WAI-986-000-REP-LC-0001_RevC.1
TECHNICAL REPORT
ECOLOGICAL ASSESSMENT – MARTHA PIT PLAN CHANGE
GENERAL AREA 000

Bioresearches
A Babbage Company

Ecological Assessment: Martha Mineral Zone Plan Change

August 2022

Consulting Biologists – Established 1972
P.O. Box 2027, Auckland 1140. New Zealand
www.Bioresearches.co.nz

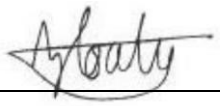
Bioresearches
A Babbage Company

Ecological Assessment: Martha Mineral Zone Plan Change

August 2022

DOCUMENT APPROVAL

Document title:	Ecological Assessment: Martha Mineral Zone Plan Change
Prepared for:	Oceanagold New Zealand
Version:	Updated following s92
Date:	11 August 2022
Document name:	WAI-986-000-REP-LC-0001.B.1.IAC April 2022.docx

Authors:	Annabelle Coates, M.Sc (Hons) Senior Ecologist	
Reviewer:	Chris Wedding, M.Sc. (Hons) Ecology Manager	
Approved for Release:	Chris Wedding, M.Sc. (Hons) Ecology Manager	

REVISION HISTORY

Rev. No.	Date	Description	Author(s)	Reviewer	Approved
1	8 June 2021	Version 1	A Coates	C Wedding	
2	17 June 2021		A Coates	C Wedding	C Wedding
3	5 July 2021	Version 3	A Coates	C Wedding	
4	26 August 2021	Final	A Coates	C Wedding	C Wedding
5	5 April 2022	Version 4	A Coates	C Wedding	
6	8 August 2022	Updated following s92	A Coates	C Wedding	

Reference: Bioresearches (2022). Ecological Assessment: Martha Mineral Zone Plan Change. Report for Oceanagold New Zealand. pp 29

Cover Illustration: Planted vegetation near Martha Pit rim

CONTENTS

1. INTRODUCTION

OceanaGold (New Zealand) Ltd (OGNZL) is lodging a private plan change to the Hauraki District Plan that primarily seeks to increase the size of the Martha Mineral Zone (MMZ) in order to provide for the potential future expansion of surface mining in the Martha Pit, Waihi by way of a resource consent application. The area subject to the proposed extension of the MMZ is largely to the north, west and south of the Martha Pit and is described in more detail in the plan change application prepared by Mitchell Daysh.

Bioresearches (Babbage Consultants Limited), was commissioned by OGNZL to complete an assessment of the existing terrestrial ecology values within the properties proposed to be rezoned as MMZ, and assess the potential effects of the plan change on those ecological values. The values described in this report include vegetation, lizards and birds and are based on desktop and database reviews, which are, in part, informed by various ecological surveys undertaken at the Martha Pit and the surrounding environment between 2011 and 2020.

1.1 Site Overview

The current extent of the MMZ located in the central area of Waihi comprises approximately 100 ha. The area includes the existing Martha Pit and Surface Facilities Area, as well as areas of undeveloped land around the perimeter of the pit. The MMZ is bordered by properties that are zoned Residential, Low Density Residential and Town Centre in the Hauraki District Plan.

Vegetation cover within the MMZ largely consists of amenity or other planted assemblages, with some weedy regeneration occurring beneath. These areas of vegetation generally form narrow strips around the pit rim, are moderately diverse and contain establishing, mostly native species that have been planted. The planted areas have low habitat complexity and are generally isolated by surrounding modified land uses, particularly those adjacent properties zoned Town Centre and 'Residential' in the Hauraki District Plan. There is also a small area of riparian vegetation, and other vegetation associated with the stream that flows along the eastern edge of the MMZ (referred to as Eastern Stream, hereafter).

There are two waterways the flow along the eastern and western sites of the MMZ. The Eastern Stream is already partially in the MMZ and a small additional reach will be added to the zone under this plan change application. The Mangatoetoe Stream flows along the western side of the MMZ. It currently is not within the MMZ, however the plan change would result in a small section flowing into, then out of the zone at its western most point.

Figure 1. Planted vegetation within the Martha Mineral Zone, Waihi.

Figure 2. Planted strips of vegetation around the Martha Pit edge, Martha Mineral Zone.

1.2 Values of the Current Martha Mineral Zone

Vegetation around Martha Pit is largely planted vegetation, dominated by common natives and exotic species. A list of species recorded around the perimeter of the existing Martha Pit is provided in Appendix A.

The vegetation in the current MMZ provides only a minor contribution to the ecological value of the greater area because it is:

- a very thin area (all edge);
- surrounded by highly modified land uses (perturbations);

- a planted assemblage (and so limited diversity);
- as yet early successional assemblage;
- with little habitat complexity.

Representativeness.

The vegetation and habitats in the current MMZ are young, highly modified and generally based on planted compositions, some of which provide amenity value only. While indigenous species generally dominate, there are a range of exotic and pest species. The composition is heading towards that typical of young, regenerating ecosystems (although some species, such as *Coprosma repens*, would not have naturally occurred there) but the plant and fauna diversity (species richness) is too low and a number of expected species are not present. In regard to the structure, while developing, it does not represent a natural system. In terms of thresholds, the ED is not depleted and there are very good examples of natural systems nearby meaning the "threshold" for this criterion does not need to be lowered because of rarity. Therefore, representativeness is considered to be currently low.

Rarity / Distinctiveness

No naturally uncommon or rare species were recorded, however kauri, kānuka and mānuka trees ('Threatened- Nationally Vulnerable' (de Lange et al. 2018)) form part of the planting mixtures and have higher value because of their conservation status (Roper-Lindsay et al., 2018). A few isolated kauri trees (e.g. 'Judges kauri') that are not part of planting palettes have become amenity trees only. Despite the disease driven threat status there are no rare species in the plantings, the land environment is not threatened and there are no distinctive ecological features or unusual species or assemblages. There is also the potential that 'At Risk' copper skink may be present within the current MMZ, although surveys of the current pit rim has not recorded them. The rarity and distinctiveness criterion is judged to be Low.

Diversity and pattern.

As with representativeness, the diversity and the pattern of the largely planted ring around the pit rim is considered less than typical and, being mostly edge the feature does not exhibit any environmental gradient assemblage responses or other patterns related to natural processes. As mentioned, the diversity of plant, and animal species and habitat types is limited and has not had the potential to substantially increase over time. The diversity and pattern criterion is considered to be Negligible.

Ecological context.

In terms of size and shape and ecological context, the vegetation and habitats at Martha Pit form too narrow strips, with only limited connectivity function. The fragmented areas of vegetation and habitats along the pit edge, particularly along the western side, are subject to edge effects which reduce habitat quality. This young, induced, thin, small, limited buffer, limited connectivity function area is considered to have only a low contextual value, perceptively greater than the residential surrounds but still of Low ecological value.

Conclusion

Overall, the terrestrial ecological value of the predominantly planted vegetation and habitats in the current MMZ is **Negligible.**

Significance

In accordance with the Waikato RPS and criterion 3 (vegetation or habitat that is currently habitat for indigenous species or associations of indigenous species that are: classed as threatened or at risk, or endemic

to the Waikato region, or at the limit of their natural range) and 11A, this vegetation is "technically" significant because of the presence of now listed as threatened: mānuka, kānuka and kauri, all of which comprise part of the planted mixture around the pit edge. However, this assessment does not consider the feature "significant" if the only criteria checked is rarity related to one of the species elevated to a threatened / At risk status because of a possible issue of diseases (i.e. Myrtle Rust affecting manuka and kānuka), and are species which remain as yet common. At Risk copper skink have not been recorded within the MMZ from surveys of representative habitat, including planted and regenerating vegetation near the pit rim. Therefore, the Martha vegetation is not considered significant in terms of section 6(c) of the RMA and the Waikato RPS

1.3 Proposed new areas for Martha Mineral Zone

The additional properties proposed to be rezoned as MMZ comprise approximately 9.7ha of residential and commercial land at various locations around the boundary of the existing MMZ, but predominantly in the north, east and south of the MMZ. The current zoning for the land proposed to be included in the extension of the MMZ includes Residential, Low-Density Residential and Town Centre Zones (Figure 3).

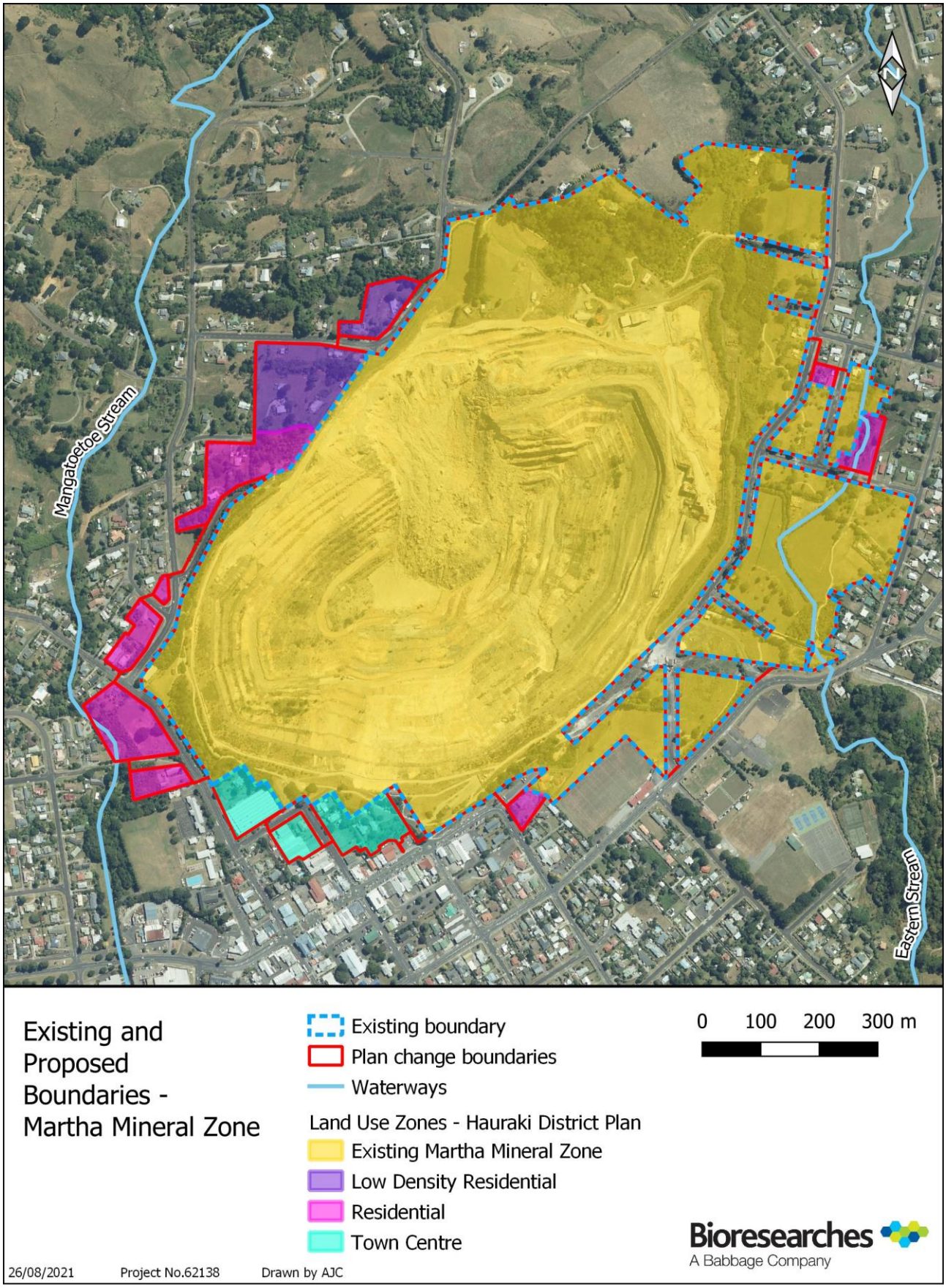


Figure 3. Current zone of land parcels within the proposed Martha Mineral Zone (MMZ).

2. METHODS

2.1 Site Assessments

The terrestrial vegetation, flora and fauna values within the properties proposed to be rezoned as MMZ were assessed based on desktop reviews and multiple site visits to the MMZ between 2011 and 2020. Information and data gathered during various investigations undertaken by Bioresearches to inform other proposed developments by OGNZL in Waihi have also been utilised.

Opportunistic observations of birds were made during the site visits and this was supplemented with bird data records (DOC fauna, inaturalist, New Zealand eBird, accessed 7 May 2020) and obtained from previous visits to the site.

A lizard survey of pit rim vegetation was undertaken in March 2019, in accordance with Hare (2012[1]). The Department of Conservation's Amphibian and Reptile Distribution Scheme (ARDS) database was also accessed to determine species previously recorded from the area and surrounding landscape. In addition, habitat value assessments were made for the areas within the proposed zone extension.

2.2 Ecological Impact Assessment Methodology

Guidelines for assessing ecological value have been published by the Environment Institute of Australia and New Zealand (Roper-Lindsay et al. 2018). The guidelines provide a standardised matrix framework that allows ecological valuations to be clear, transparent and consistent.

Table 1 describes the matters to be assessed when assigning ecological values. These matters are:

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

Table 2 describes how those matters, and the presence of different fauna and flora species informs the assigned ecological value.

In addition, the area has been assessed against the criteria given in the Waikato Regional Policy Statement (RPS). These criteria are given in Table 11-1 of the RPS, and can be found in section 3.8 of this document.

[1] Hare, KM. 2012. Herpetofauna: funnel trapping Version 1.0. *In* Greene. T, McNutt. K (editors) 2012. Biodiversity Inventory and Monitoring Toolbox. Department of Conservation, Wellington, New Zealand http://www.doc.govt.nz/biodiversitymonitoring/

Table 1. Assessment Matters to be considered when assigning ecological value or importance to a site or area of vegetation / habitat / community (as per Table 4 of Roper-Lindsay et al. 2018).

Matters	Attributes to be considered when assigning value
Representativeness	*Criteria for representative vegetation and aquatic habitats:* • Typical structure and composition • Indigenous species dominate • Expected species and tiers are present • Thresholds may need to be lowered where all examples of a type are strongly modified. *Criteria for representative vegetation and aquatic habitats:* • Species assemblages that are typical of the habitat • Indigenous species that occur in most of the guilds expected for the habitat type
Rarity/ distinctiveness	*Criteria for rare/distinctive vegetation and habitats:* • Naturally uncommon or induced scarcity • Amount of habitat or vegetation remaining • Distinctive ecological features • National Priority for Protection *Criteria for rare/distinctive species of species assemblages:* • Habitat supporting nationally threatened or At-Risk species, or locally uncommon species • Regional or national distribution limits of species or communities • Unusual species or assemblages • Endemism
Diversity and Pattern	• Level of natural diversity, abundance and distribution • Biodiversity reflecting underlying diversity • Biogeographical considerations- pattern, complexity • Temporal considerations, considerations of lifecycles, daily or seasonal cycles of habitat availability and utilisation
Ecological context	• Site history and local environment conditions which have influenced the development of habitats and communities • The essential characteristics that determine an ecosystems integrity, form, functioning and resilience (from 'intrinsic value' as defined in RMA) • Size, shape and buffering • Condition and sensitivity to change • Contribution of the site to ecological networks, linkages, pathways and the protection and exchange of genetic material • Species role in ecosystem functioning - high level, key species identification, habitat as proxy

Table 2 Method for assigning ecological values derived from Tables 5 and 6 of EIANZ 2018.

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

3. ECOLOGICAL ASSESSMENT

3.1 Vegetation

Vegetation within the properties to be rezoned to MMZ is generally managed lawn, pasture or dominated by common native shrubs and exotic tree species (e.g. Figure 4, Figure 5) – primarily reflect its residential usage. Native vegetation includes, but are not limited to, tree ferns (*Cyathea* spp.), cabbage tree (*Cordyline australis*), koromiko (*Veronica stricta var. stricta*), *Pittosporum* spp., lemonwood (*Pittosporum eugenioides*), manuka (*Leptsopermum scoparium*), and flax (*Phormium tennax*). As with other vegetation already within the MMZ, these planted assemblages support some 'naturally occurring' (i.e. not planted) and weedy regeneration beneath, have low habitat complexity and are generally isolated by surrounding modified land uses. There is also an area of vegetation associated with the Eastern Stream. Vegetation along the area of Eastern Stream to be included in the MMZ is a mixture of native and exotic species including willow (*Salix spp*), tree ferns (*Cyathea*), cabbage tree and manuka. It is likely the area also has a high prevalence of weed species. With a strong exotic and weedy composition, the vegetation value of these environments is **low to negligible**.

Figure 4. Pine and wattle dominated trees at 7 Cambridge Road, within the proposed MMZ (image courtesy of Google Earth).

Figure 5. Garden and amenity trees at 10 Pitt Street, within the proposed MMZ (image courtesy of Google Earth).

Of note, is an area of establishing (planted in 2012) native plantings of approximately 0.5ha in area located between Moresby Avenue and Russell Street near the south western extent of the Martha Pit (Figure 7 and Figure 6), and located on the true left bank of the Mangatoetoe Stream where the stream will be included in the new MMZ area. This area contains a mixture of plants, including cabbage tree (*Cordyline australis*), flax (*Phormium tenax*), kanuka (*Kunzea robusta*) and other indigenous species and is similar in composition, size (4-6 m) and age to other plantings currently present around the perimeter of the Martha Pit. Being largely native in composition, this vegetation is of **low** value (rather than negligible).

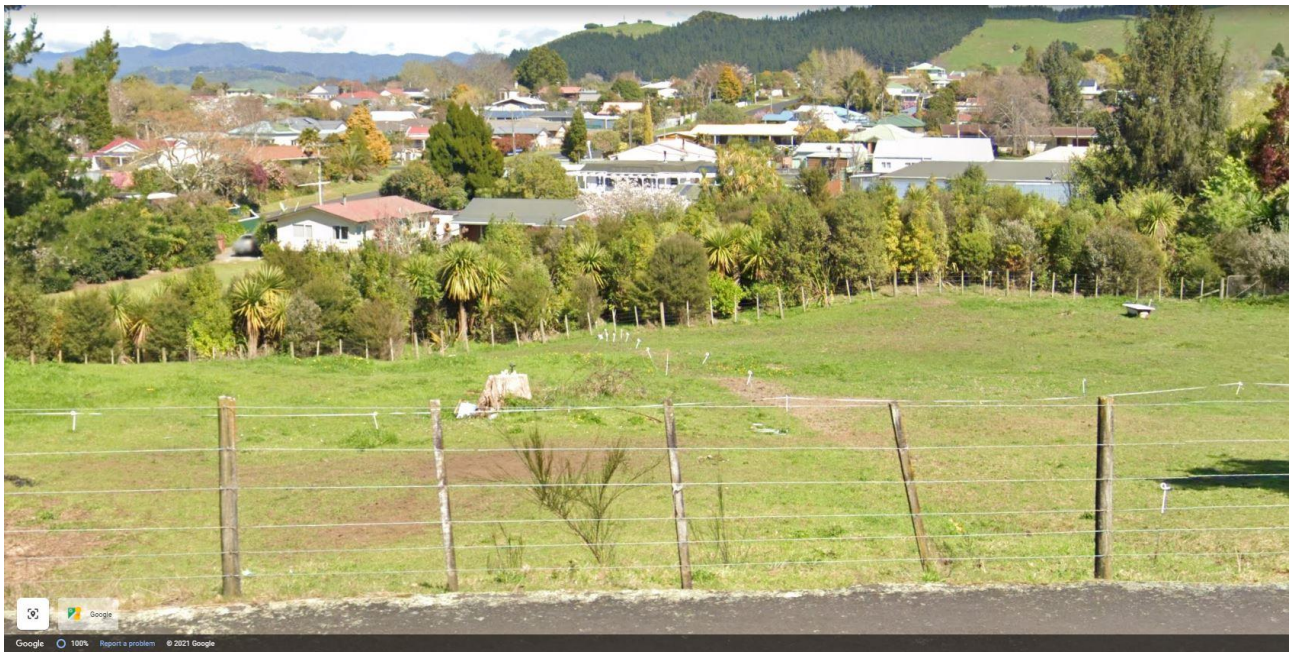


Figure 6. Planted vegetation (across the paddock) at Moresby Road, Waihi.

Vegetation present, including the planted areas, will tend to perform poorly as habitat for native flora and fauna due to the small size and fragmented nature. Edge effects are expected to influence all vegetation, including the planted areas. Edge affected vegetation generally contains higher numbers of weeds and are subject to stronger winds which can result in damage or slowed growth.

Figure 7: Area of planted vegetation within proposed Martha Mineral Zone boundary change

3.2 Freshwater

3.2.1 Mangatoetoe Stream

Approximately 125 m of the Mangatoetoe Stream flows through the area of planted vegetation in Figure 7. Its headwaters flow from steep farmland and scrub north of Martha Pit, and it continues to flow in a predominantly southerly direction, through central Waihi, before discharging to the Ohinemuri River. Over its length, it is subject to influence from the urban and rural environments such as stormwater and nutrient enrichment inputs. Monitoring and investigations of the Mangatoetoe Stream[2, 3, 4] show better quality habitat and higher water quality is located in the upper reaches of the catchment, while the lower urban part contains degraded habitat. Medium term water quality monitoring (Figure 8, Table 3) data shows that the water quality of Mangatoetoe Stream is variable, with neutral pH and generally acceptable dissolved oxygen levels, and with low nutrient levels (nitrates and phosphorus). Based on the WRC water quality categories, for the most part, the Mangatoetoe Stream meets the satisfactory criteria, with some poorer quality reaches.

Upstream of the reach to be included in the new MMZ area, the stream is relatively open and strongly influenced by the gardens and land use of the properties it flows through (Figure 9). Substrate a mixture of sands, gravels and cobbles. The openness, coupled with the hard substrate likely means periphyton growth can be abundant during warmer periods. Downstream of the reach, the stream is very deep, becoming unwadeable in the lower reaches near the confluence with the Ohinemuri River (Figure 10). Flow along the stream is generally slow and instream habitat is predominantly run habitat, with occasional pools. Fish habitat in the lower part of the catchment, including the reach to be included in the new MMZ is relatively good with some bank undercutting present, reasonable shade provided by steep banks and mixed riparian vegetation, and woody debris. However, rubbish is a common occurrence both in the stream and on the banks, further limited habitat quality.

Shortfin eel (*Anguilla australis*) and common bully (*Gobiomorphus cottidanus*) have been recorded in the stream (both common, not threatened species). Older surveys have also recorded the common (Not threatened) Crans bully, and At Risk - Declining longfin eels (*Anguilla dieffenbachii*). Due to the degraded nature of the stream within Waihi, but the possibility that At-Risk Declining longfin eels may utilise the stream, the values of the Mangatoetoe Stream are considered to be conservatively **Moderate**.

[2] Boffa Miskell, 2018, Project Martha: Assessment of Freshwater Ecological Effects, prepared for Oceana Gold (NZ) Ltd
[3] Bioresearches 1985. Ohinemuri River catchment: Biological and water quality data 1984-1985. Prepared for Waihi Gold Company
[4] Bioresearches 1998: Martha Mine Extended Project Water Quality and Aquatic Biology. Prepared for Oceana Gold New Zealand Ltd

Figure 8: Water quality sampling locations on the Mangatoetoe Stream

Table 3: Summary of water quality information for Mangatoetoe Stream, Waihi. Data records vary at each site. Result show Median (min-max; number of samples). All units g/m3 except where otherwise stated. [5]

Site	MG1	MG2	MG3 (in new MMZ area)	MG4	WRC Water Quality Categories*
Sample period	01/1994 – 05/1999	05/1993 – 05/1999	07/1994 – 05/1999	01/1994 – 02/2015	
Dissolved Oxygen	9.1 (7.1-10.7; 19)	8.8 (6.5-10.9; 23)	8.4 (6.8-10.8; 19)	8.7 (7.2-10.9; 17)	E=>90% S=80-90% U=<80%
pH (units)	7.15 (6.1-7.7; 24)	7.0 (6-7.4; 28)	6.9 (6.1-7.3; 24)	7.1 (6.1-7.4; 23)	E=7-8 S=6.5-7 or 8-9
Total Ammoniacal Nitrogen	0.03 (0.02-0.11; 24)	0.02 (0.01-0.1; 28)	0.02 (0.01-0.08; 24)	0.01 (0.01-0.11; 21)	
TKN	0.12 (0.1-2.1; 18)	0.1 (0.1-1.7; 18)	0.1 (0.1-1.2; 18)	0.1 (0.1-1.6; 14)	
Nitrates	0.765 (0.26-0.88; 24)	0.735 (0.28-.076; 28)	0.725 (0.16-1.72; 24)	0.45 (0.08-1.33; 21)	
Total Phosphorus	0.03 (0.005-0.656; 18)	0.009 (0.004-0.4340; 18)	0.013 (0.004-0.244; 18)	0.01 (0.004-0.469; 15)	E=<0.01 S=0.01-0.04 U=>0.04

* E = Excellent, S = Satisfactory, U = Unsatisfactory

Figure 9: Mangatoetoe Stream upstream of the proposed MMZ expansion

Figure 10: Lower reaches of Mangatoetoe Stream

3.2.2 Eastern Stream

Approximately 100m of the Eastern Stream flows through three residential sections on the eastern side of the existing MMZ, to be incorporated into the new zone boundary. The Eastern Stream is an unnamed tributary of the Waimata Stream, which flows into the Ohinemuri River. The Eastern Stream appears to

[5] Boffa Miskell, 2018, Project Martha: Assessment of Freshwater Ecological Effects, prepared for Oceana Gold (NZ) Ltd

originate in the hills north of Waihi, near the terminus of Bulltown Road. It flows through predominantly lifestyle and low density residential sections before reaching the MMZ. It flows through an area of the current MMZ that is currently reserve/parkland that has been extensively planted. No monitoring data exists for the Eastern Waterway, however it is of similar state to the Mangatoetoe Stream and considered to be typical of a degraded semi urban waterway. It is expected that water quality along the length of Eastern Stream would reflect that of the Mangatoetoe Stream illustrated in Table 3.

Habitat in Eastern stream is influenced by the urban and rural land uses of the catchment. Substrates are mixed and include areas of abundant fine sediment, as well as some areas of gravel (Figure 11). Banks are generally relatively incised and this suggests the catchment can be relatively flashy following rainfall (Figure 12). At the reach of stream to be included in the new MMZ area, the flow is slow and the substrate is soft. Instream habitat is predominantly run, with some small pool areas, however there is a good amount of fish cover including woody debris and undercut banks. Riparian vegetation is present and is influenced by garden species from the surrounding area, as well as apparently planted vegetation.

Records from the New Zealand Freshwater Fish Database from the lower reaches of the Eastern Stream show common bully, shortfin eel and black mudfish (*Neochanna diversus*; At Risk - Declining) have been recorded in the stream. The black mudfish record was from 1958 and they were not recorded during a 2006 survey, however there remains a possibility they may still be present in the catchment. Due to the degraded nature of the stream within Waihi, but the possibility that At-Risk Declining black mudfish may be present, the values of the Eastern Stream are considered to be conservatively **Moderate**.

Figure 11: Eastern Stream at the upstream extent of the reach to be included in the MMZ

Figure 12: Eastern Stream is highly incised

3.3 Birds

A review of various databases (DOC fauna, inaturalist, New Zealand eBird, accessed 9 June 2021) indicates presence of a suite of common native birds throughout the Waihi Ecological District. Areas to the east of the Ecological District support several 'At Risk' coastal bird species that are not expected to use vegetation around Martha Pit (the vegetation and environment does not represent the coastal habitats they use). North Island kaka (*Nestor meridionalis*) have been recorded at Orokawa Scenic Reserve, 2.5 km east of the Martha Pit). This species is also resident within the Coromandel and Kaimai Ranges, and has been recorded widely

in the surrounding area (e.g. Primrose Hill Domain, Paeroa, 2018). However, it has not been recorded at Martha Pit during site visits and is not expected to be present on any regular basis within the proposed MMZ, due to the lack of suitable habitat and urban environment.

The bird species recorded using habitats during field visits at Martha Pit and surrounding environments (2017 – 2020) include 10 native (three endemic) and 16 introduced species. No 'Threatened' or 'At Risk' species were recorded. The avifauna was dominated (in terms of abundance and frequency of presence) by introduced species. It is also likely that the avifauna around the MMZ (current and proposed areas) are influenced by domestic cats, probably more so than environments beyond residential zones. A full list of species observed during various visits to the area around the Martha Pit is provided in Appendix No species of conservation concern were recorded and none are expected, even on an intermittent basis.

Common species that could be expected to be within the MMZ, but were not recorded, from 17 field visits, include kereru (*Hemiphaga novaeseelandiae*) and bellbird (*Anthornis melanura*). Both species have been recorded in the surrounding landscape. For example, bellbird was recorded at Gilmore Reserve in Waihi in March 2019 (New Zealand eBird). Kereru is wide-ranging and occurs throughout the Coromandel and Kaimai Ranges, and probably also Orokawa Scenic Reserve (no database records for this species there) but a lack of suitable resources within the MMZ (e.g. mature, fruit-bearing trees) suggests that it does not regularly visit the vegetation.

The avifauna community around Martha Pit, including the areas proposed to be rezoned as MMZ, are common and largely exotic species who's "value" can be assessed as **Low to Negligible**

3.4 Lizards

Native lizard habitat in the proposed areas to be rezoned as MMZ is conservatively considered to be of **Moderate** value, on the basis of potential presence of a 'high value' species, but not having been detected from survey of pit-side vegetation.

Vegetation around Martha Pit both within the current MMZ, and within the proposed extension is predominantly planted, and / or urban. Potential habitats include planted areas, residential gardens and weedy roadside vegetation. 'At Risk' copper skinks (*Oligosoma aeneum*) have been recorded from planted and weedy vegetation in the wider landscape, but have not been recorded in representative surveys within existing pit rim vegetation. They do have the potential to be present within the proposed extension of the MMZ in otherwise low to negligible value vegetation features.

A 2019 survey of parts of the Martha Pit rim did not record any lizards and the habitat values were considered to be low. It is possible that 'Not Threatened' copper skink (*Oligosoma aeneum*) is present in the proposed extension areas of the MMZ, however such areas are unlikely to support any significant lizard populations.

Further, habitat connectivity of potential habitats within the various properties in the proposed extension is limited and would increase the risk of stochastic extinction over time for any such populations present.

3.5 Bats

Long-tailed bats (LTBs; *Chalinolobus tuberculatus*) are classified as 'Nationally Critical' in the North Island (O'Donnell et al., 2017). This classification is given the qualifier "Conservation Dependent" which indicates that this species is likely to move to a worse status (extinct) if current management ceases (Townsend et al., 2008). LTBs are a highly mobile species and their habitat requirements include roosting, commuting and foraging. They have very large home ranges. For example, median home ranges for LTBs have been calculated to be as large as 2,006 ha, and as wide as 10.85 km in the Eglington Valley, South Island (O'Donnell, 2001, cited in Smith et al. 2017). Records of LTBs from the lower Coromandel Ranges and upper Kaimai-Mamaku Forest Parks (most recently from October 2015 in the upper Kaimai-Mamaku Forest Park) are therefore within flight range of the MMZ (Figure 13).

Surveys of OGNZL land were undertaken as part of investigations for the Waihi North Project in 2011, 2017 and 2022. Despite over 620 useable bat monitoring nights (i.e. when weather conditions were suitable for bats to be moving around), the presence of bats was not recorded within the area.

Figure 1, Figure 3 and Figure 4 show trees within the proposed MMZ that support roost tree characteristics (≥15 cm DBH, and probably support cracks, cavities and flaky bark). Watercourses and vegetated edges that may support flight and foraging paths for LTBs are limited within the proposed MMZ. Where these features occur within the proposed MMZ, they are generally limited to the Mangatoetoe Stream and associated riparian vegetation, where it passes through a Residential Zone, and some small fingers of vegetation at the north western edges of the existing pit. The likelihood of use of these areas, some 12km to the most recent existing records, and over 8km from pre 2000 records, is very low, even on an intermittent basis, because they occur within Residential and Town Centre Zones.

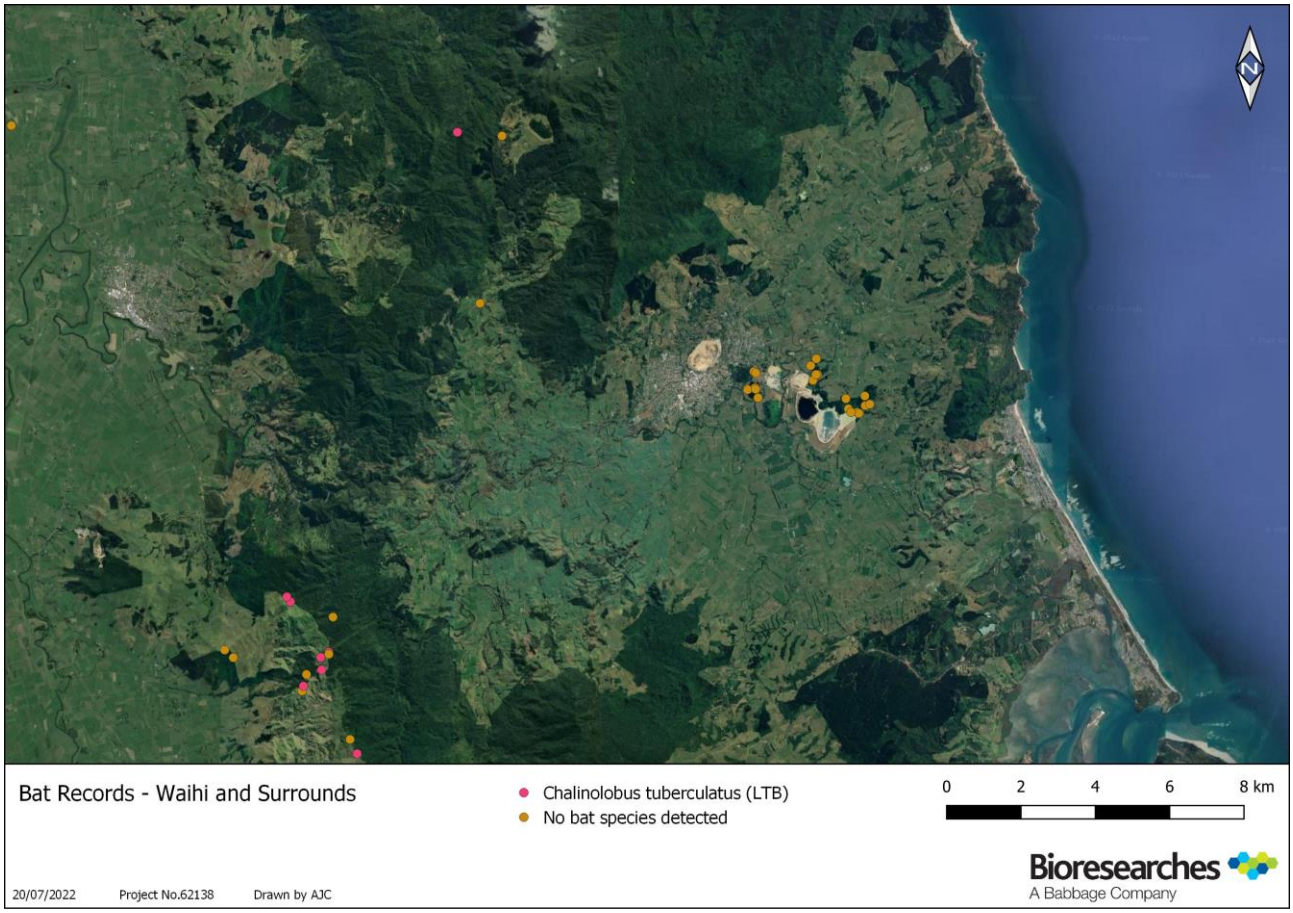


Figure 13: Bat records in the vicinity of the MMZ area

3.6 Frogs

Native frog habitat with in the proposed areas to be rezoned as MMZ is considered to be of Negligible ecological value.

Both Hochstetter's frog (*Leiopelma hochstetteri*) and Archey's frog (*Leiopelma archeyi*) are known from the wider Coromandel Peninsula area and are At Risk (Hochstetter's frog) or Threatened- Nationally Vulnerable (Archeys). Suitable potential habitat for Hochstetter's frogs includes first and second order stony stream banks under a mature forest canopy, with occasional small pools or waterfalls and a gently sloping bank. No suitable habitat is present within either the existing MMZ or the area proposed to be included. Habitat such as this would be limited to the banks of Eastern and Mangatoetoe Streams, however the lack of mature forest, high proportion of fine sediment, steep or engineered banks coupled with the presence of urban predators including cats, rats and dogs mean the presence of indigenous frogs in the MMZ is considered to be very unlikely.

Archey's frog is entirely terrestrial, and occurs in damp forest habitat, above 400 m. No such habitat occurs within the MMZ.

3.7 Summary of Ecological Values

Table 4 provides a summary of the ecological values of associated with the areas proposed to be included in the MMZ.

Table 4: Summary of ecological values associated with areas proposed to be included in the Martha Mineral Zone expansion

Martha Street	Ecological Value	Comments
Vegetation	Low to Negligible	Vegetation consists of common indigenous and exotic species within gardens and small areas of establishing indigenous vegetation
Freshwater	Moderate	Degraded habitat typical of urban and rural catchment, however possibility At Risk – Declining longfin eels and black mudfish may still be present.
Birds	Low to Negligible	Birds present in the area are common native and exotic species. Vegetation does not provide habitat of any significant quality.
Lizards	Moderate	Lizard habitat is limited due to the quality of the vegetation. Potential for At Risk copper skink to be present in vegetation within the current and proposed MMZ.
Frogs	Negligible	Indigenous frog habitat is not present within current and proposed MMZ boundaries.

3.7.1 Representativeness

The vegetation and habitats within the proposed extension of the MMZ are known to consist of common native or exotic garden species, or are young, planted compositions, most of which provide amenity value only. Fauna communities of common birds are generally dominated by exotic species, with some, such as kereru and bellbird, probably intermittent visitors only. No native lizards have been recorded and the habitats are generally highly disturbed and isolated. 'At Risk' copper skink may be present in some areas. Copper skink are listed as At Risk, however they are relatively common within the ecological district. While indigenous species generally dominate the planted areas, the representativeness of these areas to natural communities is **Low**.

3.7.2 Rarity / Distinctiveness

No naturally uncommon or rare fauna or flora species are known to occur within the proposed MMZ. However, there remains a chance At Risk –Declining longfin eels and black mudfish may be present in the streams, and copper skink may be present in vegetated areas, and therefore rarity and distinctiveness is conservatively **Moderate**. Longfin eels have not been recorded since 1981 (the most recent record on the NZ Freshwater Fish Database). More recent fish surveys have been undertaken of the Mangatoetoe Stream (1994, 2018, 2019), however longfin eels have not been recorded in any of these more recent surveys. While there is still potential for this species to be present in the wider catchment, the time and survey effort undertaken in recent surveys of the Mangatoetoe Stream does not justify a 'High' value 'rarity' rating. A similar argument is made for copper skink. No copper skink have been recorded within the existing MMZ

during representative surveys. They are relatively common in the wider ecological district and therefore their potential presence also does not justify a 'High' value 'rarity' rating.

3.7.3 Diversity and pattern

As with representativeness, the diversity and the pattern of the vegetation in the proposed zone extension area, is considered less than typical and consists mostly of residential gardens and edge affected small areas of native and mixed native and exotic plantings. The vegetation or habitats do not exhibit any environmental gradient assemblage responses or other patterns related to natural processes other than regenerating and weedy edge components. The diversity of plant, and animal species and habitat types is limited and has very limited potential to increase over time (residential zones). The diversity and pattern criterion is considered to be **Very Low**.

3.7.4 Ecological context

In terms of size and shape and ecological context the vegetation within the proposed extension to the Martha Mineral Zone contribute to small, disconnected areas of garden, amenity planting or weedy regeneration at the south-western edge of the pit. The small areas of vegetation are subject to edge effects which reduce habitat quality. This young, induced, thin, small, limited buffer, limited connectivity function area is considered to have only a **Very Low** contextual value.

Conclusion

As per Table 2, the proposed MMZ additional areas rates Low or Very Low for three matters and Moderate for one (one the basis of a historic long-fin eel and black mudfish records). The overall ecological value of the areas of the proposed MMZ is **Low**.

3.8 Waikato Regional Policy Statement

Table 5 assesses the ecological values of the area against criteria set out in Table 11-1 of the Waikato RPS. The terrestrial areas within the proposed extension to the Martha Mineral Zone do not meet any of the criteria for significant indigenous biodiversity, except where 125 m of Mangatoetoe Stream passes through one property at Moresby Avenue and some potential for copper skink to inhabit any area of amenity garden, rough grass or planted vegeation. This aquatic habitat, as well as Eastern Stream triggers criteria 3, 8 and 11 as per Table 5, generally due to the potential presence of At Risk – Declining longfin eels. Criteria 3 is also triggered due to the potential for At Risk – Declining copper skink to be present within the site.

Table 5: Assessment of the area against Waikato RPS significance criteria

	Criteria	Meets Criteria?	Comments
1	It is indigenous vegetation or habitat for indigenous fauna that is currently, or is recommended to be, set aside by statute or covenant or by the Nature Heritage Fund, or Ngā Whenua Rāhui committees, or the Queen Elizabeth the Second National Trust Board of Directors, specifically for the protection of biodiversity, and meets at least one of criteria 3-11.	No	The land is not subject to a statute or covenant, or set aside by any of the mentioned committees.
2	In the Coastal Marine Area, it is indigenous vegetation or habitat for indigenous fauna that has reduced in extent or degraded due to historic or present anthropogenic activity to a level where the ecological sustainability of the ecosystem is threatened.	No	The area is not in the Coastal Marine Area.
3	It is vegetation or habitat that is currently habitat for indigenous species or associations of indigenous species that are: • classed as threatened or at risk, or • endemic to the Waikato region, or • at the limit of their natural range.	Yes	Mangatoetoe Stream and Eastern Stream have had At Risk Declining longfin eels / black mudfish in the past. It is possible they are still present. Copper skinks have some potential to inhabit any area of amenity garden, rough grass or planted vegetation but have not been detected from survey within the MMZ
4	It is indigenous vegetation, habitat or ecosystem type that is under-represented (20% or less of its known or likely original extent remaining) in an Ecological District, or Ecological Region, or nationally.	No	No. Vegetation & habitats are largely planted and / or amenity.
5	It is indigenous vegetation or habitat that is, and prior to human settlement was, nationally uncommon such as geothermal, chenier plain, or karst ecosystems, hydrothermal vents or cold seeps.	No	No. Vegetation & habitats are largely planted and / or amenity.
6	It is wetland habitat for indigenous plant communities and/or indigenous fauna communities (excluding exotic rush/pasture communities) that has not been created and subsequently maintained for or in connection with: • waste treatment; • wastewater renovation; • hydro electric power lakes (excluding Lake Taupō); • water storage for irrigation; or • water supply storage; unless in those instances they meet the criteria in Whaley et al. (1995)	No	There are no wetland areas within the proposed boundary update.
7	It is an area of indigenous vegetation or naturally occurring habitat that is large relative to other examples in the Waikato region of similar habitat types, and which contains all or almost all indigenous species typical of that habitat type. Note this criterion is not intended to select the largest example only in the Waikato region of any habitat type.	No	No. Vegetation & habitats are largely fragmented, planted and / or amenity.
8	It is aquatic habitat (excluding artificial water bodies, except for those created for the maintenance and enhancement of biodiversity or as mitigation as part of a consented activity) that is within a stream, river, lake, groundwater system, wetland, intertidal mudflat or estuary, or any other part of the coastal marine area and their margins, that is critical to the self-sustainability of an	Yes	The Mangatoetoe Stream and Eastern Stream (fish migratory and dispersal pathway) pass through part of the proposed MMZ.

	indigenous species within a catchment of the Waikato region, or within the coastal marine area. In this context "critical" means essential for a specific component of the life cycle and includes breeding and spawning grounds, juvenile nursery areas, important feeding areas and migratory and dispersal pathways of an indigenous species. This includes areas that maintain connectivity between habitats.		
9	It is an area of indigenous vegetation or habitat that is a healthy and representative example of its type because: • its structure, composition, and ecological processes are largely intact; and • if protected from the adverse effects of plant and animal pests and of adjacent land and water use (e.g. stock, discharges, erosion, sediment disturbance), can maintain its ecological sustainability over time.	No	No. Vegetation & habitats are largely planted and / or amenity.
10	It is an area of indigenous vegetation or habitat that forms part of an ecological sequence, that is either not common in the Waikato region or an ecological district, or is an exceptional, representative example of its type.	No	No. Vegetation & habitats are largely planted and / or amenity.
Role in protecting ecologically significant area			
11	It is an area of indigenous vegetation or habitat for indigenous species (which habitat is either naturally occurring or has been established as a mitigation measure) that forms, either on its own or in combination with other similar areas, an ecological buffer, linkage or corridor and which is necessary to protect any site identified as significant under criteria 1-10 from external adverse effects.	Yes	Planted vegetation west of Moresby Avenue provides a 10-25 m buffer to Mangatoetoe Stream.

4. ASSESSMENT OF EFFECTS

Effects associated with the plan change to expand the MMZ are considered to be broadly similar to effects associated with works that can occur under the current residential zoning.

Activities expected under the current zoning could result in loss/alteration to terrestrial vegetation, disturbance to fauna including potentially present At Risk copper skink, increased sediment inputs to waterways, loss/alteration of riparian vegetation, and changes to the natural alignments of Mangatoetoe Stream and Eastern Stream. Activities that may occur if the zone of the properties in question changes to MMZ are expected to result in the same type and level of effect. It is considered that effects on ecological values will be no greater should the zoning change to MMZ, compared to what could be experienced if the zoning remains as it currently is.

Actual and potential adverse effects on ecological values associated with future activities within the MMZ cannot be assessed in this report, given the footprint of any expansion of the Martha Pit will need to be detailed as part of any future resource consent application. However, it is likely that any such proposal could include the removal of much of the existing planted vegetation around the Martha Pit. Given that it is understood that any potential expansion of the Martha Pit within the MMZ would be classified as a discretionary activity under the Hauraki District Plan – all potential ecology effects of a proposal can be appropriately assessed and considered by the relevant decision-maker.

Given the generally low ecological values in the areas to be rezoned as MMZ, and the fact that the existing provisions in Section 6.2 of the Hauraki District Plan (Indigenous Biodiversity and Significant Natural Areas) already seek to provide for the maintenance and enhancement of the life supporting capacity of ecosystems, the mauri of natural resources and the extent and representativeness of the District's indigenous biological diversity, it is not considered that the proposed plan change requires any additional provisions to manage potential ecological effects that may result from the expansion of the MMZ.

5. CONCLUSIONS AND RECOMMENDATIONS

OGNZL is proposing to extend the MMZ to include some Residential, Low Density Residential and Town Centre zoned property parcels. **These areas have conservatively moderate (Mangatoetoe Stream, Eastern Stream and potentially present copper skinks) to negligible ecological value** on the basis of low or very low values pertaining to representativeness, diversity and pattern, and ecological context and conservatively moderate values for rarity / distinctiveness due to the potential for At Risk species to be present (longfin eels in the highly modified Mangatoetoe and Eastern Streams and copper skink in highly modified and localised terrestrial habitats). The isolated and residential nature of these values would further limit their potential to improve over time.

The presence of 125 m of the Moderate Value Mangatoetoe Stream within one property on Moresby Avenue, and Eastern Stream triggers significance criteria 3, 8 and 11 as per Table 5. This is due to the potential (historic) presence of long-finned eel and black mudfish (criterion 3), that it is aquatic habitat (criterion 8) and that the planted vegetation alongside provides riparian buffer (criterion 11, Mangatoetoe Stream only).

Effects arising from the change in zone are expected to be similar to those experienced should construction activities occur within a residential zone. Any potential expansion of the Martha Pit within the MMZ would be classified as a discretionary activity under the Hauraki District Plan – all potential ecology effects of a proposal can be appropriately assessed and considered by the relevant decision-maker.

Appendix A – Native vegetation around Martha Pit

Species	Common name
Agathis australis	kauri
Astelia solandri	kōwharawhara
Carex secta	purei
Coprosma kirkii	
Coprosma robusta	karamu
Corokia cotoneaster	corokia
Cyathea dealbata	silver fern
Cyathea medullaris	mamaku
Dacrycarpus dacrydiodes	kahikatea
Dacrydium cupressinum	rimu
Dodonaea viscosa	akeake
Geniostoma ligustrifolium	hangehange
Grisilinea littoralis	puka
Knightia excelsa	rewarewa
Kunzea robusta	kānuka
Leptospermum scoparium	mānuka
Leucopogon fasciculatus	mingimingi
Melicytus ramiflours	māhoe
Phormium tenax	harakeke
Pittosporum eugenioides	tarata
Pittosporum tenuifolium	black māpou
Podocarpus totara var. *totara*	tōtara
Pomaderris kumarahou	kumarahou
Pseudopanax arboreus	five-finger
Pseudopanax crassifolius	horoeka
Pteridum esculentum	bracken
Schefflera digitata	patē
Sophora chathamica	kōwhai
Veronica stricta	koromiko
Vitex lucens	pūriri

Appendix B: Bird species recorded from site visits to the Waihi MMZ and surrounds

Common name	Species name	9/05/2017	10/05/2017	25/05/2017	26/05/2017	22/01/2018	26/03/2018	27/03/2018	28/03/2018	29/03/2018	5/03/2019	6/03/2019	27/08/2019	28/08/2019	17/03/2020	18/03/2020	19/03/2020	20/03/2020	Total
Blackbird	*Turdus merula*	✓	✓	✓	✓		✓		✓	✓		✓	✓	✓	✓	✓	✓	✓	14
California quail	*Callipepia californica*	✓	✓		✓	✓	✓			✓	✓		✓	✓					9
Chaffinch	*Fringilla coelebs*	✓	✓			✓	✓	✓	✓						✓				7
Eastern rosella	*Platycercus eximius*	✓	✓		✓	✓	✓		✓	✓		✓	✓	✓					10
Fantail	*Rhipidura fulginosa*	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓	15
Feral turkey	*Meleagris gallopavo*					✓	✓												2
Goldfinch	*Carduelis carduelis*		✓		✓										✓				3
Greenfinch	*Carduelis chloris*		✓	✓	✓			✓											4
Grey warbler	*Gerygone igata*	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓		✓	✓	✓	14
House sparrow	*Passer domesticus*	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓					11
Magpie	*Gymnorhina tibicen*	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	17
Morepork	*Ninox novaeseelandiae*			✓															1
Myna	*Acridotheres tristis*	✓	✓	✓		✓	✓		✓	✓			✓	✓			✓	✓	11
NZ kingfisher	*Todiramphus sanctus*	✓	✓		✓		✓		✓	✓		✓	✓	✓	✓	✓	✓	✓	13
Pheasant	*Phasianus colchicus*	✓				✓	✓	✓	✓	✓	✓		✓	✓	✓				10
Pukeko	*Porphyrio melanotus*	✓	✓	✓		✓	✓	✓	✓	✓			✓	✓	✓	✓		✓	13
Rock pigeon	*Columba livia*								✓							✓			2
Shining cuckoo	*Chrysococcyx lucidus*					✓	✓		✓	✓									4
Silvereye	*Zosterops lateralis*	✓	✓		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓			✓	13
Skylark	*Alauda arvensis*					✓	✓	✓	✓										4
Song thrush	*Turdus philomelos*	✓	✓	✓		✓	✓	✓	✓	✓			✓	✓					10
Starling	*Sturnus vulgaris*	✓	✓	✓		✓	✓		✓	✓			✓	✓					9
Swamp harrier	*Circus approximans*	✓	✓	✓				✓		✓				✓					6
Tui	*Prosthemadera novaeseelandiae*		✓			✓		✓			✓						✓		5
Welcome swallow	*Hirundo neoxena*			✓		✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	12
Yellowhammer	*Emberiza citrinella*		✓	✓		✓	✓	✓	✓				✓	✓			✓		9