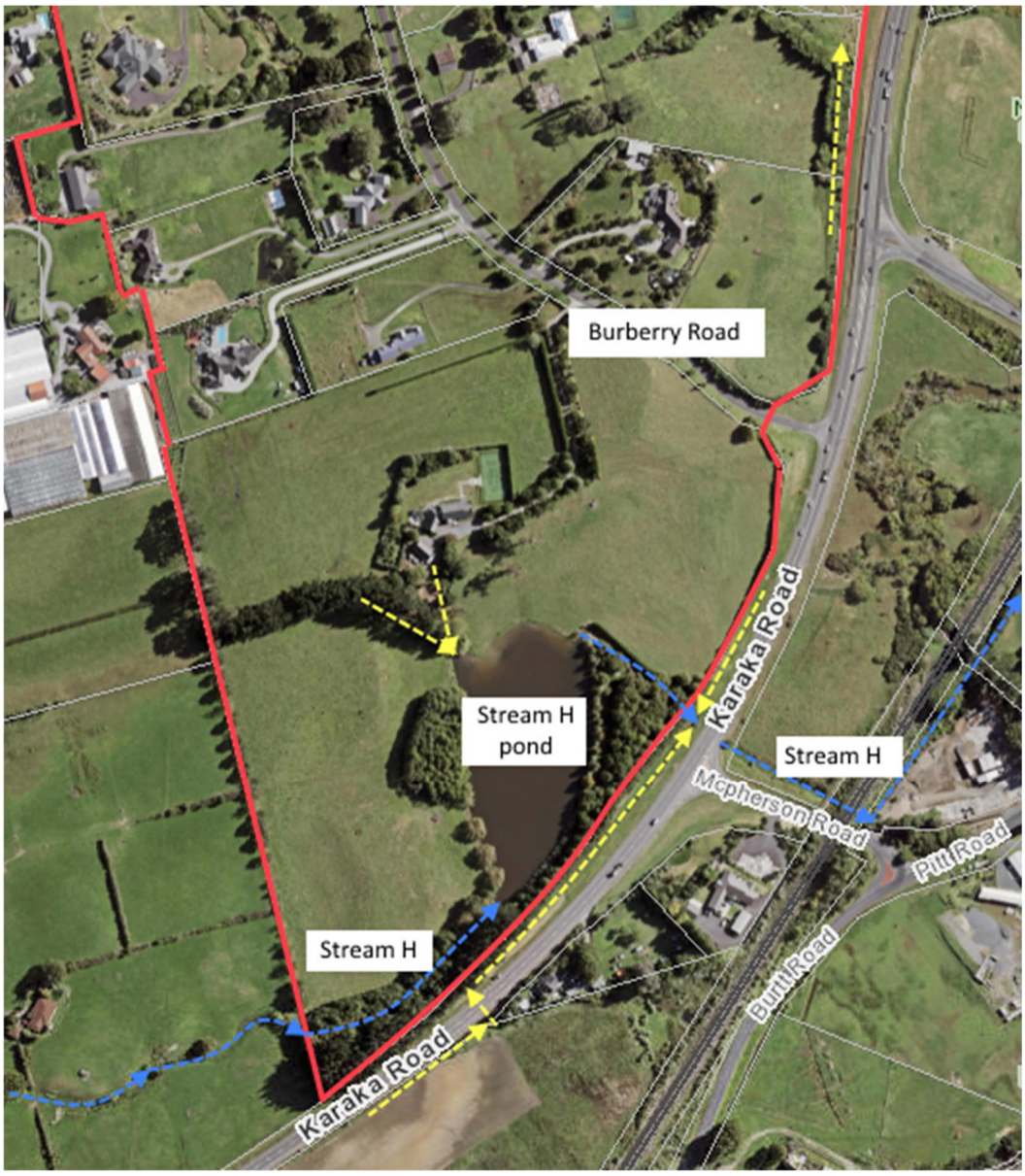

Figure 4. Watercourses within the Stream H portion of Auranga B2, showing the diversion of Stream H to pond H, diversion of the Pond H discharge across Karaka Road (where naturally it would have continued past Burberry Road to enter into the western arm of Ngakaroa Creek), and the creation of roadside drains along Karaka Road to take stormwater from roads and discharge it to the diverted Stream H as it crosses under Karaka Road.

Stream H is natural in its headwaters (outside of Auranga B2) and for the first part within Auranga B2 before it enters the Stream H pond (Plates 1 & 2). Thereafter, the flowpaths have been significantly modified such that overflow from the pond via an intermittently flowing spillway channel, is fed into a culvert under Karaka Road, under the adjacent rail line and through a constructed channel to the true right arm of Ngakaroa Creek.

The presumed natural flowpath of Stream H is along the true left of Karaka Road to join with the true left arm of Ngakaroa Creek. Instead, this portion of the natural stream has been infilled (around Burberry Road) and channelised to form a drain through which the remaining ephemeral flow is conveyed to the wetland area at the head of the true left arm of Ngakaroa Creek.

Within Auranga B2, Stream H is a permanent stream reach until it reaches the Stream H pond, after which it becomes an intermittent spillway (and thereafter exists the Auranga B2 site). Stream H enters Auranga B2 from the south-western corner of the site and flows through to the corner of

Stream H Pond. There are a number of tributary inflows, which either join directly to Stream H, or flow through the pond and eventually join the stream.

The permanent section of the Stream H is soft bottomed and has a slow velocity, with an estimated base flow of 0.04 ms^{-1}. The stream has an average width of 0.92 m and is shallow with an average depth of 6 cm. The stream was well shaded for most of its length by a mature stand of pine, macrocarpa and willows, which had been planted on both sides of the stream bank (Plate 1). Ferns were also present in places along the immediate stream bank. The stream was fenced with stock exclusion fencing on both sides. The stream had a large amount of organic matter within the stream, which is likely to provide a food source and habitat for resident macroinvertebrates.

Fish cover was present in the form of undercut banks and wood immediately upstream of the pond, and gambusia were noted within the stream. An SEV was undertaken at this site with a resultant value of 0.500, indicating moderate ecological value (see next section for further details).

Plates 1 and 2. Stream H showing a section within pine forest upstream of the Stream H pond. At this point and SEV was undertaken. The Stream H pond (ca. 1.2 ha surface area) intercepts all flow from upstream and

discharges overflow (when the pond is full) via a spillway to join with the Karaka Road roadside drain which connects under the road and rail line via culvert to the Ngakaroa Stream.

The Stream H pond is approximately 1.2 ha in surface area and has a clay and sand base, and is shallow. The riparian margins around the pond are planted with predominantly exotic species including redwoods, elder and cedar. Exotic rushes were also noted along with indigenous flax (Plate 2). Over 50 % of the buffer zone around the pond was wider than 10 m. The pond was popular with exotic and indigenous aquatic bird species which are associated with open bodies of water. During the site visit in 2017, Canadian geese (c.15), paradise shelduck (c.2), mallard duck (c.4) and a white-faced heron were observed using the pond. A kingfisher was also heard at the site.

Apart from Stream H, there are four other watercourses within or adjacent to Auranga B2. These are:

1. Ephemeral L

Ephemeral Stream L is located on the eastern side of Auranga B2 and discharges to the true left arm of Ngakaroa Creek. The catchment size is small, and the watercourse is heavily modified (Plates 3 & 4). An amenity pond has been constructed in its upper reaches with a secondary pond further downslope. Constructed channels link the ponds and provide a spillway to Ngakaroa Creek. The level of modification has removed any natural traces of the original watercourse, however the size of the contributing catchment (1.1 ha) suggests that in its natural state, this watercourse would have been ephemeral. A similar-sized catchment adjacent (to the south) is in pasture and is grazed, and does not support an intermittent stream.

Plates 3 and 4. Ephemeral stream L showing a constructed pond downstream with overflow channel (left) and constructed pond upstream (right).

2. Ephemeral A4

Ephemeral watercourse A4 has been modified considerably, with a series of excavated ponds within 24 Burberry Road to capture water (Figure 5), and excavated channels between ponds to enable overflow (Plate 5). The ponds and channel system is within Auranga B2, however access to the site was not permitted.

The ponds flow into 30 Burberry Road (outside of the Auranga B2 boundary). While there is evidence of stock pugging of fenceline soils, there is no evidence of an intermittent watercourse.

Indeed, most of the land within the lower part of 30 Burberry slopes towards 24 Burberry (Plate 6), rather than towards Stream A where flow would be expected to travel.

Figure 5. 24 Burberry Road showing extensive creation of amenity ponds within a flow path assessed as being ephemeral. Watercourse flow is from the bottom right to the top left of the Figure.

Plates 5 and 6. Ephemeral watercourse A4 looking up-catchment (left – within Auranga B2)) with a view into the lower excavated amenity ponds and joining channels of 24 Burberry Road, and down-catchment (right- not within Auranga B2) within 30 Burberry Road, showing lack of intermittent flow path.

3. Stream K

Stream K is located in the north-east corner of Auranga B2 (Figure 3) and comprises an open-channel intermittent stream with two branches that total 220 m. The stream is within a grazed paddock and open to stock grazing. The stream has no riparian woody vegetation and stock grazing over time has contributed to a high level of bank erosion and pugging of the bed. Exotic grasses and exotic plants – soft rush and water pepper - are well established within the stream bed.

An SEV was not undertaken at this location (due to lack of flow), however based on the physical condition of the stream and, in comparison to similar streams over which SEVs have been conducted in Auranga A and B, it is anticipated that this stream will score poorly for fish diversity, macroinvertebrate community health and overall stream ecological functions.

4. Ngakaroa Stream

The true left arm of Ngakaroa Stream forms part of the eastern boundary of Auranga B2 with a broad floodplain and escarpment from Karaka Road north to the confluence with Stream K (Plates 7 - 9). The upper reaches of the Creek are choked with sediment – perhaps as a result of the significant earthworks that occurred with the creation of the nearby SH1 associated interchange, which, from historic aerial photos, appears to have created a broad, elevated infill area between Karaka Road and Ngakaroa Creek. The sediment basin formed is up to 15 m wide with loosely-packed sediments and has been extensively colonised by raupo Typha orientalis. The saline influence of the creek is obvious in the lower reaches adjoining Auranga B2, with a well-defined channel, dead terrestrial weeds (presumably from a recent king tide) and the presence of saltmarsh ribbonwood Plagianthus divaricatus along the margins. The riparian margin along both sides of the Creek has been modified by weeds and vegetation removal, however it still retains an estuarine character. The associated floodplain supports mainly woody weeds (privet Ligustrum lucidum and L. sinense, willow Salix sp., woolly nightshade Solanum mauritianum), and exotic grasses (pampas grass Cortaderia selloana and

pasture grasses), however still serves an important functional role in helping regulate storm or high tide flows.

Plate 7. Upper freshwater-influenced part of the true left arm of Ngakaroa Creek looking towards Auranga B2, and showing raupo reed-land with escarpment behind (and paddocks within Auranga B2 further behind).

The escarpment that is along the true left margin of the arm of the Ngakaroa Creek that borders Auranga B2, as well as the floodplain mentioned above both provide an opportunity to restore a wide riparian margin to the Creek where the margin is currently fragmented, laden with exotic weeds or denuded of woody vegetation.

We understand that the concept development plan for Auranga B2 provides for a 20 m wide (minimum) Esplanade Reserve along this section of Ngakaroa Creek. This would add considerably to the ecological values of the local area (particularly since there are currently few present).

Plate 8. View looking down Ngakaroa creek bordering Auranga B2 showing effects of king tide, raupo (left) and mature saltmarsh ribbonwood (right).

Plate 9. View looking up Ngakaroa creek with mature saltmarsh ribbonwood (right) and plantation pines within Auranga B2 in back-ground.

3.3 Fish habitat and SEV

The only information on fish within the local area is that for Stream A within Auranga. A fisheries survey within Stream A in 2015 identified four fish species; shortfin eels (Anguilla australis), inanga (Galaxias maculatus), common bully (Gobiomorphus cotidianus) and gambusia (Gambusia affinis).

During culvert removal works and stream restoration within Stream A, gambusia, shortfin eel and common bully were recorded.

Fish habitat is scarce within Auranga B2. The ponds are likely to support shortfin eel, however the ephemeral watercourses and Stream K lack any habitat of note, and lack flow to support fish. Stream H may support fish in the short section of plantation pine upstream of the Stream H pond, however the spillway to the pond likely presents an effective barrier to fish as it is a wide, rock-lined channel that rarely supports flow.

The Stream H pond and smaller associated ponds on the ephemeral watercourses should be fished if they are proposed to be drained, as eels are likely within them, if they contain water.

The results of the SEV undertaken on Stream H upstream of the Stream H pond, are presented below and in Appendices B and C in full.

A macroinvertebrate samples was collected at the SEV site, following the Ministry for the Environment's 'Protocols for Sampling Macroinvertebrates in Wadeable Streams' (Stark et al. 2001). The samples was preserved in 70% ethanol and processed according to 'Protocol P3: Full Count with Subsampling Option'. Macroinvertebrates were identified to the level required for Macroinvertebrate Community Index (MCI) assessment, which is standard. Macroinvertebrate community health was assessed using the following indices or metrics:

- Total Abundance: This is the total number of invertebrates recorded in the sample.

- Taxonomic Richness: The total number of taxa (usually species or genus) recorded in the sample. This reflects the general health of the community through a measurement of the variety of the taxa present.
- EPT Richness: The total number of taxa belonging to the orders Ephemeroptera, Plecoptera and Trichoptera (mayflies, stoneflies and caddisflies, respectively). These insect groups are generally dominated by pollution-sensitive taxa. Two caddisfly taxa are excluded as they are not indicators of good water quality, these being Oxyethira and Paroxyethira. The EPT index usually increases with improved water quality and increased habitat diversity with a higher percentage composition indicating good conditions.
- Macroinvertebrate Community Index (MCI) (Stark and Maxted, 2007a, b): The MCI derives a stream health score from pollution-sensitivity scores assigned to each macroinvertebrate taxon. Taxon scores are between 1 and 10, with 1 representing species highly tolerant of organic pollution (e.g. worms and some dipteran species) and 10 representing species highly sensitive to organic pollution (e.g. some mayflies and stoneflies). A site score is obtained by summing the scores of individual taxa and dividing this total by the number of taxa present at the site. Guidelines for interpretation of scores are given in Table 1.

Table 1. Interpretation of Macroinvertebrate Community Index values (Stark and Maxted 2007).

Quality Class	Description	MCI
Excellent	Clean water	> 119
Good	Doubtful quality	100 – 119
Fair	Probable moderate pollution	80 – 99
Poor	Probable severe pollution	< 80

A summary of macroinvertebrate results is presented in Table 2. Full macroinvertebrate results are provided in Appendix A.

Table 2: Macroinvertebrate results for Stream H.

Indices	Stream H above pond
Number of taxa	15
Number EPT taxa	0
% EPT taxa	0
MCI-sb	67.47
SQMCI-sb	2.67

Fifteen macroinvertebrate taxa were identified in the sample collected from Stream H, upstream of H pond. No sensitive EPT (mayflies, stoneflies and caddisflies) taxa were collected in this stream. The sample was dominated by two taxa: seed shrimps (Ostracoda) and the NZ mud snail Potamopygus, which comprised 60 % of the sample. Both species are species that are tolerant of degraded/ polluted freshwater. Ostrocoda are often present in ponds and slow flowing habitats. Oligochaetes

were present in high numbers and are a pollution-tolerant species that is found in a wide range of habitat conditions.

Stream H had a MCI-sb of 67.47 indicating 'poor' water and habitat quality and probable severe pollution, using the interpretation recommended by Stark and Maxted (2007).

The SEV score for Stream H was 0.500 indicating moderate habitat quality. The hydraulic function score assesses how natural or modified the flow regime is of the stream, taking into account things such as floodplain connectivity. The hydraulic function score was relatively high, as the stream was not impacted by urban development (Table 3).

Table 3. SEV function scores.

Function	Stream H above pond
Hydraulic mean score	0.62
Biogeochemical mean score	0.58
Habitat provision mean score	0.40
Biodiversity mean score	0.28
Overall mean SEV score	0.500

The biogeochemical functions were used to assess the quality of the water in the stream. These parameters look at water temperature, dissolved oxygen and organic matter input and retention. The high amount of riparian shading and organic matter inputs to the stream resulted in a moderate biogeochemical functions score of 0.58.

The habitat provision function score was used to assess the quality of the available habitat for aquatic fauna. The connected floodplain and high amount of riparian shading resulted in a moderate score for this function.

The biodiversity function score was low for this site; however, a fish survey was not undertaken so fisheries data could not be incorporated into the analysis. The macroinvertebrate population reflected poor habitat and water quality.

An SEV was not undertaken on Stream K, however there is SEV data from nearby intermittent streams within Auranga A that can provide a guide as to the likely SEV function scores for this stream. Stream K has no riparian cover, has eroded banks and lacks instream habitat variation and abundance. SEV scores from across five streams within Auranga A[1] returned scores between 0.170 and 0.334. We would expect that Stream K would return an SEV score within this range.

[1] Drury 1 Precinct (Auranga A) Intermittent streams with no tree cover: Stream B2 glasshouses 0.170, Stream B1 mid-section paddock 0.304, Stream A1 upper catchment 0.280, Stream B3 0.314, Stream B1 upper catchment 0.334.

3.4 Wetlands

The upper reaches of the true left arm of Ngakaroa Creek area within Auranga B2. Historic earthworks associated with the SH1 interchange appear to have blocked, diverted or otherwise influenced the natural watercourses discharging to the estuarine arm, resulting in an impounded estuarine headwater that has since become sediment-filled and colonised by wetland plants. This area is located between the upper reach of Ngakaroa Creek and the most eastern (lower) boundary of 15 Burberry Road (Plate 10).

Raupo is the principle wetland species present, although the wetland extends further upstream than the extent of raupo. The wetland extent is estimated at 1,400 m^2, of which ca. 650 m^2 is within Auranga B2 (and the remainder is adjacent to Auranga B2). The wetland has no stock access. It is heavily vegetated, mainly in grasses, with some woody vegetation (comprising privet and woolly nightshade).

The area of wet ground opposite the intersection of Karaka Road and Great South Road is not considered to be a wetland, despite the area supporting exotic wetland plant species (Plate 11). This area is boggy because of an earth barrier that has formed at a lower fenceline. Naturally, this depression would have supported an ephemeral watercourse that would have made its way to the upper reaches of Ngakaroa Creek. That flow path has been excavated out to form a broad flow channel (beneath plantation trees; Plate 12). This area of boggy ground supports exotic soft rush Juncus effusus, water pepper Persicaria hydropiper, and pasture grass as the dominant plant species. It is part of a grazing paddock and the ground is heavily pugged and compacted.

Plate 10 (left). Wetland in the upper reaches of Ngakaroa Creek, part of which lies within Auranga B2.

Plate 11 (right). Wet ground caused by an embankment – this is not a natural wetland or stream.

Plate 12. Downstream of the wet ground in Plate 11, showing wide excavated flow channel (along the route of a likely historic ephemeral flow path).

3.5 Summary of aquatic values

Approximately 965 m of watercourses (Table 4) and 17,000 m^2 of ponds (Table 5) were identified on the ground, as well as 650 m^2 of wetland

Overall aquatic ecology values range from low to moderate within the PPC area. There are no streams that qualify as 'high' or 'very high' ecological value (Table 6).

No rare or threatened aquatic species were recorded and it is unlikely that any are present given the level of modification of the landscape ad biological components within it.

All watercourses have been heavily modified by past farming activities and some continue to be degraded by lack of riparian cover and stock access. Where riparian cover is provided for, those watercourses have invariably been excavated out, diverted or changed from their natural state to a considerable degree.

Despite the level of modification, the site still retains a functional watercourse system with minimal culverting or piping. Ephemeral flow paths connect to streams which in turn discharge to wetland or saline creek margins.

The series of online ponds constructed throughout Auranga B2 provides both a risk for aquatic life (though modifying flow and water temperature during discharge) and also an opportunity to incorporate amenity into the proposed development scheme.

Restoration of pond margins, stream margins and wetland areas in full, or in part, could provide enhancements to both the capacity of the freshwater system to support biodiversity, and improve ecological functionality.

Table 4. Length of watercourse types in Auranga B2. Does not include drains and water tables along Karaka Road (outside but adjacent to Auranga B2 site).

Stream Type	Length of stream Auranga B2 (m)	Watercourse identifier
Ephemeral	80 m	Drain excavated alongside Karaka Road
	85 m	Ephemeral flow path L
	310 m	Ephemeral flow path A4
Intermittent	220 m	Stream K
	100 m	Stream H pond spillway
Permanent	170 m	Reach of Stream H upstream of Stream H pond
Total	965 m	

Table 5: Area of ponds and wetland in Auranga B2.

Habitat type	Pond	Wetland
Area of habitat (m^2)	1.2 ha Stream H pond	650 m^2 head of Ngakaroa Creek
	Approx. 0.5 ha in total across all others	

A summary of the key characteristics obtained by walkover or remote observations are shown in Table 6.

Table 6. Summary of aquatic values in Auranga B2.

Stream	Type	Riparian diversity[1]	Channel shade[2]	In stream habitat[3]	Bed characteristics[4]	Overall condition[5]
H above pond	Permanent	Moderate	Very good	Poor	Moderate	Moderate
H spillway	Intermittent	Poor	Poor	Poor	Poor	Poor
Adjacent Karaka and GSR intersection	Ephemeral	Moderate	Very good	Very poor	Very poor	Poor
L	Ephemeral	Moderate	Good	Very poor	Very poor	Poor
K	Intermittent	Poor	Very poor	Poor	Poor	Poor
A4	Ephemeral	Moderate	Moderate	Poor	Poor	Poor

1 Riparian diversity assessed as: no vegetation (very poor), pasture or grass or monoculture of low weeds (poor), several woody plant species either native or exotic (moderate), many woody plant species; mixed exotic/ native/ successional species (good); highly diverse range of native plant species forming a mature or maturing canopy with understorey and ground tiers (very good).

2 Channel shade assessed as: fully open; lack of canopy cover (very poor); <20 % water surface shaded (poor); 20 – 60 % water surface shaded; mostly open with shaded patches (moderate); 60 – 80 % water surface shaded; mostly shaded with some open patches (good); > 80 % water surface shaded; full canopy (very good).

3 In stream habitat assessed as: favourable habitats (woody debris, rooted aquatic vegetation, leaf packs, undercut banks, root mats, stable habitat) limited and coverage <10 % channel (very poor); favourable habitat diversity limited to 1-2 types; woody debris rare, coverage 10 – 30 % of channel (poor); moderate variety of habitat types (3-4 types) covering 30 – 50 % channel (moderate); most habitat types present, covering 50 – 75 % channel (good); all habitat types present covering >75 % of channel (very good).

4 Bed characteristics assessed as: Very high loading of un-natural silt and uniform hydrologic conditions (very poor); un-natural siltation with limited variety of hydrological conditions (poor); mostly natural bed substrates with moderate variety of hydrologic conditions (moderate); natural bed substrates with a good variety of pools, runs, riffles (good); natural bed substrates with the full range of hydrologic conditions present (deep and shallow pools, chutes, runs, riffles) (very good).

5 Overall condition assessed as a combination of the four key characteristics with scores all or predominately of ‘poor’ returning an overall poor condition or very poor, scores predominantly or mostly of ‘moderate’ returning an overall moderate condition, and scores all or predominately of ‘good’ returning an overall good condition.

3.6 Terrestrial ecology

3.6.1 Vegetation

A preliminary assessment of historical and current aerial photos of the site indicates that the area has been actively farmed for an extensive period of time. The current ecological state of the site is extensively modified from its original, pre-human natural state. Indigenous vegetation is very scarce and what is present is largely garden amenity plantings (hedgerows or gardens), or farm shelterbelts.

Where naturally-occurring, indigenous vegetation is present, it is only lone, self-seeded saplings of common native shrubs (mostly karamu and mahoe) amongst weed-dominated vegetation – and is usually associated with the riparian margins of streams and pond margins. There is no old growth or naturally regenerating forest or shrubland on the site or nearby.

Native trees and shrubs are predominantly within shelter belts and hedgerows, or as small copses bordering ponds or amenity garden areas. Of the hundreds of trees and shrubs noted across the sites in the arboricultural report, only approximately 5 % are native species, and all have been planted, rather than being relict trees from original indigenous vegetation communities.

Ten native species comprise the majority of native plants across the site. These are:

- lemonwood (Pittosporum eugenioides)
- mahoe (Melicytus ramiflorus)
- black matipo (Pittosporum tennifolium)
- karo (Pittosporum crassifolium)
- totara (Podocarpus totara var. totara)
- rimu (Dacrydium cupressinum)
- karaka (Corynocarpus laevigatus)
- kowhai (Sophora microphylla)
- puriri (Vitex lucens)
- flax (Phormium tenax)
- karamu (Coprosma robusta)

A range of minor constituents of native planted species across the sites are noted in the arboriculture report. None of the native plants note on site are threatened plants and it is likely that few, if any, are of local provenance.

Exotic trees comprise the majority of woody vegetation across the site, mainly as specimen trees or for use as hedgerows. Approximately half of that number of trees are conifers (providing no flower or fruit), with the remainder providing some flower or fruit during the year.

3.6.2 Birdlife

Birdlife observed on site reflects the modified state of this rural environment. Of the 22 species recorded on site, 11 are native and are commonly recorded in rural areas of Auckland (and most of the North Island). All of the native species are classified as Not Threatened.

Native birds recorded on site include:

- Silvereye (Zosterops lateralis)
- Fantail (Rhipidura fuliginosa)
- Grey Warbler (Gerygone igata)
- Tui (Prosthemadera novaeseelandiae)
- Pukeko (Porphyrio porphyrio subsp. melanotus)
- Australasian harrier (Circus approximans)
- Spur wing plover (Vanellus miles)
- White-faced heron (Egretta novaehollandiae)
- Kingfisher (Todiramphus sanctus)
- Welcome swallow (Hirundo neoxena neoxena)
- Paradise shelduck (Tadorna variegata)

Exotic birds recorded from the site:

- Canada goose (Branta canadensis; approx. 90 on pasture at 41 Jesmond Rd)
- Mallard duck (Anas platyrhynchos)
- Common myna (Acridotheres tristis)
- Starling (Sturnus vulgaris)
- House sparrow (Passer domesticus)
- Pheasant (Phasianus colchicus)
- California quail (Callipepla californica)
- Australian magpie (Gymnorhina tibicen)
- Blackbird (Turdus merula)
- Gold finch (Carduelis carduelis)
- Song thrush (Turdus philomelos)

Habitat for native birds is not distributed evenly across the site. Paradise shelduck and kingfisher were recorded in low numbers around ponds, as would be expected for these species. Wet pasture or boggy areas alongside streams were most likely to support heron, plover and pukeko (all of which were recorded in low numbers). Passerines (tui, warbler, fantail, silvereye) were only recorded where there were concentrations of mature trees (exotic or native).

In terms of nesting habitat and core habitat for native birds, it is very unlikely that any of the pasture areas, ponds or margins of Ngakaroa Creek constitute core local habitat, particularly given the abundance of surrounding farmed areas, amenity ponds, river margins and small wetlands that are also presumably used by these species.

The predominantly large, mature conifers that comprise shelter belts and the scattered amenity trees throughout the site are considered to be of low ecological value (for birds) and do not qualify as being ecologically significant under the AUP ecological criteria. Food resources for birds currently present on site come largely from mature weeds and scattered exotic amenity trees which do not meet any of the Auckland Council ecological significance criteria.

3.6.3 Lizards

No native lizards were found, despite targeted searches in some potentially favourable sites across the Auranga B2 area. Although the search was not extensive, it is unlikely that native lizard populations have persisted across most of the site, given the extensive environmental modifications to the original vegetation cover. Of the original fauna of up to 11 lizard species that would have inhabited indigenous ecosystems prior to human occupation of the Auckland area, it is extremely unlikely that geckos have persisted, and is likely that only copper skink (Oligosoma aeneum; Not Threatened) may have survived in some areas (see below).

The introduced plague skink (rainbow skink; Lampropholis delicata) was found at points across the sites and is likely to be present throughout much of the dry grassland, dwellings and farm building areas.

The Department of Conservation's National Herpetofauna Database notes only two records from 1940 and 1960 of native copper skink in the area, both of which are at least 2 km from the subject site.

Copper skinks can be found in a range of urban and rural environments, including those that have been extensively and recently modified. The majority of the subject site is managed as grazed pasture, however there are some areas of rank grassland, planted treeland or less-intensively managed farmland that could support the species. There may be other suitable habitat within sites not able to be accessed for this assessment.

Overall, the site supports very few native plant, bird or other likely land-based indigenous ecology values. No threatened or rare species were recorded, and there is no vegetation on site that qualifies as native scrubland or native forest.

3.7 Summary of ecological values

Overall aquatic ecology values range from low to moderate within the PPC area. All streams have been heavily modified by past farming activities and some continue to be degraded by lack of riparian cover and stock access. Observations of stream riparian cover and instream quality, supported by observations from streams within Auranga B, and biological and water quality information from Auranga A, reinforces our assessment that the streams at the site are heavily degraded.

Total waterway length within Auranga B2 is estimated to be 965 m, of which approximately 490 m comprises intermittent or permanent streams. Several ponds exist across the site, including a large 1.2 ha expanse as part of Stream H. One wetland is present – as part of the headwater margin to Ngakaroa Creek on the south-eastern part of the site. A portion of that wetland is within Auranga B2 and is influenced by overland flows from Auranga B2. The wetland is well vegetated, is not grazed by stock and is in good condition, although it is likely to have been induced/ created form past earthworks across this part of SH1/ Karaka Road.

There is no remnant or secondary regenerating native forest on this site and no listed SEAs, although the SEA associated with Ngakaroa Creek is adjacent to the northern/ eastern part of Auranga B2.

Most woody vegetation across the sites exist as exotic specimen trees, shelter belts or hedgerows. These provide limited and low quality nesting and food resources for birds, and at most benefit a few native birds that are neither threatened nor rare.

Due to the low diversity of native birds and native vegetation, and likely lack of native lizards, the overall indigenous ecological value of Auranga B2 is considered to be low.

4.0 Recommendations

1. The structure plan should identify the streams and wetlands as constraints in the analysis of the features of the PPC area; and
2. The Precinct Plan as part of the PPC should identify the streams recorded in this report (noting however that the stream classifications in some cases are indicative given the limitations identified in this report), and the wetland on the margins of Ngakaroa Creek.

The identification of the features identified in this report will assist in their recognition at the time of future resource consent applications. The AUP includes a comprehensive set of rules relating to identified features (for example E3 for steams and E15 for vegetation). These are considered to be appropriate to address the potential for adverse effects in the same way they already apply to the area's Future Urban Zone or Auranga A's Drury 1 Precinct. From an ecological perspective, these rules are appropriate to address relevant effects that may be generated at the time of resource consent.

In respect to stream health, the Drury 1 Precinct includes rules for:

- Stormwater management (Rules 3 and 6.7)
- Riparian margin planting (Rule 6.6)

From an ecological perspective, these rules are considered to be appropriate to manage the potential effects of residential development within the site. The rules provide for stormwater retention (consistent with the Stormwater Management Plan) and the planting of streams. It is understood that the PPC will apply these rules to the Auranga B2 area. This is supported in respect to the management of ecosystem values.

In respect to development in Auranga A, I have first-hand experience in the application of the Drury 1 Precinct rules, and in my opinion, these are fit for purpose and should apply to the Auranga B2 area in the same manner they apply in Auranga A.

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Attachment A

Relevant objectives and policies of the AUP as they relate to terrestrial and aquatic ecosystems within Auranga B2.

Chapter B – Regional Policy Statement

B2 Tāhuhu whakaruruhau ā-taone - Urban growth and form

B2.4. Residential growth

B2.4.1. Objectives

(1) Residential intensification supports a quality compact urban form.

B2.4.2. Policies

(4) Provide for lower residential intensity in areas:

(a) that are not close to centres and public transport;

(b) that are subject to high environmental constraints;

(c) where there are 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; and

(d) where there is a suburban area with an existing neighbourhood character.

(5) Avoid intensification in areas:

(a) where there are 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 or special character; or

(b) that are subject to significant natural hazard risks; where such intensification is inconsistent with the protection of the scheduled natural or physical resources or with the avoidance or mitigation of the natural hazard risks.

B7. Toitū te whenua, toitū te taiao – Natural resources

B7.2. Indigenous biodiversity

B7.2.1. Objectives

(1) Areas of significant indigenous biodiversity value in terrestrial, freshwater, and coastal marine areas are protected from the adverse effects of subdivision use and development.

(2) Indigenous biodiversity is maintained through protection, restoration and enhancement in areas where ecological values are degraded, or where development is occurring.

B7.2.2. Policies

(5) Avoid adverse effects on areas listed in the Schedule 3 of Significant Ecological Areas – Terrestrial Schedule and Schedule 4 Significant Ecological Areas – Marine Schedule.

B7.3. Freshwater systems

B7.3.1. Objectives

(1) Degraded freshwater systems are enhanced.

(2) Loss of freshwater systems is minimised.

(3) The adverse effects of changes in land use on freshwater are avoided, remedied or mitigated.

B7.3.2. Policies

(1) Integrate the management of subdivision, use and development and freshwater systems by undertaking all of the following:

(a) ensuring water supply, stormwater and wastewater infrastructure is adequately provided for in areas of new growth or intensification;

(b) ensuring catchment management plans form part of the structure planning process;

(c) controlling the use of land and discharges to minimise the adverse effects of runoff on freshwater systems and progressively reduce existing adverse effects where those systems or water are degraded; and

(d) avoiding development where it will significantly increase adverse effects on freshwater systems, unless these adverse effects can be adequately mitigated.

(2) Identify degraded freshwater systems.

(3) Promote the enhancement of freshwater systems identified as being degraded to progressively reduce adverse effects.

(4) Avoid the permanent loss and significant modification or diversion of lakes, rivers, streams (excluding ephemeral streams), and wetlands and their margins, unless all of the following apply:

(a) it is necessary to provide for:

(i) the health and safety of communities; or

(ii) the enhancement and restoration of freshwater systems and values; or

(iii) the sustainable use of land and resources to provide for growth and development; or

(iv) infrastructure;

(b) no practicable alternative exists;

(c) mitigation measures are implemented to address the adverse effects arising from the loss in freshwater system functions and values; and

(d) where adverse effects cannot be adequately mitigated, environmental benefits including on-site or off-site works are provided.

(5) Manage subdivision, use, development, including discharges and activities in the beds of lakes, rivers streams, and in wetlands, to do all of the following:

(a) protect identified Natural Lake Management Areas, Natural Stream Management Areas, and Wetland Management Areas;

(b) minimise erosion and modification of beds and banks of lakes, rivers, streams and wetlands;

(c) limit the establishment of structures within the beds of lakes, rivers and streams and in wetlands to those that have a functional need or operational requirement to be located there; and

(d) maintain or where appropriate enhance:

(i) freshwater systems not protected under Policy B7.3.2(5)(a);

(ii) navigation along rivers and public access to and along lakes, rivers and streams;

(iii) existing riparian vegetation located on the margins of lakes, rivers, streams and wetlands; and

(iv) areas of significant indigenous biodiversity.

(6) Restore and enhance freshwater systems where practicable when development, change of land use, and subdivision occur.

B7.4. Coastal water, freshwater and geothermal water

B7.4.1. Objectives

(2) The quality of freshwater and coastal water is maintained where it is excellent or good and progressively improved over time where it is degraded.

(4) The adverse effects of point and non-point discharges, in particular stormwater runoff and wastewater discharges, on coastal waters, freshwater and geothermal water are minimised and existing adverse effects are progressively reduced.

(5) The adverse effects from changes in or intensification of land use on coastal water and freshwater quality are avoided, remedied or mitigated

(6) Mana Whenua values, mātauranga and tikanga associated with coastal water, freshwater and geothermal water are recognised and provided for, including their traditional and cultural uses and values.

B7.4.2. Policies

(1) Integrate the management of subdivision, use, development and coastal water and freshwater, by:

(a) ensuring water supply, stormwater and wastewater infrastructure is adequately provided for in areas of growth; and

(b) requiring catchment management planning as part of structure planning;

(c) controlling the use of land and discharges to minimise the adverse effects of runoff on water and progressively reduce existing adverse effects where those water are degraded; and

(d) avoiding development where it will significantly increase adverse effects on water, unless these adverse effects can be adequately mitigated.

(4) Identify areas of coastal water and freshwater bodies that have been degraded by human activities.

(5) Engage with Mana Whenua to:

(a) identify areas of degraded coastal water where they have a particular interest; and

(b) remedy or, where remediation is not practicable, mitigate adverse effects on these degraded areas and values.

(6) Progressively improve water quality in areas identified as having degraded water quality through managing subdivision, use, development and discharges.

(7) Manage the discharges of contaminants into water from subdivision, use and development to avoid where practicable, and otherwise minimise, all of the following:

(a) significant bacterial contamination of freshwater and coastal water;

(b) adverse effects on the quality of freshwater and coastal water;

(c) adverse effects from contaminants, including nutrients generated on or applied to land, and the potential for these to enter freshwater and coastal water from both point and non-point sources;

(d) adverse effects on Mana Whenua values associated with coastal water, freshwater and geothermal water, including wāhi tapu, wāhi taonga and mahinga kai; and

(e) adverse effects on the water quality of catchments and aquifers that provide water for domestic and municipal supply.

(8) Minimise the loss of sediment from subdivision, use and development, and manage the discharge of sediment into freshwater and coastal water, by:

(a) promoting the use of soil conservation and management measures to retain soil and sediment on land; and

(b) requiring land disturbing activities to use industry best practice and standards appropriate to the nature and scale of the land disturbing activity and the sensitivity of the receiving environment.

(9) Manage stormwater by all of the following:

(a) requiring subdivision, use and development to:

(i) minimise the generation and discharge of contaminants; and

(ii) minimise adverse effects on freshwater and coastal water and the capacity of the stormwater network;

(b) adopting the best practicable option for every stormwater diversion and discharge; and

(c) controlling the diversion and discharge of stormwater outside of areas serviced by a public stormwater network.

(10) Manage the adverse effects of wastewater discharges to freshwater and coastal water by all of the following:

(a) ensuring that new development is supported by wastewater infrastructure with sufficient capacity to serve the development;

(b) progressively reducing existing network overflows and associated adverse effects by all of the following:

(i) making receiving environments that are sensitive to the adverse effects of wastewater discharges a priority;

(ii) adopting the best practicable option for preventing or minimising the adverse effects of discharges from wastewater networks including works to reduce overflow frequencies and volumes;

(iii) ensuring plans are in place for the effective operation and maintenance of the wastewater network and to minimise dry weather overflow discharges;

(iv) ensuring processes are in place to mitigate the adverse effects of overflows on public health and safety and the environment where the overflows occur;

(c) adopting the best practicable option for minimising the adverse effects of discharges from wastewater treatment plants; and

(d) ensuring on-site wastewater systems avoid significant adverse effects on freshwater and coastal water.

B8. Toitu ̄te taiwhenua - Coastal environment

B8.3. Subdivision, use and development

B8.3.1. Objectives

(1) Subdivision, use and development in the coastal environment are located in appropriate places and are of an appropriate form and within appropriate limits, taking into account the range of uses and values of the coastal environment.

(2) The adverse effects of subdivision, use and development on the values of the coastal environment are avoided, remedied or mitigated.

(3) The natural and physical resources of the coastal environment are used efficiently and activities that depend on the use of the natural and physical resources of the coastal environment are provided for in appropriate locations.

B8.3.2. Policies

(1) Recognise the contribution that use and development of the coastal environment make to the social, economic and cultural well-being of people and communities.

(2) Avoid or mitigate sprawling or sporadic patterns of subdivision, use and development in the coastal environment by all of the following:

(a) concentrating subdivision, use and development within areas already characterised by development and where natural character values are already compromised;

(b) avoiding urban activities in areas with natural and physical resources that have been scheduled in the Unitary Plan in relation to natural heritage, Mana Whenua, natural resources, coastal, historic heritage and special character; and

(c) ensuring that subdivision, use or development involving land above and below the mean high water springs can provide for any associated facilities or infrastructure in an integrated manner.

(3) Provide for use and development in the coastal marine area that:

(a) have a functional need which requires the use of the natural and physical resources of the coastal marine area;

(b) are for the public benefit or public recreation that cannot practicably be located outside the coastal marine area;

(c) have an operational need making a location in the coastal marine area appropriate and that cannot practicably

be located outside the coastal marine area; or

(d) enable the use of the coastal marine area by Mana Whenua for Māori cultural activities and customary uses.

(4) Require subdivision, use and development in the coastal environment to avoid, remedy or mitigate the adverse effects of activities above and below the mean high water springs, including the effects on existing uses and on the coastal receiving environment.

(5) Adopt a precautionary approach towards proposed activities whose effects on the coastal environment are uncertain, unknown or little understood, but could be significantly adverse.

(6) Consider the purposes for which land or water in the coastal environment is held or managed under any enactment for conservation or protection purposes and:

(a) avoid adverse effects that are significant in relation to those purposes; and

(b) avoid, remedy or mitigate other adverse effects in relation to those purposes.

B8.4. Public access and open space

B8.4.1. Objectives

(1) Public access to and along the coastal marine area is maintained and enhanced, except where it is appropriate to restrict that access, in a manner that is sensitive to the use and values of an area.

(2) Public access is restricted only where necessary to ensure health or safety, for security reasons, for the efficient and safe operation of activities, or to protect the value of areas that are sensitive to disturbance.

B8.4.2. Policies

(3) Restrict public access to and along the coastal marine area, particularly walking access, only where it is necessary to do any of the following:

(a) protect public health and safety;

(b) provide for defence, port or airport purposes;

(c) protect areas with natural and physical resources that have been scheduled in the Unitary Plan in relation to natural heritage, Mana Whenua, natural resources, coastal, historic heritage and special character;

(d) protect threatened indigenous species;

(e) protect dunes, estuaries and other sensitive natural areas or habitats;

(f) have a level of security necessary to carry out an activity or function that has been established or provided for;

(g) provide for exclusive use of an area to carry out an activity granted an occupation consent under section12 of the Resource Management Act 1991;

(h) enable a temporary activity or special event; or

(i) in other exceptional circumstances, sufficient to justify the restriction.

Chapter D - Overlays

D9 Significant Ecological Areas Overlay

D9.2. Objectives [rcp/rp/dp]

(1) Areas of significant indigenous biodiversity value in terrestrial, freshwater, and coastal marine areas are protected from the adverse effects of subdivision, use and development.

(2) Indigenous biodiversity values of significant ecological areas are enhanced.

(3) The relationship of Mana Whenua and their customs and traditions with indigenous vegetation and fauna is recognised and provided for.

D9.3. Policies [rcp/rp/dp]

(1) Manage the effects of activities on the indigenous biodiversity values of areas identified as significant ecological areas by:

(a) avoiding adverse effects as far as practicable, and where avoidance is not practicable, minimising adverse effects on the identified values;

(b) remedying adverse effects on the identified values where they cannot be avoided;

(c) mitigating adverse effects on the identified values where they cannot be avoided or remediated; and

(d) considering the appropriateness of offsetting any residual adverse effects that are significant and where they have not been able to be mitigated, through protection, restoration and enhancement measures, having regard to Appendix 8 Biodiversity offsetting.

(2) Adverse effects on indigenous biodiversity values in significant ecological areas that are required to be avoided, remedied, mitigated or offset may include, but are not limited to, any of the following:

(a) fragmentation of, or a reduction in the size and extent of, indigenous ecosystems and the habitats of indigenous species;

(b) fragmentation or disruption of connections between ecosystems or habitats;

(c) changes which result in increased threats from pests on indigenous biodiversity and ecosystems;

(d) loss of buffering of indigenous ecosystems;

(e) loss of a rare or threatened individual, species population or habitat;

(f) loss or degradation of originally rare ecosystems including wetlands, dune systems, lava forests, coastal forests;

(g) a reduction in the abundance of individuals within a population, or natural diversity of indigenous vegetation and habitats of indigenous fauna;

(h) loss of ecosystem services;

(i) effects which contribute to a cumulative loss or degradation of habitats, species populations and ecosystems;

(j) impacts on species or ecosystems that interact with other activities, or impacts that exacerbate or cause adverse effects in synergistic ways;

(k) loss of, or damage to, ecological mosaics, sequences, processes, or integrity;

(l) downstream effects on wetlands, rivers, streams, and lakes from hydrological changes further up the catchment;

(m) a modification of the viability or value of indigenous vegetation and habitats of indigenous fauna as a result of the use or development of other land, freshwater, or coastal resources;

(n) a reduction in the historical, cultural, and spiritual association held by Mana Whenua or the wider community;

(o) the destruction of, or significant reduction in, educational, scientific, amenity, historical, cultural, landscape, or natural character values;

(p) disturbance to indigenous fauna that is likely or known to increase threats, disturbance or pressures on indigenous fauna; or

(q) increases in the extinction probability of a species.

(3) Enhance indigenous biodiversity values in significant ecological areas through

any of the following:

(a) restoration, protection and enhancement of threatened ecosystems and

habitats for rare or threatened indigenous species;

(b) control, and where possible, eradication of plant and animal pests;

(c) fencing of significant ecological areas to protect them from stock impacts;

(d) legal protection of significant ecological areas through covenants or similar mechanisms;

(e) development and implementation of management plans to address adverse effects;

(f) re-vegetating areas using, where possible, indigenous species sourced from naturally growing plants in the vicinity with the same climactic and environmental conditions; or

(g) providing for the role of Mana Whenua as kaitiaki and for the practical exercise of kaitiakitanga in restoring, protecting and enhancing areas.

(4) Enable activities which enhance the ecological integrity and functioning of significant ecological areas including:

(a) the management and control of pest species that threaten indigenous biodiversity; and

(b) managing works in the vicinity of kauri, such as deadwood removal or earthworks, to control kauri dieback disease by preventing the spread of soil and kauri plant material.

(5) Enable the following vegetation management activities in significant ecological areas to provide for the reasonable use and management of land:

(a) trimming of vegetation;

(b) vegetation removal to maintain existing open areas, including tracks;

(c) vegetation removal to establish and maintain a reasonable cleared area around a building;

(d) vegetation removal required to maintain lawfully established activities, structures and buildings;

(e) vegetation removal necessary to provide for a dwelling on a site;

(f) vegetation removal necessary to provide for marae and papakainga on Māori land;

(g) vegetation removal in areas of high wildfire risk to manage this risk; and

(h) vegetation removal necessary to provide access and exit for emergency service vehicles.

(6) Avoid as far as practicable the removal of vegetation and loss of biodiversity in significant ecological areas from the construction of building platforms, access ways or infrastructure, through:

(a) using any existing cleared areas on a site to accommodate new development in the first instance;

(b) assessing any practicable alternative locations and/or methods that would reduce the need for vegetation removal or land disturbance;

(c) retaining indigenous vegetation and natural features which contribute to the ecological significance of a site, taking into account any loss that may be unavoidable to create a single building platform for a dwelling and associated services, access and car parking on a site;

(d) designing and locating dwellings and other structures to reduce future demands to clear or damage areas of significant indigenous biodiversity, for example to provide sunlight or protect property;

(e) avoiding as far as practicable any changes in hydrology which could adversely affect indigenous biodiversity values;

(f) implementing measures to maintain existing water quality and not increase the amount of sediment entering natural waterways, wetlands and groundwater; and

(g) using techniques that minimise the effects of construction and development on vegetation and biodiversity and the introduction and spread of animal and plant pests.

(7) Provide for the role of Mana Whenua as kaitiaki in managing biodiversity, particularly in Treaty Settlement areas, and for cultural practices and cultural harvesting in significant ecological areas where the mauri of the resource is sustained.

(8) Manage the adverse effects from the use, maintenance, upgrade and development of infrastructure in accordance with the policies above, recognising that it is not always practicable to locate and design infrastructure to avoid significant ecological areas.

(9) Avoid, subdivision, use and development in the coastal environment where it will result in any of the following:

(a) the permanent use or occupation of the foreshore and seabed to the extent that the values, function or processes associated with any Significant Ecological Area – Marine is significantly reduced;

(b) any change to physical processes that would destroy, modify, or damage any natural feature or values identified for a Significant Ecological Area – Marine in more than a minor way; or

(c) fragmentation of the values of a Significant Ecological Area – Marine to the extent that its physical integrity is lost.

(10) Manage the adverse effects of use and development on the values of Significant Ecological Areas – Marine, in addition to the policies above, taking into account all of the following:

(a) the extent to which existing use and development already, and in combination with any proposal, impacts on the habitat, or impedes the operation of ecological and physical processes;

(b) the extent to which there are similar habitat types within other Significant Ecological Areas – Marine in the same harbour or estuary or, where the significant ecological area - marine is located on open coast, within the same vicinity; and

(c) whether the viability of habitats of regionally or nationally threatened plants or animals is adversely affected, including the impact on the species population and location.

(11) Avoid structures in Significant Ecological Areas – Marine 1 (SEA-M1) except where a structure is necessary for any of the following purposes:

(a) scientific and research purposes, or for public education, and will enhance the understanding and long-term protection of the significant ecological area;

(b) navigation and safety;

(c) habitat maintenance and enhancement; or

(d) to benefit the regional and national community, including structures for significant infrastructure where there is no reasonable or practicable alternative location on land, or elsewhere in the coastal marine area outside of a Significant Ecological Area – Marine 1(SEA-M1).

Chapter E – Auckland Wide

E1 Water Quality and Integrated Management

E1.2. Objectives [rp]

(1) Freshwater and sediment quality is maintained where it is excellent or good and progressively improved over time in degraded areas.

(3) Stormwater and wastewater networks are managed to protect public health and safety and to prevent or minimise adverse effects of contaminants on freshwater and coastal water quality.

E1.3. Policies [rp/dp]

(1) Manage discharges, until such time as objectives and limits are established in accordance with Policy E1.3(7), having regard to:

(a) the National Policy Statement for Freshwater Management National Bottom Lines;

(b) the Macroinvertebrate Community Index as a guideline for freshwater ecosystem health associated with different land uses within catchments in accordance with Policy E1.3(2); or

(c) other indicators of water quality and ecosystem health.

(2) Manage discharges, subdivision, use, and development that affect freshwater systems to:

(a) maintain or enhance water quality, flows, stream channels and their margins and other freshwater values, where the current condition is above National Policy Statement for Freshwater Management National Bottom Lines and the relevant Macroinvertebrate Community Index guideline in Table E1.3.1 below; or

(b) enhance water quality, flows, stream channels and their margins and other freshwater values where the current condition is below national bottom lines or the relevant Macroinvertebrate Community Index guideline in Table E1.3.1 below.

Table E1.3.1 Macroinvertebrate Community Index guideline for Auckland rivers and streams

Land use	Macroinvertebrate Community Index guideline
Native forest	123
Exotic forest	111
Rural areas	94
Urban areas	68

(3) Require freshwater systems to be enhanced unless existing intensive land use and development has irreversibly modified them such that it practicably precludes enhancement.

(4) When considering any application for a discharge, the Council must have regard to the following matters:

(a) the extent to which the discharge would avoid contamination that will have an adverse effect on the life-supporting capacity of freshwater including on any ecosystem associated with freshwater; and

(b) the extent to which it is feasible and dependable that any more than a minor adverse effect on freshwater, and on any ecosystem associated with freshwater, resulting from the discharge would be avoided.

(6) Policies E1.3(4) and (5) apply to the following discharges (including a diffuse discharge by any person or animal):

(a) new discharge; or

(b) a change or increase in any discharge of any contaminant into freshwater, or onto or into land in circumstances that may result in that contaminant (or, as a result of any natural process from the discharge of that contaminant, any other contaminant) entering freshwater.

(8) Avoid as far as practicable, or otherwise minimise or mitigate, adverse effects of stormwater runoff from greenfield development on freshwater systems, freshwater and coastal water by:

(a) taking an integrated stormwater management approach (refer to Policy E1.3.10);

(b) minimising the generation and discharge of contaminants, particularly from high contaminant generating car parks and high use roads and into sensitive receiving environments;

(c) minimising or mitigating changes in hydrology, including loss of infiltration, to:

(i) minimise erosion and associated effects on stream health and values;

(ii) maintain stream baseflows; and

(iii) support groundwater recharge;

(d) where practicable, minimising or mitigating the effects on freshwater systems arising from changes in water temperature caused by stormwater discharges; and

(e) providing for the management of gross stormwater pollutants, such as litter, in areas where the generation of these may be an issue.

(9) Minimise or mitigate new adverse effects of stormwater runoff, and where practicable progressively reduce existing adverse effects of stormwater runoff, on freshwater systems, freshwater and coastal waters during intensification and redevelopment of existing urban areas by all of the following:

(a) requiring measures to reduce contaminants, particularly from high contaminant-generating car parks and high-use roads;

(b) requiring measures to reduce the discharge of gross stormwater pollutants;

(c) requiring measures to be adopted to reduce the peak flow rate and the volume of stormwater flows:

(i) within sites identified in the Stormwater Management Area – Flow 1 and Flow 2 Control (as shown on the planning maps);

(ii) where development exceeds the maximum impervious area for the relevant zone; or

(iii) from areas of impervious surface where discharges may give rise to flooding or adversely affect rivers and streams;

(d) taking an integrated stormwater management approach for large-scale and comprehensive redevelopment and intensification (refer to Policy E1.3.10 below) and encourage the restoration of freshwater systems where practicable; and

(e) ensuring intensification is supported by appropriate stormwater infrastructure, including natural assets that are utilised for stormwater conveyance and overland flow paths.

(10) In taking an integrated stormwater management approach have regard to all of the following:

(a) the nature and scale of the development and practical and cost considerations, recognising:

(i) greenfield and comprehensive brownfield development generally offer greater opportunity than intensification and small-scale redevelopment of existing areas;

(ii) intensive land uses such as high-intensity residential, business, industrial and roads generally have greater constraints; and

(iii) site operational and use requirements may preclude the use of an integrated stormwater management approach.

(b) the location, design, capacity, intensity and integration of sites/development and infrastructure, including roads and reserves, to protect significant site features and hydrology and minimise adverse effects on receiving environments;

(c) the nature and sensitivity of receiving environments to the adverse effects of development, including fragmentation and loss of connectivity of rivers and streams, hydrological effects and contaminant discharges and how these can be minimised and mitigated, including opportunities to enhance degraded environments;

(d) reducing stormwater flows and contaminants at source prior to the consideration of mitigation measures and the optimisation of on-site and larger communal devices where these are required; and

(e) the use and enhancement of natural hydrological features and green infrastructure for stormwater management where practicable.

(11) Avoid as far as practicable, or otherwise minimise or mitigate adverse effects of stormwater diversions and discharges, having particular regard to:

(a) the nature, quality, volume and peak flow of the stormwater runoff;

(b) the sensitivity of freshwater systems and coastal waters, including the Hauraki Gulf Marine Park;

(c) the potential for the diversion and discharge to create or exacerbate flood risks;

(d) options to manage stormwater on-site or the use of communal stormwater management measures;

(e) practical limitations in respect of the measures that can be applied; and

(f) the current state of receiving environments.

(12) Manage contaminants in stormwater runoff from high contaminant generating car parks and high use roads to minimise new adverse effects and progressively reduce existing adverse effects on water and sediment quality in freshwater systems, freshwater and coastal waters.

(13) Require stormwater quality or flow management to be achieved on-site unless there is a downstream communal device or facility designed to cater for the site's stormwater runoff.

(14) Adopt the best practicable option to minimise the adverse effects of stormwater discharges from stormwater network and infrastructure including road, and rail having regard to all of the following:

(a) the best practicable option criteria as set out in section 2 of the Resource Management Act 1991;

(b) the reasonable timeframes over which adverse effects can be avoided as far as practicable, or otherwise minimised or mitigated;

(c) the scale and significance of the adverse effects;

(d) infrastructure investment priorities and the consequences of delaying infrastructural improvements in other areas;

(e) the ability to prevent or minimise existing adverse effects having regard to the effectiveness and timeframes of other feasible methods, including land use controls;

(f) opportunities to integrate with other major infrastructure projects or works;

(g) the need to maintain and optimise existing stormwater networks and provide for planned land use and development; and

(h) operational requirements and space limitations.

(15) Utilise stormwater discharge to ground soakage in areas underlain by shallow or highly permeable aquifers provided that:

(a) ground soakage is available;

(b) any risk to people and property from land instability or flooding is avoided;

(c) stormwater quality treatment is implemented to minimise effects on the capacity and water quality of the underlying aquifer system; and

(d) discharge to ground soakage is the most effective and sustainable option.

(16) Require land use development and drainage systems within areas underlain by peat soils to provide for stormwater discharge to ground soakage that maintains underlying water levels and the geotechnical stability of the peat soils.

(17) Avoid the discharge of wastewater to the coastal marine area and to freshwater, unless:

(a) alternative methods, sites and routes for the discharge have been considered and are not the best practicable option;

(b) Mana Whenua have been consulted in accordance with tikanga Māori and due weight has been given to section 6, section 7 and section 8 of the Resource Management Act 1991;

(c) the affected community has been consulted regarding the suitability of the treatment and disposal system to address any environmental effects;

(d) the extent to which adverse effects have been avoided, remedied or mitigated on areas of:

(i) high recreational use, or that are used for fishing or shellfish gathering;

(ii) areas of maintenance dredging;

(iii) commercial or residential waterfront development;

(iv) high ecological value; and

(v) marine farms.

(19) Ensure wastewater networks are designed and operated to minimise wet weather overflows by:

(a) requiring wastewater networks to be designed and constructed in accordance with recognised industry standards, including being sized to cater for the maximum probable development level of the area to be serviced;

(b) requiring the management of connections to the wastewater network;

(c) requiring wastewater networks to be managed in accordance with a network operations plan including an overflow mitigation plan with clear requirements and timeframes; and

(d) designing and locating overflow points to minimise nuisance, damage, public health risk and adverse ecological effects.

(20) Require land use and development in areas serviced by a combined sewer network to:

(a) avoid increasing stormwater flows to the combined sewer network, unless any increase is minor and there is no practicable alternative;

(b) where practicable, reduce stormwater flows from existing impervious areas to the combined sewer network at the time of urban intensification, redevelopment or subdivision; and

(c) discharge stormwater from new impervious areas and existing impervious areas to a separated stormwater system, or a suitable alternative, where one of those options is available.

(21) Progressively minimise the adverse effects of wet weather overflows from wastewater networks by:

(a) adopting the best practicable option to reduce wet weather overflows to an average of no more than two events per discharge location per year in areas serviced by a separated wastewater network with priority for:

(i) receiving environments that are used for public and contact recreation activities;

(ii) receiving environments that are sensitive to the adverse effects of wastewater overflows;

(iii) areas significant to Mana Whenua; or

(iv) adopting the best practicable option to reduce wet weather overflows from the combined sewer network.

(b) requiring the development and implementation of a network operations plan; as part of any network discharge consent; and

(c) adopting wastewater overflow response procedures.

(22) Minimise the adverse effects of dry weather overflows by:

(a) ensuring wastewater networks and combined sewer networks are operated and maintained to minimise the likelihood of dry weather overflows occurring; and

(b) adopting wastewater overflow response procedures to minimise adverse effects and risks to public health and safety and the environment.

(26) Prevent or minimise the adverse effects from construction, maintenance, investigation and other activities on the quality of freshwater and coastal water by:

(a) adopting best management practices and establishing minimum standards for the discharges; or

(b) where Policy E1.3(26)(a) is not practicable, have regard to the following:

(i) the nature, volume and concentration of the contaminants in the discharge;

(ii) the sensitivity of the receiving environment to the contaminants in the discharge;

(iii) other practicable options for the discharge, including reuse or discharge to the trade sewer; and

(iv) practicable measures to reduce contaminant concentrations prior to discharge or otherwise mitigate adverse effects.

E2 Water quantity, allocation and use

E3. Lakes, rivers, streams and wetlands

E3.2. Objectives [rp]

(1) Auckland's lakes, rivers, streams and wetlands with high natural values are protected from degradation and permanent loss.

(2) Auckland's lakes, rivers, streams and wetlands are restored, maintained or enhanced.

(3) Significant residual adverse effects on lakes, rivers, streams or wetlands that cannot be avoided, remedied or mitigated are offset where this will promote the purpose of the Resource Management Act 1991.

(4) Structures in, on, under or over the bed of a lake, river, stream or wetland are provided for where there are functional or operational needs for the structure to be in that location, or traverse that area.

(5) Activities in, on, under or over the bed of a lake, river, stream and wetland are managed to minimise adverse effects on the lake, river, stream or wetland.

(6) Reclamation and drainage of the bed of a lake, river, stream and wetland is avoided, unless there is no practicable alternative.

E3.3. Policies [rp]

(1) Avoid significant adverse effects, and avoid where practicable or otherwise remedy or mitigate other adverse effects of activities in, on, under or over the beds of lakes, rivers, streams or wetlands within the following overlays:

(a) Natural Stream Management Areas Overlay;

(b) Natural Lake Management Areas Overlay;

(c) Urban Lake Management Areas Overlay;

(d) Significant Ecological Areas Overlay; and

(e) Wetland Management Areas Overlay.

(2) Manage the effects of activities in, on, under or over the beds of lakes, rivers, streams or wetlands outside the overlays identified in Policy E3.3(1) by:

(a) avoiding where practicable or otherwise remedying or mitigating any adverse effects on lakes, rivers, streams or wetlands; and

(b) where appropriate, restoring and enhancing the lake, river, stream or wetland.

(3) Enable the enhancement, maintenance and restoration of lakes, rivers, streams or wetlands.

(4) Restoration and enhancement actions, which may form part of an offsetting proposal, for a specific activity should:

(a) be located as close as possible to the subject site;

(b) be 'like-for-like' in terms of the type of freshwater system affected;

(c) preferably achieve no net loss or a net gain in the natural values including ecological function of lakes, rivers, streams or wetlands; and

(d) consider the use of biodiversity offsetting as outlined in Appendix 8 Biodiversity offsetting.

(5) Avoid significant adverse effects, and avoid, remedy or mitigate other adverse effects of activities in, on, under or over the beds of lakes, rivers, streams or wetlands on:

(a) the mauri of the freshwater environment; and

(b) Mana Whenua values in relation to the freshwater environment.

(6) Manage the adverse effects on Mana Whenua cultural heritage that is identified prior to, or discovered during, subdivision, use and development by:

(a) complying with the protocol for the accidental discovery of kōiwi, archaeology and artefacts of Māori origin;

(b) undertaking appropriate actions in accordance with mātauranga and tikanga Māori; and

(c) undertaking appropriate measures to avoid adverse effects, or where adverse effects cannot be avoided, effects are remedied or mitigated.

(10) Enable the planting of any plant, excluding pest species, in, on, or under the bed of a lake, river, stream or wetland where it is suitable for habitat establishment, restoration or enhancement, the maintenance and enhancement of amenity values, flood or erosion protection or stormwater runoff control provided it does not create or exacerbate flooding.

(11) Encourage the planting of plants that are native to the area.

(12) Encourage the incorporation of Mana Whenua mātauranga, values and tikanga in any planting in, on, or under the bed of a lake, river, stream or wetland.

(13) Avoid the reclamation and drainage of the bed of lakes, rivers, streams and wetlands, including any extension to existing reclamations or drained areas unless all of the following apply:

(a) there is no practicable alternative method for undertaking the activity outside the lake, river, stream or wetland;

(b) for lakes, permanent rivers and streams, and wetlands the activity is required for any of the following:

(i) as part of an activity designed to restore or enhance the natural values of any lake, river, stream or wetland, any adjacent area of indigenous vegetation or habitats of indigenous fauna;

(ii) for the operation, use, maintenance, repair, development or upgrade of infrastructure; or

(iii) to undertake mineral extraction activities; and

(c) the activity avoids significant adverse effects and avoids, remedies or mitigates other adverse effects on Mana Whenua values associated with freshwater resources, including wāhi tapu, wāhi taonga and mahinga kai.

(15) Protect the riparian margins of lakes, rivers, streams, and wetlands from inappropriate use and development and promote their enhancement to through all of the following:

(a) safeguard habitats for fish, plant and other aquatic species, particularly in rivers and streams with high ecological values;

(b) safeguard their aesthetic, landscape and natural character values;

(c) safeguard the contribution of natural freshwater systems to the biodiversity, resilience and integrity of ecosystems; and

(d) avoid or mitigate the effects of flooding, surface erosion, stormwater contamination, bank erosion and increased surface water temperature.

(16) Protect land alongside streams for public access through the use of esplanade reserves and esplanade strips, marginal strips, drainage reserves, easements or covenants where appropriate and for water quality, ecological and landscape protection purposes.

E11 Land disturbance – Regional

E11.2. Objectives [rp]

(1) Land disturbance is undertaken in a manner that protects the safety of people and avoids, remedies and mitigates adverse effects on the environment.

(2) Sediment generation from land disturbance is minimised.

E11.3. Policies [rp]

(1) Avoid where practicable, and otherwise mitigate, or where appropriate, remedy adverse effects on areas where there are natural and physical resources that have been scheduled in the Plan in relation to natural heritage, Mana Whenua, natural resources, coastal environment, historic heritage and special character.

(7) Require any land disturbance that will likely result in the discharge of sediment laden water to a surface water body or to coastal water to demonstrate that sediment discharge has been minimised to the extent practicable, having regard to the quality of the environment; with:

(a) any significant adverse effects avoided, and other effects avoided, remedied or mitigated, particularly in areas where there is:

(i) high recreational use;

(ii) relevant initiatives by Mana Whenua, established under regulations relating to the conservation or management of fisheries, including taiāpure, rāhui or whakatupu areas;

(iii) the collection of fish and shellfish for consumption;

(iv) maintenance dredging; or

(v) a downstream receiving environment that is sensitive to sediment accumulation;

(b) adverse effects avoided as far as practicable within areas identified as sensitive because of their ecological values, including terrestrial, freshwater and coastal ecological values; and

(c) the receiving environments ability to assimilate the discharged sediment being taken into account.

(8) Monitor the quality of fresh and coastal water bodies across the region and the effects of land disturbance on water quality and receiving environments.

E12 Land disturbance – District

E12.2. Objectives

(1) Land disturbance is undertaken in a manner that protects the safety of people and avoids, remedies and mitigates adverse effects on the environment.

E12.3. Policies

(1) Avoid where practicable, and otherwise, mitigate, or where appropriate, remedy adverse effects of land disturbance on areas where there are natural and physical resources that have been scheduled in the Plan in relation to natural heritage, Mana Whenua, natural resources, coastal environment, historic heritage and special character.

E15 Vegetation management and biodiversity

E15.2. Objectives [rcp/rp/dp]

(1) Ecosystem services and indigenous biological diversity values, particularly in sensitive environments, and areas of contiguous indigenous vegetation cover, are maintained or enhanced while providing for appropriate subdivision, use and development.

(2) Indigenous biodiversity is restored and enhanced in areas where ecological values are degraded, or where development is occurring.

E15.3. Policies [rcp/rp/dp]

(1) Protect areas of contiguous indigenous vegetation cover and vegetation in sensitive environments including the coastal environment, riparian margins, wetlands, and areas prone to natural hazards.

(2) Manage the effects of activities to avoid significant adverse effects on biodiversity values as far as practicable, minimise significant adverse effects where avoidance is not practicable, and avoid, remedy or mitigate any other adverse effects on indigenous biological diversity and ecosystem services, including soil conservation, water quality and quantity management, and the mitigation of natural hazards.

(3) Encourage the offsetting of any significant residual adverse effects on indigenous vegetation and biodiversity values that cannot be avoided, remedied or mitigated, through protection, restoration and enhancement measures, having regard to Policy E15.3(4) below and Appendix 8 Biodiversity offsetting.

(4) Protect, restore, and enhance biodiversity when undertaking new use and development through any of the following:

(a) using transferable rural site subdivision to protect areas in Schedule 3 Significant Ecological Areas -Terrestrial Schedule;

(b) requiring legal protection, ecological restoration and active management techniques in areas set aside for the purposes of mitigating or offsetting adverse effects on indigenous biodiversity; or

(c) linking biodiversity outcomes to other aspects of the development such as the provision of infrastructure and open space.

(9) Avoid activities in the coastal environment where they will result in any of the following:

(a) non-transitory or more than minor adverse effects on:

(i) threatened or at risk indigenous species (including Maui's Dolphin and Bryde's Whale);

(ii) the habitats of species that are at the limit of their natural range or which are naturally rare;

(iii) threatened or rare ecosystems, including naturally rare ecosystems;

(iv) areas containing nationally significant examples of indigenous ecosystems or indigenous community types; or

(v) areas set aside for full or partial protection of indigenous biodiversity under other legislation, including the West Coast North Island Marine Mammal Sanctuary.

(b) any regular or sustained disturbance of migratory bird roosting, nesting and feeding areas that is likely to noticeably reduce the level of use of an area for these purposes, or result in permanent abandonment of an area;

(c) the deposition of material at levels which would adversely affect the natural ecological functioning of the area; or

(d) fragmentation of the values of the area to the extent that its physical integrity is lost.

(10) Avoid (while giving effect to Policy E15(8) above) activities in the coastal environment which result in significant adverse effects, and avoid, remedy or mitigate other adverse effects of activities, on:

(a) areas of predominantly indigenous vegetation;

(b) habitats that are important during the vulnerable life stages of indigenous species;

(c) indigenous ecosystems and habitats that are found only in the coastal environment and are particularly vulnerable to modification, including estuaries, lagoons, coastal wetlands, intertidal zones, rocky reef systems and saltmarsh;

(d) habitats of indigenous species that are important for recreational, commercial, traditional or cultural purposes including fish spawning, pupping and nursery areas;

(e) habitats, including areas and routes, important to migratory species;

(f) ecological corridors, and areas important for linking or maintaining biological values; or

(g) water quality such that the natural ecological functioning of the area is adversely affected.

Chapter E – Auckland-Wide

E38 Subdivision - Urban

E38.2. Objectives

(1) Land is subdivided to achieve the objectives of the residential zones, business zones, open space zones, special purpose zones, coastal zones, relevant overlays and Auckland-wide provisions.

E38.3. Policies

(5) Provide for subdivision of residential zoned sites containing indigenous vegetation scheduled in the D9 Significant Ecological Areas Overlay where the significant ecological area is to be protected, and enable the same or a similar number of sites to be created as would be enabled if the site did not contain a significant ecological area.

(14) Encourage the design of subdivision to incorporate and enhance land forms, natural features, and indigenous trees and vegetation.

(22) Require subdivision to be designed to manage stormwater:

(a) in accordance with any approved stormwater discharge consent or network discharge consent;

(b) in a manner consistent with stormwater management policies in E1 Water quality and integrated management;

(c) by applying an integrated stormwater management approach to the planning and design of development in accordance with stormwater management policies in E1 Water quality and integrated management;

(d) to protect natural streams and maintain the conveyance function of overland flow paths;

(e) to maintain, or progressively improve, water quality;

(f) to integrate drainage reserves and infrastructure with surrounding development and open space networks; and

(g) in an integrated and cost-effective way.

Attachment B

Macroinvertebrate results from Stream H above the Stream H pond.

Bottle No.			Auranga C
			Stream H
Sample No.			
Site Name			
Taxa	MCI	MCI-sb	
	score	score	
Caddisfly Hydrobiosis	5	6.7	
Caddisfly Oxyethira	2	1.2	
Caddisfly Paroxyethira	2	3.7	
Caddisfly Plectrocnemia	8	6.6	
Caddisfly Triplectides	5	5.7	
Damselfly Xanthocnemis	5	1.2	
Bug Microvelia	5	4.6	7
True Fly Austrosimulium	3	3.9	1
True Fly Chironomus	1	3.4	1
True Fly Culicidae	3	1.2	15
True Fly Mischoderus	4	5.9	1
True Fly Nothodixa	4	9.3	2
True Fly Orthocladiinae	2	3.2	2
True Fly Polypedilum	3	8	
True Fly Tanytarsini	3	4.5	
True Fly Zelandotipula	6	3.6	4
Crustacea Ostracoda	3	1.9	67
Crustacea Paracalliope	5	5.5	
Crustacea Paraleptampho	5	5.5	18
Crustacea Paratya	5	3.6	
MITES	5	5.2	
SPIDERS Dolomedes	5	6.2	
Mollusc Physella	3	0.1	3
Mollusc Potamopyrgus	4	2.1	46
OLIGOCHAETES	1	3.8	21
LEECHES	3	1.2	2
FLATWORMS	3	0.9	1

Attachment C

SEV results from Stream H above the Stream H pond.

Function category	Report section*	Function	Worksheet #	Variable (code)	Stream H
				Vchann	0.80
				Vlining	0.80
				Vpipe	1.00
Hydraulic	4.1	NFR		=	0.80
				Vbank	1.00
				Vrough	0.70
Hydraulic	4.2	FLE		=	0.70
				Vbarr	0.30
Hydraulic	4.3	CSM		=	0.30
				Vchanshape	0.40
				Vlining	0.80
Hydraulic	4.4	CGW		=	0.67
				Hydraulic function mean score	0.62
				Vshade	0.70
biogeochemical	4.5	WTC		=	0.70
				Vdod	0.45
biogeochemical	4.6	DOM		=	0.45
				Vripar	0.50
				Vdecid	0.72
biogeochemical	4.7	OMI		=	0.43
				Vmacro	0.95
				Vretain	0.60
biogeochemical	4.8	IPR		=	0.60
				Vsurf	1.00
				Vripfilt	0.40
biogeochemical	4.9	DOP		=	0.70
				Biogeochemical function mean score	0.58
				Vgalspwn	1.00
				Vgalqual	0.00
				Vgobspwn	0.80
habitat provision	4.10	FSH		=	0.40
				Vphyshab	0.48
				Vwatqual	0.16
				Vimperv	0.50
habitat provision	4.11	HAF		=	0.41
				Habitat provision function mean score	0.40
				Vfish	0.00
Biodiversity	4.12	FFI		=	0.00
				Vmci	0.30
				Vept	0.00
				Vinvert	0.23
Biodiversity	4.13	IFI		=	0.18
				Vripcond	0.70
				Vripconn	0.95
Biodiversity	4.14	RVI		=	0.67
				Biodiversity function mean score	0.28
Overall mean SEV score (maximum value 1)					0.500