

NOVEMBER REVISED VERSION

**MITIGATION OPTIONS FOR THE POTENTIAL LOSS
OF INDIGENOUS VEGETATION AND HABITAT AT
THE PROPOSED KIWI POINT QUARRY,
WELLINGTON**



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MITIGATION OPTIONS FOR THE POTENTIAL LOSS OF INDIGENOUS VEGETATION AND HABITAT AT THE PROPOSED KIWI POINT QUARRY, WELLINGTON



Looking along the face to where mitigation planting is proposed as part of the proposed Kiwi Point Quarry extension; 31 July 2018.

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1. INTRODUCTION

A plan change has been notified (Plan Change 83) to rezone part of Open Space B land in the Ngauranga Gorge to Business 2 to enable expansion of the Kiwi Point Quarry. About half of the proposed quarry extension has already been zoned as Business 2 through previous plan changes. Wildland Consultants undertook a previous assessment of ecological effects (Wildland Consultants 2017) and a survey for lizards at the proposed quarry site (Wildland Consultants 2018). The assessment of ecological effects mapped the various vegetation types within the extent of the proposed quarry extension and suggested potential mitigation areas.

Wildland Consultants (2017) identified a number of areas that might prove suitable to mitigate the loss of indigenous vegetation and habitat due to quarry expansion. The report noted that in principle, mitigation should be in kind (like for like), on a site with similar environmental gradients, close to the affected area, and with the potential for additional conservation actions over a larger area (ideally at least three times larger) than the affected area. Greater Wellington Regional Council has indicated that the mitigation proposed in Plan Change 83 is considerably less than the “ideally at least three times larger” suggested, and they would like to see an increase in the mitigation proposed to align more closely with a nominal 1:3 ratio for mitigation.

This report details the potential effects and sets out a potential mitigation solution that exceeds the 1:3 ratio for mitigation and integrates with stream and riparian rehabilitation. This document can inform the restoration plans required by various Resource Consent Conditions, but it not a formal mitigation plan.

2. POTENTIAL ADVERSE ECOLOGICAL EFFECTS

2.1 Terrestrial

The amount and type of vegetation and habitat potentially affected by the quarry extension is shown in Figure 1 and set out in Table 1. Eight vegetation/habitat types were identified at the site, including the predominantly indigenous [ngaio]/māhoe forest, ngaio-māhoe-māpou forest, māhoe forest, regenerating forest and mixed gully forest, and the predominantly exotic Scotch broom-gorse scrub and shrubland, blackberry-pōhuehue vineland and exotic pasture. Most of the vegetation and habitat types to be potentially affected are highly modified or dominated by introduced species.

Changes to the quarry extension layout have resulted avoiding the clearance of 0.25 hectares of indigenous vegetation. Vegetation Types ‘6 - Mixed gully forest’, and ‘8 - Māhoe forest’ occur fully or partially within the proposed quarry extension, but are unlikely to be affected by proposed works; this comprises 0.51 hectares of indigenous vegetation. In total, 12.32 hectares of vegetation, including 4.15 hectares of indigenous vegetation, is proposed to be cleared.

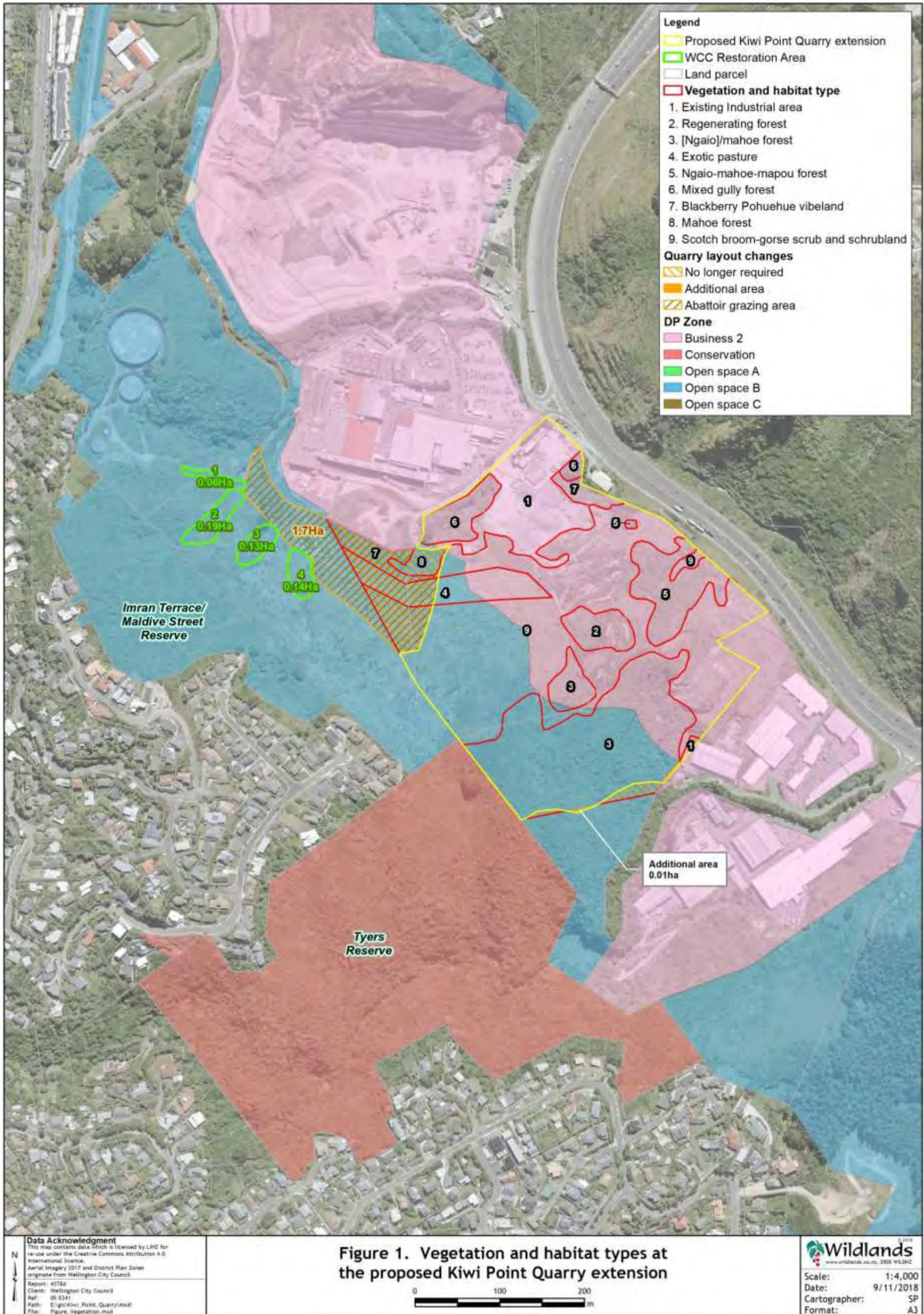
Table 1: Vegetation and habitat potentially affected by the proposed Kiwi Point Quarry extension.

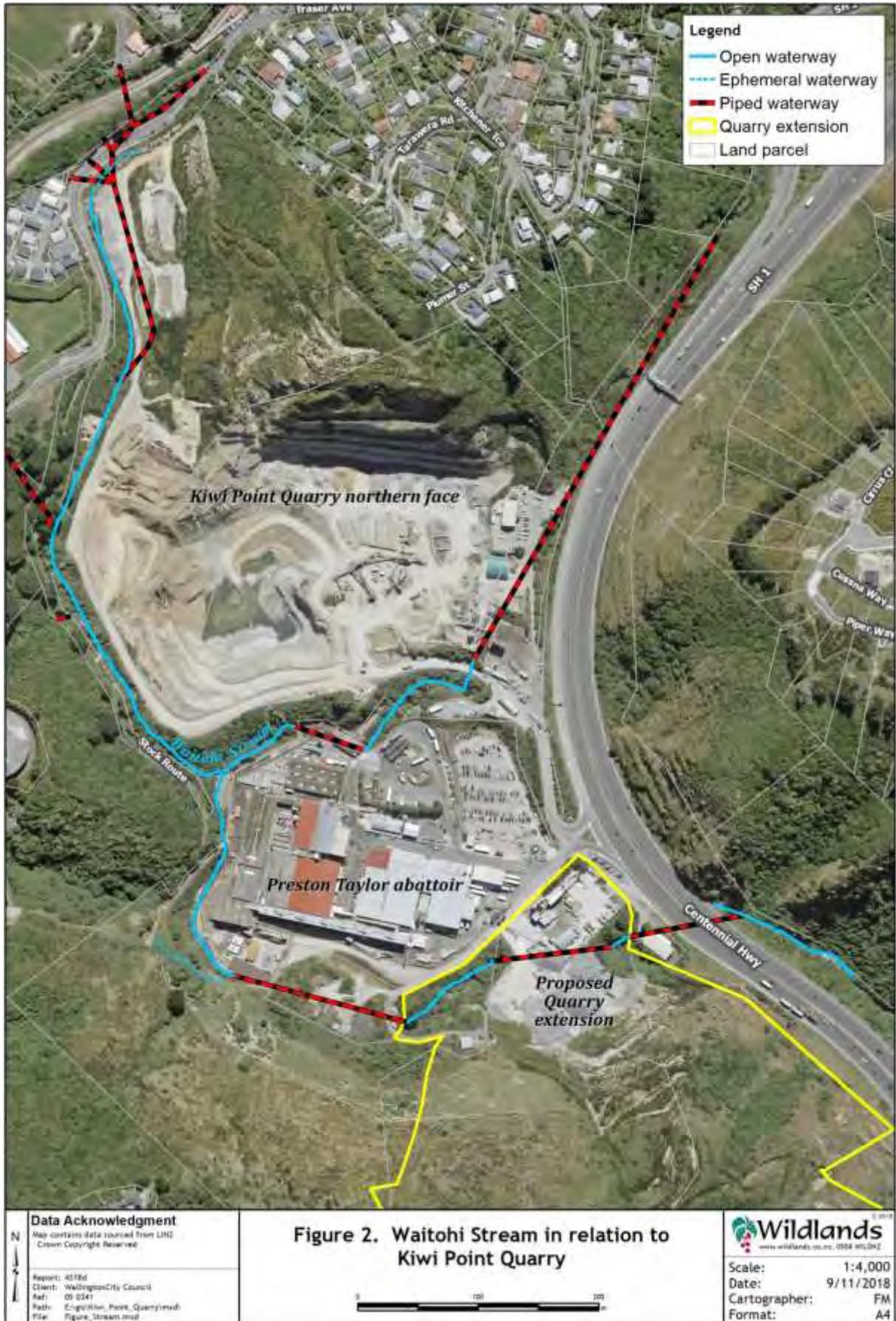
	Figure code	Vegetation or Habitat type	Indigenous	Current District Plan Zone (area affected Ha)		Total (Ha)
				Business 2	Open Space B	
Notified layout	1	Existing Industrial area	No	1.38	0.01	1.39
	2	Regenerating forest	Yes	0.33		0.33
	3	[Ngaio]/māhoe forest	Yes	0.96	2.14	3.1
	4	Exotic pasture	No	0.28	0.14	0.42
	5	Ngaio-māhoe-mapou forest	Yes	0.71		0.71
	9	Scotch broom-gorse scrub and scrubland	No	3.72	1.78	5.5
Additional clearance	3	[Ngaio]/māhoe forest	Yes		0.01	0.01
Required for grazing	4	Exotic pasture	No		0.29	0.29
	7	Blackberry-pōhuehue vineland	No		0.25	0.25
	9	Scotch broom-gorse scrub and scrubland	No		0.32	0.32
Within quarry extension but unlikely to be cleared	5	Ngaio-māhoe-mapou forest	Yes	0.08		0.08
	6	Mixed gully forest	Yes	0.43		0.43
	7	Blackberry-pōhuehue vineland	No	0.14		0.14
	9	Scotch broom-gorse scrub and scrubland	No	0.13		0.13
No longer to be cleared	3	[Ngaio]/māhoe forest	Yes	<0.01	0.11	0.11
	7	Blackberry-pōhuehue vineland	No		0.03	0.03
	8	Māhoe forest	Yes	<0.01	0.14	0.14
Indigenous vegetation to be cleared				2.00	2.15	4.15
Non-indigenous vegetation or habitat				5.38	2.79	8.17
Total vegetation or habitat cleared				7.38	4.94	12.32

2.2 Waterways

Potential effects on the Waitohi Stream are technically outside the scope of Wellington City Council Plan Change 83 and instead come under the ambit of the Wellington Regional Council. However it was felt that an integrated mitigation package would provide greater ecological benefits in the long term.

The location of the Waitohi Stream and tributaries within and adjacent to the site is shown in Figure 2. Waterways flow through the site from various, mainly urban, catchments and are directed around the northern part of the quarry. Many open reaches of waterway still occur within the wider quarry site; unlike waterways in upstream urban areas that are now mainly impervious surfaces with waterways piped through the storm water system. Increasing urbanisation in the top of the catchment is





resulting in more flashy flows, which is in part contributing to erosion of the bank beneath Fraser Avenue.

The stream is highly constrained for much of its length by the use of bunds and other hard surfaces. The Fraser Avenue tributary has a bund and a quarry road along the left bank (eastern side) – this road may be required as an emergency road from or to State Highway 1 during a natural disaster. A sewer main is also located under part of this road.

The section of open stream to the west of the Taylor Preston abattoir is constrained on both banks, with the secondary flood channel taken up by abattoir infrastructure on the left bank and an access track constraining the right bank. In addition, several water mains and a gas main cross the stream and gas pipe line infrastructure occurs on the right bank. Concrete structures have also been placed in the stream bed to protect the water mains by capturing large water-borne debris; this needs to be cleared after flood flows, thus a vehicle access track cuts down to the stream bed.

Downstream of the water mains, the stream is diverted in to a 150 m length of pipe which has proven to provide insufficient capacity during peak flows. Some of the Taylor Preston plant has been flooded, as has the lower-lying area to the southeast of the pipe inlet.

Nevertheless, most of the open sections of waterway still retain riparian vegetation on at least one bank, and some reaches are vegetated on both banks. The vegetation is often a mix of common indigenous species such as māhoe (*Melicytus ramiflorus*), karamu (*Coprosma robusta*), taupata (*Coprosma repens*), koromiko (*Veronica stricta* var. *stricta*), and rangiora (*Brachyglottis repanda*), and introduced and weedy species such as crack willow (*Salix × fragilis*), brush wattle (*Paraserianthes lophantha*), gorse (*Ulex europaeus*), broom (*Cytisus scoparius*), tradescantia (*Tradescantia fluminensis*), blackberry (*Rubus fruticosus* agg.), Darwin's barberry (*Berberis darwinii*), montbretia (*Crocoshia × crocosmiiflora*), fennel (*Foeniculum vulgare*) and rank pasture grasses. This mix of species still provides benefits to the stream, including bank protection, shading, and organic matter and invertebrate input.

The proposed development has the potential to adversely impact the Waitohi Stream in the following ways:

- Loss of riparian vegetation – Proposed Quarry activities are unlikely to require further riparian vegetation clearance. The method of transporting quarried material from the southern face to the rock crushing plant at the northern face could be via a haul road, or via a conveyor belt. It is proposed that neither of these options come closer than five metres from the stream, however in places the existing riparian vegetation is much wider than five metres.
- Further constraints along the waterway – The space to construct and operate a haul road, or a conveyor belt, is limited along much of the potential route. No details are available for either option. It is anticipated that the haul road/conveyor system will be built very above the flood plain and it will cross the Waitohi stream at least once. A Resource Consent will be required from the Greater Wellington Regional Council to build the facility, and all consent conditions will be complied with.

The facility will be built in such a way so as to not interfere with stream flow or further reduce the Waitohi Stream floodplain.

- Additional loss of open reaches – Under the proposed quarry expansion there are no plans to pipe any part of the stream.
- Increased area of impervious surfaces within the quarry resulting in more flashy and higher peak flows. – No hard surfaces will be created as result of the quarry expansion. Most of the run off and aggregate wash water will be stored in the quarry pit for reuse. This will reduce flows from the proposed expansion into the stream.
- Sediment input in to the waterways, especially from the transport of quarried material along Waitohi Stream. – Transport of extracted rock will not deposit sediment in Waitohi steam. If extracted rock is transported by conveyer system measures will be in place to ensure that no sediment will be deposited in the stream. A haul road may generate dust which may get deposited in the stream. To mitigate dust generation the haul road will be sprayed with a dust suppressant called “Vital Bon-Matt Stonewall” using a water truck (this is being used in the quarry now) making sure that this product does not enter drains or waterways (Vital Chemical 2013). Alternatively a permanent sprinkler system could be installed along the haul road to supress dust with any runoff collected in a roadside swale and treated appropriately before being discharged into to any waterways.

2.3 Revision of layout

In July 2018, there were further revisions to the proposed area that would cleared by further quarry development, resulting in a slight increase at the south-eastern margin and a substantial reduction at the northern end of the proposed quarry. These changes and the vegetation potentially affected are illustrated in Figure 1 and Table 1. Additionally, in order to honour the lease with Taylor Preston abattoir, a section of the lower slopes is to be retained as pasture grassland for emergency or hold-over stock grazing (shown in Figure 1). The exact area available is not yet known as this depends on whether a haul road or conveyor option will be constructed through the grazing area.

Also, as noted above, some of the vegetation and habitat types are unlikely to be affected by the proposed quarry extension even though they are located within the proposed quarry envelope.

2.4 Plan Change History and mitigation

Three previous plan changes directly concern the Quarry - Plan Change 25, 26 and 64. Plan Change 25 (Kiwi Point Quarry Extension, Ngauranga Gorge) and Plan Change 26 (Taylor Preston Area, Ngauranga Gorge - Rationalisation of Zone Boundaries) were approved in 2004, becoming operative 6 July 2006. Plan Change 25 provided for an extension of the Quarry (Southern face) rezoning adjacent land from Open Space to Suburban Centre. Plan Change 26 provided for a rationalisation of zone boundaries, with the Taylor Preston area rezoned Suburban Centre. Plan Change 64 (Amendments to Kiwi Point Quarry Provisions) became operative in July 2009, establishing a single set of rules for the operation of the quarry (with previously a different set of rules for the North Face and South Face areas). Vegetation clearance

is a permitted activity in some District Plan Zones, such as Business 2. More than half of the area within the proposed quarry extension is currently zoned as Business 2.

None of these plan changes appear to have included mitigation for the loss of vegetation within current proposed Plan Change 83. Thus regardless of current zoning as Business 2 or Open Space B, potential adverse effects on all indigenous vegetation needs to be mitigated. Table 1 also shows the split in vegetation clearance between Business 2 and Open Space B.

2.5 Additional concerns identified by Wellington City Council

The loss of the reasonably successful planting trials (Figure 1) due to potential stock grazing is of concern to Wellington City Council. Potential impacts on these areas are proposed to be avoided by careful the alignment of the proposed stock fence (Figure 1). The estimated area for each of the planting trails is provided in Table 2.

Table 2: Wellington City Council replanting trial adjacent to Kiwi Point Quarry extension.

Number on Figure	Area of Trial (ha)
Area 1	0.06
Area 2	0.19
Area 3	0.13
Area 4	0.13
Total area	0.51

In addition to the above planting trials, a further two planting trials occur further up the ridge adjacent to Tyers Reserve (Figure B in Appendix 1), but these are unlikely to be affected. Also of concern to Wellington City Council is the potential loss of some key plant species which are no longer common in Wellington District. These species include kōwhai (*Sophora microphylla*), as there aren't many original plants remaining, scattered akiraho (*Olearia paniculata*), pockets of mānuka (*Leptospermum scoparium* var. *scoparium*; At Risk-Declining) and kānuka (*Kunzea robusta*; Threatened-Nationally Vulnerable). Within the proposed mitigation area immediately adjacent to the proposed quarry extension, around rocky outcrops at the top of the slope, there also are several very old plants of thick-leaved māhoe (*Melicytus crassifolius*; At Risk-Declining).

One of the concerns is that losing these plants could result in the loss of some of Wellington's plant species original genetic diversity, as well as the loss of plants and the surrounding habitat. These species also indicate potential remnant coastal scrub or forest. Within Wellington District it is estimated (largely from a desktop analysis) that approximately 32 hectares of coastal scrub and 55 hectares of coastal forest and/or scrub remains. This is likely to be an under-estimate of the total extent as vegetation with coastal scrub and forest features can extend further inland than the immediate shoreline (for instance the Ngauranga mitigation area comprises wind-swept ngaio (*Myoporum laetum*), māhoe (*Melicytus ramiflorus*), tree hebe (*Veronica parviflora*), mānuka, kānuka, and a range of divaricating coastal shrubs, similar to that found within the quarry extension area and other coastal areas in Wellington).

WCC planners would like to see effects and/or mitigation of the waterways integrated in to any mitigation package. Additionally concerns have been raised about maintaining connectivity for birds along the Wellington coastal escarpment and between the escarpments either side of State Highway 1. The ecological benefits of site remediation during and upon completion of quarry operations also need to be incorporated in to a mitigation package.

2.6 Other potential adverse effects

A survey for lizard species (Wildland Consultants 2018) did not find any lizards or lizard sign. The habitat appears to be suitable for lizards, but lizard densities are perhaps very low and thus difficult to detect. Removal of vegetation and rocky outcrops therefore still has the potential to affect lizard habitat. Indigenous vegetation also provides habitat for indigenous bird species, although these are expected to be the more common species (also refer to section 4).

Currently possum and mustelid control is undertaken in the indigenous forest areas to the west of State Highway 1, and possum control only to the east of State Highway 1. Bait stations target possums and traps target mustelids. Vegetation and habitat removal and the lag in time for replanted areas to provide suitable habitat and food for displaced fauna, could be partially mitigated for by intensifying predator control, such as undertaken rodent control within the mitigation areas and surrounding forests. This would enable the remaining areas to provide habitat for a slightly increased fauna population, potentially including animals that have been displaced from areas of vegetation clearance. Abattoirs can also attract rodents scavenging dropped meat and offal. Presumably the Taylor Preston plant has strict hygiene regulations including rodent control. Therefore rodent control in surrounding areas may also benefit the Taylor Preston plant.

Stock, including on occasion goats, have been known to escape from the hold-over stock grazing area for the abattoir. The escaped animals will then browse indigenous vegetation as well as pasture grasses, including plants established for mitigation. Occasionally these animals, and especially goats, are hard to round up, and can invade adjacent areas, or adversely impact indigenous vegetation over a longer duration. Given that the fencing of the hold-over stock grazing area will need to be reconfigured, there is an opportunity here to ensure that the fencing is appropriate for containing species such as goats. This would reduce, or hopefully prevent, future access by escaping stock to mitigation areas and surrounding reserves.

3. POTENTIAL MITIGATION

Potential adverse ecological effects as a result of the proposed Kiwi Point Quarry extension are set out in Table 3, and include:

- Potential impacts on Waitohi Stream
- Loss of 4.15 hectares of indigenous vegetation,
- Loss of coastal forest and scrub,
- Loss of local genetic plant diversity,

- Loss of lizard and bird habitat,
- Reduced habitat connectivity for fauna,
- Potential grazing of mitigation areas by stock escaped from the hold-over stock grazing area associated with the abattoir.

The focus for mitigation was to address the biodiversity that is proposed to be adversely affected. Thus restoration or planting of areas to mitigate for the loss of indigenous vegetation, while pest control seeks to improve adjacent habitats to mitigate for the loss of terrestrial fauna habitat. All the areas proposed for mitigation are either adjacent or very close to the proposed quarry extension; this increases the likelihood of being able to establish similar indigenous vegetation types to those proposed to be impacted. All the mitigation sites are on Wellington City Council owned and managed land and all are zoned Open Space B.

Table 3. Potential mitigation solutions for adverse ecological effects of the proposed Kiwi Point Quarry extension.

Potential Adverse Effect	Potential Mitigation
Potential impacts on Waitohi Stream	<ul style="list-style-type: none"> • Retain and maintain all existing areas of riparian vegetation. • Progressively improve the quality of the riparian vegetation, including increasing indigenous species dominance. • Investigate and consider opportunities to remove constraining infrastructure and increase the natural floodplain and stream meander • Increase the width of riparian vegetation where practicable. • Investigate daylighting additional sections of currently piped waterway.
Loss of 4.15 hectares of indigenous vegetation	<ul style="list-style-type: none"> • Plant areas of suitable habitat with a suitable suite of species, including species of coastal forest and scrub.
Loss of coastal forest and scrub	<ul style="list-style-type: none"> • Ensure that mitigation areas are suitable for establishing coastal forest and scrub.
Loss of local genetic diversity	<ul style="list-style-type: none"> • Take cuttings and collect seed from the target species at the site to include in future mitigation planting. • Direct transfer of vegetation to parts of the mitigation area.
Loss of habitat for birds	<ul style="list-style-type: none"> • Plant area with indigenous plant species known to be favoured by indigenous birds. • Undertake more intensive pest control by establishing rodent control in mitigation and surrounding areas.
Loss of habitat for lizards	<ul style="list-style-type: none"> • Plant area with indigenous plant species known to be favoured by indigenous lizards. • Undertake more intensive pest control by establishing rodent control in mitigation and surrounding areas.
Reduced habitat connectivity for fauna	<ul style="list-style-type: none"> • Ensure that vegetated corridors link different portions of the site.
Stock grazing mitigation areas	<ul style="list-style-type: none"> • Ensure that the fencing surrounding the hold-over stock grazing area is of sufficient quality to contain stock brought to the abattoir. Goat proof as a minimum and possibly deer proof if deer are to be released into the hold-over stock grazing area.

The total areas proposed for each potential mitigation aspect are set out in Table 4 and shown on Figure 3.

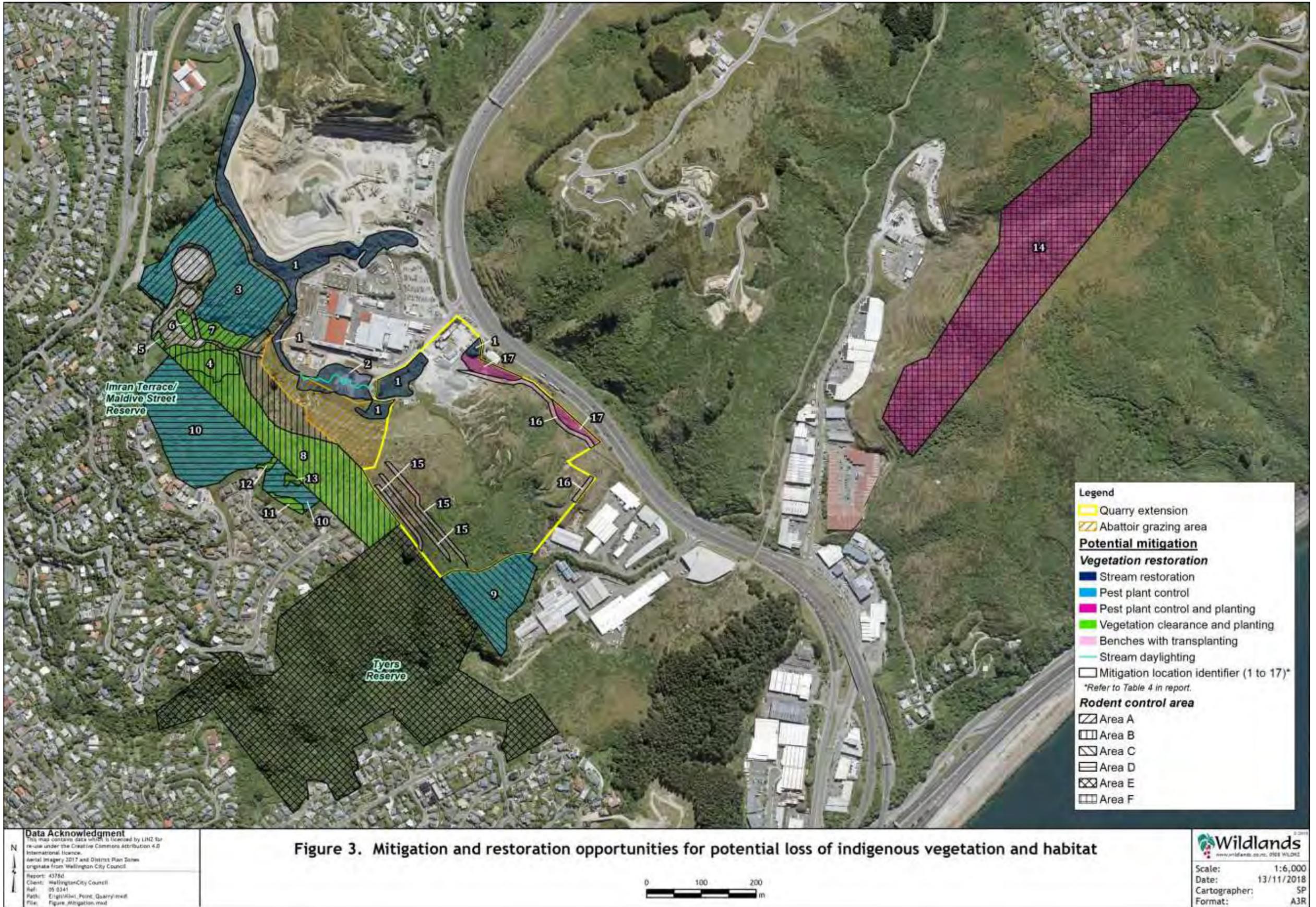
Table 4. Potential mitigation tasks and locations for adverse ecological effects of the proposed Kiwi Point Quarry extension.

Number on Figure	Location	Tasks	Area (ha)	Planting/mitigation ratio	Actual area (ha) available	Total area (ha)
Stream restoration						
1	Riparian enhancement	Retain and maintain riparian vegetation while the quarry is active. Progressively manage pest plant species, increase dominance of suitable, eco-sourced, indigenous plant species. Where practicable, increase width of riparian vegetation strip up to 20 metres either side of the stream and legally protect restoration area.	2.50	1.00	2.50	2.50
2	Stream daylighting	Consider, and if possible, daylight the reach south of Taylor Preston abattoir and establish an indigenous riparian buffer up to 20 metres either side of the stream.	0.56	1.00	0.56	N/E¹
Area adjacent to Kiwi Point Quarry extension identified for mitigation planting						
3	Around water tank	Remove pest plant species in forest area for five years.	2.85	0.1	0.29	
4	Water tank gorse	Remove pest plant species, cut rows in the gorse and plant indigenous species. Ongoing weed control for five years.	0.44	1	0.44	
5	Water tank road side face	Remove pest plant species and rank grass and plant indigenous species. Ongoing weed control for five years.	0.03	1	0.03	
6	Upper pipe gully	Remove blackberry, fennel and other pest plant species and plant indigenous species. Ongoing weed control for five years.	0.10	1	0.10	
7	Lower pipe gully	Remove blackberry, fennel and other pest plant species and plant indigenous species. Ongoing weed control for five years.	0.28	1	0.28	
8	Upper faces and paddocks	Remove pest plant species, use gorse as nurse crop, and plant indigenous species. Ongoing weed control for five years.	3.17	1	3.17	
9	South of quarry	Remove pest plant species and plant any clearings with a suitable range of coastal forest species, including those species currently not found at the site that would normally be expected to occur in coastal forest and scrub. Ongoing weed control for five years.	1.53	0.3	0.46	4.76

¹ N/E Not possible to estimate at this point in time. The suggested mitigation option requires more investigation and/or is too far in the future to estimate.

Number on Figure	Location	Tasks	Area (ha)	Planting/mitigation ratio	Actual area (ha) available	Total area (ha)
Imran Terrace / Maldive Street Reserve						
10		Remove pest plant species (not including below areas). Ongoing weed control for five years.	3.40	0.10	0.34	
11		Remove pest plant species, cut tracks in gorse if required and plant indigenous species. Ongoing weed control for five years.	0.09	1.00	0.09	
12		Remove pest plant species, cut tracks in gorse if required, kill pine trees and plant indigenous species. Ongoing weed control for five years.	0.04	1.00	0.04	
13		Kill pine trees and plant indigenous species. Ongoing weed control for five years.	0.04	1.00	0.04	0.51
Ngauranga site						
14		Focus on areas accessible from the 4WD track. Remove blackberry, cotoneaster and other pest plant species. Where required cut tracks at right angles to prevailing wind in areas of dense gorse. Plant open areas and gorse areas. Some plants to be retained so 70% of area available. Seed bomb or undertake enhancement planting in one third of this area	9.77	0.60	5.86	5.86
Benches with transplanting						
15	Upper benches	The area will be fenced off along the top-most bench. The three tiers of benches will be constructed, and then indigenous vegetation from other parts of the site translocated and settled on the benches. A lower fence will be built and the area monitored and weed control undertaken as necessary for at least five years.	0.43	1.00	0.43	
16	Lower bench	The area will be fenced off on the Ngauranga Gorge side. The bench will be constructed at about RL70, and then indigenous vegetation from other parts of the site translocated and settled on the bench. An upper fence will be built, or some other measure to exclude vehicles, and the area monitored and weed control undertaken as necessary for at least five years.	0.28	1.00	0.28	0.71
Visual amenity and remediation planting						
17	Visual amenity maintenance	Remove fennel and blackberry and other pest plants for five years. Manage area towards greater indigenous dominance; consider planting suitable indigenous species if required	0.36	0.30	0.11	N/E

Number on Figure	Location	Tasks	Area (ha)	Planting/mitigation ratio	Actual area (ha) available	Total area (ha)
Not labelled	Remediation of cut benches	Scarify bench surface parallel with batter face. Apply at least 500 mm depth and preferably up to 1 metre depth of topsoil on the benches. Plant with suitable, eco-sourced, indigenous trees that can eventually screen out the batter faces.				N/E
Total area of restoration or planting						11.84
Rodent control for at least five years						
A	Water tank reserve	Set up and maintain a network of rodent control stations for at least five years.	4.60	0.1	0.46	
B	Upper faces and paddocks		4.93	0.1	0.49	
C	South of quarry		1.53	0.1	0.15	
D	Imran Terrace / Maldive Street Reserve		3.57	0.1	0.36	
E	Tyers Reserve		15.34	0.1	1.53	
F	Ngauranga site		9.77	0.1	0.97	3.96
Total area of mitigation proposed						15.09
Additional non-area based mitigation						
	Fencing of Abattoir hold-over stock grazing area	Goat proof fencing around whole area.				
	Retain local genetic diversity of plant species	Collect seed and cutting of <i>Meliccytus crassifolius</i> , mānuka, kānuka, kōwhai, akiraho and propagate to include in restoration planting				



The planting/mitigation ratio in Table 4 is based on the approximate area that is likely to be able to be planted or rehabilitated and is a conservative estimate. For planting and weed control this comprises an estimate of the proportion of the area currently dominated by pest plant species, pasture grassland, or canopy gaps (e.g. 10% of an area = planting/mitigation ratio of 0.1). A similar approach was used for rodent control benefits. The current possum control operations will be having some effect on rodent numbers. The steepness of the terrain is likely to limit the density of rodent stations that can be deployed. Thus it is estimated that the rodent control would conservatively provide control over an additional 10% of the target areas.

In summary the loss of 4.15 hectares of indigenous vegetation will be mitigated by restoration planting/management on the equivalent of 11.84 hectares, rodent control benefits over at least 3.96 hectares (combined total 15.80 hectares), and additional actions such as harvesting genetic material and securely fencing stock. The combination of weed control, restoration planting, enhancement planting (introducing species, such as podocarps, that would have occurred at the sites in the past, but are no longer present), increased pest animal control, secure stock fencing and securing genetic material from key plant species will amount to a mitigation ratio greater than 1:3.

3.1 Potential adverse effect on Waitohi Stream

The suggested mitigation actions are grouped by location within the whole quarry, including areas outside of proposed Plan Change 83, to enable a staged approach to the rehabilitation of the Waitohi Stream. During quarry operations, the focus should be on retaining all areas of riparian vegetation, regardless of whether they are dominated by indigenous or exotic plant species, along all sections of open stream that currently occur within WCC-owned land.

A Riparian Management Plan will be commissioned from a suitably qualified expert that includes the ongoing management and protection (physical and eventually legal) of the existing riparian areas. This could be a stand-alone report or a chapter in the quarry Management Plan that will be required. Consultation will be required with Taylor Preston, Greater Wellington Regional Council, and relevant iwi. Ongoing management is to include gradual and successive management towards a riparian area dominated by indigenous plant species and control of environmental weed species. This may require some novel or experimental approaches to deal with the very steep banks and intermittent flood events.

The Riparian Management Plan will pre-date and will be implemented prior to the Stream Rehabilitation Plan required under Conditions 67 and 68 of GWRC Resource Consent Condition WGN170175 [34504], [34510], [34512], [34513], [34514 and [34515] by 2027, but must be aligned with these Conditions (provided in Appendix 2) and the Quarry Management Plan (Wellington City Council 2014) and a Quarry Management Plan for this southern part of the quarry if it is different to the existing quarry plan. The Quarry Management Plan also indicates the requirements to remove any introduced industrial waste from the stream bed and slopes, divert and treat any contaminated run-off, remove pest plants, and enhance riparian vegetation.

The Riparian Management Plan should also give consideration to the eventual potential changes to the stream, including expansion of the riparian areas to 20 metres wide, and daylighting of a section of the stream and/or recontouring to provide improved flow paths, once parts of the quarry are decommissioned.

Resource conditions pertaining to the proposed or future quarry operations or other commercial operations within WCC-owned land will include measures to enable the physical protection of the stream, including sediment and nutrient control plans.

3.1.1 Fraser Avenue tributary - Northern quarry

If at all possible the erosion of the true right bank should be managed to prevent further undermining of Fraser Road:

1. Maintain the current vegetation on the true right side of the stream and as opportunities arise spot-spray environmental weed species and plant indigenous plant species.
2. If possible, and where practical, consider reducing the road width beside the stream and pull back the bund accordingly to stop directing the water flow into the bank below Fraser Avenue.
3. Trial the application of a hydroseed mix onto the eroding bank that includes grasses (in order of preference and/or decreasing percentage of mix; browntop (*Agrostis capillaris*), perennial ryegrass (*Lolium perenne*), Chewings fescue (*Festuca rubra* subsp. *commutata*) **plus** wharariki (*Phormium cookianum* subsp. *hookeri*) and tutu (*Coriaria arborea* var. *arborea*) seed – these last two species are both low-growing indigenous species with good root systems.

Once quarry operations cease on the northern face – remove as much of the bund and road as practicable to reduce constraints on the true left (eastern) side of the stream. Consider realigning the emergency access road around the back of the quarry pit to provide more space for the stream.

If possible, move the stream away from the foot of the bank beneath Fraser Avenue and reinstate a more natural meander (resource consent will be required to alter the stream path). Backfill the steep areas beside Fraser Avenue to reduce erosion risk. Once the stream has been recontoured, control/remove all environmental weed species and plant with indigenous species.

Where possible, ensure that there is at least 20 metres (horizontally) of riparian area between Fraser Avenue and the stream, and another 20 metres on the eastern side of the stream (on the opposite bank to Fraser Avenue). The aim of this would be to create a 20 metre swath of indigenous riparian vegetation either side of the stream and to improve linkages between habitats.

3.1.2 Waitohi Stream near the Taylor Preston plant

While the quarry is operational:

1. Ensure that the existing riparian vegetation is maintained; there should be no loss of riparian extent and where possible an increase in the extent of riparian vegetation.
2. As opportunities arise, undertake control of environment pest plants and replace these with suitable, eco-sourced, indigenous riparian plant species. Any pest plant control should be undertaken in narrow strips angling down the bank in the direction of the flow to prevent bank destabilisation.
3. WCC works with Taylor Preston and Wellington Water to reduce the ongoing encroachment into the stream with the long-term aim of establishing indigenous vegetation cover on both banks of this currently open section of stream, where this is practicable.
4. In the longer term, WCC works with all relevant agencies to ensure that when piping infrastructure needs to be upgraded/replaced then consideration is given to elevating these pipes above the 1 in 100 year flood level, and where possible move associated infrastructure out of the floodplain.
5. If a haul road is to be constructed for conveying quarried material, then this road will not be cantilevered out over the stream and the road will not encroach further into the stream channel than the current existing fence or track margin. A line of suitable, eco-sourced, indigenous shrubs will be planted and maintained along the top of the bank beside the haul road to reduce dust input into the stream, in addition to other sediment and control mechanisms required by any resource consents for the haul road.

Haul road or conveyor no long required:

6. Once the haul road or the conveyor is no longer required, then it will be decommissioned including the following:
 - a. Where possible, the true right bank will be recontoured into a more gentle slope and planted with suitable, eco-sourced, indigenous plant species. Species such as non-invasive poplar and willow may be planted as part of the plant suite initially to help stabilise the banks, but would need to be removed, without damaging the indigenous vegetation, once the indigenous vegetation is sufficiently established (possibly about 10 years).
 - b. Where possible, a riparian area with a horizontal width of at least 20 metres is to be planted with indigenous species.
 - c. Investigation will be undertaken to remove or elevate the current culvert/bridge to reduce flood flow constraints.
 - d. Investigation will be undertaken to re-create an open channel with secondary flow path(s) downstream of the culvert/bridge to link in with the open stream channel south of the Taylor Preston. This would equate with daylighting approximately 142 metres of stream (measured as a straight line, the actual stream should meander).

If this option proceeds, then a minimum horizontal width of 20 metres of indigenous riparian planting, using suitable, eco-sourced plants will be planted on the true right bank and up to 20 horizontal metres where possible on the true left bank.

Upon quarry closure:

7. Give effect to the Stream Rehabilitation Plan as per Conditions 67 and 68 of GWRC Resource Consent Condition WGN170175 [34504], [34510], [34512], [34513], [34514 and [34515].
8. Once the quarry is decommissioned, but prior to daylighting and other improvement works on the stream, work with the relevant authorities to enable the removal or remediation of downstream fish passage barriers.

Requirements of the Fisheries Regulations 1983 Part 6 Fish Passage S42 Culverts and fords are as follows:

- (1) Notwithstanding regulation 41.2.d, no person shall construct any culvert or ford in any natural river, stream, or water in such a way that the passage of fish would be impeded, without the written approval of the Director-General incorporating such conditions as the Director-General thinks appropriate.
- (2) The occupier of any land shall maintain any culvert or ford in any natural river, stream, or water (including the bed of any such natural river, stream, or water in the vicinity of the culvert or ford) in such a way as to allow the free passage of fish: provided that this requirement shall cease if the culvert or ford is completely removed or a written exemption has been given by the Director-General.

The Department of Conservation has recently received legal advice on this section of the regulations, indicating that the entity responsible for maintaining fish passage is the occupier of the land. "Occupier" includes the owner of any land when there is no apparent occupier; and also any person doing any work by contract for the occupier.

3.1.3 Waitohi Stream downstream of Taylor Preston

There are two sections of open waterway with associated riparian vegetation along this reach of the stream. This riparian vegetation shall be retained throughout the life of the quarry. As opportunities arise, pest plants will be removed and replaced with suitable, eco-sourced, indigenous riparian plant species. Where feasible, the area of riparian vegetation will be extended to 20 metres either side of the stream.

3.1.4 Legal protection of the riparian area

As Waitohi Stream reaches are rehabilitated they will be protected by a legal mechanism with the aim of protecting the conservation and amenity values of the riparian vegetation and the stream. The legal protection will include the full width of

the rehabilitation area or up to 20 metres either side of the stream, whichever is the greater.

3.2 Loss of indigenous vegetation

It is proposed to mitigate the loss of indigenous vegetation through various means. Vegetation restoration will occur within 21.66 hectares of Wellington City Council owned land to achieve 10.42 hectares of indigenous vegetation restoration and to remove pest plants and increase indigenous plant species dominance in another 0.72 hectares. Indigenous vegetation restoration will be achieved through a variety of means but will generally involve removal of pest plants and planting or spreading seed of suitable plant species.

In addition it is proposed to undertake some direct transfer of soil and trees on to the benches constructed early in the development of the quarry. This would amount to approximately 0.71 hectares. The outcome of the direct transfer trials is not certain, but should these not be successful then these areas will also be planted, or infill planted, with suitable indigenous species. Thus it is proposed, in addition to other measures set out below, to create 11.84 hectares of indigenous vegetation to mitigate the loss of 4.15 hectares of indigenous vegetation.

3.2.1 Planting methodology

Much of the proposed planting locations are subject to strong prevailing winds that quickly dry out the soil. In many locations the top soil is also relatively thin. To improve planting success the following methodologies could be considered:

- Where practicable and where soils are less than 200 mm thick, apply on average up to 500 mm depth of soil in areas to be planted.
 - If possible, scarify the subsoil to allow easier root penetration, ensuring scarification is parallel to the contours to help retain moisture.
 - Applied soil depth can vary from 300 mm to 600 mm to create a more heterogeneous habitat.
 - Soil could include 10% rocks of variable size but no larger than 300 mm and 10-20% organic woody or plant debris. The inclusion of rocks and woody debris can help retain soil on slopes, and creates a more heterogeneous habitat.
- Add a handful of sphagnum moss or other moisture retaining organic matter that has been soaked overnight to the bottom of each planting hole to help retain soil moisture and increase humus content.
- Use cut indigenous plant material to either thatch areas of ground to be rehabilitated or create wind rows.
 - This can assist with mitigation success by releasing any seeds associated with the cut vegetation that may germinate in situ.
 - It will provide some shelter for plantings within or up wind of the deposited material.
 - It adds organic matter, and potentially suitable mycorrhizal fungi, to the soil.

- It may assist with moisture control and sediment retention.
- Non-indigenous plant material or logs can also be used for this purpose provided they do not include environmental pest plant seeds.
- Retain gorse as a shelter plant.
 - Plant clusters of indigenous species in the shelter of established gorse plants.
 - Cut meandering rows at right angles to the wind direction in gorse thickets and plant within these rows.
- On shallow slopes or flat areas, apply mulch at least 200 mm thick. Green mulch (including cut but not yet composted leaf matter) can be applied hard up to the plant stem.
- Use handtools (e.g. pickaxe or planting spade) to dig up pest plants and replant with indigenous species. Pest plants often occur where soil is deeper and/or of better quality.
- Consider the use of seedbombs to initiate seedling establishment in difficult to access locations.

3.2.2 Direct transfer of indigenous vegetation

Direct transfer involves scooping up plants, their roots and associated soils, ensuring that the root ball remains intact, and relocating the whole scoop to a restoration area. Scoops should be placed immediately adjacent to each other. The areas should then reworked by the excavator so that the small trees, and any tree ferns are standing more-or-less upright. Extra soil needs to be spread around the transferred vegetation at the end of the salvage operation, to cover the root systems as much as practicable. Essentially this process involves picking up a chunk of ecosystem, with all the associated soil microbes and organisms, and relocating it. This method has been trailed in other locations with a range of success, from limited to excellent in higher rainfall areas. It will be a useful mitigation tool as recent and modified soils often lack suitable soil microbes for the plants being established. If any of the key species noted above can be transferred then this could also assist with the longer-term retention of these specimens and their genetic contribution.

The proposed method for the upper benches involves:

- Fencing the upper margin of the site (including a gate at the northwest corner for later maintenance access).
- Removing vegetation and soil (stockpile top soil for later use).
- Cut and form the benches.
- Scarify the rock bench surface, parallel with the batter face, to improve soil holding ability.
- Place an average 300 mm depth of soil on the bench (this can vary from 200 mm to 400 mm).
- Relocate indigenous vegetation from elsewhere within the site,
- Settle the soil, trees and other vegetation,
- Apply more topsoil where there are obvious gaps in soil layer,
- Built the fence along the lower bench,

- Monitor the success (percent ground cover, percent survival, species survival, and height of canopy species)
- Control pest plants for at least five years

The method for the lower bench near the Ngauranga Gorge will be similar except for the location of the fences.

The outcome of this trial is not certain. Should any plants die after translocation then mitigation or infill planting will be required on these benches.

3.3 Loss of coastal forest and scrub

The revegetation areas adjacent to the quarry and at the Ngauranga site will be planted with species that will develop into coastal forest and scrub. The net result at the completion of all the mitigation will be an increase in the amount of coastal forest and scrub (4.15 hectares lost versus 11.84 hectares planted or managed towards indigenous plant species dominance).

3.4 Loss of local genetic plant diversity

Wellington City Council has already commenced seed collecting and the taking of cuttings from key species such as *Melicytus crassifolius*, mānuka, kānuka, kōwhai, and akiraho so that they can be propagated and included in restoration planting.

In addition, the direct transfer of vegetation and soil, where this is physically and logistically possible, could also assist with retaining some of the genetic diversity of vegetation, soil microbes and small fauna.

3.5 Loss of lizard and bird habitat

No lizards, or lizard sign, were located during the lizard survey, yet the habitat looks suitable for lizards. Only common forest birds were noted at the site during the surveys and only common bird species are expected to use the habitat proposed to be affected. It is anticipated that the extent of mobile bird habitat will not be greatly diminished by the removal of 4.15 hectares of vegetation. However there could be some loss of seasonal food supply (e.g. flowering kōwhai, fruiting māhoe and coprosma species) and seasonal nesting or roosting habitat. The proposed restoration would result in 11.84 hectares of indigenous habitat. Revegetation of the benches at a later stage could provide additional bird and lizard habitat over time.

Other than loss of habitat, the other adverse impact on both lizard and bird populations is predation by introduced mammals. Possums are controlled within all proposed mitigation areas through bait stations. Mustelid traps are being utilized in Tyers Reserve. Control of rodents would greatly improve the habitat for lizards and bird species likely to use these areas. The total area proposed to receive rodent control is 39.74 hectares, which should enable lizard and bird populations to achieve greater population densities in these areas. These increased densities should mitigate for the loss of 4.15 hectares of indigenous vegetation.

3.6 Reduced habitat connectivity for fauna

It has been proposed (S42A Report Appendix 6, Attachment 4) that a 70 metre wide area should be planted along the southern boundary of the proposed quarry extension once the quarry is decommissioned and the site levelled (refer to Figure 4). Additionally, a 40 metre (estimated) fauna corridor would extend throughout the site, mostly centred on the Waitohi Stream. This corridor is proposed to provide a habitat corridor for birds to offset the reduced connectivity between the eastern escarpment of Ngauranga Gorge and Tyers Reserve and other reserves on the western side of the Gorge. Some of the area proposed for habitat corridors is not owned by WCC and may therefore not be available for any planting to occur.

Birds are highly mobile species and are likely flying across the motorway between forest and scrub remnants, as well as between forest remnants on the Kiwi Point Quarry side of Ngauranga Gorge. The loss of a small area of indigenous vegetation (4.15 hectares) is proposed to be mitigated by a somewhat larger area of mitigation and restoration management (11.84 hectares). Overall the loss of connectivity is expected to be minimal for bird species.

An 8 metre wide bench is to be retained/recreated along State Highway 1 (refer to the lower bench in Table 3 or Section 3.2.2) and used as a direct transfer trial or, if that is not successful, planted with suitable, eco-sourced, indigenous plant species. The species that will establish or be planted are likely to be lower-stature species rather than tall forest trees to reduce potential future risks to State Highway 1.

Once the southern quarry is decommissioned and back-filled to level RL67, soil could be applied to create a slope between the top of the 8 metre wide benches at approximately RL74 and the back-filled area. If constructed at 1:3 then this slope will create an additional 21 metre wide area that could be planted with indigenous species. Thus, a nearly 30 metre wide corridor of indigenous vegetation could be created along the eastern boundary and part of the southern boundary; which will create and connect habitats for small fauna such as lizards and invertebrates, and may also provide seasonal resources for bird species.

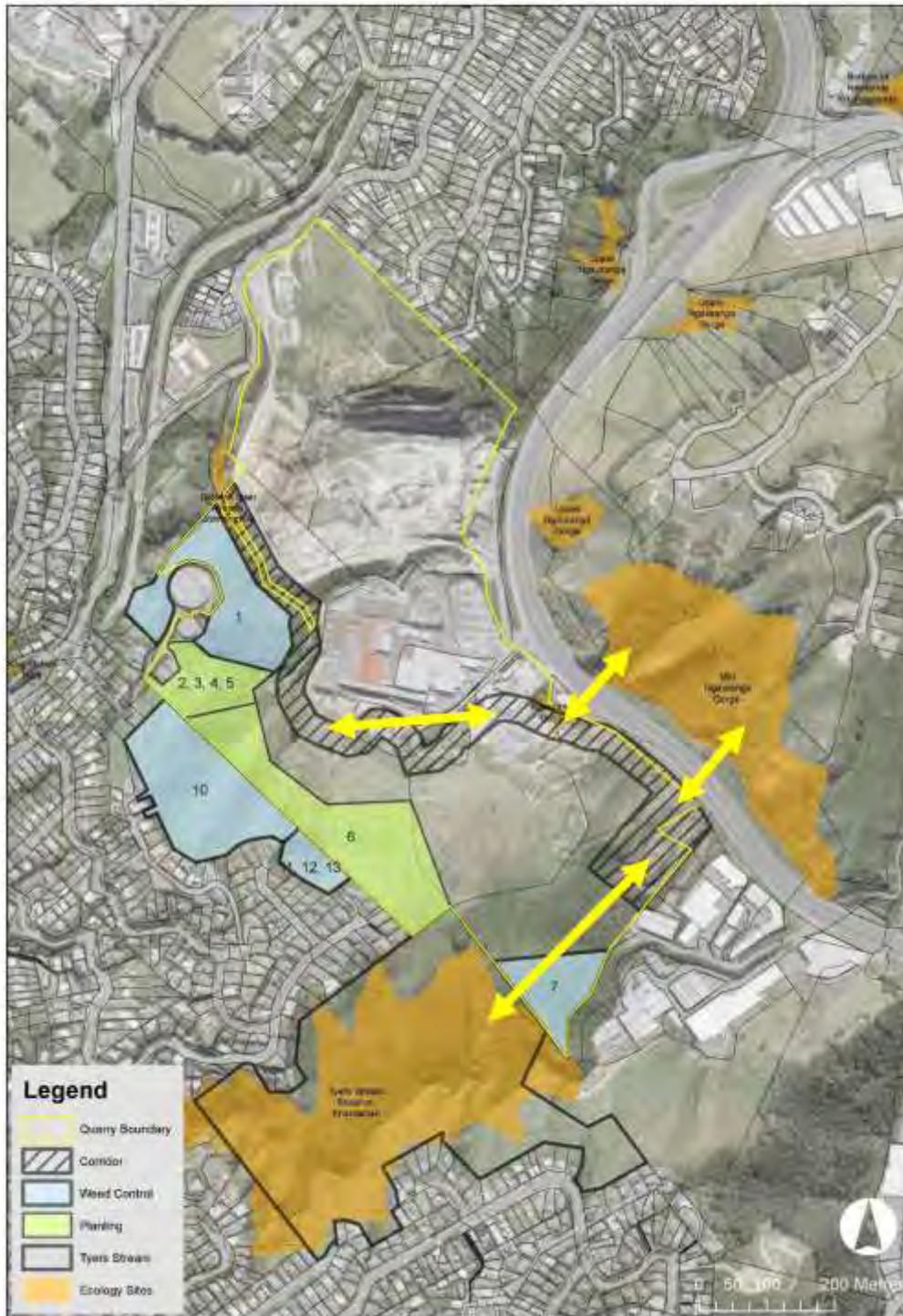
The mixed indigenous-exotic vegetation on the hill facing State Highway 1 and on the previously cut face on the south-eastern boundary (both areas mainly outside the site boundaries) is proposed to be retained; this would complement and further widen this corridor of vegetation. Retention and enhancement of riparian vegetation (refer to Section 0) will also create a near continuous riparian corridor of up to 40 metres wide (refer to Figure 3).

The benches created throughout the life of the quarry will need to be revegetated in part to visually screen the batter slopes. If the benches are planted with suitable, eco-sourced, indigenous plant species, then this will also create some additional habitat and reduce the distance between habitats.

The requirement for a 70 metre wide corridor at the southern end of the quarry seems excessive.

Attachment 4: Quarry Mitigation Options

Mitigation proposed by Wildlands in Blue & Green. My additions in black hatch.



21 August 2018

[36]

Figure 4. S42A Appendix 6 suggested ecological corridor.

The option to develop a bird corridor close to State Highway 1 is not favoured for a number of reasons:

- Providing bird habitat adjacent to a busy road is likely to result in high bird mortality through bird strike with cars. For instance, NZ Transport Agency is currently spending a lot of money removing vegetation attractive to birds from along SH2 to reduce bird strike.
- The proposed bird corridor could largely not be established until after the quarry is exhausted, which is predicted to be some 15 to 20 years away. By then the birds would be habituated to using other routes.
- Some of the site identified as bird corridor is likely to be rezoned as industrial and this is likely to cause a lot of activity and other disturbance that would make such a corridor less bird friendly.

Overall, the loss of connectivity is expected to be less than minor for birds, as they can fly between habitats, and likely to be mitigated through the planting of strategically placed mitigation and rehabilitation areas for less mobile terrestrial fauna.

3.7 Fencing the grazing area

Stock, including on occasion goats, have been known to escape from the hold-over stock grazing area for the abattoir and invade adjacent areas including reserves. It is proposed to securely fence the designated abattoir grazing area (Figure 3) with a fence capable of retaining goats. It is difficult to calculate a mitigation benefit for this activity as escapes can be sporadic and the duration that animals are left free-roaming can vary greatly. However, this option is offered in addition to the mitigation planting, pest plant control, and rodent control.

3.8 Remediation and amenity planting

The benches created throughout the life of the quarry will need to be revegetated in part to visually screen the batter slopes. If the benches are planted with suitable, eco-sourced, indigenous plant species then this will also create some additional habitat and reduce the distance between habitats.

Vegetation on the face along State Highway 1 will be retained, in part for visual screening. If possible pest plant species should be controlled and gradually replaced with suitable, low-growing, eco-sourced indigenous plants. This would over time create some additional habitat for birds and other terrestrial fauna.

The quantity of habitat to be potentially created through these measures can not be determined accurately at this stage, as it depends on the final quarry configuration and health and safety issues being suitably addressed.

3.9 Restoration Plan

The S42A report, Appendix 2 recommends the development of a Quarry Management Plan and a Restoration Plan to direct ecological mitigation for the loss of terrestrial vegetation and the associated habitat.

The Restoration Plan is to include objectives, and principles and measures for the rehabilitation of the site, including:

- a phasing plan to indicate order of works, potential greatest extent of cut faces and a timetable and associated budget for the rehabilitation of prominent quarry faces, processes and timeframes for monitoring the effectiveness of rehabilitation measures, and contingency plans to improve measures shown to be ineffective.
- measures to create soil conditions which will support plant growth.
- measures to create a variety of site conditions to support a range of species.
- means of controlling runoff to avoid erosion.
- means of control of plant and animal pests.
- measures to avoid fire risks.
- means to assist native vegetation to regenerate on grazing land.
- rehabilitation which is compatible with Open Space strategy for adjacent areas of land and with the Ngauranga Gorge's location as a gateway to Wellington City.

The Quarry Management Plan is also to include opportunities to daylight Waitohi Stream and restore its riparian vegetation.

These objectives, principles and measures are supported.

3.10 Summary of mitigation

Current areas of riparian vegetation will be protected from proposed works and investigations will be undertaken to widen the floodplain to a larger, more natural width along one reach of stream and to potentially daylight another reach of stream. The riparian vegetation in combination with restoration planting and management and retention of other areas of vegetation will mitigate for the any loss of habitat connection for terrestrial fauna.

The mitigation proposed will include the equivalent of 11.84 hectares of mitigation planting and restoration management and rodent control over 39.74 hectares, preservation of local genetic plant stock through seed and cutting collection and direct transfer of soil and plants, and protection of the wider area from roaming stock (and potentially goats) through securely fencing the abattoir hold-over stock grazing paddock. The amount of indigenous vegetation likely to be cleared is 4.15 hectares. The cumulative total of the mitigation proposed is estimated to be in excess of 15.80 hectares, with the inclusion of seed/cutting collection and fencing.

4. RESPONSE TO S42A REPORT

The report is critical of a number of aspects in previous Wildlands reports. In particular the following

Insufficient survey for bird species using the site and implication that North Island kākā, kākāriri, and kārearea (bush falcon) would use this site as part of their core habitat.

The forest and scrub on the site is of much shorter stature and more modified than the forest within Tyers Reserve. Wildland Consultants (2017) identifies the indigenous species likely to be using the area seasonally. The range of species listed in the report and sources from eBird largely comprises Greater Wellington Regional Council state of the environment five-minute bird count monitoring during November and December from 2011 to 2015; this is considered to be a reputable data source.

Species such as North Island kākā (*Nestor meridionalis septentrionalis*; At Risk-Recovering), kākāriri (red-crowned kākāriki; *Cyanoramphus novaezelandiae novaezelandiae*; At Risk-Relict), and kārearea (bush falcon; *Falco novaeseelandiae ferox*; At Risk-Recovering) may occasionally, or seasonally, use the indigenous vegetation with the quarry but it is unlikely to be part of their core habitat as these species prefer taller forest such as in the adjacent Tyers Reserve.

Failure to provide like for like mitigation.

The forest and scrub within the Ngauranga Site comprises coastal forest and scrub similar to the vegetation to be removed, and the mitigation at all sites aims to recreate this same type of forest and scrub habitat. Some additional areas of mitigation have been agreed since the August Draft mitigation report.

Failure to achieve no net loss of biodiversity.

The mitigation options set out in this version of the report achieve at least no net loss of biodiversity.

No accounting of the ecological benefits of site rehabilitation or amenity planting.

Rehabilitation of the site once the quarry is exhausted will certainly provide some ecological benefits. However, the main focus is rehabilitation or amenity planting and not indigenous habitat creation. Under Biodiversity Offsetting guidance the purpose of the mitigation or offset needs to be considered, and each area can only be counted once (e.g. for amenity planting OR mitigation) (BBOP 2012, Department of Conservation 2014). Moreover, much of the rehabilitation or amenity planting can not occur until the quarry is proposed to be closed some 15 or 20 years in the future. Thus the lag for the proposed habitat creation to occur severely diminished any biodiversity gains and provides negligible benefit against vegetation that is to be removed in the near future.

5. CONCLUSIONS

Plan Change 83 to rezone part of Open Space B land in the Ngauranga Gorge to Business 2 to enable expansion of the Kiwi Point Quarry will result in a range of potential adverse ecological effects including loss of indigenous vegetation and local genetic plant material, loss of a small area of coastal scrub and forest, and loss of habitat for indigenous fauna. Greater Wellington Regional Council has indicated that the mitigation proposed in Plan Change 83 is considerably less than the “ideally at least three times larger” than the potential effects, and they would like to see an increase in the mitigation proposed to align more closely with a nominal 1:3 ratio for mitigation.

This report has shown that mitigation to achieve a 1:3 ratio is possible on Wellington City Council owned land close to the quarry. The mitigation comprises a combination of weed control, restoration planting, enhancement planting (introducing species that would have occurred at the sites in the past but no longer occur, including podocarp species), increased pest animal control, secure stock fencing and securing genetic material from key plant species. It is important that performance measures are associated with any planting, and that there are requirements to address appropriate replanting where there is loss of planted individuals after planting.

Although outside the scope of the Wellington City Council Plan Change 83, this report also includes mitigation options for the Waitohi Stream and its tributaries that run through the site. This includes retaining and enhancing existing riparian vegetation areas, and investigations of reinstating and vegetating a larger floodplain along a tributary reach and daylighting and vegetating part of the Waitohi Stream mainstem.

ACKNOWLEDGMENTS

Anita Benbrook, Illona Keenan, Myfanwy Emeny, and Logen Logeswaran all from Wellington City Council are thanked for additional information and useful discussion. Lindsay Daysh from Incite provided further planning context and discussion. Stephen Fuller (Boffa Miskell), Jason Jones (Wellington City Council) and David Cameron (Stantec) also provided useful discussion and further information.

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Wildland Consultants 2018: Assessment of lizards for a proposed expansion of the Kiwi Point Quarry, Ngauranga Gorge, Wellington. Prepared for Wellington City Council, Wellington, *Wildland Consultants Ltd Contract Report, No. 4378b*: 13 pp.

ADDITIONAL VALUES IDENTIFIED BY WELLINGTON CITY COUNCIL

Sent: Thursday, 26 July 2018 2:10 p.m.
To: Astrid van Meeuwen-Dijkgraaf
Subject: RE: Kiwi Point Quarry



Figure A. Location of trial planting areas that will not be affected by the proposed quarry extension.

Hi Astrid

There are several areas of planting, most of the planting is in the lower areas, separate email, numbered 1-4. The above 2 sections were just a trial to see if I could plant successfully into the long grass, with two different aspects. Section A completely failed, which didn't surprise me as it is north facing, extremely dry and very windy, section D, south facing, long wet grass, constant level of moisture. The plants put in around the base of some of the broom and gorse have grown all right, but not thriving.

On the other sites, 1-4, the area is really dry, windy, and soil mixed in places, some of the site is stony and some has a portion of soil to plant into. The idea around this planting was to plant the gullies and work outwards which was surprisingly successful. The sites have continuously had issue with gorse and blackberry, are difficult to access, quite steep in places. The maintenance has been fairly haphazard as the contract money to pay for these sites has been somewhat limited.

I believe the sections 1-4 will now form part of the new grazing area. The plants were put in in 2009 and 2012. I seem to recall more than this but will need to troll through some records to check.



Figure B. Location of plant species of interest within the proposed Kiwi Point Quarry extension area. Key to the symbols is on the next page.

- A = *Melicytus crassifolius*, several very old plants, in around the rocky outcrops
- B = areas of mānuka/ kānuka , not very exact as I didn't record the species, based from memory
- C = *Sophora microphylla*, reasonably significant as there aren't many original plants around
- D = *Olearia paniculata*, scattered plants, some on the other side of the gorge also

The bush remnant above C and D areas is mostly māhoe dominated scrub areas, matipo etc, I didn't explore too far down into there as its very steep and I was on my own.



Figure C. Trial planting areas that could be affected by location of proposed emergency / hold-over stock grazing area.

WAITOHI STREAM REMEDIATION RESOURCE CONSENT CONDITIONS

This appendix includes the stream remediation conditions from GWRC Resource Consent Condition WGN170175 [34504], [34510], [34512], [34513], [34514 and [34515].

Stream remediation

67. By the **1 July 2027** the consent holder shall submit for approval to the satisfaction of the *Manager* a Stream Rehabilitation Plan (SRP). The SRP shall be designed by a suitably qualified person such as a freshwater ecologist in consultation with Ngati Toa Rangatira and Port Nicholson Block Settlement Trust and may include (but not be limited to);

- Riparian planting plans;
- Enhancement for cultural values ;
- Rehabilitation of concrete lined/highly modified sections;
- Provision of fish habitat features (e.g. water, pools and cover); and
- Ensuring fish passage.
- Timeframes for the completion of rehabilitation activities.

The SRP must, at a minimum, provide for rehabilitation activities on an equivalent length of stream equal to that contained within the site (including the Waitohi [Ngauranga] Stream and tributaries). Remediation may be undertaken within the site or downstream of the site.

Alternatively, the SRP may provide for activities to be undertaken on the Tyres Stream (tributary to the Waitohi [Ngauranga] Stream) if it is recommended by a suitably qualified person such as an ecologist that the benefit (to the catchment) of undertaking the remediation on the Tyres Stream is of greater ecological value to than undertaking remediation on the Waitohi [Ngauranga] Stream within the site.

No stream remediation shall take place until the consent holder has received written notice that the SRP is approved to the satisfaction of the *Manager*.

68. The consent holder shall undertake progressive stream rehabilitation as the *site* is decommissioned and all works to achieve the final platforms are completed.

Stream rehabilitation must, at a minimum, be undertaken on an equivalent length of stream equal to that contained within the site (including the Waitohi [Ngauranga] Stream and tributaries). Remediation may be undertaken within the site or downstream of the site.

Alternatively, rehabilitation activities may be undertaken on the Tyres Stream (tributary to the Waitohi [Ngauranga] Stream) if it is recommended by a suitably qualified person such as an ecologist that the benefit (to the catchment) of undertaking the remediation on the Tyres Stream is of greater ecological value than undertaking remediation on the Waitohi [Ngauranga] Stream within the site.

All stream remediation shall be undertaken in accordance with the approved Stream Rehabilitation Plan (condition 67) and to the satisfaction of the **Manager**.

Note: Additional resource consents from your local council may be required to undertake this proposal. We advise you to contact the Wellington City Council prior to commencing works.



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