WESTPOWER LTD. PROPOSED WAITAHA HYDRO SCHEME

ASSESSMENT OF ENVIRONMENTAL EFFECTS

VEGETATION

Dated June 2025

Report prepared for Westpower Ltd.

Report prepared by TACCRA Ltd.

Statement confirming compliance with the Environment Court's Code of Conduct for expert witnesses contained in the Environment Court Practice Note 2023

As an expert witness or peer reviewer, I have read, and I am familiar with the Environment Court's Code of Conduct for expert witnesses contained in the Environment Court Practice Note 2023.

I have prepared my, or provided input into, an assessment of effects for the Waitaha Hydro Scheme in compliance with the Code of Conduct and will continue to comply with it in this Fast-track Approvals Act process. In particular:

- my overriding duty is to assist the decision-maker impartially on matters within my expertise;
- unless I state otherwise, my assessment is within my area of expertise, and I have not omitted to consider material facts known to me that might alter or detract from the opinions I express; and
- I have not, and will not behave as, an advocate for the Applicants.

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1.0 INTRODUCTION

Westpower proposes a run-of-the-river hydro electric scheme (Scheme) for the Waitaha River, approximately 36 kilometres south of Hokitika on the West Coast of the South Island, New Zealand.

The Scheme would be run-of-river with no instream storage. The proposed headworks include a low weir and intake structure situated at the top of Morgan Gorge that will divert water into a pressurised tunnel and desander. The tunnel will convey the diverted water down to a Power Station below Morgan Gorge. After passing through the turbines the diverted water will be returned via tailrace discharging to the Waitaha mainstem in the vicinity of the confluence of Alpha Creek. The Scheme is to divert up to a proposed maximum of 23 m^3/s (cumecs), while maintaining a minimum residual flow of 3.5 cumecs immediately downstream of the intake. The abstraction reach would include approximately 2500 metres of the Waitaha River, including Morgan Gorge. Construction access to the headworks above Morgan Gorge would initially be via helicopter and / or on foot and then via an access tunnel (once it is completed), while an access road would be required from the Waitaha Road to the Power Station. Further detail on the project design and project background information as it relates to terrestrial flora is set out in **Appendix A**. A full description of the Project Site is set out in the Project Overview Report (Westpower, 2025).

TACCRA Ltd. has been commissioned by Westpower Ltd. (Westpower) to assess the potential effects of the Scheme on terrestrial flora.

This report considers and assesses the values and the significance of the Project Site in relation to terrestrial flora, the potential effects of the Scheme on terrestrial flora and how (if necessary) these effects are proposed to be avoided, mitigated or remedied (and where necessary if significant adverse effects remain, how these should be offset or compensated). The scope and approach of this report is set out in **Appendix B**.

It concludes the Scheme will have a **no more than minor** effect after implementing, where practicable, the recommendations included.

2.0 EXISTING ENVIRONMENT

2.1 Terrestrial Vegetation Present

Vegetation present within the Scheme's footprint and in its environs is predominantly indigenous in two of the four key areas of proposed works. In these, exotic species are present though extremely rare and confined to alluvial flats and recent disturbance areas where forest or shrub cover is not predominant. Vegetation type, species composition and stature is related to landform (type and age) and natural disturbance history.

In a third key area, the Scheme's footprint occurs within predominantly exotic vegetation (farmland), with the indigenous species that are present being of such low incidence that they are not deemed to constitute a viable indigenous community.

A fourth area involves three categories of land cover – a.) indigenous forest and shrubland through which a widened access road and a new transmission line is proposed under the Scheme; b.) a farmland/legal road landholding mix that has undergone a high degree of development where exotic vegetation predominates in any areas of Scheme componentry (proposed new access road/transmission line and an upgrade to an existing transmission line; and c.) indigenous vegetation traversed by an existing transmission line also proposed for upgrade under the Scheme component is present, it contains an existing transmission line, proposed for upgrade under the Scheme, where this upgrade will not result in any clearance of vegetation beyond the extent already occupied by the existing line, therefore there is no nett impact/effect attributable to the Scheme for this existing line upgrade.

The main assemblages of the Scheme's components covered in this report are sited in the separate areas assigned Area 1, Area 2, Area 3 and Area 4 to provide a framework for description and assessment (**Map 1** shows the locations of each relative to their wider environs). All are at less than 320 metres above

sea level. Vegetation cover, where present in Area 1 and Area 2 and their environs is predominantly indigenous, these areas being on land administered by the Department of Conservation (DOC), and including a minimal area (part of the Macgregor Creek bed) administered by Land Information New Zealand (LINZ). There is no evidence of major modification to vegetation by human activity e.g., clearance or logging, in Areas 1 and 2.

Area 3 is on private freehold land, developed or partially developed for pastoral grazing as part of a dairy farming operation.

Area 4 comprises a varying mix of private freehold land (mainly developed for dairy farming), legal road administered by Westland District Council (WDC) being the Waitaha Road route providing access to the Waitaha Valley's east side, lesser areas of DOC Reserve adjacent to State Highway 6 and the intersection of the WDC Waitaha Road and on the west side of the WDC Beach Road at Kakapotahi, and legal road strip administered by Transit New Zealand along/adjacent to State Highway 6, and a further short section of WDC road from State Highway 6 to the existing Waitaha Substation.

Due to the narrow, extended linear nature of the existing transmission line (comprising a Scheme component) and formed public road (State Highway 6, Waitaha Road, Beach Road and Bold Head Road) it is not practical to show them as occurring in relatively defined zones on mapping. Instead, it is more practical for purposes of this assessment that the section of transmission line proposed for upgrade, and section(s) of existing roading located in Area 4, where shown on Scheme mapping, be shown as linear features.

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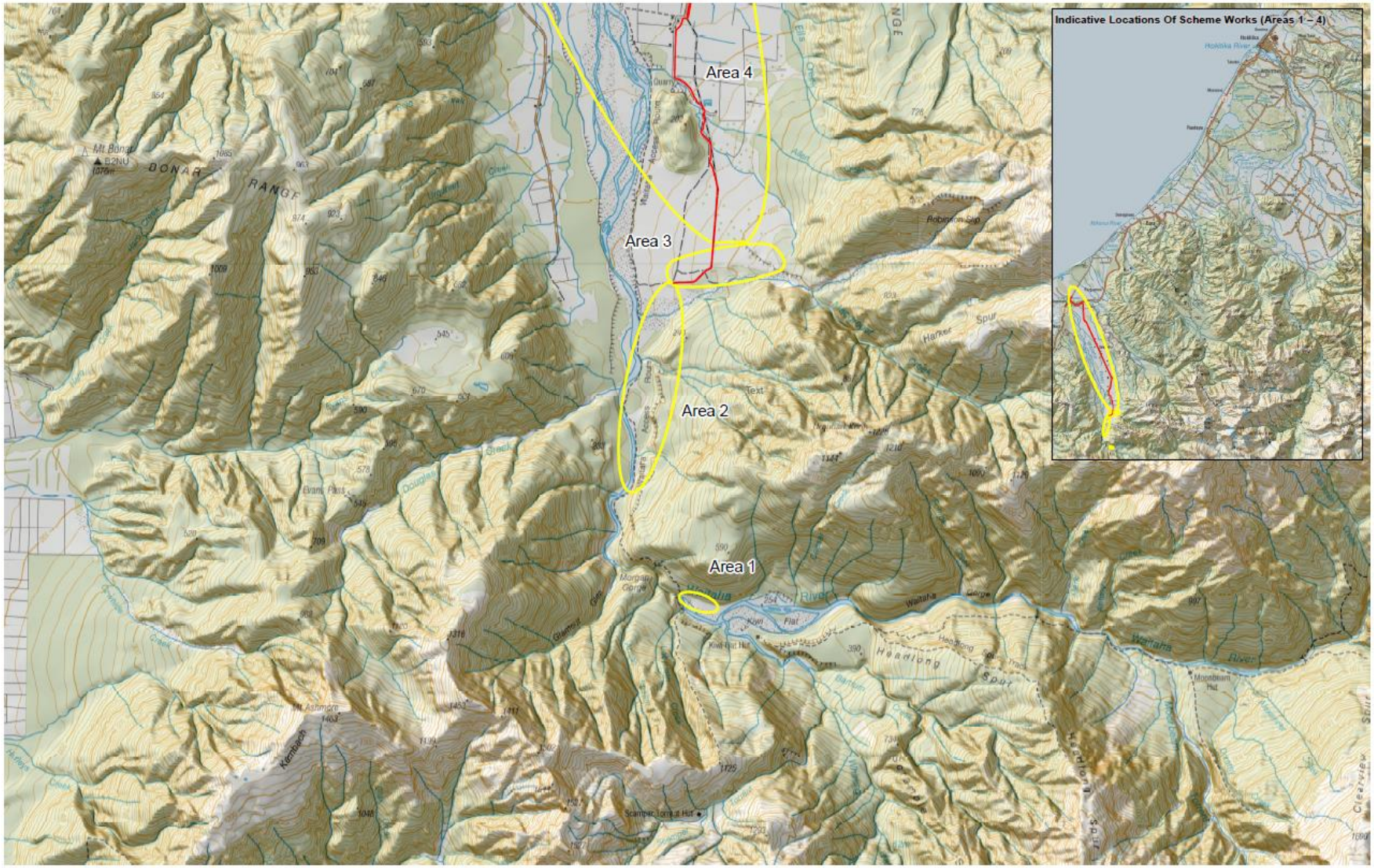

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Legend

- Proposed transmission line (generally adjacent to proposed access)
- Proposed transport access
- Area 1: General area of various headworks and associated infrastructure activities
- Area 2: General area of access road, powerhouse, tunnel portal exit and associated infrastructure and activities
- Area 3. Spoil disposal and associated infrastructure activities
- Area 4: Transmission line and transport access (indicative) - refer inset

Waitaha Hydro

Map 1: Locations Of Key Works

Date: 28 May 2025 | Revision: 5

Plan Prepared by Boffa Miskell Limited

Author: brian.mcauslan@boffamiskell.co.nz | Checked: JDe

Key landforms in Area 1 include hill foot slopes, terraces and terrace faces associated with these, and an area of relatively recent alluvial terrace. The principal forest types present here can be broadly grouped as kamahi forest and seral forest using the classification described by James *et al.*, (1973), and as lowland forest and seral low forest under the classifications described by Wardle, (1977, 1979 and 1991).

Area 2 is larger and encompasses a greater range of landforms than does Area 1, in particular a sequence of alluvial terraces increasing in surface age with increased height in an eastward progression, from the relatively recent alluvial flats adjacent to the current active Waitaha River bed that have no closed forest species cover, to the higher terrace and hill footslopes that carry mature podocarp/hardwood hill forest. Steeper terrace faces and footslopes within this area have likely been subject to effects of shifts on the Alpine Fault resulting in periodic disturbance via slips and colluvium deposition and exhibit a hardwood predominant forest cover with very low incidence or absence of large podocarp trees. The principal forest types present here can be broadly grouped as kamahi forest and seral forest using the classification described by James *et al.*, (1973), and as lowland forest and seral low forest under the classifications described by Wardle, (1977, 1979 and 1991). Note: Seral vegetation communities occur on sites prone to disturbance e.g., unstable gullies, steep faces and on recent alluvial surfaces or waterway banks. Seral forest vegetation is typically a mix of broadleaved indigenous hardwood tree species in a regeneration phase, along with broadleaved indigenous shrub species and tree ferns.

The result of landform influences is a segregation of Area 1 and Area 2 into four and twelve vegetation types, respectively, for descriptive purposes. These are coded 1/1, 1/2, 1/3 etc. and 2/1, 2/2, 2/3 etc. as shown on **Maps 2 and 3**. There is no indigenous vegetation type in Area 3 (**Map 4**). One indigenous vegetation type occurs in Area 4 where new Scheme components are proposed – this is coded 4/1 – it is not separately mapped but shown in **Figure 46**, p. 90.

The predominant vegetation types present in Area 1 are typical of streamside and side-slope areas across a relatively wide altitudinal range (e.g., 100 – 500 m.a.s.l.) within forested Westland catchments.

The vegetation types present on the recent alluvial flat and terrace sequences in Area 2 are also typical of forested Westland catchments. These are common and widely represented in both the Wilberg Ecological District and Harihari Ecological District and the Waitaha catchment. The indigenous forest assemblages also occur extensively in catchments of similar valleys throughout central Westland. Vegetation Type 1/4, a small area of which is within the Scheme project footprint is analogous to the LCDB Sub Alpine Shrubland land cover class. GIS analysis shows it occurs over 17 726 hectares in the Wilberg Ecological District and therefore comprises 28% of its total indigenous vegetation cover. It is present across 4256 hectares of the Waitaha catchment and therefore comprises 35% of its total indigenous vegetation cover. Like the indigenous forest vegetation of Area 1 and Area 2, this shrubland vegetation is also common and widely represented, not only in the areas noted above but in other valleys throughout central Westland.

Area 3 is on a portion of outwash fan formed by historical (and ongoing) north-south traverses of Macgregor Creek. It is well drained with minor slope. Vegetative cover over the majority of the Scheme's footprint in this area is rough, semi-developed pasture comprised predominantly of exotic grass and broadleaved herbaceous species, and the woody weed *Ulex europaeus* (gorse). Its vegetative cover would not be considered an indigenous vegetation community.

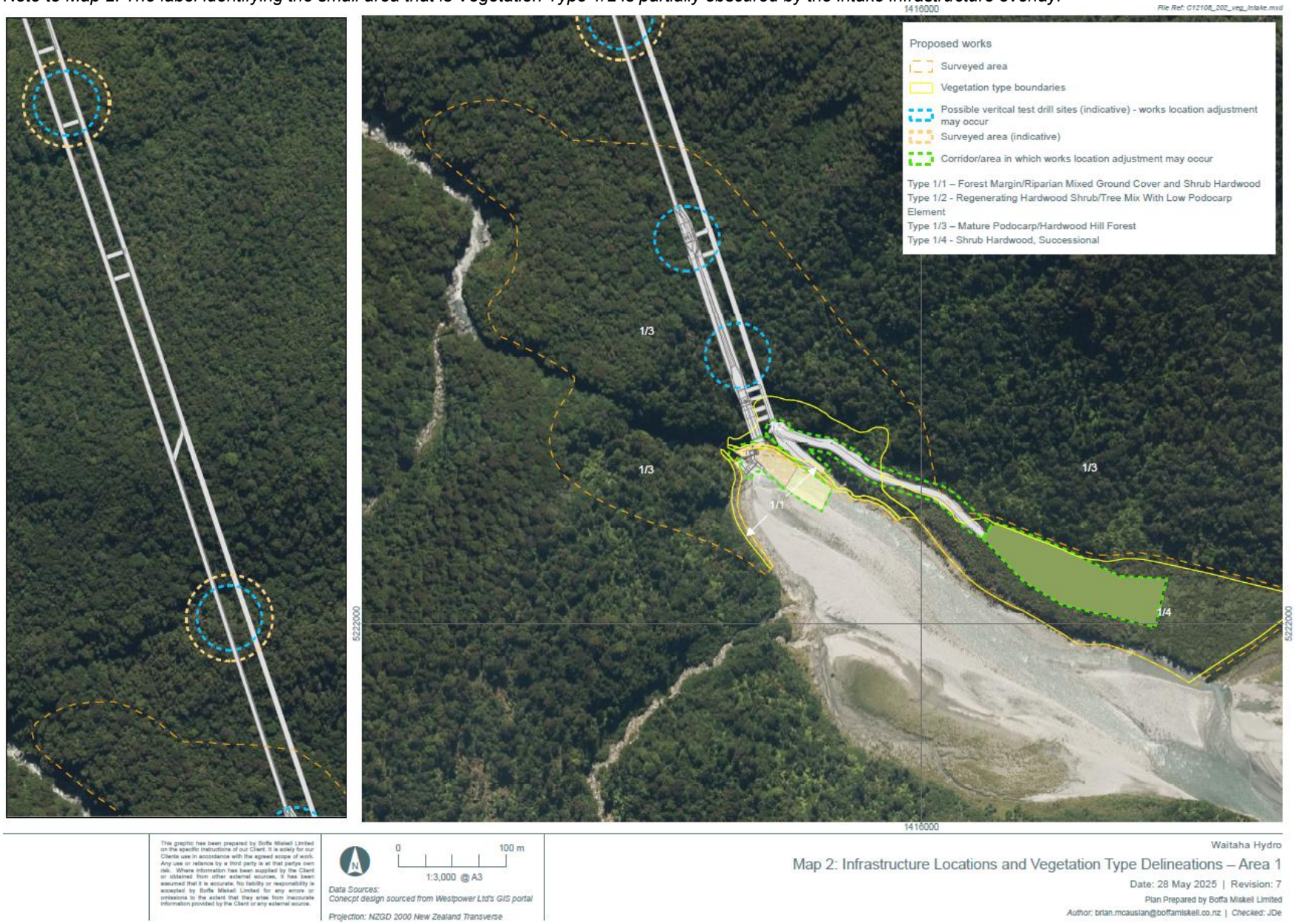
Progressing northward from its abutment with Area 3, Area 4 commences on a portion of outwash fan formed by historical north-south traverses of Macgregor Creek and continues northward through the now well-developed pastoral (dairy) farmland on former alluvial floodplain of the Waitaha River, for c. 13.5 kilometres in straight line distance north of Area 3, this traverse not considered to be or contain indigenous vegetation assemblages, to State Highway 6 on a section of terminal moraine footslope that carries podocarp/hardwood forest. There are also lesser areas of regenerating podocarp/hardwood hill forest and lowland podocarp forest in the northern extremity of Area 4 traversed by part of the proposed transmission line upgrade progressing from the State Highway 6/Waitaha Road junction westward, thence northward adjacent to State Highway 6 and then adjacent to Beach Road and finally north-eastward to end at the Waitaha Substation on Bold Head Road (both latter roads administered by Westland District Council (WDC), refer **Map 11, Appendix I**). The proposed transmission line upgrade is deemed to have zero net effect on indigenous vegetation in Area 4 given upgrade effects will be no more than those attributable to maintenance of the existing line.

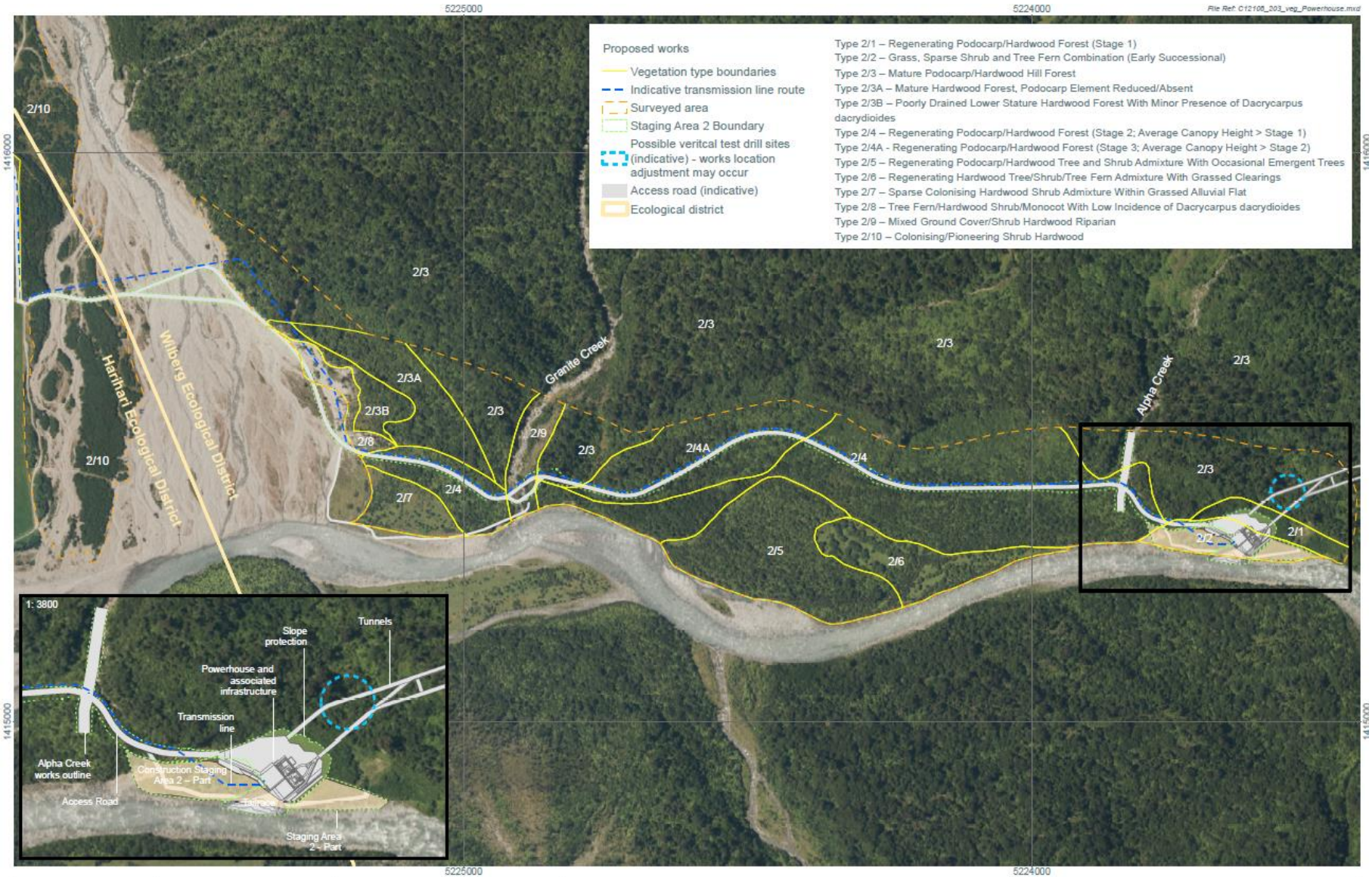
None of the indigenous vegetation assemblages or species comprising them are unusual or rare, endemic or reach distribution limits in either the Wilberg Ecological District or Harihari Ecological District (parts of the

Scheme being located in each), or regionally. The vegetation is widely represented on the similar landforms on which it occurs in both Ecological Districts in which components of the Scheme are located, and in other neighbouring Ecological Districts. For example, the Wilberg Ecological District (including the Waitaha, Wanganui, Poerua and majority of the Perth catchments) contains in excess of 45 500 hectares of similar vegetation cover. There is c. 4251 hectares of similar indigenous vegetation as occurs in the Scheme's footprint within the Harihari Ecological District (including lowland zones of the Wanganui and Whataroa catchments). The Waitaha catchment contains in excess of 8600 hectares.

Further detail of the existing environment including detailed vegetation type descriptions is set out in **Appendix C**, with a set of larger-sized map copies in **Appendix I**.

Note to Map 2: The label identifying the small area that is Vegetation Type 1/2 is partially obscured by the intake infrastructure overlay.





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Data Sources:
Concept design sourced from Westpower Ltd's GIS portal

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Waitaha Hydro

Map 3: Infrastructure Locations and Vegetation Type Delineations – Area 2

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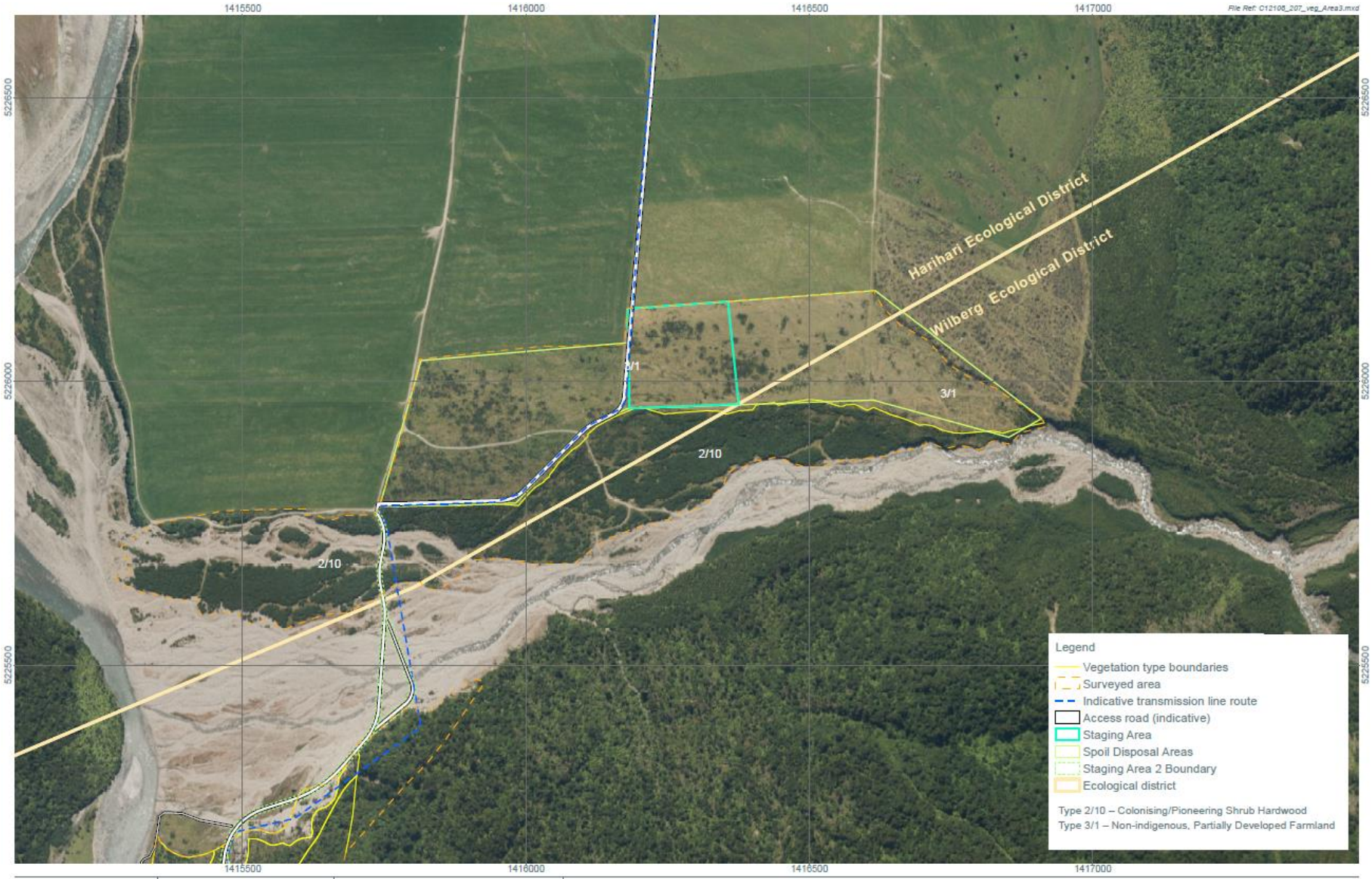

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Data Sources:
Concept design sourced from Westpower Ltd

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Map 4: Infrastructure Locations and Vegetation Type Delineations – Area 3

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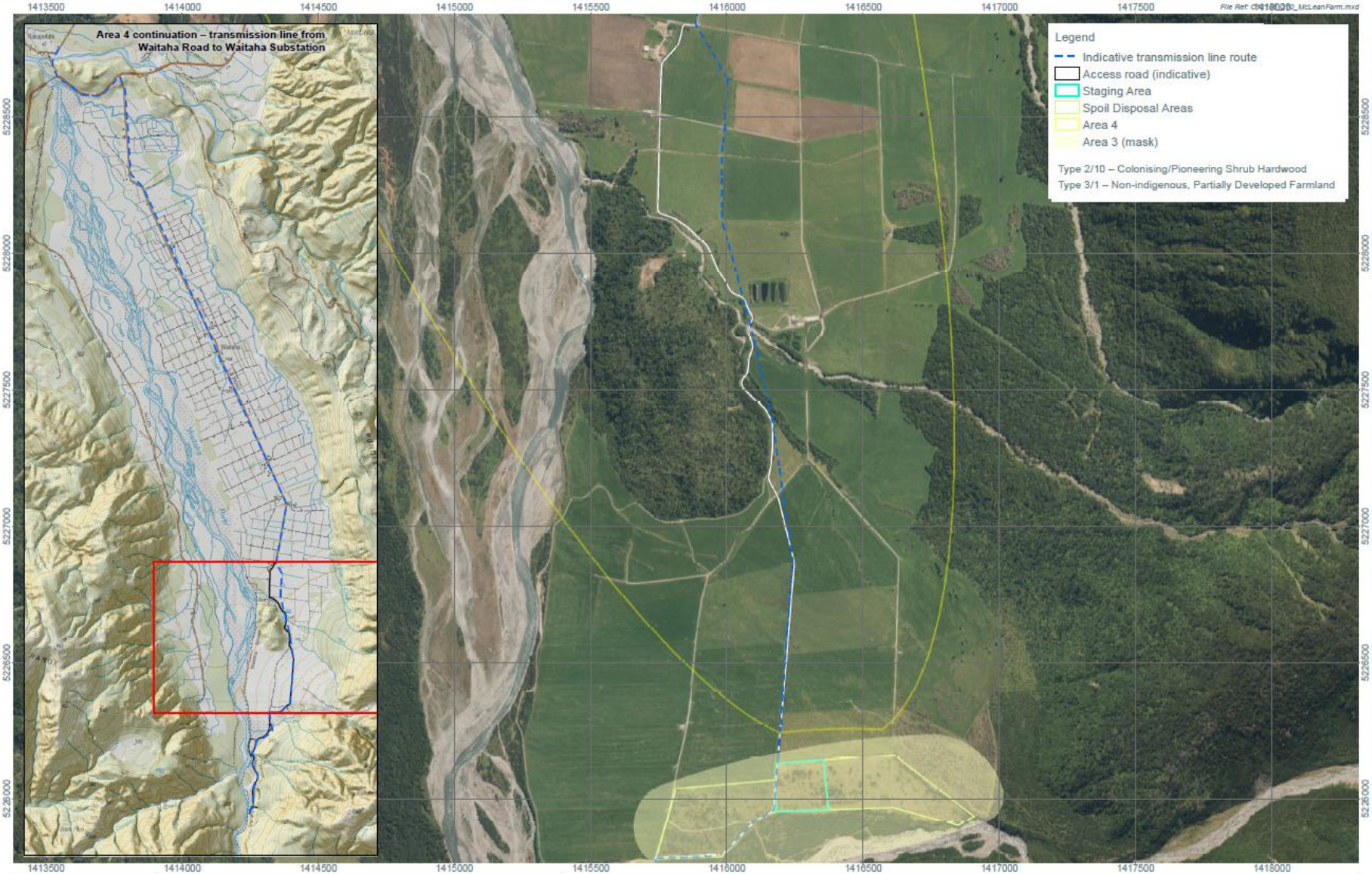

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Projection: NZGD 2000 New Zealand Transverse

Waitaha Hydro

Map 5: Infrastructure Locations and Vegetation Type Delineations – Area 4 (McLean Farm Part)

Date: 28 May 2025 | Revision: 0

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2.2 Investigations

Fieldwork covered land administered by the Department of Conservation (DOC) surrounding the proposed Scheme footprint, and zones encompassing the proposed Area 3 and Area 4 activity on freehold/other tenure land (construction and operational areas combined). Areas covered are shown in **Maps 1, 2, 3**, **4** and **5** above and their larger counterparts in **Appendix I**.

This report presents the findings of a number of separate field assessments of vegetation:

1. Undertaken in the periods 22/8/12 – 23/8/12, 12/9/12 – 13/9/12 and with a subsequent visit on 30/9/13, this was the basis of the vegetation effects assessment for the original Scheme concession application. It involved walkthrough as terrain permitted, but where possible by transect across the run of land. Use of any predefined sampling system (random or systematic) was deemed impractical due primarily to difficulty of terrain particularly about the headworks sites. Representative areas were covered based on interpretation of cover type from aerial photography and field observation.

2. Undertaken on 8/7/2024 and 22/7/2024, this was to check/assess any site and associated vegetation changes that may have occurred in the twelve years since the original field work, and to include the minor changes in later design of Scheme componentry.

3. Undertaken on 20/8/2024 and 21/8/2024, this involved assessment for potential wetland presence in Area 2, and from this, subsequent mapping of eight minor areas designated wetland under a precautionary approach (refer **Map 9, Appendix I**).

4. Undertaken on 3/11/2024 to describe and assess vegetation present at Area 3.

5. Undertaken on 18/11/2024 to describe and assess vegetation present at Area 4.

6. Undertaken on 19/12/2024, 16/2/2025, 11/4/2025, and 12/4/2025 to describe and assess vegetation present at proposed geotechnical drilling sites in Area 1, Area 2 and intermediate to these.

There were no changes in site attributes or vegetation composition between the 2012/13 and 2024 investigations that were at a level warranting major revision of vegetation type descriptions or their areas from those derived from the earlier set of field work i.e., the Scheme areas have remained stable in that time.

Purposes of the investigations were to:

- Describe the main vegetation types present, and those potentially affected by the Scheme.

- Assesses uniqueness of the potentially affected vegetation types and whether any areas have high natural heritage value in terms of the West Coast Conservation Management Strategy 2010 – 2020 (DOC 2010), hereafter referenced in abbreviated form as **CMS**.

- Enable an assessment of significance of indigenous vegetation against criteria and guidelines in the West Coast Regional Policy Statement (WCRC, 2020), Westland District Plan (WDC, 2002) and Proposed Te Tai o Poutini Plan (TTPPC, 2022), hereafter referenced in abbreviated forms as **RPS**, **WDP** and **TTPP** respectively.

- Describe the potential effects, including residual effects, of the Scheme on indigenous terrestrial vegetation.

- Recommend monitoring and mitigation/site rehabilitation.

Further detail of these investigations including methodology and areas is set out in **Appendix D**.

2.3 Values and Significance Assessment

The assessment of the significance of terrestrial vegetation values undertaken in this report has relied on the specific criteria and guidelines for assessing the significance of areas of indigenous vegetation and habitats of indigenous fauna set out in the RPS, TTPP, WDP and CMS. The relevant provisions are detailed in Table 5 in **Appendix E**. Most notably:

1. The CMS Part 3, Section 3.3.2.3 Prioritising Natural Heritage Work, Policy 1 specifies seven criteria to apply in identifying what might constitute natural heritage and assessing its relative value.

2. The RPS Section 7 Ecosystems and Indigenous Biological Diversity Policy 1 that prescribes identification of significant indigenous vegetation via assessment under criteria contained in its Appendix 1. Nine criteria/guidelines are to be considered in recognising and providing protection for areas of indigenous vegetation, any one of which may determine whether an area is significant for purposes of Section 6(c) of the Resource Management Act 1991 (RMA).

3. The WDP, Section 4.9 Natural Habitats and Ecosystems - Policy D prescribes eight criteria for use in defining areas of significant indigenous vegetation and significant habitats of indigenous fauna for purposes of Section 6(c) of the RMA and states that all areas of significant indigenous vegetation and habitats shall meet one or more of these.

4. The TTPP Part 2 - Natural and Environment Values, Ecosystems and Indigenous Biodiversity in which Policy ECO - P1 is to: *"Identify areas of significant indigenous vegetation and fauna habitat"*; and ECO – P1 (2) *"In the Buller and Westland Districts: (i) The criteria set out in Appendix 1 of the West Coast Regional Policy Statement will be used to assess significance*".

The criteria for assessment under the TTPP refer back to and rely on the criteria for assessment under the RPS. The assessment under the RPS and TTPP are therefore combined in analyses undertaken and results presented herein.

The National Policy Statement for Indigenous Biodiversity,(**NPSIB)**, does not apply to the Scheme because it excludes renewable electricity generation (subclause 1.3(3)). The four NPSIB criteria for identifying significant natural areas parallel those in the RPS and WDP, so are generally covered by significance assessments under the latter.

Having assessed the relevant provisions, the significance of the terrestrial flora values within the project site are as follows:

- Indigenous vegetation of Area 1 and Area 2 (being contiguous with a greater area within the Waitaha catchment) is significant indigenous vegetation under the WDP on the basis of five WDP (Policy 4.9D) criteria – representativeness, intactness and size of area, threat, scientific or other cultural value and protected status (and their synonymous criteria from the RPS, TTPP and CMS).

- The majority of vegetation of Area 4 is either exotic (predominant) or, where indigenous, there is no net effect of Scheme components on it, so with no Scheme effect additional to existing use, significance assessment is not necessary. However, there is one small indigenous area (the c. 3.21 hectares of Vegetation Type 4/1 in the freehold farmland) within which a component is affected by new Scheme infrastructure (a c. 85 metre long segment of transmission line, and c. 240 metre length of access road upgrade). This is significant indigenous vegetation under the WDP on the basis of a single WDP (Policy 4.9D) criterion – scientific or other cultural value (and its synonymous criteria from the RPS, TTPP and CMS).

- The WDP (Policy 4.9D) criterion of intactness and size that also encompasses RPS – Section 7 Ecosystems and Indigenous Biological Diversity Policy 1 criteria 1b) and 2a) albeit with different parameters for area consideration:

    i. Under the WDP the area qualifier is five hectares or more unmodified by human activity, comprising a predominantly intact indigenous system not affected in a major way by weed or pest species.

    ii. Under the RPS it is size of area being a relatively large example of its type within the relevant ecological district re RPS Criterion 1b), and the extent of modification (the vegetation or habitat type having been reduced to less than 20% of its former cover within region, relevant land environment, ecological district, freshwater environment re RPS Criterion 2a).

- The arbitrary designation as per the WDP Policy 4.9D (WDC, 2002) protected status criterion stands alone, pertaining to land administration and does not necessarily infer or confer high vegetation values on an ecological basis.

Table 1 below provides a summary of the significance of the terrestrial flora values assessed in accordance with the relevant planning provisions in the RPS, TTPP, WDP and CMS. Application of the criteria results in an assessment of vegetation within the Scheme's footprint as being of high natural value and significant indigenous vegetation. Further detail of the individual criteria assessments/discussion and either non-significance (non-significance outcomes are not included above or in Table 1) or significance outcomes of the values relating to terrestrial flora are set out in **Appendix E**. Taonga species present are shown in **Appendix J**.

In respect of identified wetlands, the alignment/placement of Scheme infrastructure components avoids these and sufficiently buffers them as per the Resource Management (National Environmental Standards for Freshwater) Regulations 2020 and the TTPP that each require a minimum 10 metre buffer for vegetation clearance or earthworks adjacent to natural inland wetlands otherwise consent is required. Because the Scheme avoids and sufficiently buffers the identified wetlands, no Resource Consent or associated assessment of significance is necessary under provisions of the National Policy Statement for Freshwater Management (MFE, 2020), RPS, Regional Land and Water Plan (WCRC, 2014), TTPP and WDP that would apply otherwise.

Table 1: Summary of Significant Indigenous Vegetation and High Natural Heritage Value Assessment Criteria Applicable to Area 1, Area 2, (Not Relevant to Area 3 as it Contains No Indigenous Vegetation Community), and Area 4 Indigenous Vegetation.

Criteria Alignment/Grouping & [Source]	Current Values Of Significance
Representativeness/diversity. [RPS 1(a); TTPP 1(a); WDP(ii); CMS].	Significant indigenous vegetation. [Area 1 and Area 2]
Intactness and size/representativeness/viability. [RPS 1(b); TTPP (1b); WDP(i); CMS].	Significant indigenous vegetation. [Area 1 and Area 2]
Threat/rarity/distinctiveness/threatened species and habitat. [RPS 2(b); TTPP 2(b); WDP(vi); CMS].	Significant indigenous vegetation. [Area 2 Types 2/2 and 2/6]
Scientific or other cultural value/diversity and pattern/natural landscape character/taonga species and habitat. [RPS 3(a); TTPP (3a), WDP(viii), CMS].	Significant indigenous vegetation. Area 1, Area 2 and Area 4 Type 4/1]
Protected status. [WDP(iv)].	Significant indigenous vegetation. [Area 1 & Area 2]
Rarity/distinctiveness/diversity/pattern/ecological context/connectivity/migratory species. [RPS 2(a), 2(c), 2(d), 4(a) 4(b), TTPP 2(a), 2(c), 2(d), 4(a) & 4(b); WDP(iii), (v), (vii); CMS].	Not identified as significant indigenous vegetation.

3.0 ENVIRONMENTAL EFFECTS ASSESSMENT

The Scheme consists of four sets of components in the four distinct areas (Area 1, Area 2, Area 3 and Area 4 as per **Maps 1, 2, 3, and 4**, above and their counterparts in **Appendix I)** that will affect vegetation in various ways. (*Note: the order of description here is not necessarily the order of any construction activity nor does it represent any hierarchy)*:

Area 1: Headworks including construction and maintenance of:

a) Weir and training wall.

b) Water intake and portal/structures at the true-right upstream end of Morgan Gorge. Note: A geophysical test drilling site (for horizontal drilling) is proposed between the intake and access tunnel portals and likely subsequently subsumed by the portal area(s).

c) A headworks access tunnel portal entrance and wingwalling proximal to the water intake portal.

d) A minor section (c. 66 metres long) of road providing ongoing/operational access between the headworks access tunnel portal and intake structures and portal.

e) A short (c. 143 metre long) work site access road to a construction staging area (Construction Staging Area 1) and the area itself on a small alluvial terrace on the true-right c. 250 metres upstream of Morgan Gorge entrance. For clarity it is noted that while the exact location of the access road from the intake to Construction Staging Area 1 will be determined during detailed design, the route will be within a 'corridor' which is 15 metres either side of the road alignment shown on Map 2. For the purposes of estimating vegetation clearance for this 143 metre section of temporary road, an average width of 9 metres has been applied, consisting of an average 1-metre-wide water tabling disturbance, plus 3.5 meter wide cut/fill allowance and a 4.5 metre wide carriageway for the 143 metre distance.

f) Four geophysical test drilling sites (for vertical or angled/horizontal drilling) on the forested terrace north-northwest along the tunnel-line from the intake portal entrance, one site above the intake gate location, another above the headgate and stoplog location and two sites at further intervals north-northwest along the tunnel-line from the headgate/stoplog location. Another horizontal drilling site is proposed between the intake and access tunnels however this is anticipated to be subsumed by subsequent intake infrastructure and therefore is not included in vegetation effects area assessment.

   Note: Tunnels will provide access from the lower Waitaha Valley to the various headworks facilities, and will contain desanding and other intake structures and a penstock. Construction and operation of these underground components will not affect vegetation.

Vegetation assessment and description within Area 1 and within vegetation types was observed by walkthrough, as terrain permitted, but where possible by transect across the run of land. Representative areas were covered based on interpretation of cover type from aerial photography and field observation, with final delineation by checks and/or changes observed during traverse.

The location of the above Scheme components is shown on **Map 2** in Section 2.1 and in its larger counterpart in **Appendix I**, and the orange-dashed line on these maps encompasses the assessment area(s).

Area 2: Power station and associated components, and access road and transmission line works from the southern boundary of the freehold farmland just north of Macgregor Creek, across said creek, then proceeding west along its true left and then southward from there to the Power Station site. This infrastructure set comprises construction and maintenance of:

a) A short (c. 383 metre) section of access road separate from the transmission line, extending from the freehold farmland boundary on the true right side of Macgregor Creek southward across the creek bed to its true left side. Of this, c. 175 metres traverses indigenous vegetation, the remaining 208 metres being unvegetated as the active bed of Macgregor Creek. This section of access road then continues via a traverse west for another c. 180 metres along the true left of Macgregor Creek, where the area traversed is a recent portion of the Macgregor Creek outwash fan being stone and gravel with little or no vegetative cover – in terms of effect it is deemed unvegetated.

b) A short (c. 383 metre) section of transmission line separate from the access road, extending from the freehold farmland boundary on the true right side of Macgregor Creek southward across the creek bed to a point on the hill slope on its true left side (this point to be determined in the subsequent final Scheme design phase). The objective of this is to utilise height for placement of a double pole on the hill footslope to increase line span and avoid having any pole(s) in the Macgregor Creek bed. Of this, c. 175 metres traverses indigenous vegetation, the remaining 208 metres being unvegetated as the active bed of Macgregor Creek.

c) A further short (250 metre) section of the transmission line is to run from the point on the hill slope, west to converge with the access road at a point on the true left of Macgregor Creek. The actual location of this portion of transmission line may be adjusted subject to engineering considerations during detailed design. However, the line may only be relocated within a 30 metre 'corridor', that is, a maximum of 15 metres either side of the centreline of the indicative route. This 'corridor' has been considered as part of the assessment. For the potentially affected area calculations it is assumed an average width of affected area is 10 metres for the route distance as indicatively mapped (see **Map 3**).

d) The access road with power transmission line parallel, continues from the separate access road and transmission line segments described above, and runs west for c. 238 metres along the true-left side of Macgregor Creek, then south for another c. 1654 metres to the site of construction of the Power Station. Potentially affected area calculations are based on an estimated 1892 metre route distance (including the side cuts involved in the Granite Creek temporary crossing) as indicatively mapped (see **Map 3**). This section of road will include construction of a permanent single-span bridge over Granite Creek (and an associated separate temporary Bailey bridge crossing of Granite Creek in place during permanent bridge construction). For the purposes of estimating vegetation clearance for this access road/transmission line section average width used is 17.5 metres for construction and 15 metres for permanent occupancy. The actual location of the road/transmission line may be adjusted subject to engineering considerations, to avoid large trees where practicable, or to facilitate alignment, during field layout/survey. However, the road may only be relocated within a 30 metre 'corridor', that is, a maximum of 15 metres either side of the centreline of the indicative route. This 'corridor' has been considered as part of the assessment. Wetland areas have been identified and are avoided and adequately buffered via access road and transmission line location to achieve this as a part of Scheme design. Note: Natural regeneration of indigenous ground cover and shrub species vegetation is expected to occur relatively quickly to occupy the 2.5 metre construction allowance area, post-activity, without any remediation required.

e) Twin tunnel portal exits located on the true-right of the Waitaha River at or about NZTM E1415331; N5223599, c. 1.5 kilometres in straight line distance below the nearest part of the area of headworks infrastructure. Removal of vegetation will be required across the east-west width of the footslope at this site to access the foot of the main terrace riser. Infrastructure components include a power station access platform and continuation of this to form a portal access turning bay at the access portal exit large enough to enable vehicles to turn 90 degrees into the tunnel, the power station itself, along with its access platform, a concrete wall (permanent) approximately 6 metres high at its highest point spanning between and around the tunnel portals, rockfill/batter slopes, switchyard, walling and tailbay. Scheme plans indicate the above infrastructure combination involves an area of c. 5180 square metres for construction and for permanent occupancy. Slope protection/stabilisation by e.g., forepoleing and shotcreteing treatment above the portal structures is proposed along with protection from falling rocks, where this may consist of a post and wire mesh system, possibly up to 70 metres long. Scheme plans show an anticipated slope protection area of 830 square metres in addition to the other infrastructure noted above. A geophysical test drilling site is proposed at

the water tunnel portal exit and will be subsumed within the area of later tunnel portal excavation so does not add to affected area.

f) A tailrace of concrete construction, with tapering sides. Construction-affected and permanently occupied area is c. 1470 square metres, however the excavation depth combined with extension beyond the river bank means not all construction or permanently occupied area will affect vegetation. Vegetated area potentially affected by construction and permanent occupancy is approximately 66% of total area i.e., c. 970 square metres. A component of this is in the Waitaha River true right riparian margin through which the tailrace passes obliquely – an average distance within the riparian vegetation is estimated as 40 metres, with the strip being 10 metres wide and therefore affecting an area of c. 400 square metres.

g) A construction staging area (vehicle, machinery and materials handling) on the remainder of the alluvial flat on which the Power Station and its associated infrastructure is sited. Scheme design indicates that the total area involved is c. 8185 square metres, however at least half of the proposed 1470 square metre tailrace area is also located within this, so if that half is deducted to avoid double counting the area specific to this construction staging area becomes c. 7450 square metres.

g) One geophysical test drilling site (for vertical drilling) on the tunnel line on the forested terrace south east of the power station site. Another drilling site is proposed at the margin of the alluvial flat/terrace footslope at the power station/associated infrastructure site however this is anticipated to be subsumed by subsequent infrastructure and therefore is not included in vegetation effects area assessment.

h) Waterway training and flood protection via bunding and rock rip rap (to protect the access road), and installation of a box culvert at Alpha Creek.

The location of these Scheme components is shown on **Map 3** in Section 2.1 and its larger counterpart in **Appendix I**).

Two streams that are shown on the NZTopo50 1:50 000 map of the area but are unnamed have been assigned in-house names by Westpower for descriptive purposes. These are:

1. Granite Creek = the first unnamed stream shown on map sheet NZTopo50-BW17 south of Macgregor Creek.

2. Alpha Creek = the second stream shown on map sheet NZTopo50-BW17 south of Macgregor Creek.

Vegetation clearance or disturbance during construction activities within the Scheme's project footprint (the area affected by construction), and the permanent removal of vegetation in the lesser area of the Scheme's operational footprint (areas permanently occupied by Scheme components), are the principal environmental effect on indigenous vegetation.

Where riparian areas are identified as being affected by a Scheme component with an estimated affected area calculated, these are for streams >3metres wide where provisions of the Regional Land and Water Plan (WCRC, 2014) and the Westland District Plan (WDC, 2002) prescribe 10 metre riparian margin widths. Riparian areas are listed where relevant because activities affecting indigenous vegetation in riparian margins will require consideration for regional and district planning provision purposes. Vegetation types present in riparian margins in Areas 1 – 3 are not unique or distinguished floristically from their counterparts not occupying a riparian strip. It is the arbitrary riparian designation of fixed-width distance from stream bank, not vegetation, that distinguishes these zones and that may have environmental planning restrictions that would not apply otherwise.

For streams 1 – 3 metres wide, provisions of the Regional Land and Water Plan (WCRC, 2014) prescribes 10-metre-wide riparian margins if dominant slope angle is >12^{o} and 5 metre riparian margins otherwise. This requirement will add some (expected to be relatively minor) area to available estimates of affected riparian area. The detailed field survey and mapping of small stream location was not a component of work undertaken as the basis of this report. The number and exact location of streams 1 - 3 metres wide that are potentially affected will need to be determined and will add some area to riparian zone area estimates given in Table 2. However, based on a conservative approach it is expected that the area to be added will be minor (no more than 0.30 ha) at worst and it is not

considered that potential effects on vegetation will be any greater than assessed and considered without these minor additions.

Area 3: Spoil disposal and staging area (with part of the road access and transmission line components within). The area in which the infrastructure (temporary except for the access road and transmission line segment) is sited is developed or semi-developed farmland and does not carry indigenous vegetation at a level considered a viable indigenous community so is not included in vegetation effects area attributed to the Scheme. The proposed works and their areas are:

a) Two spoil disposal areas on the private farmland and outside the true right margin of Macgregor Creek. Together these areas may occupy up to 17.12 hectares, to which excess spoil and vegetation material from Scheme construction activities will be carted and spread. These areas will be rehabilitated to pasture post construction completion.

b) A construction staging area of c. 3.2 hectares, also on the private farmland and outside the true right margin of Macgregor Creek. This area will be levelled and the site of construction facilities/infrastructure including project management and staff facilities and buildings, storage areas and repair facilities for vehicles and machinery, and concrete batching plant. This area will also be rehabilitated to pasture post construction completion.

c) A section of proposed new access road and transmission line parallel c. 175 metres long is contained within Staging Area 3.

The location of these Scheme components is shown on **Map 4** in Section 2.1 and its larger counterpart in **Appendix I**).

Area 4: Access roading and transmission line comprising:

a) A c. 2.96 kilometre section of access road from the WDC Waitaha Road through the freehold farmland to Area 3. This roading will utilise c. 1.80 kilometres of existing farm tracking with some upgrade to this, and involve new construction for the remainder.

b) A c. 2.70 kilometre section of new transmission line continuing from that at Area 3, through the freehold farmland to link with the existing Waitaha Valley transmission line that runs adjacent to the Waitaha Road.

c) Upgrading of c. 13.4 kilometres of the existing transmission line along the Waitaha Road to its junction with State Highway 6, adjacent to State Highway 6 westward to the near the State Highway 6 Waitaha River Bridge, then north and north east to join with the existing Westpower network at the Waitaha Substation on Bold Head Road (see **Map 10** and **Map 11** in **Appendix I**).

Table 2 provides a summary of the areas of the predominantly indigenous vegetation potentially affected by the Scheme. It is important to note that areas given as construction, permanent and riparian (construction) are not additive. The construction area is the expected maximum area potentially affected by each Scheme component and the construction total is an indication of the Scheme's project footprint as it pertains to vegetation effect. Areas given as permanent and riparian areas are sub-areas for purposes of describing amount of vegetation clearance associated with a given Scheme component. In the case of permanent areas these indicate the operational footprint of each Scheme component and for the Scheme in total.

Table 2: Indigenous Vegetation Potentially Affected by Scheme Components and in Total.

Scheme Component(s)	Construction (ha)	Permanent (ha)	Riparian (Construction, ha)
Area 1: Headworks and Associated Infrastructure Item(s)			
Combined Weir/Training Wall.	0.0055	0.0013	0.0
Intake Channel and Sluice Channel.	0.0585	0.0485	0.0
Intake Structure and Intake Tunnel Portal (and a Horizontal Geophysical Test Drilling Site Subsumed Within This Area).	0.0135	0.0095	0.0068
Headworks Access Tunnel Portal Entrance and Wingwall(s).	0.0099	0.0025	0.0
Access Tunnel Portal and Intake Structures Access Road.	0.0792	0.0600	0.0594
Road to Construction Staging Area 1.	0.1287	0.0	0.020
Construction Staging Area 1.	0.6710	0.0	0.0
Separate Geophysical Test Drilling Sites.	0.0400	0.0	0.0
Area 1 Sub-totals	***1.0063***	***0.1218***	***0.0862***
Area 1 Sub-totals Rounded Up	***1.01***	***0.13***	***0.09***
Area 2: Infrastructure Item(s)			
Access Road (Separate Section (part, c. 175 metres)) – true right margin of Macgregor Creek.	0.1750	0.1750	0.010
Transmission Line (Separate Section (part, c. 175 metres)), true right margin of Macgregor Creek.	0.1750	0.1750	0.010
Transmission Line (Separate Section (part, c. 208 metres)), crossing main active bed of Macgregor Creek.	Unvegetated	Unvegetated	Unvegetated
Access Road (Separate Section (part, c. 208 metres)), crossing main active bed of Macgregor Creek.	Unvegetated	Unvegetated	Unvegetated
Transmission Line (Separate Section (part, c. 250 metres)), - true left of Macgregor Creek.	0.2500	0.2500	0.0
Access Road (Separate Section (part, c. 180 metres)) – true left of Macgregor Creek.	Unvegetated	Unvegetated	n.a.
Access Road and Transmission Line Parallel, Macgregor Creek to Powerhouse (c. 240 metres west on true left of Macgregor Creek, thence 1604 metres from Macgregor Creek to Power Station Site).	3.3112	2.7480	0.0825
Total Platform Area Including Tunnel Portal Access and Turning Area, Batter Slopes, Tunnel Portal Exits, Portal Headwalling, Power Station, Switchyard, Tailbay, and Slope Protection Works, including a Geophysical Test Drilling Site Subsumed Within Portal Exit Area.	0.6010	0.5736	0.0
Tailrace.	0.0970	0.0970	0.040
Construction Staging Area 2.	0.7450	0.0	0.2250
Waterway Training and Flood Protection at Alpha Creek.	0.2142	0.1071	0.2142
Separate Geophysical Test Drilling Site.	0.0100	0.0	0.0
Area 2 Sub-totals	***5.5784***	***4.1257***	***0.5817***
Area 2 Sub-totals Rounded Up	***5.58***	***4.13***	***0.59***
Area 3: Infrastructure Item(s)			
Spoil Disposal Areas.	Non-indigenous	Non-indigenous	Non-indigenous
Construction Staging Area 3.	Non-indigenous	Non-indigenous	Non-indigenous
Access Road and Transmission Line Parallel.	Non-indigenous	Non-indigenous	Non-indigenous
Area 3 Sub-totals	***n.a.***	***n.a.***	***n.a.***
Area 3 Sub-totals Rounded Up	***0.00***	***0.00***	***0.00***
Area 4: Infrastructure Item(s)			
Access Road from Area 3 section northern end terminus to Waitaha Road end.	0.1200	0.1200	0.010
Transmission Line (Separate Section (part)), from Area 3 section northern end terminus to Waitaha Road end.	0.0850	0.0850	0.020
Transmission Line upgrade in Rural Development/Farmland Area, commencing Waitaha Road end, then via Waitaha Road, S.H. 6, Beach Road and Bold Head Road to Waitaha Substation	Non-indigenous or Nett Zero Effect on indigenous	Non-indigenous or Nett Zero Effect on indigenous	Non-indigenous or Nett Zero Effect on indigenous
Area 4 Subtotals	***0.2050***	***0.2050***	***0.0300***
Area 4 Sub-totals Rounded Up	***0.21***	***0.21***	***0.030***
Scheme Totals	**6.7897**	**4.4525**	**0.6979**
Scheme Totals Rounded Up	**6.80**	**4.46**	**0.70**

Note: Areas given as rounded sub-totals and totals in the above table are rounded up to two decimal places in every case so as to avoid dropping any area as could occur if using conventional rounding of figures less than five.
Note: Areas do not include non-vegetated zones affected by work components or parts thereof, e.g., where these are on exposed bedrock or in active river bed and are unvegetated pre-project, or the area of proposed transmission line upgrade where there is nett zero effect attributable to the Scheme Neither are areas of predominantly non-indigenous vegetation (farmland) included. All are indicative based on the Project Description.

GIS analysis undertaken using the Land Cover Database (LCDB)[1] land cover classes matched to the indigenous forest type assemblages (all Vegetation Types except Vegetation Type 1/4, a shrubland type in Area 1) potentially affected by the Scheme shows these are present across 27 851 hectares of the Wilberg Ecological District. This is 45% of its total indigenous vegetation cover. They are present across 4358 hectares of the Waitaha Catchment. This is 36% of its total indigenous vegetation cover.

The scale of proposed works within Area 1 is well within the spatial scale of natural disturbances typical of this environment i.e., does not represent clearance of large areas in conjunction with a change in land use and cover type. The nature of vegetation disturbance (removal) caused by the proposed work would not be deemed inconsistent with natural disturbance events e.g., slips, at this or similar sites. Construction involves clearance or at least some disturbance to approximately 1.0 hectare of indigenous vegetation. This includes the temporary access road (for the purposes of estimating vegetation clearance for this temporary road an average width of 9.0 metres has been applied, consisting of an average 1 metre wide water tabling disturbance, plus 3.5 meter wide cut/fill allowance and a 4.5 metre wide carriageway for the c. 143 metre distance) to the construction staging area, and the construction staging area itself, also temporary. This area, based on LCDB land cover classes, is an extremely low proportion of the types present being:

- 0.22% of the c. 447.5 hectares of the similar indigenous forest vegetation/land cover (436.8 hectares)/sub alpine shrubland (10.7 hectares) assemblages contained in the Base Area, a zone below the 400-metre contour and on the true-right of the Waitaha River/true right of Macgregor Creek carrying vegetation typical of that in the Scheme's project footprint, containing and surrounding the project footprint and considered its general locale.

- 0.01% of the 8614 hectares of their counterparts in the Waitaha catchment.

- 0.002% of the 45 577 hectares of their counterparts in the Wilberg Ecological District.

The headworks operational footprint is significantly less again, being 13% of the construction footprint for headworks. Following the construction phase, the activity becomes benign, and appears to have low likelihood of requiring disturbance of vegetation at any of the areas. Therefore, the proposed activity is not considered to have any long-term detrimental effect on vegetation surrounding the various sites. Natural regeneration should occur across any areas affected by construction (except those areas occupied by structural components).

Scheme effects on indigenous vegetation in Area 1 are considered **negligible** (i.e., less than minor).

For the Scheme components in Area 2, scale of proposed works is well within the spatial scale of natural features contributing to discontinuity in vegetation cover e.g.:

a. The narrow linear footprint of the access road/transmission corridor, at 17.5 metres maximum for construction and 15 metres for permanent occupancy, is less than half the width of the Waitaha River bed at its narrowest in the portion that the road parallels.

b. The alluvial flat area on which the proposed power station and associated infrastructure is located is of similar width to the Waitaha River bed adjacent to it (and it is already predominantly open i.e., not carrying closed-canopy vegetation cover).

Construction involves clearance or at least some disturbance to 5.58 hectares of indigenous vegetation that, based on LCDB land cover classes, is an extremely low proportion of the types present being:

- 1.3% of the c. 436.8 hectares of the similar indigenous forest vegetation assemblages contained in the Base Area, a zone below the 400-metre contour and on the true-right of the Waitaha River/true right of Macgregor Creek carrying vegetation typical of that in the Scheme project footprint, containing and extending beyond the project footprint and considered its general locale.

- 0.13% of the 4358 hectares of their counterparts in the Waitaha catchment.

[1] *Ref*: https://lris.scinfo.org.nz - Land Cover Database v.5.0, 2020.

- 0.02% of the 27 851 hectares of their counterparts in the Wilberg Ecological District.

The same pertains for all Scheme components in Area 2 as for Area 1, where, following the construction phase, the activity becomes relatively benign, and appears to have low likelihood of requiring disturbance of vegetation. Therefore, the proposed activity is not considered to have any long-term detrimental effect on vegetation surrounding the various sites. Natural regeneration should occur across any areas affected by construction (except those areas occupied by structural components).

Forming and maintaining an access road to the power station and tunnel portal exit affects the greatest area and range of vegetation. While no uniqueness in terms of overall vegetation type(s) is attributable to the general area in which the proposed access routes to these facilities would be located, defining a route that results in least damage to all vegetation, and especially large hardwood trees taken as being 60+ cm diameter at breast height (dbh) and large podocarp trees taken as being 30+ cm dbh is a priority. This should be achievable because large hardwood and podocarp tree densities across the recent terrace landforms the access road would mainly traverse are very low. Appropriate final route delineation and ground survey will be key activities in achieving this.

Scheme effects on indigenous vegetation in Area 2 are considered **minor**.

The Scheme's footprint (c. 20.32 hectares in total) in Area 3 does not include vegetation at a level considered a viable indigenous community, therefore Scheme effect here is considered **negligible**.

In Area 4, the non-indigenous assemblage of the rural development area, that is principally pasture or roadside grass verge, pertains to the majority (c. 87%) of the Area 4 Scheme footprint, the Scheme-component affected area of indigenous vegetation being assessed as c. 0.205 hectares (0.68%) of a total 30.2 hectares of similar type (broadleaved indigenous hardwood) in the Base Area. Given this extremely small, affected area within a commonly occurring indigenous vegetation type (broadleaved indigenous hardwood), Scheme effects on indigenous vegetation of Area 4 are considered **negligible** i.e. less than minor. While Area 4 includes a proposed c. 2.7 kilometre distance of transmission line upgrade in a zone of podocarp/hardwood forest, and a zone of regenerating lowland podocarp forest, implementation of the Scheme results in zero net effect to this i.e., no increase in affected area or any more effect than ongoing maintenance has to the indigenous vegetation that is present, irrespective of Scheme implementation.

Therefore, overall effects of the Scheme on vegetation are likely to be **no more than minor** for Areas 1 and 2 (and **negligible** for Areas 3 and 4). This is based on the small amount of clearance (approximately 6.8 hectares) that will occur within the surrounding contiguous area and within the combined indigenous forest and shrubland cover of the Base Area of c. 447.5 hectares, combined with measures to be implemented wherever practicable that avoid affecting important habitat components e.g., large forest trees.

4.0 ADVERSE EFFECTS MANAGEMENT RECOMMENDED

All Places Where Earthmoving/Drilling Machinery Enters:

- Machinery should be thoroughly washed down (track-gear, undercarriage, engine bay, cab and engine covers, etc.) prior to entering any part of Area 1 so as to reduce risk of weed seed transport.

Access Road To Construction Staging Area 1:

- Defining a route that results in least damage to all vegetation, and especially any large (60+ cm dbh) hardwood trees and podocarp trees (30+ cm dbh) will be a priority. Based on assessments of the indicative route, proposed road alignment variation corridor of 30 metre width, and the wider area, the incidence of large trees is extremely low however a check is warranted. A component of the detailed design work would be to enumerate and mark any large trees within a fixed width of the road formation centerline and use these data to make road alignment adjustments, subject to engineering considerations, to avoid such trees if practicable. Therefore, the actual location of the road may be adjusted (subject to engineering considerations) to provide a possibility for large tree avoidance where practicable, during field layout/survey. However, the road may only be relocated within a 30 metre 'corridor', that is, a

maximum of 15 metres either side of the centreline of the indicative route. This 'corridor' has been considered as part of the assessment.

- This section of road will not be required after completion of headworks construction. Post-construction and site decommissioning, weed monitoring and control will be important, particularly if any gravel is carted in as this is a likely source of *Ulex europaeus* seed, and possibly other weeds. Weed monitoring and any control necessary should be carried out as prescribed in **Appendix G** of this report and in accordance with a Vegetation Management Plan developed for the Scheme.

- It is expected that natural regeneration of indigenous cover would occur relatively quickly if scarification/ripping of compacted surfaces was undertaken and that regeneration would comprise a range of species present prior to works.

Construction Staging Area 1:

- This area will not be required post-construction of the headworks infrastructure and can be rehabilitated via supplementary planting or left to regenerate naturally (preferred). It is expected that natural regeneration would comprise a range of indigenous species present prior to works, and occur relatively quickly if scarification/ripping of compacted surfaces to provide fresh, loose gravel substrate was undertaken.

- Post-construction and site decommissioning, weed monitoring and control will be important, particularly where gravel is carted in as this is a likely source of *Ulex europaeus* seed, and possibly other weeds. The same monitoring and any necessary control measures should be undertaken here as recommended above for the Construction Staging Area 1 access road.

Access Road/Transmission Line:

- There is no uniqueness in terms of overall vegetation type(s) attributable to the general area in which the possible access road and transmission line is proposed. Defining a route that avoids small areas of wetland, and results in least damage to all vegetation, and especially large (60+ cm dbh) hardwood trees and podocarp trees (30+ cm dbh) will be a priority. Field observations indicate trees of these sizes are in very low densities in all vegetation types likely to be affected by access road and transmission line construction and Scheme design to date has involved route adjustments to avoid a number of such trees.

- Reiterating the above, the access road/transmission line route and area assessed in this report is based on the route as marked on Map 3 plus 15 metres either side to allow for deviations that may be required as part of detailed design. A component of this work would be to enumerate and mark all large trees within a fixed width of the road formation centerline during field layout/survey, and use these data to make any practicable road alignment adjustments to avoid as many of these large trees as possible. Relatively easy terrain of the landforms where this infrastructure construction is likely should allow some route variation if required. Tree and wetland area avoidance should be achievable, so that effect on large forest trees is not considered a factor that would preclude any parts of the general area from the activity.

- Gravel carted in is a likely source of *Ulex europaeus* seed, and possibly other weeds. Continuing vehicle use to access the various facilities during the operation of the Scheme poses a lesser risk of weed conveyance. Ongoing post-construction weed monitoring and control will be important and should be a scheduled component of Scheme maintenance, as prescribed in **Appendix G** of this report and in accordance with a Vegetation Management Plan developed for the Scheme.

Transmission Line:

- Branch trimming may be appropriate on large trees where trimming one or more branches can achieve at least a four metre vegetation clearance from line conductors without having to fell the tree to attain this. Applicability of and practicality of branch trimming needs to be assessed on a tree by tree basis given the wide variation that will exist in tree form, branching habit, crown architecture and expanse, and existing natural damage, overall health/vigour status and

the requirement to leave sufficient crown and foliage to maintain health and vigour of the particular tree. A qualified arborist should be engaged to assess any trees proposed for branch trimming and determine whether this is a practicable and acceptable treatment, case-by-case. Any branch trimming should be undertaken by or at least supervised by a suitably qualified and experienced arborist.

Geophysical Test Drilling Sites:

- Branch trimming on large trees is also a suitable management option for gaining access for helicopter long-lining of drilling equipment and materials. The same considerations apply as noted above for the transmission line.

Tunnel Portal Exit Access Ramp/Road, Powerhouse, Accessway Platform (Road and Laydown) and Alpha Creek Flood Protection:

- Gravel carted in is a likely source of *Ulex europaeus* seed, and possibly other weeds. Continuing vehicle use to access the various facilities during the operation of the Scheme poses a lesser risk of weed conveyance. Ongoing post-construction weed monitoring and control will be important and should be a scheduled component of Scheme maintenance, as prescribed in **Appendix G** of this report and in accordance with a Vegetation Management Plan developed for the Scheme.

- Natural regeneration of the range of species present prior to any clearance would be expected to occur relatively quickly on any of the above areas not permanently occupied, e.g., the site of the former Amethyst Power Scheme pipeline and access, exhibiting similar landform and vegetation types, had become overgrown by indigenous vegetation within c. 10 years of cessation of use. Supplementary planting could enhance speed of re-vegetation if required and where suitable substrate exists. To increase speed and success of plant establishment in naturally rocky or construction-rocked areas such as stopbanking/flood protection (if any), deposition of soil and organic material (obtained from other Scheme component construction) would be highly beneficial in any case and in particular prior to any supplementary planting.

- Gravel and rock carted in, and vehicle use present the same risks at these infrastructure sites as for the access road/transmission line and the same provisions are applicable for all areas of these facilities not covered by buildings or hard surface (e.g. concrete/seal) re weed monitoring and any control.

Construction Staging Area 2:

- Remedial planting with a range of tree shrub and monocot species naturally present on the site is recommended as effects mitigation. To increase success of plant survival, deposition of soil and organic material (obtained from other Scheme component construction) would be highly beneficial prior to any supplementary planting. The Scheme report by Boffa Miskell (2025) gives details of possible site remedial work.

- Post-construction and site decommissioning, weed monitoring and control will be important, particularly if any gravel is carted in as this is a likely source of *Ulex europaeus* seed, and possibly other woody weeds e.g., *Leycesteria formosa*. At least annual monitoring and for a minimum of five seasons after decommissioning is recommended, with any necessary weed control undertaken as soon as practicable in the most effective season for best control results for the species concerned, but in any case prior to plants attaining seeding maturity.

Table 3 provides a summary of Scheme effects, their assessed level of impact, recommended effects management and predicted residual effects post-management/mitigation.

Table 3: Environmental Effects on Terrestrial Vegetation Associated With Each Phase of the Scheme (Construction and Operational), the Suggested Approaches to Manage These Effects, and Effects After Management Measures Have Been Applied.

Scheme Phase	Environmental Effects	Assessment of Effects (Unmitigated)	Recommended Effects Management	Assessment of Effects Post Mitigation	Is Offset or Compensation Required
Construction	C1./ Clearance of estimated 6.80 ha of vegetation, majority being indigenous species, reducing to temporary clearance of estimated 2.34 ha of vegetation, for this component of effects assessment and their management/mitigation. Note: This effects component is separated from operational effects due to shorter-term effect combined with regeneration or rehabilitation potential.	Less than minor. [Negative].	Avoid or minimise damage to large (60+ cm dbh) hardwood trees and podocarp trees (30+ cm dbh). Subject to engineering considerations make infrastructure positioning/alignment adjustments to avoid such trees if practicable. Check large trees for practicality of branch trimming where this would result in tree retention (without excessive adverse effects on the tree) while attaining required minimum clearance for a.) transmission line conductors and b.) for aerial delivery of equipment/materials to geotechnical drilling sites. Conduct remedial planting at Construction Staging Area 2 as soon as practicable after cessation of use (at power station site) as prescribed in **Appendix G** of this report and in accordance with a Vegetation Management Plan developed for the Scheme.	Less than minor. Effects expected to reduce via natural regeneration to the permanent clearance area given under Operational O1./ below. As above, facilitated by the supplementary planting of Construction Staging Area 2.	No.
	C2./ Securing/promoting natural regeneration.	Minor. [Positive].	Facilitate natural regeneration by scarification or shallow ripping of compacted surfaces to provide fresh, loose gravel substrate as a component of site decommissioning of non-operational areas (Access Road to Staging Area 1, Staging Area 1, and Staging Area 2).	More than minor. [Positive]. Anticipate site occupancy by a range of indigenous species present prior to works, and augmenting supplementary planting at Staging Area 2.	N/A.
	C3./ Possibility of weed incursion (particularly *Ulex europaeus*, but possibly other weeds) to all of the Scheme footprint in Area 1 and Area 2.	Less than minor [Negative potential, but subject to appropriate monitoring and management].	Earthmoving machinery should be thoroughly washed down prior to entering any part of the Scheme so as to reduce the risk of weed seed transport. Weed monitoring and any control necessary should be carried out as prescribed in **Appendix G** of this report and in accordance with a Vegetation Management Plan developed for the Scheme.	Less than minor [Negative] to nil. Subject to appropriate monitoring/control, residual effects should be nil or insignificant.	No.

Table 3: Environmental Effects on Terrestrial Vegetation Associated With Each Phase of the Scheme (Construction and Operational), the Suggested Approaches to Manage These Effects, and Effects After Management Measures Have Been Applied Ctd.

Scheme Phase	Environmental Effects	Assessment of Effects (Unmitigated)	Recommended Effects Management	Assessment of Effects Post Mitigation	Is Offset or Compensation Required
Operational	O1./ Permanent clearance (infrastructure occupancy) of estimated 4.46 ha of vegetation, majority being indigenous species.	Minor. [Negative].	Avoid or minimise damage to large (60+ cm dbh) hardwood trees and podocarp trees (30+ cm dbh). Subject to engineering considerations make infrastructure positioning/alignment adjustments to avoid such trees if practicable. Check large trees for practicality of branch trimming where this would result in tree retention (without excessive adverse effects on the tree) while attaining required minimum clearance for transmission line conductors.	Minor. [Negative] Other than permanent site occupancy of estimated area by infrastructure, no other associated effects are anticipated i.e., residual effect is considered benign.	No.
	O2./ Possibility of weed incursion principally in Area 2 on the access road and transmission line, about the power station and associated infrastructure area, and in Construction Staging Area 2.	Less than minor. [Negative potential].	Weed monitoring and any control necessary should be carried out as prescribed in **Appendix G** of this report and in accordance with a Vegetation Management Plan developed for the Scheme.	Less than minor [Negative] to nil. Extremely low risk of weed incursion beyond levels naturally occurring irrespective of Scheme presence.	No.

5.0 CONCLUSION

Based on the relevant provisions in the RPS, TTPP, WDP and CMS, indigenous vegetation within the Scheme's footprint is assessed as being of high natural value and significant indigenous vegetation (refer Table 1 above). This level of significance is considered not to preclude the Scheme given its overall **no more than minor** effect and the measures to be implemented wherever practicable to reduce the effects of the Scheme even further (refer to Tables 2 and 3).

Effects of the Scheme on the area's indigenous vegetation viability, quality, integrity and intactness are likely to be inconsequential considering its small project footprint within the surrounding contiguous area (total construction footprint of 6.8 hectares within the indigenous vegetation cover of the Base Area of c. 447.5 hectares, representing an affected area of 1.5%), combined with measures to be implemented wherever practicable, that avoid affecting important habitat components e.g., large forest trees.

APPENDIX A: FURTHER DETAIL ON THE PROJECT DESIGN AND PROJECT BACKGROUND AS IT RELATES TO TERRESTRIAL FLORA

A.1/ Location of Works

Construction activities are differentiated in four main areas in different parts of the lower Waitaha Valley. For purposes of vegetation description and assessment these areas are designated Area 1 (headworks), Area 2 (including power station and associated infrastructure, access road and transmission line, and tunnel portal exits) and Area 3 (spoil disposal and staging area and minor segments of access road and transmission line), their general locations as shown on **Appendix I, Map 1**. Area 4 is not bounded as a locale on **Appendix I, Map 1**. Due to the narrow, extended linear nature of Area 4 infrastructure components (transmission line and access road components it is not practical to show them as occurring in relatively defined zones on mapping in the same way as has been done for Scheme Areas 1 – 3. Instead, it is more practical for purposes of this assessment that the section of transmission line and section(s) of access road located in Area 4, where shown on mapping, be shown as a linear feature as per **Appendix I, Map 1 inset**. Therefore, reference to Area 4 in this report is to be taken as the locale in which these components occur, without having it bounded or encircled.

Two streams that are shown on the NZTopo50 1:50,000 topographic mapping of the area but are unnamed have been assigned in-house names by Westpower Ltd. to facilitate description of Scheme components and their location. These are:

1. Granite Creek = the first unnamed stream shown on map sheet NZTopo50-BW17 south of Macgregor Creek.

2. Alpha Creek = the second stream shown on map sheet NZTopo50-BW17 south of Macgregor Creek.

Note: The locations and distances given for Scheme components in this report are based on the Project Description for capturing relevant data and forming vegetation type descriptions for the various areas, however for some works the exact route or site of construction of any of the proposed works may as a result of detailed design vary slightly in terms of grid references and infrastructure distances given in this report. The assessments discussed herein have however included the 'corridors' within which the various works will be located, and 'buffers' where these pertain to wetlands.

Areas stated and used in analyses/assessment pertain to indigenous vegetation affected by Scheme components. Therefore, they may vary from the areas specified in the Scheme design and Project Description because those pertain to the various components' physical dimensions and in some cases location of components or portions of them is in area unvegetated e.g., active river channel. Design-supplied numbers are adopted in this report except where a.) later changes to the scheme design mean some areas require more vegetation clearance than initially identified; or b.) design does not specify a size for a particular Scheme component described in this report as a sub-component in terms of its vegetation effect.

A.2/ Headworks and Associated Works/Structures = Area 1

This is the area of proposed weir, water intake and associated structures, tunnel portal entrances, access roading and construction staging area (**Appendix I, Map 1 and Map 2**) at the upstream end section of Morgan Gorge with the majority of construction activity concentrated at c. NZTM 2000 E1415825; N5222160 at altitude of c. 240 m.a.s.l. Associated with headworks construction is the proposed construction staging area on the nearest flat zone of sufficient size on the same side of the river at c. NZTM 2000 E1416125 N5222050. Five sites for proposed geotechnical test drilling are included in Area 1. Although two of these are at intermediate distances between headworks and power station sites they are, for practical purposes, included in Area 1 vegetation assessment.

Tunneling will not impact on vegetation except in relation to tunnel entry portals and any associated apron placement.

A.3/ Access Road, Powerhouse and Associated Works/Structures = Area 2

This is the area for a tunnel portal exit and tunneling excavation, and for access road, power transmission line, power station, power station access ramp and tunnel portal access roading, tailrace, surrounding hardfill area, construction staging area, face stabilisation and Alpha Creek stream training (**Appendix I, Map 1 and Map 3**).

It extends from the freehold farmland boundary just north of Macgregor Creek, across Macgregor Creek and along the true-right side of the Waitaha River to c. 0.75 km below Morgan Gorge, on land administered in by the Department of Conservation (with a smaller area on the true right of Macgregor Creek administered by Land Information New Zealand (LINZ)).

A.4/ Spoil Disposal and Staging Area (and Including Minor Segments of Access Road and Transmission Line = Area 3

All of Area 3 is on private freehold land on the northern side of the extensive outwash fan formed by Macgregor Creek. It is developed or partially developed for pastoral grazing as part of a dairy farming operation, where exotic vegetation predominates (**Appendix I, Map 1 and Map 4**).

A.5/ Transmission Line and Access Road Segment(s) in Mixed Tenure = Area 4

Area 4 comprises a varying mix of private freehold land (mainly developed for dairy farming), legal road administered by Westland District Council (WDC) being the Waitaha Valley true right access road (Waitaha Road), and sections of Beach Road and Bold Head Road at Kakapotahi a lesser area of DOC Reserve adjacent to State Highway 6 and the intersection of Waitaha Road, and legal road administered by Transit New Zealand along/adjacent to State Highway 6.

Progressing northward from its abutment with the northern margin of Area 3, Area 4 commences on a portion of outwash fan formed by historical north-south traverses of Macgregor Creek, this freehold land is well developed as part of a dairy farming operation, where exotic vegetation (pasture species) predominates. The area continues north across the pasture land of the dairy farm, to the Waitaha Road (a WDC-maintained sealed road). In traversing the farmland area prior to Waitaha Road there is one small area (3.21 hectares, described as Vegetation Type 4/1 in **Appendix D**) of indigenous vegetation affected by the Scheme due to the proposed routes of a section of the new transmission line, and a section of proposed access road involving an upgrade of existing farm tracking.

Further progression northward follows the Waitaha Road through well-developed pastoral (dairy) farmland on former alluvial floodplain of the Waitaha River with no indigenous vegetation community presence, for c. 13.0 km in straight-line distance north of Area 3, as far as the DOC administered landholding (part RS 4772) immediately adjacent to State Highway 6. This is a strip of indigenous vegetation (podocarp/hardwood forest and regeneration mix) approximately 380 metres across at its widest point, adjacent to the highway on its south side, and traversed by the Waitaha Road to its juncture with State Highway 6. This indigenous vegetation continues westward around the morainic footslope to near the Waitaha River Bridge, then grades north and north north-east into regenerating lowland podocarp forest in the northern extremity of Area 4, traversed by part of the proposed transmission line upgrade from the State Highway 6/Beach Road junction northward adjacent to Beach Road and finally north north-eastward to end at the Waitaha Substation on Bold Head Road (both latter roads administered by WDC, refer **Map 11, Appendix I**). Note: The proposed transmission line upgrade is deemed to have zero nett effect on indigenous vegetation in Area 4 given upgrade effects will be no more than those attributable to maintenance of the existing line.

APPENDIX B: SCOPE AND APPROACH OF THE VEGETATION REPORT

The land on which the predominant amount of indigenous vegetation potentially affected by the Scheme occurs is within Reserve 1672 and Section 1, Survey Office Plan 12094. These landholdings are part of the Waitaha Forest conservation unit being Stewardship Land administered by the Department of Conservation (DOC). The proposed activity sites are mainly within the Wilberg Ecological District, the general area of proposed activities being predominantly on the true-right side of the Waitaha River upstream from Macgregor Creek to the upper end of the Morgan Gorge (**Appendix I, Map 1**). A lesser area on the true right side of Macgregor Creek is in the Harihari Ecological District.

The purpose of this report is to assess the effects of the Scheme on indigenous terrestrial vegetation, including ascertaining presence of and potential effect on vegetation constituting a component of any natural inland wetland (hereafter wetland) as defined in the National Policy Statement for Freshwater Management), such vegetation (if present) being deemed a sub-component of terrestrial vegetation. This report:

- Describes the main vegetation types present in the area and those potentially affected by the Scheme.
- Assesses the significance or uniqueness of the potentially affected vegetation types.
- Describes and assesses the potential effects of the Scheme on indigenous terrestrial vegetation.
- Proposes mitigation and rehabilitation.
- Describes predicted residual effect of the Scheme, overall, on vegetation.

This report presents the findings of a number of separate field assessments of vegetation:

1. Undertaken in the periods 22/8/12 – 23/8/12, 12/9/12 – 13/9/12 and with a subsequent visit on 30/9/13, this was the basis of the vegetation effects assessment for the original Scheme concession application. It involved walkthrough as terrain permitted, but where possible by transect across the run of land. Use of any predefined sampling system (random or systematic) was deemed impractical due primarily to difficulty of terrain particularly about the headworks sites. Representative areas were covered based on interpretation of cover type from aerial photography and field observation.
2. Undertaken on 8/7/2024 and 22/7/2024, this was to check/assess any site and associated vegetation changes that may have occurred in the twelve years since the original field work, and to include the minor changes in later design of Scheme componentry.
3. Undertaken on 20/8/2024 and 21/8/2024, this involved assessment for potential wetland presence in Area 2, and from this, subsequent mapping of eight minor areas designated wetland under a precautionary approach (refer **Map 9, Appendix I**).
4. Undertaken on 3/11/2024 to describe and assess vegetation present in part of Area 2 and in Area 3.
5. Undertaken on 18/11/2024 to describe and assess vegetation present at Area 4.
6. Undertaken on 19/12/2024, 16/2/2025, 11/4/2025, and 12/4/2025 to describe and assess vegetation present at proposed geotechnical drilling sites in Area 1, Area 2 and intermediate to these.

Fieldwork of assessments 1 – 3, part of 4 and 6 covered land administered by DOC surrounding the proposed project footprint (construction and operational areas combined) and the operational footprint i.e., permanent site occupancy once construction is completed. The majority of this (Area 1 and Area 2) is within the Waitaha Forest conservation unit.

Fieldwork of assessments 4 and 5 covered area north of the Wilberg Ecological District boundary, including a portion of the bed and true right margin of Macgregor Creek that is part of Area 2, and a portion of freehold farmland that encompasses Area 3, the Scheme footprint in this zone being predominantly in the Harihari Ecological District, and an area extending from Area 3 northward (this linear zone constituting Area 4) through freehold farmland and thence along the WDC's Waitaha Road to State Highway 6, along a portion of this, thence adjacent to WDC roading from State Highway 6 to the Waitaha Substation on Bold Head Road, also in the Harihari Ecological District.

Vegetation type descriptions and species noted are based on visual assessment.

APPENDIX C: INVESTIGATIONS

Different vegetation types were identified to describe the principal variations present at a local scale i.e., finer scale than that used in e.g., the New Zealand Land Cover Database (LCDB)[2], and their extent. This was necessary to enable assessment of Scheme effects and of any significance and natural values against the provisions of the relevant planning documents.

The types identified and described are sometimes quite clearly demarcated by topographical change e.g., by a terrace dropover where a clear type change occurs between higher and lower terraces, or between a recent alluvial flat and a forested margin. However, this is not always the case, and it is common to have varying degrees of intergradation where topographical change is gradual and types merge. Also, the vegetation types were determined by the main species within cover tiers (e.g., emergent, canopy, understory/shrub, groundcover). It was not intended that the survey provide a complete catalogue of every species present within a given type.

Vegetation assessment and description within the Scheme area and within vegetation types was on the basis of observation by walkthrough, as terrain permitted, but where possible by transect across the run of land. Use of any predefined sampling system (random or systematic) on all areas was deemed impractical due primarily to vegetation variation and difficulty of terrain particularly about the headworks sites.

Representative areas were covered based on interpretation of cover type from aerial photography and field observation, with final delineation on the basis of checks and/or changes observed during traverse. The result is a segregation of Area 1 into four indigenous vegetation types, Area 2 into thirteen indigenous vegetation types, Area 3 as one non-indigenous vegetation type, and Area 4 into one indigenous vegetation type, a rural development/farmland zone and an area of indigenous vegetation where Scheme infrastructure has zero nett effect, for descriptive purposes. These are coded 1/1, 1/2, 1/3 and 1/4 and 2/1, 2/2, 2/3 etc., and 3/1 for the respective Areas and for Area 4, 4/1, Rural Development/Farmland and Zero Nett Effect (see **Appendix I, Maps 2, 3, 4 and 5**).

Area 2 (see **Appendix I, Map 3**) as assessed is a strip c. 2250 metres long, that varies between c. 180 metres and 1000 metres wide, including both sides of Macgregor Creek and its active bed and along the true-right of the Waitaha River upstream of the true-left side of Macgregor Creek. This does not imply that all of this width will be affected by any works, the width being chosen arbitrarily to coincide with landform change where possible, but mainly to cover sufficient area to provide some flexibility in final location of any access road and other infrastructure without the requirement to extend the surveyed area eastward later if it were found too narrow in the first instance. The values and effects assessment pertaining to this wider zone also apply to sub-areas that Scheme components comprise within it e.g., the proposed 15 metre wide access road/transmission line and its associated 30 metre 'corridor'. Terrain allowed transect walk-through and representative areas were covered based on interpretation of cover type from aerial photography, with splitting of types into sub-types in some cases on the basis of changes observed during traverse.

Area 3 (see **Appendix I, Map 4**) as assessed involved a zone extending north from the southern freehold farm boundary into the partially developed/developed farmland. The overall area assessed is c. 1000 metres long and average 500 metres wide, bounded by NZTM 2000 coordinates E1415738 N5225774; E1415998 N5225794; E1416167 N5225942; E1416606 N5225953; E1416984 N5225935; E1416609 N5226156 and E1415819 N5226104.

Area 4 (see **Appendix I, Map 5, Map 10 and Map 11**) involves a more or less linear c. 15 kilometre progression across the portion of outwash fan formed by historical north-south shifts of Macgregor Creek, from the Scheme's proposed staging area of Area 3, traversing north across the pasture land of the dairy farm (the only indigenous vegetation affected within the farmland is a c. 3.21 hectare stand of broadleaved hardwood species through which the proposed transmission line and part of the access road pass), to the Waitaha Road (WDC-maintained sealed road). Northward progression continues following the Waitaha Road through well-developed pastoral (dairy) farmland on former alluvial floodplain of the Waitaha River with no indigenous vegetation community presence in the Scheme footprint, as far as the DOC administered landholding (part RS 4772) immediately adjacent to State Highway 6, and then west adjacent to the highway to near the Waitaha River Bridge, thence

[2] *Ref*: https://lris.scinfo.org.nz - Land Cover Database v.5.0, 2020.

adjacent to the WDC's Beach Road from State Highway 6 to the Waitaha Substation on Bold Head Road near Kakapotahi.

The primary descriptions for Vegetation Types in Area 1 and Area 2 were developed from field work in 2012 – 2013, and have been checked in 2024 for any change and for wetland identification. Area 3 and Area 4 description is based on work done in 2024 and 2025.

The basis for determination of any wetland presence in this report is the methodology contained in the Wetland Delineation Protocols (MFE, 2022), in conjunction with the area specification of the National Policy Statement for Freshwater Management, Clause 3.2.3(1)(a), Mapping and Monitoring Natural Inland Wetlands (MFE, 2020):

"Every regional council must identify and map every natural inland wetland in its region that is:

a) 0.05 hectares or greater in extent; or

b) of a type that is naturally less than 0.05 hectares in extent (such as an ephemeral wetland) and known to contain threatened species."

Area 1 vegetation and landforms are deemed upland without wetland presence within the Scheme's footprint, based on aerial imagery, site visits, and considering the Wetland Delineation Protocols (MFE, 2022) and National Policy Statement for Freshwater Management (MFE, 2020) area specification.

The recent unforested alluvial flat portion of Area 2 that contains the proposed power station and associated infrastructure had specific wetland assessment plot work conducted on 20/8/24 using the Wetland Delineation Protocols (MFE, 2022) to confirm wetland presence/absence. The outcome of this investigation is that no wetland areas are identified here.

The forested low terrace area(s) between Alpha Creek and Macgregor Creek that the proposed access road/transmission line will traverse were checked on 20/8/24 and 21/8/24 for any areas that might constitute wetland designation, given:

i. the more recent and low-relief terrace landforms and array of vegetation types occupying these areas (see Appendix I, Map 3); and,

ii. indications from initial field visits that specific wetland assessment was warranted to clarify any uncertainties.

This checking identified eight minor zones (**Appendix I, Map 9**) within three vegetation types 2/3B, 2/4 and 2/4A that are considered to constitute wetlands for purposes of Scheme effects avoidance. Of these, two are slightly larger than 0.05 hectares, the remainder being smaller. The reason for inclusion of those less than 0.05 hectares is as a precautionary approach. This recognises that no specific threatened species' presence investigations have been undertaken, it being deemed pragmatic to simply designate the areas as wetland on the basis of the primary indicator of wetland (Wetland Delineation Protocols (MFE, 2022)) observed at each being presence of standing water. Descriptions of vegetation and site attributes for each are given as sub-types under the relevant broader Vegetation Type within which they occur in **Appendix D**, Section D.2/.

N.B: No detailed wetland vegetation surveys were deemed necessary for any of the eight sites given that there is no contention they are not wetlands, and that the combination of their minor areas, identified locations, and extent mapping via GIS enables their avoidance and adequate buffering from Scheme infrastructure effects on vegetation.

Area 3 and the portion of Area 4 where new Scheme infrastructure is proposed is deemed upland/dryland and without wetland presence within the Scheme's footprint or in proximity to it, based on aerial imagery, site visits, and considering the Wetland Delineation Protocols (MFE, 2022) and National Policy Statement for Freshwater Management (MFE, 2020) area specification.

APPENDIX D: EXISTING ENVIRONMENT

Key landforms in Area 1 include hill foot slopes, terraces and terrace faces associated with these, and an area of relatively recent alluvial terrace at altitude of c. 240 – 280 m.a.s.l. The principal forest types present here can be broadly grouped as kamahi forest and seral forest using the classification described by James *et al.*, (1973), and as lowland forest and seral low forest under the classifications described by Wardle, (1977, 1979 and 1991).

Note: Seral vegetation communities occur on sites prone to disturbance e.g., unstable gullies, steep faces and on recent alluvial surfaces or waterway banks. Seral forest vegetation is typically a mix of broadleaved indigenous hardwood tree species in a regeneration phase, along with broadleaved indigenous shrub species and tree ferns.

Predominant landforms in Area 2 are a set of relatively recent, low alluvial outwash terraces, terrace faces and tributary stream fans at altitude of c. 140 – 160 m.a.s.l.

The Area 2 survey zone is larger and encompasses a greater range of landforms than does Area 1, in particular the sequence of alluvial terraces increasing in surface age with increased height in an eastward progression, from the relatively recent alluvial flats adjacent to the current active Waitaha River bed that have no closed forest species cover, to the higher terrace and hill footslopes that carry mature podocarp/hardwood hill forest. Steeper terrace faces and footslopes within this area have likely been subject to effects of shifts on the Alpine Fault resulting in periodic disturbance via slips and colluvium deposition and exhibit a hardwood predominant forest cover with very low incidence or absence of large podocarp trees. The principal forest types present here can be broadly grouped as kamahi forest (mature and establishing or regenerating) and seral forest using the classification described by James *et al.*, (1973), and as lowland forest (mature and establishing or regenerating) under the classifications described by Wardle, (1977, 1979 and 1991). Part of the outwash fan of Macgregor Creek is the also included as an Area 2 landform. Substrate is schistose alluvium/colluvium. Surfaces range from current, active, unvegetated streambed subject to frequent and varied stream channel changes linked to rainfall events, to semi-stable and stable recent surfaces exhibiting pioneer indigenous species vegetation establishment.

A limited amount of tracking exists on the true right side of Macgregor Creek, used to access the creek bed for a stone recovery operation. Apart from this, there is no evidence of major modification to vegetation by human activity e.g., clearance or logging, in Area 1, Area 2 or their environs.

The northern portion of the Macgregor Creek outwash fan is the landform on which Area 3 occurs. The farmland development has occurred on an area of these recent more stable surfaces, where indigenous vegetation that may have existed has been replaced with or outcompeted by exotic pasture and woody weed species, and the site is subject to periodic rotational grazing as a component of the wider dairy farm operation. Extremely infrequent indigenous fern and moss species are present on some rock piles and two extremely minor (together totaling 496 square metres at c. 50% cover i.e., 248 square metres) areas of indigenous tree/shrub cover is all that remain (being 0.12% of the 20.32 hectare area). Frequency, density, stature/status and cover of indigenous species within the Scheme's proposed spoil disposal and staging areas are so low that their presence is not considered to constitute an indigenous vegetation community.

The farmland and associated rural infrastructure (e.g., roading, utilities, drainage, farm dwellings and other buildings) development of Area 4 is predominantly on areas of the true right former alluvial floodplain of the Waitaha River. This area has been farmed either as drystock/sheep operations or dairying operations for an extended period (many decades), with extent of development reflecting this. While stands of indigenous vegetation are present in places, these are remnants of what would have been the former more extensive cover, and in places occasional large podocarp trees occur in otherwise cleared pasture. Scheme infrastructure placement avoids both throughout, with the exception of the one c. 3.17 hectare zone of indigenous broadleaved hardwood vegetation (Vegetation Type 4/1, see Figure 46, p. 91 for location) affected by a section of the proposed new transmission line route and a portion of the proposed access road route.

D.1/ Vegetation Type Descriptions for Area 1

Type 1/1 – Forest Margin/Riparian Mixed Ground Cover and Shrub Hardwood:

This type is a mixed moss/herb/fern/monocot and shrub hardwood low cover occurring in a narrow strip (typically 3 – 6 metres wide) from the exposed gravel/sand/rock of the active river bed to intergrade with the shrub margin of Vegetation Type 1/3 on the true left of the Waitaha River and in a similar situation between active riverbed and margin of Vegetation Type 1/2 on the true-right side. The majority is temporarily inundated for short periods at time of highest river flows.

Components of this cover type also occupy the bedrock surfaces of the Morgan Gorge between the upper level of permanently scoured-clean rock and the lower margin of the Vegetation Type 1/3 shrub component that covers the Morgan Gorge sides. Seedlings of forest tree species e.g. *Metrosideros umbellata, Pterophylla racemosa, Podocarpus laetus, Dacrydium cupressinum* and *Pectinopitys ferruginea* occur occasionally in this type on the lower levels of Morgan Gorge sides however the latter three podocarps do not appear on the river bank margins upstream of the gorge.

Cover height range within Vegetation Type 1/1 is from ground surface to c. 1.5 metres at the margins of this type where it intergrades with the other forest type shrub tiers. Species comprising the higher cover include the shrubs *Coriaria arborea, Coprosma rugosa, Veronica salicifolia, Carpodetus serratus, Carmichaelia arborea, Olearia arborescens, Olearia ilicifolia* and *Olearia avicenniifolia* and monocots *Phormium cookianum, Astelia fragrans* and *Austroderia richardii*.

Ground cover species include mosses and thallose liverworts (*Marchantia berteroana* and *Monoclea forsteri*), and *Nertera depressa*, *Hydrocotyle moschata, Gingidia montana, Hypochoeris radicata, Lobelia angulata, Anisotome hastii, Acaena anserinifolia, Rubus parvus, Raoulia tenuicaulis, Veronica lyallii*, *Cirsium palustre, Cirsium arvense*, *Carex* sp., *Schoenus pauciflorus, Poa* spp., *Agrostis dyeri, Festuca* sp., *Carex goyenii, Hierochloe novae-zelandiae*, *Rytidosperma setifolium,* and *Parablechnum novae-zealandiae.* In damp zones under other cover or on banks, *Austroblechnum lanceolatum* and *Austroblechnum colensoi* occur.

No major change has occurred in Vegetation Type 1/1 between 2012 and 2024.
(See Figures 1a - 1b, 2a - 2b).

Figures 1a & 1b - Example of Vegetation Types 1/1 & 1/3.

Vegetation Type 1/1 occupies a narrow strip of c. 3 – 6 metres between the active Waitaha River bed and the shrub hardwood margin of Vegetation Type 1/3 at the foot of the slope beyond the river bank.

1a - State in 2012:

1b - State in 2024 (photograph taken from slightly further upriver than in 2012):

Type 1/2 - Regenerating Hardwood Shrub/Tree Mix With Low Podocarp Element:

This is an area of closed-canopy regenerating hardwood shrub and tree cover occupying a foot slope face on the true-right of the Waitaha River extending upstream from the upper end of Morgan Gorge for c. 150 metres. It extends c. 20 - 40 metres upslope to gradually intergrade with Vegetation Type 1/3.

Canopy height is c. 6 - 8 metres with prevalent species being *Griselinia littoralis* (particularly frequent)*, Pterophylla racemosa, Carpodetus serratus, Olearia ilicifolia, Olearia arborescens,* and *Pseudowintera colorata.* Occasional small (c. 30 cm diameter at breast height (dbh)) *Podocarpus laetus* stems are present in upper zones where an intergrade with Vegetation Type 1/3 occurs.

Understory and shrub species include canopy species regeneration, *Schefflera digitata, Aristotelia serrata, Coprosma ciliata, Coprosma rhamnoides, Coprosma foetidisima, Coprosma rotundifolia* (in drier zones), *Coprosma dumosa*, *Coprosma colensoi, Myrsine divaricata*, *Raukaua anomalus*, occasional *Quintinnia serrata* and scattered *Pectinopitys ferruginea* and *Podocarpus laetus* seedlings. *Alsofila smithii* tree ferns occur throughout, while *Dicksonia squarrosa* tree ferns are less prevalent. *Carmichaelia arborea, Coriaria arborea* and *Veronica salicifolia* are present about margins.

Ground cover species are mosses including *Hypopterygium novae-seelandiae*, *Mniodendron dendroides*, and *Cyathophorum bulbosum*, liverworts (*Monoclea forsteri*, *Marchantia berteroana* and *Schistochila* sp.), *Nertera villosa*, *Nertera depressa, Viola filicaulis, Microlaena avenacea*, *Carex uncinata, Astelia fragrans*, *Pakau pennigera*, *Asplenium bulbiferum*, *Leptopteris superba, Parablechnum novae-zealandiae*, *Cranfillia fluviatilus*, *Austroblechnum colensoi, Metrosideros diffusa* and scattered seedlings of canopy and shrub species.

Epiphytes include *Asplenium flaccidum*, *Hymenophyllum* spp., *Hymenophyllum nephrophyllum,* and *Astelia fragrans*.

No major change has occurred in Vegetation Type 1/2 between 2012 and 2024.
(see Figures 2a - 2b).

Figures 2a & 2b - Example of Vegetation Types 1/1 & 1/2.

Vegetation Type 1/2 occupies the foot slope face and upper terrace margins at the entry to Morgan Gorge. Moss and herbaceous components of Vegetation Type 1/1 occur in a very narrow strip on the large rocks between the active Waitaha River bed and the margin of Vegetation Type 1/2.

2a - State in 2012:

2b - State in 2024:

Type 1/3 – Mature Podocarp/Hardwood Hill Forest:

This occurs on terraces; terrace faces and hill foot slope/side slope areas. The type is mature podocarp/hardwood hill forest with the podocarp element more prevalent on terrace zones and in particular along better-drained terrace edges, ridges and on higher-level slopes. In gully sides and on faces, including the upper sides of Morgan Gorge, the podocarp element is reduced, hardwoods forming the canopy.

Canopy emergents are principally *Dacrydium cupressinum* (dbh range typically 50 – 100+ cm), and to lesser extent, *Podocarpus laetus, Pectinopitys ferruginea* and *Metrosideros umbellata*. *Libocedrus bidwillii* trees typically 40 – 80 cm dbh, occur either as scattered individuals or in small patches, in particular on the upper terrace surface on the true right of the Morgan Gorge, and *Podocarpus laetus* trees appear more frequent here.

Canopy height is c. 16 – 22 metres in upper zones, reducing on lower faces and into Morgan Gorge sides, where a hardwood canopy prevails, and podocarps are absent or if present occur rarely and are small. *Pterophylla racemosa* and *Quintinnia serrata* are main canopy species along with *Metrosideros umbellata* and occasional smaller stems of the emergent podocarp species.

The understory/shrub tier includes canopy species regeneration and *Pseudopanax crassifolius, Pseudopanax colensoi, Raukaua anomalus, Raukaua simplex*, *Griselinia littoralis, Carpodetus serratus, Pseudowintera colorata, Neomyrtus pedunculata, Phyllocladus alpinus, Archeria traversii*, *Schefflera digitata, Coprosma lucida, Coprosma grandifolia, Coprosma foetidissima, Coprosma rhamnoides, Coprosma dumosa*, *Coprosma colensoi*, *Coprosma linariifolia*, and *Coprosma ciliata. Ascarina lucida, Hedycarya arborea, Myrsine divaricata, Coprosma rotundifolia* and *Neomyrtus pedunculata* become more common in the shrub tier on terraces and upper-level slopes. *Alsofila smithii* and *Dicksonia squarrosa* tree ferns occur in varying densities throughout.

Ground cover includes regeneration of canopy and understory species. Various mosses occur (including *Dendroligotrichum dendroides, Cyathophorum bulbosum*, *Hypopterygium novae-seelandiae* and *Mniodendron dendroides*) and liverworts are present (particularly *Schistochila* spp.). Cover includes *Pseudodiphasium volubile*, *Nertera villosa*, *Nertera depressa, Microlaena avenacea*, *Uncinia* spp., *Astelia fragrans*, *Leptolepia novae-zelandiae*, *Lastreopsis hispida*, *Pakau pennigera, Leptopteris superba, Austroblechnum lanceolatum, Parablechnum novae-zealandiae*, *Lomaria discolor*, *Zealandia pustulata subsp. pustulata*, *Tmesipteris tannensis*, *Hymenophyllum demissum*, *Hymenophyllum revolutum*, *Metrosideros diffusa*, *Luzuriaga parviflora, Poa colensoi, Arthropodium candidum*, *Phormium cookianum* and *Gahnia* sp. Patches of *Histiopteris incisa* are present in open areas of gullies.

Climbers include *Metrosideros diffusa*, *Metrosideros fulgens*, and *Rubus schmidelioides*.

Epiphytes include *Hymenophyllum revolutum*, *Hymenophyllum multifidum*, *Hymenophyllum demissum, Zealandia pustulata subsp. pustulata, Notogrammitis heterophylla, Asplenium flaccidum*, *Astelia fragrans*, *Pterophylla racemosa* and *Quintinnia serrata*.

In zones above the scoured-clean bedrock in gorge areas, but prior to establishment of forest shrub species as main cover, there is a zone of moss/liverwort and herbaceous and monocot cover. This can vary in width from a few metres to ten metres or more. At least some parts of the zone are affected by flooding at times of high river flow. Various moss species are common along with liverworts (including *Monoclea forsteri*, *Marchantia berteroana* and *Schistochila* sp.). Scattered seedlings of tree and shrub species occur e.g. *Metrosideros umbellata, Veronica salicifolia, Pterophylla racemosa, Coprosma rugosa, Carmichaelia arborea, Olearia arborescens, Olearia ilicifolia,* and *Olearia avicenniifolia*. Otherwise, principal cover species include *Austroderia richardii*, *Parablechnum novae-zealandiae*, *Carex* sp., *Forstera tenella*, *Veronica lyallii, Agrostis dyeri, Hydrocotyle moschata*, *Geum leiospermum, Gunnera monoica, Lobelia angulata* and *Schoenus pauciflorus*.

No major change has occurred in Vegetation Type 1/3 between 2012 and 2024.
(see Figures 3a - 3b, 4a - 4b, 5a - 5b, 6a - 6b, 8a - 8b and 9a - 9b).

Figures 3a & 3b - Example of Vegetation Types 1/1 & 1/3.

Vegetation Type 1/3 occupies terrace faces and upper terrace margins at the entry to Morgan Gorge. Vegetation Type 1/1 extends in a strip between the active river bed and the margin of Vegetation Type 1/3 on the hill face at left of the photograph.

3a - State in 2012:

3b - State in 2024:

Figures 4a & 4b - Example of Vegetation Types 1/1 & 1/3.

Vegetation Type 1/3 on the terrace face at the true-left entry to Morgan Gorge. Vegetation Type 1/1 extends in a strip between the active river bed and the margin of Vegetation Type 1/3 at left of the photograph and the moss/herb/monocot component rises around the bedrock of the gorge entrance to occupy a margin c. 6 metres wide at the actual gorge entry.

4a- State in 2012:

4b - State in 2024:

Figures 5a & 5b - Example of Vegetation Type 1/3.

Vegetation Type 1/3 on the terrace edge and mid to upper face at the true-right entry to Morgan Gorge – possible site of the tunnel portal entrances is approximately at lower left corner of photograph.

5a - State in 2012:

5b - State in 2024:

Figures 6a & 6b - Example of Vegetation Type 1/3:

Vegetation Type 1/3 on the terrace edge and mid to upper face on the true-right of the Waitaha River upstream of Morgan Gorge in the zone to be traversed by access roading to the contractors' facilities area.

6a - State in 2012:

6b - State in 2024:

Figures 7a & 7b - Example of Vegetation Types 1/1 & 1/3:

Example of Vegetation Type 1/1 grading to Vegetation Type 1/3 hardwood shrub component cover on the true-left wall at the entrance to Morgan Gorge.

7a - State in 2012:

7b - State in 2024:

Figures 8a & 8b - Example of Vegetation Type 1/3 Shrub Component:

Vegetation Type 1/3 hardwood shrub cover on faces of Morgan Gorge. This grades uphill to higher-stature hardwood canopy forest cover, with a minor podocarp element.

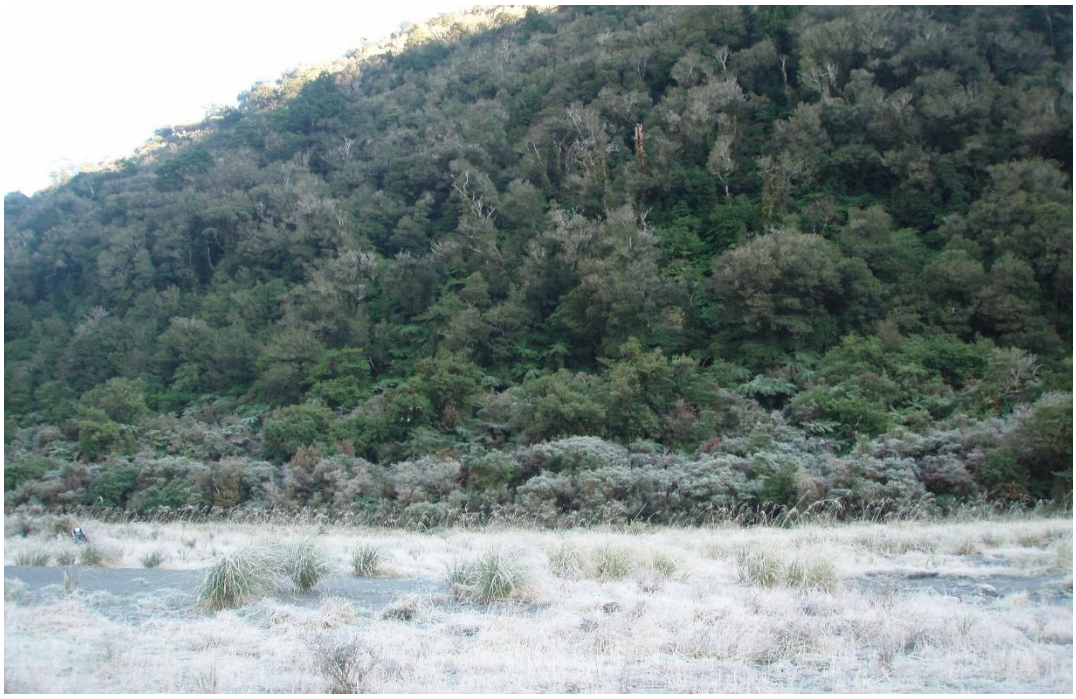
8a - State in 2012:

8b - State in 2024:

Figures 9a & 9b - Example of Vegetation Type 1/3:

Vegetation Type 1/3 on lower hill foot slopes above the northern margin of Kiwi Flat (note that this is not part of the proposed headworks area – it is included as an illustration of the stature and composition of this type of hardwood footslope forest cover with very low to no incidence of large podocarp emergents).

9a - State in 2012:



9b - State in 2024 (photograph taken from slightly further downriver and closer to the hill footslope than in 2012):

Type 1/4 - Shrub Hardwood, Successional:

This occurs on a relatively recent alluvial terrace extending from the active stream bed of the Waitaha River true-right, north to the hill footslope margin, the terrace surface being c. 6 – 8 metres above the bed of the river and not showing signs of flood inundation. The type is dense, closed-canopy hardwood shrub cover, typical canopy height being c. 3 – 5 metres.

Predominant canopy species include *Olearia ilicifolia*, *Raukaua anomalus*, *Coprosma ciliata, Coprosma dumosa, Coprosma* sp., *Coprosma colensoi, Carmichaelia arborea* and *Myrsine divaricata*. Other canopy hardwoods of less frequent occurrence are *Griselinia littoralis* (and very occasionally as an emergent), *Pennantia corymbosa, Pseudowintera colorata* and *Veronica salicifolia*.

A dense understory tier includes all of the canopy species, with increased presence of *Pseudowintera colorata*. *Carpodetus serratus* and *Coprosma rotundifolia* are understory components.

Common ground cover species are the moss *Hypopterygium novae-seelandiae*, the thallose liverworts *Monoclea forsteri* and *Marchantia berteroana*, ferns (*Cranfillia fluviatilus, Polystichum vestitum, Leptopteris superba, Austroblechnum colensoi* and occasional young *Alsofila smithii* tree ferns), the monocots *Microlaena avenacea* and *Carex uncinata* and the broadleaved herbs *Cardamine forsteri* and *Epilobium pedunculare.*

A frequent climber is *Rubus schmidelioides*.

Epiphytes are the ferns *Notogrammitis heterophylla, Asplenium flaccidum*, *Notogrammitis angustifolia subsp. nothofageti, Hymenophyllum demissum* and *Hymenophyllum revolutum*. Mosses, in particular *Weymouthia mollis*, are common.

No major change has occurred in Vegetation Type 1/4 between 2012 and 2024.
(See Figures 10a - 10b and 11a - 11b).

Figures 10a & 10b - Example of Vegetation Type 1/4:

Typical stature and composition of Vegetation Type 1/4 as seen along the edge of the alluvial terrace above the active bed of the Waitaha River, northern margin of Kiwi Flat.

10a - State in 2012:

10b - State in 2024:

Figures 11a & 11b - Example of Vegetation Type 1/4:

Typical stature and species composition of Vegetation Type 1/4.

11a - State in 2012:

11b - State in 2024:

D.1(a)/ Other Observations Relating to Vegetation – Area 1

Generally, the state of vegetation of all types described above, both within the areas of proposed works and the wider area, appears healthy and stable with the exception of change due to naturally caused events e.g., occasional slips, changes in river channel location and windfall zones, these being random and relatively infrequent. While possums and deer are present, browse effect on indigenous vegetation at all sites appears very low. Sign indicates low possum numbers in particular on the northern footslopes bordering Kiwi Flat and in the terrace below Morgan Gorge, with very limited effect on vegetation in the Scheme area. Likewise for deer, sign is sporadic and concentrated on the grassed and sandy areas of flats. Grazing is evident on grassed clearing/flat areas but appears sporadic and at a low level – this will be seasonally variable, highest in spring and summer – however even then would not be of significant detriment to the majority of indigenous vegetation present given the low deer population density. Once into areas of shrub/bush cover deer movements disperse, and vegetation appears little affected. No goats or goat sign were observed in this part of the Scheme area.

Exotic herbaceous weed species adapted for wind dispersal of seed (e.g., *Cirsium* spp.) are present in low concentrations outside of forest areas e.g., along river and stream margins. No brushweed species were observed in this part of the Scheme area.

D.2/ Vegetation Type Descriptions for Area 2

Type 2/1 – Regenerating Podocarp/Hardwood Forest (Stage 1):

This occurs on a narrow, low, recent terrace that runs east to a vertical or near vertical terrace face at the foot of which varying amounts of debris accumulation from face slipping form a slope. The vegetation type is podocarp/hardwood in an early regenerational phase with tree ferns a significant canopy element. Canopy height is c. 5 – 7 metres average and no large podocarp or hardwood trees are present. It is typical of that observed on relatively young, well drained surfaces.

Canopy cover is principally *Pterophylla racemosa*, *Carpodetus serratus*, *Quintinnia serrata, Melicytis ramiflorus* and with the tree ferns *Alsofila smithii* and *Dicksonia squarrosa*. Occasional *Pectinopitys ferruginea* stems are present and scattered *Dacrydium cupressinum* pole-sized (<20 cm dbh) stems are emergent above the hardwood component. *Ripogonum scandens* occurs in the canopy in places (and in lower tiers).

The shrub tier includes canopy species regeneration and *Podocarpus laetus*, *Ascarina lucida, Hedycarya arborea, Myrsine australis,* and *Coprosma grandifolia*. *Alsofila smithii* and *Dicksonia squarrosa* tree ferns are abundant. Along margins, *Carmichaelia arborea*, *Coprosma rugosa, Olearia avicenniifolia, Olearia ilicifolia* and *Olearia arborescens* are present.

Ground cover under the closed canopy is primarily litter with various mosses (including *Cyathophorum bulbosum* and *Hypopterygium novae-seelandiae*) and liverworts (particularly *Monoclea forsteri*, *Hymenophyton flabellatum*, and *Schistochila* spp.). Other cover includes *Asplenium bulbiferum, Asplenium flaccidum, Lastreopsis hispida*, *Parablechnum novae-zealandiae*, *Lomaria discolor, Hymenophyllum demissum*, *Notogrammitis billardierei*, *Nertera villosa*, *Microlaena avenacea*, *Carex uncinata*, *Astelia fragrans*, *Metrosideros diffusa*, and scattered seedlings/young plants of canopy and shrub tiers. *Histiopteris incisa* is present about margins.

Climbers include *Metrosideros diffusa* and occasional *Ripogonum scandens* patches occur, principally in the sub canopy. Epiphytes include *Asplenium flaccidum*, *Grammitis* spp., *Hymenophyllum* spp., *Polyphlebium venosum*, *Tmesipteris tannensis*, *Zealandia pustulata subsp. pustulata*, *Astelia fragrans*, *Pterophylla racemosa* and *Quintinnia serrata*.

Within Type 2/1 there are occasional small semi-clearings on slopes at the foot of the terrace, a result of slips from above. Canopy, shrub and ground cover species present in the closed-canopy areas are represented, however additional species observed in these areas and not noted in closed-canopy areas include the shrubs *Pennantia corymbosa* and *Coprosma dumosa* and as ground cover components, *Polystichum vestitum*, *Pteridium esculentum*, *Acaena anserinifolia*, *Lotus pedunculatus*, *Austroderia richardii* and other mixed grass and thistle species.

The terrace face is included in Type 2/1. Cover consists of a similar hardwood species assemblage to that which comprises the terrace canopy and shrub tiers along with *Veronica salicifolia* and *Griselinia littoralis*, and prevalent ground cover species include *Blechnum* spp. ferns observed on the terrace and *Astelia fragrans*, along with mosses and liverworts.

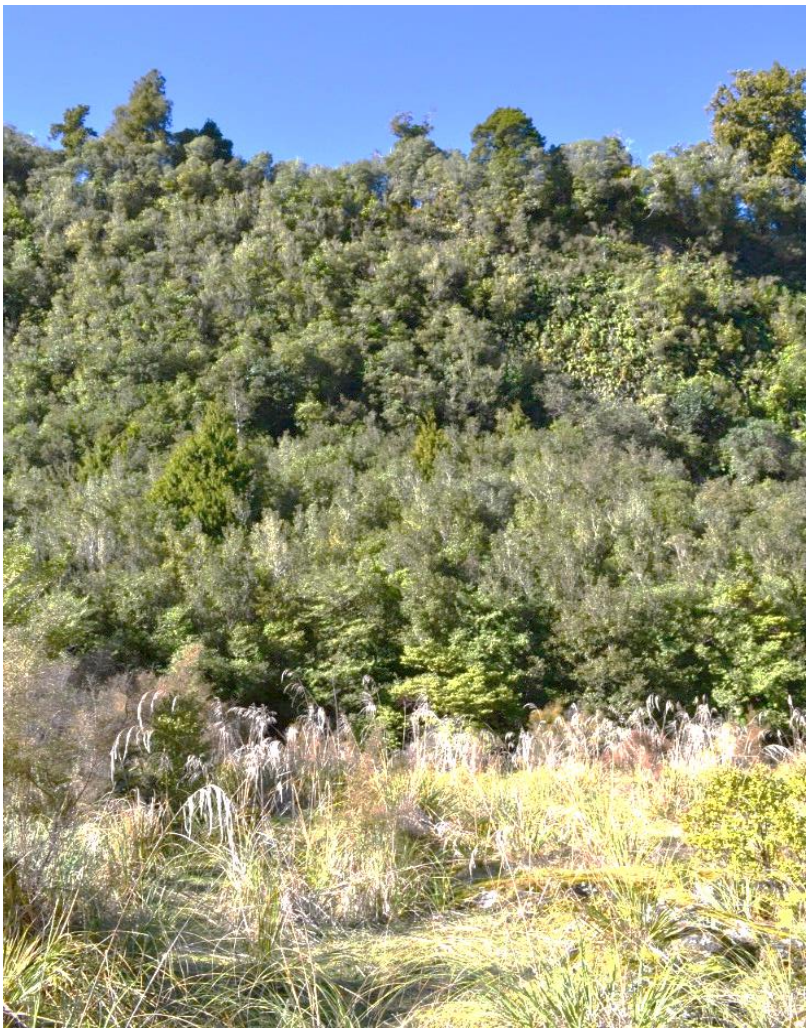
No major change has occurred in Vegetation Type 2/1 between 2012 and 2024.
(See Figures 12a - 12b).

Figures 12a & 12b - Example of Vegetation Type 2/1:

Vegetation Type 2/1 stature and composition on the low terrace in the foreground and on the terrace face and regenerating slip in the background.

12a - State in 2012:

12b – State in 2024:



Type 2/2 – Grass, Sparse Shrub and Tree Fern Combination (Early Successional):

This occurs on a relatively recent alluvial flat that has a historic river channel around its eastern margin. This area is predominantly vegetated and not an active portion of the river. Cover is typically between 0.5 and 0.8 metres high. Very occasional regeneration of forest trees in seedling stage is present e.g. *Metrosideros umbellata* and *Pterophylla racemosa*. Shrub cover consists of scattered individual stems or as small clumps. Common species are *Coprosma rugosa, Coprosma propinqua*, *Coprosma elatirioides, Coprosma rubra, Coprosma* sp.*, Pennantia corymbosa*, *Carmichaelia arborea, Pseudopanax crassifolius, Carpodetus serratus*, *Hedycarya arborea*, *Myrsine divaricata, Ascarina lucida*, *Dracophyllum longifolium*, *Raukaua simplex* and the tree ferns *Alsophila smithii* and *Dicksonia squarrosa.*

Monocots and other ground cover species on the main flat and channel include abundant *Austroderia richardii* and scattered *Astelia fragrans, Phormium cookianum, Lomaria discolor, Parablechnum novae-zealandiae, Cranfillia fluviatilus, Austroblechnum penna-marina subsp. alpina, Hypolepis rufobarbata, Histiopteris incisa, Metrosideros diffusa* and *Acaena anserinifolia.* Grasses (*Agrostis tenuis*, *Poa* spp., *Festuca* sp., *Trisetum tenellum, Anthoxanthum odoratum, Holcus lanatus*) and mosses are intermingled along with other broadleaved herbaceous plants including *Cirsium arvense, Cirsium vulgare, Ranunculus repens*, *Ranunculus acaulis, Lotus pedunculata*, *Hydrocotyle novae-zelandiae, Hydrocotyle sulcata, Celmisia coriacea*, *Stellaria media, Plantago raoulii*, *Hypochoeris radicata, Gunnera prorepens* and *Gunnera monoica. Ptychomnion aciculare* and *Thuidiopsis furfurosa* are common mosses.

Species present as ground cover along the flat margin with the active riverbed in what is a flood-inundation zone include *Marchantia berteroana, Acaena anserinifolia*, *Nertera ciliata, Gunnera monoica, Raoulia tenuicaulis*, *Veronica lyallii* and *Rytidosperma setifolium*.

No major change has occurred in Vegetation Type 2/2 between 2012 and 2024.
(See Figures 13a - 13b and 14a – 14b).

Figures 13a & 13b - Example of Vegetation Type 2/2:

Vegetation Type 2/2 composition and cover of the river flat and historic channel.

13a - State in 2012:

13b - State in 2024:

Figures 14a & 14b - Example of Vegetation Type 2/2:

Vegetation Type 2/2 composition and cover on the river flat.

14a - State in 2012:

14b - State in 2024:

Type 2/3 – Mature Podocarp/Hardwood Hill Forest:

This occurs on elevated terrace and hill foot slope/side slope areas. The type is mature podocarp/hardwood hill forest with the podocarp element more prevalent on terrace zones and in particular along better-drained terrace edges and ridges. In gully sides and on faces the podocarp element is reduced or absent, hardwoods forming the canopy.

Canopy emergents are principally *Dacrydium cupressinum* (dbh range typically 70 – 110+ cm), and to lesser extent, *Pectinopitys ferruginea* and *Metrosideros umbellata* and very occasional *Dacrycarpus dacrydioides*. Canopy height is c. 16 – 22 metres, with *Pterophylla racemosa* and *Quintinnia serrata* the main canopy species along with smaller stems of the emergent podocarps.

The understory/shrub tier includes canopy species regeneration and *Podocarpus laetus*, *Ascarina lucida, Hedycarya arborea, Myrsine divaricata, Neomyrtus pedunculata, Pseudopanax crassifolius, Griselinia littoralis, Pseudowintera colorata, Coprosma foetidissima*, *Coprosma rhamnoides*, *Coprosma dumosa*, and *Coprosma ciliata. Alsophila smithii* and *Dicksonia squarrosa* tree ferns are common.

Ground cover is primarily litter with various mosses (including *Dawsonia superba*, *Cyathophorum bulbosum*, *Hypopterygium novae-seelandiae* and *Mniodendron dendroides*), liverworts (particularly *Schistochila* spp.) and occasional patches of *Pseudodiphasium volubile*. Other cover includes *Nertera villosa*, *Nertera depressa, Nertera ciliata, Microlaena avenacea*, *Arthropodium candidum*, *Carex* sp., *Astelia fragrans*, *Hymenophyllum nephrophyllum*, *Lastreopsis hispida*, *Sticherus cunninghamii*, *Parablechnum novae-zealandiae*, *Lomaria discolor*, *Hymenophyllum demissum*, *Hymenophyllum revolutum*, *Notogrammitis billardierei*, *Metrosideros diffusa*, and scattered seedlings/young plants of canopy and shrub tiers.

Climbers include *Ripogonum scandens*, *Freycinetia banksii*, *Metrosideros diffusa*, *Metrosideros fulgens*, *Metrosideros perforata* and *Rubus cissoides*.

Epiphytes include *Asplenium flaccidum*, *Grammitis* spp., *Hymenophyllum revolutum*, *Hymenophyllum* spp., *Polyphlebium venosum*, *Tmesipteris tannensis*, *Zealandia pustulata subsp. pustulata*, *Astelia fragrans*, *Pterophylla racemosa* and *Quintinnia serrata*.

No major change has occurred in Vegetation Type 2/3 between 2012 and 2024.
(See Figures 15a - 15b).

Type 2/3A – Mature Hardwood Forest, Podocarp Element Reduced/Absent:

This is a variation of Type 2/3 occurring particularly on foot slope faces in the northern portion of Area 2. The main difference is that the emergent podocarp element typical of Type 2/3 is significantly reduced and absent in places, the canopy height is lower (est. 8 – 12 metres on densest-cover faces) and has a higher proportion of *Alsophila smithii* and *Dicksonia squarrosa* tree ferns and *Ripogonum scandens* and *Freycinetia banksii* thickets.

No major change has occurred in Vegetation Type 2/3A between 2012 and 2024.
(See Figures 15a - 15b).

Figures 15a & 15b - Example of Vegetation Types 2/3 & 2/3A:

Typical composition and stature of Vegetation Type 2/3A on face terrain, grading into Vegetation Type 2/3 in higher ridge areas.

15a - State in 2012:

15b - State in 2024:

Type 2/3B – Poorly Drained Lower Stature Hardwood Forest with Minor Presence of Dacrycarpus dacrydioides:

This is a relatively small area on a slight terrace c. 3 metres high along its western margin. It is adjacent to Macgregor Creek on its northern edge and at the same level, exhibiting poor drainage and recent alluvial deposits from Macgregor Creek overflow. The vegetation here grades to Vegetation Type 2/3A, however key differences are lower canopy height (c. 6 – 10 metres), extremely dense thickets of *Ripogonum scandens* and *Freycinetia banksii* as canopy cover in conjunction with hardwoods as per Vegetation Type 2/3A and a low incidence of *Dacrycarpus dacrydioides* as saplings and pole sized stems and a single stem of tree size estimated at c. 60 cm dbh. The few emergent *Dacrydium cupressinum* trees present show advanced dieback, likely a result of sedimentation and impeded drainage due to the gravel and silt deposition by Macgregor Creek.

No major change has occurred in Vegetation Type 2/3B between 2012 and 2024.
(See Figures 16a - 16b).

Sub-type 2/3B - Wetland:

This is a small sub-area (0.252 hectares) within Vegetation Type 2/3B assessed as wetland (Appendix I, Map 7, Site W8). The most applicable wetland class is a seepage. Canopy cover is typically 5 – 7 metres high of extremely dense and closed *Frecinetia banksii* interlaced with *Ripogonum scandens*. Occasional *Dacrycarpus dacrydioides* saplings are emergent. Shrub stratum species include *Coprosma propinqua, Coprosma colensoi, Coprosma lucida, Coprosma* sp., *Coriaria arborea, Ascarina lucida* and *Dicksonia squarossa.* Ground cover includes occasional *Austroderia richardii* along with *Carex* sp., and *Juncus edgariae,* the ferns *Parablechnum novae-zelandiae*, *Parablechnum procerum*, and *Lastreopsis hispida*, the herb *Nertera depressa*, and the moss *Mniodendron dendroides.* While the majority of vegetation cover is comprised of facultative upland species (*Freycinetia banksia, Ripogonum scandens, Dicksonia squarossa, Carex uncinata,*) there is nevertheless a component of facultative (e.g., *Dacrycarpus dacrydioides*, *Coprosma propinqua, Austroderia richardii*), and facultative wetland (e.g., *Juncus edgariae*) species present. While vegetation may have excluded this area from wetland status, the time and effort required to undertake a vegetation plotting exercise at the level described by Clarkson (2013) was deemed unwarranted given the presence of standing water. A practical approach taken is that wetland designation for this area is on the basis of an exhibited wetland hydrology primary indicator (MFE, 2022) being standing water presence in combination with the vegetation assemblage present that comprises at least some hydrophytes. N.B: This approach is deemed satisfactory in this case where the result is designation as wetland (a precautionary approach), whereas it would not be if being used as rationale for a non-wetland designation.

Figures 16a & 16b - Example of Vegetation Type 2/3B:

Vegetation Type 2/3B occurs at middle-left of the picture adjacent to Macgregor Creek. The relatively small area of this type is evident as naturally occurring dieback of hardwoods and emergent *Dacrydium cupressinum* trees along the true-left creek margin.

16a - State in 2012:

16b - State in 2024:

Figure 17 - Example of Vegetation Sub-type 2/3B Wetland:

Sub-type 2/3B Wetland occupies a small area of slight depression formed between a recent alluvial flat on the Waitaha River true right, rising ground to the east, and gravel buildup from the southern margin of the Macgregor Creek outwash fan. It appears to receive water possibly from Macgregor Creek subsurface seepage and the same from the rising forested ground to its east, in addition to precipitation. This is Site W8 in 2024.

Type 2/4 – Regenerating Podocarp/Hardwood Forest (Stage 2; Average Canopy Height > Stage 1):

This occurs on two sets of recent terrace surfaces (slightly higher and older than that supporting Vegetation Type 2/1 cover). One smaller area is between Macgregor Creek and Granite Creek – this intergrades eastward with Type 2/3 and 2/3A. A larger area extends in a band from Granite Creek south to about NZTM E5224240; N1415340 and east to the foot of a terrace face beyond which it intergrades upslope with its Vegetation Type 2/4A sub-type in places and otherwise Vegetation Type 2/3. Vegetation Type 2/4 is podocarp/hardwood forest in a regenerational phase slightly more advanced than that of Vegetation Type 2/1. Canopy height is typically c. 6 – 10 metres with tree ferns a significant component in places. No large podocarp or hardwood trees are present.

Canopy cover is principally *Pterophylla racemosa* and the tree ferns *Alsophila smithii* and *Dicksonia squarrosa*. Other canopy hardwoods of less frequent occurrence are *Quintinnia serrata, Carpodetus seratus*, *Griselinia littoralis*, and *Pennantia corymbosa*. Occasional *Pectinopitys ferruginea* and *Dacrydium cupressinum* pole-sized (< 20 cm dbh) stems are emergent above the hardwood component, mainly along the western margin of this type. *Ripogonum scandens* occurs in the canopy in places (and in lower tiers).

The shrub tier includes canopy species regeneration and tree ferns along with *Pseudopanax crassifolius, Pseudopanax colensoi, Ascarina lucida, Hedycarya arborea, Melicytus ramiflorus, Coprosma rotundifolia, Coprosma ciliata, Coprosma dumosa*, and *Pseudowintera colorata.* Along margins *Coprosma* species are prevalent, including those internal to the forest plus *Coprosma propinqua* and *Coprosma elatirioides.*

Ground cover species include the mosses *Cyathophorum bulbosum*, *Hypopterygium novae-seelandiae* and *Mniodendron dendroides,* liverworts (particularly *Schistochila* spp. and occasional *Monoclea forsteri*), *Parablechnum novae-zealandiae, Lomaria discolor, Cranfillia fluviatilus, Austroblechnum colensoi, Lastreopsis hispida, Asplenium bulbiferum*, *Asplenium polyodon, Uncinia* spp*., Nertera villosa, Nertera depressa*, *Microlaena avenacea* and *Metrosideros diffusa.*

Climbers include *Ripogonum scandens*, *Rubus cissoides* and *Metrosideros diffusa*.

Epiphytes include *Dendrobium cunninghamii*, *Asplenium flaccidum*, *Grammitis* spp., *Hymenophyllum* spp., *Polyphlebium venosum*, *Rumohra adiantiformis, Astelia fragrans*, *Melicytus ramiflorus*, *Pterophylla racemosa* and *Quintinnia serrata*.

Type 2/4A - Regenerating Podocarp/Hardwood Forest (Stage 3; Average Canopy Height > Stage 2):

This is a variation of Vegetation Type 2/4 occurring on a slightly more elevated (3 – 4 metres higher) terrace. The main difference is that canopy height is greater (est. 14 metres average) and with *Pterophylla racemosa* trees of 60 – 100+ cm dbh scattered through as emergents between 18 and 24 metres tall. Emergent podocarps are extremely rare but *Dacrydium cupressinum* and *Dacrycarpus dacrydioides* stems are present in the northern part of the surveyed zone.

No major change has occurred in Vegetation Types 2/4 or 2/4A between 2012 and 2024.
(See Figures 17a - 17b).

Sub-type 2/4 & 2/4A - Wetland:

Seven separate small areas (ranging from 0.0084 hectares to 0.0865 hectares) occur within their broader areas of Vegetation Types 2/4 and 2/4A (**Appendix I, Map 8**, Sites W1 – W7).

While dense forest species vegetation cover may have excluded a significant proportion of these areas (e.g., W1, and W4 – W6) from wetland status based on the 50/20 rule and prevalence index components of the Wetland Delineation Protocols (MFE, 2020), the time and effort required to undertake a vegetation plotting exercise at the level described by Clarkson (2013) was deemed unwarranted given the presence of standing water or evidence of this at each. A pragmatic approach taken is that wetland designation for these areas is on the basis of an exhibited wetland hydrology primary indicator (MFE, 2022) being the standing water presence. N.B: This approach is deemed satisfactory in this case where the result is designation as wetland (a precautionary and conservative approach, resulting in a positive wetland identification), whereas it would not be if being used as rationale in arguing for a non-wetland designation.

The smaller areas may also have been excluded on basis of size (i.e., each being less than 0.05 hectares), however without specific threatened species assessment to determine presence/absence, they are included, again as a precautionary measure.

The characteristics these seven sites designated wetland are:

Site W1 – Measured dimensions 14.0 metres x 6.0 metres therefore occupies 0.0084 hectares as an expanded strip each side of a minor (c. 1.5 metres wide average, flowing minimally) forest waterway. Exhibiting standing water and signs of this, as a wetland class the most applicable is a seepage. Canopy vegetation is principally *Pterophylla racemosa* and *Alsophila smithii* as closed cover, and sparse, patchy liverwort/bryophyte ground cover with the occasional monocots *Carex uncinata* and *Microlaena avenacea*.

Site W2 - Measured dimensions 17.0 metres x 9.5 metres therefore occupies 0.0162 hectares as an impeded portion of minor waterway (c. 2.0 m wide, flowing 75 mm deep) at the upper margin of a small terrace dropover (4 – 6 metres). Exhibits standing water, and as a wetland class the most applicable is a seepage. Cover is very sparse *Pterophylla racemosa* and *Dicksonia squarossa* as partial and open canopy, with prevalent *Carex* spp., *Metrosideros diffusa* and occasional *Juncus* spp. as ground cover.

Site W3 – An area of 0.0865 hectares determined via GPS positions taken around the perimeter and plotting of these. It occurs in a slight depression on an otherwise flat, low terrace, between a terrace footslope at the area's eastern margin and dry ground further west. Exhibits standing water, and as a wetland class the most applicable is a seepage. Cover is sparse *Pterophylla racemosa* and *Dicksonia squarossa* as very open partial canopy, with *Coprosma* spp. in the shrub stratum and prevalent *Carex* spp., and lesser presence of *Metrosideros diffusa*, *Nertera* sp. and occasional *Juncus* sp. as ground cover.

Site W4 - Measured dimensions 17.0 metres x 3.0 metres therefore occupies 0.0051 hectares as an impeded portion of a minor (c. 2 metres wide and 75 mm deep with extremely slow flow rate) forest waterway channel, proximal to the lower footslope of rising ground to the east. Exhibits standing water, and as a wetland class the most applicable is a seepage. Cover is *Pterophylla racemosa* and *Alsophila smithii* as a dense, closed canopy, with occasional *Coprosma rotundifolia* and *Coprosma rhamnoides* in the shrub stratum. *Metrosideros diffusa, Microlaena avenacea* and *Carex uncinata* are present as ground cover at standing water margins, and a bryophyte/liverwort community prevails in submerged parts.

Site W5 - Area of 0.0120 hectares determined via GPS positions taken along a centre line and plotting of these, with an associated strip of 1.5 metres either side. Based on its narrow sinuous form, appears to be a depression from a historical (no longer flowing) minor stream channel. Exhibits standing water, and as a wetland class the most applicable is a seepage. Cover is dense *Pterophylla racemosa* and *Alsophila smithii*, with scattered *Coprosma rhamnoides*, *Coprosma rotundifolia* and *Ascarina lucida* in the shrub stratum. Ground cover is *Blechnum* sp., *Microlaena avenacea* and occasional *Carex uncinata*.

Site W6 – An area of 0.0511 hectares determined via GPS positions taken around the perimeter and plotting of these. This area is a minor depression with standing water in places and others drier but with evidence of water having been present i.e., ephemeral wetland. Cover is variable density *Pterophylla racemosa* and *Dicksonia squarrosa* typically 6 - 8 m high, with *Ascarina lucida*, *Coprosma* spp., *Carpodetus serratus* and *Ripogonum scandens* in the shrub stratum, and with the monocots *Carex uncinata* and *Microlaena avenacea* and liverworts (including *Monoclea forsteri* and *Schistochila* spp.), as ground cover generally, with a bryophyte abundance as ground cover in ephemeral portion(s).

W7 – An area of 0.0294 hectares determined via GPS positions taken around the perimeter and plotting of these. In a slight depression on an otherwise flat, low terrace, at the terminus of what appears to have been an historical overflow channel originating higher up Granite Creek. Exhibits standing water, and as a wetland class the most applicable is a seepage. Appears conjoint with a minor (c. 0.5 metres wide average, flowing 90 mm deep) forest waterway at NZTM E1415441 N5224750. Cover is sparse, low *Pterophylla racemosa* and *Dicksonia squarrosa,* with *Coprosma* spp., *Ascarina lucida, Carpodetus serratus* and *Ripogonum scandens* in the shrub stratum and with prevalent *Carex* spp., and lesser presence of *Metrosideros diffusa, Nertera* sp., *Microlaena avenacea* and occasional *Austroderia richardii* as ground cover.

Figures 18a & 18b - Example of Vegetation Type 2/4

Typical Vegetation Type 2/4 composition and cover – i.e. the hardwood/tree fern regeneration extending from the grassed flat margin back to the foot of the ridge in middle distance where it grades into Vegetation Type 2/3.

18a - State in 2012:

18b - State in 2024:

Figure 19 – Example of Vegetation Sub-type 2/4 Wetland Zone:

Sub-type 2/4 Wetland physical attributes and vegetation, being an expanded zone either side of a minor forest waterway.This is Site W1 in 2024.

Figure 20 – Example of Vegetation Sub-type 2/4 Wetland Zone

Sub-type 2/4 Wetland showing ground cover and shrub vegetation, being an impeded zone of a minor forest waterway at an upper terrace margin. *Metrosideros diffusa* is prevalent as a climber on the tree fern stems and as ground cover, along with *Carex* spp. This is Site W2 in 2024.

Figure 21 – Example of Vegetation Sub-type 2/4 Wetland Zone

Sub-type 2/4 Wetland, occupying a slight depression on an otherwise flat, low terrace. Shows typical ground cover, shrub and tree strata composition and stature. This is Site W3 in 2024.

Figure 22 - Example of Vegetation Sub-type 2/4A Wetland Zone

Sub-type 2/4A Wetland, occupying a slight depression that appears to have been part of an historical minor waterway. Shows typical ground cover and shrub strata composition and stature, with *Metrosideros diffusa* evident as a climber on the tree fern stems and as ground cover. This is Site W5 in 2024.

Figure 23 - Example of Vegetation Sub-type 2/4A Wetland Zone

Sub-type 2/4A Wetland, occupying a depression that appears to have been part of, or an end to, an historical overflow channel of Granite Creek. Shows typical ground cover and shrub strata composition and stature. This is Site W7 in 2024.

Type 2/5 – Regenerating Podocarp/Hardwood Tree and Shrub Admixture With Occasional Emergent Trees:

Occupying the northern c. 2/3 of a low outwash terrace/ex alluvial flat, this area of podocarp/hardwood forest is in early stages of regeneration. While there are occasional small clearings, the canopy is closed over the majority of the area and is c. 8 – 12 metres high, however drops in height and thins with progression southward to become c. 6 – 7 metres as it intergrades with Vegetation Type 2/6 and tree ferns become an increasing proportion of cover here.

Scattered larger *Pterophylla racemosa* trees of 40 - 80 cm dbh, occasional small *Dacrydium cupressinum* trees of c. 30 cm dbh, and very occasional *Metrosideros umbellata* trees (largest observed was est. 90 cm dbh) occur as canopy emergents.

Predominant canopy species is *Pterophylla racemosa,* along with the tree ferns *Alsophila smithii* and *Dicksonia squarrosa*. *Carpodetus serratus, Griselinia littoralis, Pseudopanax crassifolius, Dacrydium cupressinum* and *Pectinopitys ferruginea* are less frequently occurring components.

Understory and shrub tier species include those of the canopy, and *Pseudowintera colorata, Hedycarya arborea*, *Melicytus ramiflorus, Ascarina lucida, Pennantia corymbosa, Quintinnia serrata, Pseudopanax colensoi, Coprosma rhamnoides, Coprosma rotundifolia, Coprosma dumosa* and *Coprosma* sp. Very occasional *Dacrycarpus dacrydioides* saplings were observed. Along margins, scattered *Carmichaelia arborea* and *Coprosma propinqua* are present.

Ground cover species include the mosses *Cyathophorum bulbosum*, *Hypopterygium novae-seelandiae* and *Mniodendron dendroides*, liverworts (*Schistochila* spp. and occasional *Monoclea forsteri*), occasional clusters of *Polystichum vestitum,* and *Cranfillia fluviatilus, Lastreopsis hispida, Nertera villosa, Nertera depressa*, *Cardamine forsteri*, *Stellaria media, Uncinia* spp.*, Microlaena avenacea, Acaena anserinifolia* and *Metrosideros diffusa.*

Climbers include sparse *Ripogonum scandens*, *Rubus cissoides, Rubus schmidelioides* and *Metrosideros diffusa*.

Epiphytes observed were *Asplenium flaccidum*, *Tmesipteris tannensis*, *Grammitis* spp., *Hymenophyllum* spp., *Polyphlebium venosum*, *Rumohra adiantiformis, Asplenium flaccidum, Melicytus ramiflorus*, *Pterophylla racemosa* and *Quintinnia serrata*.

No major change has occurred in Vegetation Type 2/5 between 2012 and 2024.
(See Figures 18a – 18b and 19a – 19b).

Figures 24a & 24b -Example of Vegetation Types 2/5 & 2/6:

Vegetation Type 2/5 composition and cover at the southern end of its area, grading into Vegetation Type 2/6.

24a - State in 2012:

24b - State in 2024:

Type 2/6 – Regenerating Hardwood Tree/Shrub/Tree Fern Admixture with Grassed Clearings:

This type grades from Type 2/5 and occupies the southern c. 1/3 of the same low outwash terrace/ex alluvial flat. Regeneration of hardwood forest tree and shrub species, tree ferns and colonising shrub species occur as scattered individual stems or as small closed-cover stands interspersed with variable-sized grassed clearings. A moderate amount of recent and old deer sign (grazing and droppings) was evident in these clearings however there was very little sign of browse on other vegetation (shrubs, trees etc.).

Predominant tree and shrub species are *Griselinia littoralis*, *Pterophylla racemosa, Melicytis ramiflorus, Pseudowintera colorata*, *Pseudopanax crassifolius, Raukaua simplex, Carpodetus serratus*, *Hedycarya arborea*, *Myrsine divaricata, Ascarina lucida*, *Pennantia corymbosa*, *Coprosma rugosa, Coprosma rubra, Coprosma elatirioides*, *Coprosma propinqua, Coprosma dumosa*, and the tree ferns *Alsophila smithii* and *Dicksonia squarrosa.* Occasional *Podocarpus laetus* saplings were observed.

Monocots and other ground cover species include regeneration of the tree and shrub species along with *Austroderia richardii* and scattered *Astelia fragrans, Parablechnum novae-zealandiae, Cranfillia fluviatilus, Histiopteris incisa, Pteridium esculentum, Paesia scaberula, Polystichum vestitum, Notogrammitis heterophylla, Metrosideros diffusa, Cardamine forsteri, Acaena anserinifolia* and *Stellaria media.*

Climbers include *Rubus cissoides, Rubus schmidelioides*, *Metrosideros diffusa* and *Metrosideros perforata*.

Epiphytes, mainly occurring on tree ferns, include *Asplenium flaccidum*, *Tmesipteris tannensis*, *Grammitis* spp., *Hymenophyllum* spp., *Polyphlebium venosum*, *Rumohra adiantiformis, Astelia fragrans*, *Melicytus ramiflorus*, *Pterophylla racemosa* and *Quintinnia serrata*.

Grasses and broadleaved herbaceous plants in clearings include *Agrostis tenuis*, *Poa* sp., *Anthoxanthum odoratum, Holcus lanatus, Ranunculus repens, Lotus pedunculata*, *Taraxacum officinale, Cirsium arvense, Cirsium palustre, Hypochoeris radicata,* and *Plantago lanceolata*.

Species present as ground cover along the margin with the active riverbed in what is a flood-inundation zone are as for Vegetation Type 2/2 but with increased presence of *Austroderia richardii.*

No major change has occurred in Vegetation Type 2/6 between 2012 and 2024.
(See Figures 19a – 19b and 20a – 20b).

Figures 25a & 25b - Example of Vegetation Types 2/5 & 2/6:

Emergent trees and the higher canopy of Vegetation Type 2/5 are shown in the background, with typical Vegetation Type 2/6 composition and cover in the foreground.

25a - State in 2012:

25b - State in 2024:

Figures 26a & 26b - Example of Vegetation Type 2/6:

Typical Vegetation Type 2/6 composition and cover – grassed clearings interspersed with shrub hardwood and tree fern clusters.

26a - State in 2012:

26b - State in 2024 (photograph taken from slightly more internal to Type 2/6 than in 2012):

Type 2/7 – Semi-grassed Alluvial Flat With Colonising Hardwood Shrub Presence:

This type occurs on a relatively recent alluvial flat. Colonising shrub species occur as individuals or clusters interspersed throughout a sporadically grassed area. It differs from Vegetation Types 2/2 and 2/6 in that it has a higher incidence of grass sward cover between and under shrub hardwoods.

Shrub and young tree species include *Coprosma rugosa*, *Coprosma propinqua*, *Coprosma areolata, Coprosma* sp., *Pennantia corymbosa, Carpodetus serratus, Aristotelia serrata,* and *Myrsine divaricata.*

Grasses and broadleaved herbaceous plants in main clear zones include *Agrostis tenuis, Poa* spp., *Anthoxanthum odoratum*, *Festuca* sp., *Holcus lanatus, Trisetum tenellum*, *Ranunculus repens, Lotus pedunculata, Taraxacum officinale, Hypochoeris radicata, Trifolium repens, Cirsium arvense*, *Cirsium palustre, Plantago lanceolata*, *Hydrocotyle novae-zelandiae* and *Acaena anserinifolia*.

Other ground cover species occurring singly or as patches are *Paesia scaberula, Polystichum vestitum, Parablechnum novae-zealandiae, Lomaria discolor, Histiopteris incisa* and *Austroderia richardii* (dense in places).

Ulex europaeus has established about the northern margin near the outwash fan of Macgregor Creek and is present in far higher concentrations than was the case in 2012.

A change noted in Vegetation Type 2/7 between 2012 and 2024 is increased site cover by *Coprosma ssp., Austroderia richardii,* and the *Ulex europaeus* weed incursion.
(See Figures 21a – 21b).

Figures 27a & 27b - Example of Vegetation Type 2/7:

Typical Vegetation Type 2/7 composition and cover.

27a - State in 2012:

27b - State in 2024 (photograph taken from slightly more internal to Type 2/7 and looking more easterly than in 2012):

Type 2/8 – Tree Fern/Hardwood Shrub/Monocot with Low Incidence of Dacrycarpus dacrydioides:

A restricted area on the immediate true left of Macgregor Creek, this has been affected by shingle and rock deposits at times of flooding. Cover varies from c. 3 – 4 metres high where it grades to Vegetation Type 2/3B to the north and to Vegetation Type 2/4 to the south. Species composition is similar to Vegetation Type 2/4 re hardwood shrubs and tree ferns. There is a more open area closer to Macgregor Creek, where *Dicksonia squarrosa* and *Alsofila smithii* tree ferns are prevalent, along with scattered *Coprosma* spp. and *Rubus* spp. and *Metrosideros diffusa* clusters are common on supporting vegetation. Occasional *Dacrycarpus dacrydioides* seedlings and saplings are present. *Austroderia richardii* is frequent in the open and *Acaena anserinifolia* is present on gravel areas.

A change noted here is the increased occurrence of *Ulex europaeus* since 2012.
(See Figures 22a – 22b).

Figures 28a & 28b - Example of Vegetation Type 2/8:

Typical Vegetation Type 2/8 composition and cover is shown in the mid foreground.

28a - State in 2012:

28b - State in 2024:

Type 2/9 – Mixed Ground Cover/Shrub Hardwood Riparian:

This occupies narrow (10 – 20 metres wide) strips on either side of Alpha Creek, and is typical of vegetation colonising relatively recent and/or disturbed rock and alluvial deposit surfaces in forested valley catchments.

Hardwood tree regeneration is *Pterophylla racemosa* and *Metrosideros umbellata*. Shrub species include *Coriaria arborea, Veronica salicifolia, Carpodetus serratus, Aristotelia serratus, Ascarina lucida, Fuchsia excorticata, Carmichaelia arborea, Coprosma* spp., *Olearia ilicifolia* and *Olearia avicenniifolia.*

Common ground cover species are mosses, lichens, *Pseudodiphasium volubile*, *Parablechnum novae-zealandiae, Austroblechnum penna-marina subsp. alpina, Paesia scaberula, Lastreopsis hispida, Austroderia richardii,* and scattered *Lotus pedunculata*, grasses, broadleaved herbs e.g., *Hypochoeris radicata*, *Acaena anserinifolia* and *Nertera depressa*.

A change noted in Vegetation Type 2/8 between 2012 and 2024 is increased site cover via growth of indigenous shrub hardwood species.
(See Figures 23a – 23b).

Figures 29a & 29b - Example of Vegetation Type 2/9:

Typical Vegetation Type 2/9 composition and cover is shown in the foreground.

29a - State in 2012:

29b - State in 2024:

Type 2/10 – Colonising/Pioneering Shrub Hardwood

This occupies a variable width strip (average c. 120 metres wide, and totaling c. 20.7 hectares) on an area of recent outwash fan on the true right side of Macgregor Creek, and is typical of vegetation colonising relatively recent and/and or frequently disturbed slip and alluvial deposit surfaces. Canopy cover is dense, grading in height from 5 – 6 metres average at the southern margin bordering the Macgregor Creek bed, to 6 – 8 metres average toward the northern margin with the farmland. This gradation reflects a difference in age since stream channel disturbance of the site, the higher vegetation being on surfaces having had a longer duration of non-disturbance. The complete absence of trees reflects young landform surface age.

Hardwood tree regeneration (only a canopy component still in the sapling stage) is *Pterophylla racemosa* and *Griselinia littoralis.* While this tree representation is a far lesser component of cover than the various shrub species in the southern portion of the site, it increases concomitant with diminishing proportion of *Coriaria arborea* with progression northward. Shrub species include *Coriaria arborea* (abundant)*, Hedycarya arborea, Veronica salicifolia, Veronica subalpine, Aristotelia serratus, Fuchsia excorticata, Hedycaryia arborea, Melicytus ramiflorus, Hoheria glabrata, Coprosma colensoi*, *Coprosma propinqua*, *Coprosma rigida* and *Olearia avicenniifolia* at margins. *Dicksonia squarrosa* tree ferns are a scattered sub-canopy component.

*G*round cover is sparse (litter and rock prevail), but species present are monocots *Astelia fragrans* and *Carex uncinata*, (both occasional), and the ferns *Parablechnum novae-zealandiae, Phymatosorus diversifolius, Pyrrosia eleagnifolia, Asplenium flaccidum, Pakau pennigera, Polystichum vestitum,* and in more open zones and margins, *Paesia scaberula*. *Acaena anserinifolia* is present along margins. The moss *Thuidiopsis furfurosa* is frequent on exposed rock both under cover and in more open zones.

The climber *Muehlenbeckia australis* is common and *Metrosideros diffusa* is also present as a climber, but uncommon.

Phymatosorus diversifolius, Pyrrosia eleagnifolia, Asplenium flaccidum and *Notogrammitis heterophylla* are present epiphytically.

Existing tracks for vehicle use bisect the area giving access from the farm boundary to the Macgregor Creek bed. Vegetation along and in proximity to these open-margined sites includes more exotic species including *Anthoxanthum odoratum* (grass), and broadleaved herbaceous species e.g., *Hypochaeris radicata, Taraxacum officinale, Ranunculus repens, Lotus pedunculata* and *Digitalus purpurea.*

Leycesteria formosa is establishing in places near tracks and in some instances further away from tracking and in association/intermingled with the indigenous shrub cover. *Ulex europaeus* is present along margins but was not observed in interior, closed canopy zones.

Figure 30 – Unvegetated Bed of Macgregor Creek:

View looking south from southern margin of Vegetation Type 2/10 across the unvegetated active bed of Macgregor Creek (this track entry is at or proximal to the proposed access road/transmission line traverse of Vegetation Type 2/10, and the view across Macgregor Creek indicates the vegetation and footslope (middle distance) on which the transmission line pole to gain span height could be located.

Figure 31 - Example of Vegetation Type 2/10:

Typical Vegetation Type 2/10 composition and cover is shown to left and right of the access track (this track is at or proximal to the proposed access road/transmission line traverse location. View is looking south from approximately half way through the width of the Vegetation Type 2/10 strip.

Figure 32 - Macgregor Creek Bed and Vegetation Type 2/10:

View north across Macgregor Creek active bed to Vegetation Type 2/10 margin illustrating shrub cover stature and density, with complete absence of trees.

Figure 33 - Example of Vegetation Type 2/10 Northern Margin With Freehold Farmland:

The Vegetation Type 2/10 strip northern margin is at left (blue arrow). This view is looking south from the upper southeastern corner of the proposed staging area, with the vehicle in the middle distance (arrowed) parked at the upper southeastern corner of the larger of the two proposed spoil disposal areas. An example of open, exotic vegetation cover of the staging area is at right of photograph.

D.2(a)/ Other Observations Relating to Vegetation – Area 2

Generally, the state of vegetation of all types described above, both within the areas of proposed works and the wider area, appears healthy and stable with the exception of change due to naturally caused events e.g., occasional slips, changes in river channel location, and windfall zones, these being random and relatively infrequent. While possums and deer are present, browse effect on indigenous vegetation at all sites appears very low. Sign indicates low possum numbers. The sign that is present tends to be concentrated about forest margins bordering river flats and on the recent terraces and stream side faces with predominant broadleaved hardwood shrub cover, however the possum numbers present are having a very limited effect on vegetation in the Scheme project footprint and surrounding area.

Likewise for deer, sign is sporadic and concentrated on the grassed and sandy areas of flats. Grazing is evident on grassed clearing/flat areas but appears occasional and at a low level – this will be seasonally variable, highest in spring and summer – however even then would not be of significant detriment to the majority of indigenous vegetation present given the low deer population density. Once into areas of shrub/bush cover, deer movements disperse, and vegetation appears little affected.

No goats or goat sign were observed in this part of the Scheme area on the true-right of the Waitaha River above Macgregor Creek, however goats are present in moderate numbers on the true-left, from below Douglas Creek up to Labyrinth Creek.

Exotic herbaceous weed species adapted for wind dispersal of seed (e.g., *Cirsium* spp.) are present in low concentrations outside of forest areas e.g., along river and stream margins and in admixture with grasses on more open alluvial flat areas. *Ulex europaeus* has established in moderate density and appears to be expanding in coverage on the alluvial flat zone bordering the true-right of the Waitaha River and true-left of Macgregor Creek that carries Vegetation Types 2/7 and 2/8. It, along with *Leycesteria formosa* are also present in Vegetation Type 2/10 on the true right of Macgregor Creek. No other brushweed species were noted in any areas.

D.3/ Vegetation Type Description for Area 3

Type 3/1 – Non-indigenous, Partially Developed Farmland

This Type occurs across all of the c. 20.32 hectares occupied by both proposed spoil disposal areas and the proposed staging area.

The predominant vegetation is exotic, in two categories/strata:

1. Higher-stature woody weed being *Ulex europaeus* of varying density patches, of height up to c. 2.0 metres, occurring throughout. This appears to have been subject to previous spraying – at least 50% of former cover has been eliminated with remnant dead woody material devoid of foliage present now.

2. Ground cover comprised of broadleaved herbaceous species, predominantly weeds, and introduced monocots (grasses). Species include *Digitalus purpurea* (abundant), *Jacobaea vulgaris* (abundant), *Hypochaeris radicata, Taraxacum officinale, Ranunculus repens, Trifolium repens, Lotus pedunculata, Rumex obtusifolius*, *Cirsium vulgare*, *Cirsium arvense*, *Holcus lanatus,* and *Anthoxanthum odoratum* (abundant).

Figure 34 – Example of Vegetation Type 3/1 in Larger Proposed Spoil Disposal Area:

Typical predominant exotic species cover type, species composition and density within Vegetation Type 3/1 where *Ulex europaeus* is up to 2.0 metres high and an increased cover component. This photograph is taken c. mid-way through the larger proposed spoil disposal area, looking north northeast.

Figure 35 – Example of Vegetation Type 3/1 in Larger Proposed Spoil Disposal Area:

Typical predominant exotic species ground cover type, species composition and density within Vegetation Type 3/1 where *Ulex europaeus* is a less dense cover component. This photograph is taken c. one third of the way through the larger proposed spoil disposal area, looking north.

Figure 36 - Example of Vegetation Type 3/1 in Larger Proposed Spoil Disposal Area:

Typical predominant exotic species ground cover type, species composition and density within Vegetation Type 3/1 where *Ulex europaeus* is not a cover component. This photograph is taken near the northern boundary of the largest proposed spoil disposal area with the well-developed farmland, looking south across the centre of the spoil disposal area.

Figure 37 - Existing Modification In Vegetation Type 3/1 in Larger Proposed Spoil Disposal Area:

Degree of existing modification by grazing and farm track establishment and illustrating typical exotic vegetation type and cover. Photograph is taken from the track that bisects this larger proposed spoil disposal area and view is looking east up the approximate middle of the area from c. 60 metres inside the area from its western margin with the fully developed farmland.

Figure 38 - Existing Modification In Vegetation Type 3/1 in Larger Proposed Spoil Disposal Area:

Degree of existing modification by grazing and farm track establishment and illustrating typical exotic vegetation type and cover. Photograph is taken from the track that bisects this larger proposed spoil disposal area and view is looking west down the approximate middle of the area.

Figure 39 - Example of Vegetation Type 3/1 in Staging Area:

Typical predominant exotic species ground cover type, species composition and density within Vegetation Type 3/1 where *Ulex europaeus* is not a cover component. This photograph is taken mid way along the southern boundary of the proposed staging area, looking east across it, toward the smaller proposed spoil disposal area, located in the middle distance.

Figure 40 - Existing Modification in Vegetation Type 3/1 in Smaller Proposed Spoil Disposal Area:

Exotic vegetation cover and degree of existing modification by grazing and farm track establishment in the smaller of the two proposed spoil disposal areas and illustrating typical exotic vegetation type and cover. View is looking north along a possible route for heavy vehicle access, from the southeastern corner of the spoil disposal area, with the fully developed farmland in the middle distance.

Figure 41 - Example of Vegetation Type 3/1 in Smaller Proposed Spoil Disposal Area:

Exotic vegetation cover and illustration of absence of indigenous vegetation in the smaller proposed spoil disposal area. View is northwest from near the spoil area's southeastern corner.

Figure 42 - Example of Vegetation Type 3/1 in Smaller Proposed Spoil Disposal Area:

Exotic vegetation cover and illustration of absence of indigenous vegetation in the smaller proposed spoil disturbance area. View is west from part way along the spoil area's eastern margin.

While indigenous species are present these constitute a minute proportion of site cover, assessment of occurrence being:

a) Two extremely minor areas (together totaling 496 square metres at c. 50% cover i.e., 248 square metres) of indigenous tree/shrub occurrence:

   i. Zone 1 consists of five *Pterophylla racemosa* stems ranging from 20 – 35 centimetres diameter at breast height and scattered shrub stature (c. 3.0 metres high) *Fuchsia excorticata* stems intermingled with *Ulex europaeus* in one zone of 9 metres wide x 31 metres long centred on NZTM E1415980 N5226022.

   ii. Zone 2 comprises six *Pterophylla racemosa* stems ranging from c. 20 – 35 centimetres diameter at breast height and ten *Pterophylla racemosa* poles (>10 centimetres and < 20 centimetres diameter at breast height), seven scattered shrub stature (c. 3.0 metres high) *Fuchsia excorticata* stems and one *Coprosma* sp. shrub stem in a second zone of 7 meters wide x 31 metres long centered on NZTM E1416110 N5226040.

   Other than these two instances, woody indigenous species are absent.

b) Infrequent indigenous fern species (*Polystichum vestitum*, *Paesia scaberula*, *Histiopteris incisa*, *Austroblechnum penna-marina*, *Phymatosorus diversifolius, Pyrrosia eleagnifolia,* and *Cranfillia deltoides*) are present in extremely low densities and as small-sized (generally less than 0.3 metres high) plants in some rocky piles; Sparse *Pteridium esculentum* was observed only in one location and occupied an estimated 0.50 square metres.

c) The herb *Hydrocotyle novae-zealandiae* was observed in only one location of approximately 1.5 square metres, and *Epilobium nerteroides* slightly more frequently.

d) *Thuidiopsis furfurosa* moss is common and present as partial cover however this is generally in admixture with exotic grass and broadleaved herbaceous species on rocks.

Considering the above observations, combined with the predominance of exotic species and the degree of site modification (grazing), the indigenous component present in the proposed spoil disposal

areas and staging area is not considered a viable indigenous vegetation community. Vegetation present lacks integrity, viability and the ecosystem function of an indigenous vegetation assemblage, and does not warrant consideration as such, being more correctly classed and considered as an exotic assemblage.

Figure 43 – Woody Indigenous Vegetation in Vegetation Type 3/1:

One of two minor instances of indigenous woody species present in the larger of the two proposed spoil disposal areas (taller emergent stems are unthrifty *Pterophylla racemosa* and the linear band between the arrows is sparse shrub status *Fuchsia excorticata* and *Ulex europaeus* mix). This area centres on NZTM E1415980 N5226022.

Figure 44 - Woody Indigenous Vegetation in Vegetation Type 3/1:

Second of two minor instances of indigenous woody species present in the larger of the two proposed spoil disposal areas (stems are unthrifty *Pterophylla racemosa*). This area centres on NZTM E1416110 N5226040. Note absence of all other indigenous cover and prevalence of exotic species grass and broadleaved herbaceous ground cover.

Figure 45 – Exotic/Indigenous Species in Vegetation Type 3/1:

Example of ground cover consisting of exotic grass and broadleaved herbaceous species beneath the small tree and pole stem *Pterophylla racemosa* in the patch shown in Figure 44.

D.4/ Vegetation Type Descriptions for Area 4

The Scheme footprint in Area 4 occurs within three categories of land use/vegetation cover.

Category 1 – Indigenous Vegetation Type 4/1:

This is a small area (c. 3.21 hectares) of vegetation on the McLean Farm freehold (Scheme infrastructure in this farm area is shown on **Map 5, Appendix I**), considered an indigenous community, being regenerating indigenous forest/shrub cover. Scheme effect on it is due to proposed access road and transmission line location (although the proposed access road route will bisect it, effects of this component on it are reduced by utilisation (with upgrade) of the existing formed farm track that averages c. 4.5 metres wide.

Type 4/1 – Colonising/Pioneering Shrub Hardwood

The c. 3.21 hectares (reduced from total delineation area of 3.377 hectares to adjust for existing farm tracking and waterway bed) of Vegetation Type 4/1 and its partial riparian location is shown in **Figure 46** and **Figure 47**.

Broadleaved indigenous hardwoods comprise a closed canopy of varying in height from c. 3 meters to 7 metres, with occasional regenerating podocarps (*Dacrydium cuppressinum* and *Pectinopitys ferruginea*) and *Pterophylla racemosa* as emergents. Predominant canopy species are *Pterophylla racemosa*, *Melicytus ramiflorus*, *Schefflera digitata*, *Fuchsia excorticata*, *Pennantia corymbosa* and *Aristotelia serrata*. Understory/shrub species include regeneration of canopy species along with *Myrsine divaricata*, *Hedycarya arborea*, *Ascarina lucida*, *Coprosma rotundifolia*, *Coprosma colensoi*, *Coprosma propinqua*, and *Dicksonia squarrosa* tree ferns.

Typical ground cover species are *Parablechnum novae-zelandiae*, *Austroblechnum lanceolatum*, *Pakau pennigera, Lomaria discolor*, *Polystichum vestitum*, *Cranfillia fluviatilus*, *Asplenium bulbiferum*, *Urtica dioica* subsp. *dioica*, *Acaena anserinifolia*, *Carex uncinata*, the mosses *Cyathophorum bulbosum* and *Mniodendron dendroides* and the thallose liverwort *Monoclea forsteri.*

Climbers are *Ripogonum scandens, Rubus schmidelioides, Metrosideros diffusa, and Muehlenbeckia australis* (abundant, and a canopy component).

Epiphytes include *Asplenium flaccidum*, *Phymatosorus diversifolius*, *Earina autumnalis*, and the moss *Weymouthia mollis*.

Figure 46 - Location and Extent of Vegetation Type 4/1:

The semitransparent yellow-green shaded area delineates Vegetation Type 4/1 as 3.377 hectares. The existing farm track/accessway bisecting the area is indicated by the pink arrows, and the proposed access road upgrade utilises this. Note: If an estimated 5% (1688 square metres) is deducted for the existing vehicle access (indicated by the pink arrows), streambed and other non-indigenous vegetated areas is deducted, total vegetated area of Type 4/1 reduces to c. 3.210 hectares for vegetation effect assessment purposes.

Figure 47 - Location and Extent of Vegetation Type 4/1 and Affected Areas:

The potentially affected portions of Vegetation Type 4/1 are shown by the bisecting purple line indicating a segment of the proposed new transmission line route, with yellow arrows indicating north/south extent of vegetation effect – distance between arrows is c. 85 metres, with proposed clearance width of strip being 10 metres i.e., 5 metres either side of the purple line. Blue arrows indicate the proposed access road route involving upgrade of the existing farm accessway.

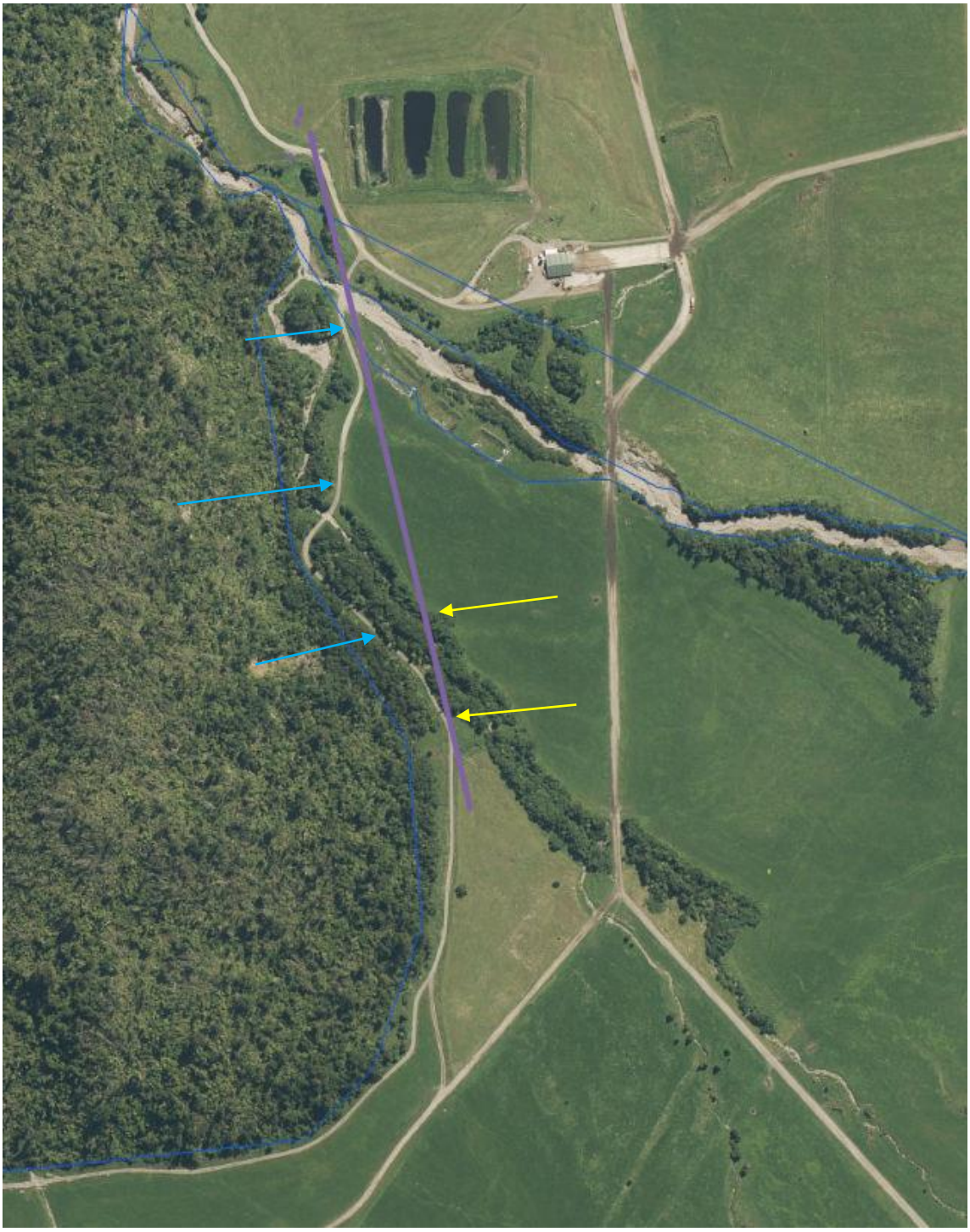


Figure 48 – Example of Vegetation Type 4/1:

This view shows typical species composition, stature, and cover of Vegetation Type 4/1. View is looking north from the proposed (existing gravelled road in foreground) access road upgrade route along the indicative route of the new transmission line where it likely bisects the Vegetation Type 4/1 strip (passes left of the emergent *Pectinopitys ferruginea* tree showing against the sky beyond the vehicle).

Figure 49 - Example of Vegetation Type 4/1:

View along the northern margin of the Vegetation Type 4/1 strip with the pasture border, showing typical species composition, stature, and cover.

Category 2 - Farmland/Rural Development Areas:

Land use here is farmland/rural development, the area being cleared of indigenous vegetation or, where an indigenous component is present it is extremely minor e.g., single isolated or widely scattered trees or small (deemed <0.5 ha) isolated patches of shrub vegetation such that the area(s) concerned are not of a scale to be considered viable indigenous vegetation or as comprising an indigenous community. Typical cover and condition in this zone are shown by Figures 50 – 62 being a sequence from Area 3 to commencement of the indigenous vegetation subject to zero nett effect by the Scheme (described herein as Category 3). **Appendix I, Map 10 and Map 11** show the location of the photograph representing each Figure in the progression along the proposed new access road and transmission line in the freehold farmland, and then the proposed transmission line upgrade route from the Waitaha Road end to the commencement of Category 3 vegetation (see below). Note that these points are not necessarily the exact location of the line - they are representative locations that best illustrate vegetation present along the route and its environs.

Figure 50 - Exotic Vegetation on Developed Farmland of the Rural Development Area:

View looking north from the northern margin of the Scheme's proposed Construction Staging Area 3 along the proposed route of the new access road and transmission line through developed pasture/farmland with no indigenous vegetation community.

Figure 51 - Exotic Vegetation on Developed Farmland of the Rural Development Area:

Northward progressional step - looking north along the proposed route of the new access road and transmission line (approximately following fenceline) through developed pasture/farmland with no indigenous vegetation community.

Figure 52 - Exotic Vegetation on Developed Farmland of the Rural Development Area:

Further northward progression step - looking north along the proposed route of the new access road and transmission line through developed pasture/farmland with no indigenous vegetation community, until the strip of Vegetation Type 4/1, part indicated between the yellow arrows.

Figure 53 - Exotic Vegetation on Developed Farmland of the Rural Development Area:

Further northward progression step - view looking north from the northern margin of Vegetation Type 4/1, along the proposed route of new transmission line through developed pasture/farmland with no indigenous vegetation community.

Figure 54 - Exotic Vegetation on Developed Farmland of the Rural Development Area:

Further northward progression step - looking north along the approximate route of new transmission line (likely along the right-hand side of the formed farm road (to be upgraded as part of the Scheme's access road) and through the developed pasture to the Waitaha Road) with no indigenous vegetation community.

Figure 55 - Exotic Vegetation on Developed Farmland of the Rural Development Area:

Further northward progression step - looking north along the proposed route of existing transmission line upgrade along the Waitaha Road from a point near where the new section of transmission line will link to the existing line, with no indigenous vegetation community.

Figure 56 - Exotic Vegetation on Developed Farmland of the Rural Development Area:

Further northward progression step - looking north along the proposed route of existing transmission line upgrade along the Waitaha Road, with no indigenous vegetation community.

Figure 57 - Exotic Vegetation on Developed Farmland of the Rural Development Area:

Further northward progression step - looking north along the proposed route of existing transmission line upgrade along the Waitaha Road, with no indigenous vegetation community.

Figure 58 - Exotic Vegetation on Developed Farmland of the Rural Development Area:

Further northward progression step - looking north along the proposed route of existing transmission line upgrade along the Waitaha Road, with no indigenous vegetation community.

Figure 59 - Exotic Vegetation on Developed Farmland of the Rural Development Area:

Further northward progression step - looking north along the proposed route of existing transmission line upgrade along the Waitaha Road, with no indigenous vegetation community.

Figure 60 - Exotic Vegetation on Developed Farmland of the Rural Development Area:

Further northward progression step - looking north along the proposed route of existing transmission line upgrade along the Waitaha Road, with no indigenous vegetation community.

Figure 61 - Exotic Vegetation on Developed Farmland of the Rural Development Area:

Further northward progression step - looking north along the proposed route of existing transmission line upgrade along the Waitaha Road, with no indigenous vegetation community.

Figure 62 - Exotic Vegetation of the Rural Development Area and Commencement of Indigenous Vegetation:

Further northward progression step - looking north along the proposed route of existing transmission line upgrade along the Waitaha Road, with indigenous vegetation community at right and in middle distance. Note: This illustrates the commencement of the nett zero effect area of transmission line upgrade on indigenous vegetation in Area 4.

Category 3 - Indigenous Vegetation in Which Scheme Components Occur With Zero Nett Clearance Effect:

This Scheme infrastructure here involves upgrading of c. 0.33 kilometres of the existing transmission line along the Waitaha Road to its junction with State Highway 6, and for a further c. 2.4 kilometres adjacent to State Highway 6 westward to near the State Highway 6 Waitaha River Bridge, then north and north east to join with the existing Westpower network at the Waitaha Substation on the WDC administered Bold Head Road.

The area traversed is a corridor occupied by indigenous shrub hardwood and tree regeneration (having been subjected to past clearance for line construction and maintenance) and interspersed in places with varying densities of exotic weeds including *Ulex europaeus* and *Rubus fruiticosus*, and where implementation of the Scheme results in no nett change to the indigenous vegetation that is present.

Typical cover and condition in this zone are shown by Figures 63 – 72 being a sequence continuing from that of Figures 50 - 62, to and around State Highway 6 and to the Waitaha Substation at Bold Head Road, illustrating the indigenous vegetation subject to zero nett effect by the Scheme.

Because Scheme effects in this area will only be due to upgrade of the existing transmission line and subsequent line maintenance, and will not involve any additional clearance this area is not attributed any Scheme clearance effects, as in nett they are nil here, i.e., no more clearance effect is attributable to the Scheme than has occurred or will occur from current transmission line existence, irrespective of the Scheme.

Appendix I, Map 10 and Map 11 show the location of the photograph representing each Figure in the progression along the proposed transmission line upgrade route from the commencement of Category 2 vegetation to the Waitaha Substation on Bold Head Road. Note that these points are not necessarily the exact location of the line - they are representative locations that best illustrate vegetation present along the route and its environs.

Figure 63 - Indigenous Vegetation Adjacent to Waitaha Road:

Further northward progression step - looking north along the proposed route of existing transmission line upgrade along the Waitaha Road showing the corridor in the podocarp/hardwood forest that will be utilised, to give zero nett clearance area effect of transmission line upgrade on indigenous vegetation in Area 4. The State Highway 6/Waitaha Road junction is in the photograph's middle distance.

Figure 64 - Indigenous Vegetation at Waitaha Road/State Highway 6 Junction:

West-running corridor in the podocarp/hardwood forest traversed by the existing transmission line – view is west from the Waitaha Road/ State Highway 6 junction. Zero nett clearance area effect of the Scheme's transmission line upgrade on indigenous vegetation pertains here.

Figure 65 - Indigenous Vegetation Adjacent to State Highway 6:

Further westward progression step – looking west along the corridor in the podocarp/hardwood forest and forest regeneration traversed by the existing transmission line, with State Highway 6 to the right. Zero nett clearance area effect of the Scheme's transmission line upgrade on indigenous vegetation pertains here.

Figure 66 - Indigenous Vegetation Adjacent to State Highway 6:

Further westward progression step – looking west along the corridor in the podocarp/hardwood forest and forest regeneration traversed by the existing transmission line, with State Highway 6 to the right. Zero nett clearance area effect of the Scheme's transmission line upgrade on indigenous vegetation pertains here.

Figure 67 - Indigenous Vegetation Adjacent to State Highway 6:

Further westward progression step – looking west along the corridor in the podocarp/hardwood forest and forest regeneration traversed by the existing transmission line, with State Highway 6 to the right. Zero nett clearance area effect of the Scheme's transmission line upgrade on indigenous vegetation pertains here.

Figure 68 - Indigenous Vegetation Adjacent to State Highway 6:

Further westward progression step of transmission line upgrade – Waitaha River Bridge is beyond the brow in State Highway 6. Zero nett clearance area effect of the Scheme's transmission line upgrade on indigenous vegetation pertains here.

Figure 69 - Indigenous Vegetation - State Highway 6 to Kakapotahi River:

Northward progression step of transmission line upgrade from State Highway 6 junction (in foreground) with Beach Road, toward the Waitaha Substation. Zero nett clearance area effect of the Scheme's transmission line upgrade on indigenous vegetation pertains here.

Figure 70 - Indigenous Vegetation - State Highway 6 to Kakapotahi River:

Illustrates typical vegetation in the existing transmission line corridor from S.H. 6/Beach Road junction - this view is looking south parallel to Beach Road on its western side, toward the location of the Figure 68, with the point where Figure 68 was taken from indicated by the pink arrow. Both existing network transmission lines are shown here, 11kV at right, 66kV at left. Zero nett clearance area effect of the Scheme's transmission line upgrade on indigenous vegetation pertains here.

Figure 71 - Indigenous Vegetation - State Highway 6 to Kakapotahi River:

North-northeastward progression step of transmission line upgrade from State Highway 6 to the Waitaha Substation, this view is from Beach Road showing the typical vegetation on east side of Beach Road, just prior to the Kakapotahi River crossing. Zero nett clearance area effect of the Scheme's transmission line upgrade on indigenous vegetation pertains here.

Figure 72 - Indigenous Vegetation - Kakapotahi River to Bold Head Road and Waitaha Substation:

Further north-northeastward progression step of transmission line upgrade from State Highway 6 to Waitaha Substation. This section is from the Kakapotahi River crossing to the Waitaha Substation on Bold Head Road. Zero nett clearance area effect of the Scheme's transmission line upgrade on indigenous vegetation pertains here. The Waitaha Substation is located c. 80 metres to right of the building's roof that is visible beyond and beyond the two poles in the middle distance, the pink arrow indicating its location.

APPENDIX E: SIGNIFICANCE OF THE VALUES RELATING TO TERRESTRIAL FLORA

This assessment applies policies pertaining to the assessment of natural heritage and significant indigenous vegetation contained in the following documents:

1. The West Coast Conservation Management Strategy 2010 – 2020 (DOC, 2010), developed under provisions of the Conservation Act, 1987: *"establishes objectives for the integrated management of natural and historic resources … It is the key conservation management tool which the Department uses to implement legal, policy and strategic direction"* (DOC, 2010, p. 3). The West Coast Conservation Management Strategy 2010 – 2020 Part 3, Section 3.3.2.3 Prioritising Natural Heritage Work, Policy 1 specifies seven criteria to apply in identifying what might constitute natural heritage and assessing its relative value.

2. The West Coast Regional Policy Statement (2020) – Section 7 Ecosystems And Indigenous Biological Diversity Policy 1(a) (WCRC, 2020) prescribes identification of significant indigenous vegetation via assessment under criteria contained in its Appendix 1. Nine criteria/guidelines are to be considered in recognising and providing protection for areas of indigenous vegetation, any one of which may determine whether an area is significant for purposes of Section 6(c) of the Resource Management Act 1991 (RMA, 1991).

3. The Westland District Plan, Section 4.9 Natural Habitats and Ecosystems - Policy D (WDC, 2002) prescribes eight criteria for use in defining areas of significant indigenous vegetation and significant habitats of indigenous fauna for purposes of Section 6(c) of the Resource Management Act 1991 (RMA, 1991) and states that all areas of significant indigenous vegetation and habitats shall meet one or more of these.

4. The Proposed Te Tai o Poutini Plan, Part 2 - Natural And Environment Values, Ecosystems and Indigenous Biodiversity, Policy ECO- P1 is to: *"Identify areas of significant indigenous vegetation and fauna habitat"*; and ECO – P1 (2) *"In the Buller and Westland Districts: (i) The criteria set out in Appendix 1 of the West Coast Regional Policy Statement will be used to assess significance*" (TTPPC, 2022).

The National Policy Statement for Indigenous Biodiversity (NPSIB) does not apply given the specific exclusion of its subclause 1.3(3): *"Nothing in this National Policy Statement applies to the development, operation, maintenance or upgrade of renewable electricity generation assets and activities and electricity transmission network assets and activities."* (MFE, 2023, p. 5). However, the NPSIB sets out criteria for identifying significant indigenous vegetation or significant habitats of indigenous fauna much the same way as in the RPS, TTPP and WDP.

The four criteria and their definitions for determining significance are (NPSIB, pp. 34 – 37):

> Representativeness: *"Representativeness is the extent to which the indigenous vegetation or habitat of indigenous fauna in an area is typical or characteristic of the indigenous biodiversity of the relevant ecological district."*
>
> Diversity and pattern: *"Diversity and pattern is the extent to which the expected range of diversity and pattern of biological and physical components within the relevant ecological district is present in an area."*
>
> Rarity and distinctiveness: *"Rarity and distinctiveness is the presence of rare or distinctive indigenous taxa, habitats of indigenous fauna, indigenous vegetation or ecosystems."*
>
> Ecological context: *"Ecological context is the extent to which the size, shape, and configuration of an area within the wider surrounding landscape contributes to its ability to maintain indigenous biodiversity or affects the ability of the surrounding landscape to maintain its indigenous biodiversity."*

Although not strictly relevant to this application, it is noted that the four NPSIB criteria for identifying significant natural areas are largely reflected in and parallel those of the RPS, TTPP and WDP so are considered covered by the significance assessments in this report made under the latter three planning documents.

Table 4 contains the criteria from the four different sources discussed above and aligns these criteria where they vary in terminology but are deemed to have the same or similar intent, and where a criterion from one source can apply more than once to a criterion or criteria from other sources.

In Table 4 and for purposes of discussion of significance and natural values assessment the following abbreviations are assigned:

RPS = West Coast Regional Policy Statement (2020).

WDP = Westland District Plan (2002).

TTPP **=** Proposed Te Tai o Poutini Plan (2022).

CMS = West Coast Conservation Management Strategy 2010 – 2020.

The structure of some criteria encompasses wider habitat considerations, applicable to flora as a component of habitat and to any fauna reliant on that habitat. Habitat significance and natural heritage values as they apply to fauna are covered in detail by other surveys and reporting re the Scheme (Wildlife Surveys, 2014, Buckingham, 2025 and Ussher, 2025).

An assessment of the vegetation in Area 1, Area 2, Area 3 and Area 4 is made against each of the criteria groupings that apply via discussion under headings based on the criteria in Table 4 that are relevant to terrestrial flora.

Wetland Assessment

In respect of the wetlands identified and described in Appendix D, the alignment/placement of Scheme infrastructure components avoids these and sufficiently buffers them as per the Resource Management (National Environmental Standards for Freshwater) Regulations 2020 (N.Z. Government, 2020) and the TTPP (TTPPC, 2022) that each require a minimum 10 metre buffer to apply for vegetation clearance or earthworks adjacent to natural inland wetlands of the sizes observed/recorded in Area 2, otherwise consent is required.

Because the proposed activity avoids and sufficiently buffers the identified wetlands, no Resource Consent or associated assessment of significance is necessary under provisions of the NPSFM, RPS, Regional Land and Water Plan (WCRC, 2014), TTPP and WDP that would apply otherwise.

Table 4: Appendix E: Criteria Framework for Determining Significance and Natural Heritage Values for Purposes of Section 6(c) of the Resource Management Act 1991 (RPS, WDP, TTPP) and Natural Heritage Values (CMS).

RPS (Policy 7.1(a)) TTPP Policy ECO - P1(2)(i)	WDP (Policy 4.9D)	CMS (Policy 3.3.2.3(1))
1(a) Representativeness. Indigenous vegetation or habitat of indigenous fauna that is representative, typical or characteristic of the indigenous biodiversity of the relevant ecological district. This can include degraded examples where they are some of the best remaining examples of their type, or represent all that remains of indigenous biological diversity in some area.	(ii) Representativeness. The area is one of the best examples of an association of species which is typical of its ecological district.	Representativeness, Diversity.
1(b) Representativeness. Indigenous vegetation or habitat of indigenous fauna that is a relatively large example of its type within the relevant ecological district.	(i) Intactness and Size. The area is unmodified by human activity, comprises a predominantly intact indigenous system and is not affected in a major way by weed or pest species; AND, The area of indigenous vegetation has a predominant cover of 5 hectares or more.	Viability, Intactness.
2(a) Rarity/Distinctiveness. Indigenous vegetation or habitat of indigenous fauna that has been reduced to less than 20% of its former extent in the region, or relevant land environment, ecological district, or freshwater environment.	(i) Intactness and Size. The area is unmodified by human activity, comprises a predominantly intact indigenous system and is not affected in a major way by weed or pest species; AND, The area of indigenous vegetation has a predominant cover of 5 hectares or more.	Viability, Intactness.
2(b) Rarity/Distinctiveness. Indigenous vegetation or habitat of indigenous fauna that supports an indigenous species that is threatened, at risk, or uncommon, nationally or within the relevant ecological district.	(vi) Threat. The area supports an indigenous species or community of species which is threatened within the ecological district or threatened nationally.	Threatened Species and Habitat.
2(c) Rarity/Distinctiveness. The site contains indigenous vegetation or an indigenous species at its distribution limit within the West Coast region or nationally.	(iii) Distinctiveness. The area has indigenous species or an association of indigenous species which is unusual or rare in the ecological district, or endemic or reaches a distribution limit in the ecological district. The area may be distinctive because of the influences of factors such as altitude, water table, soil type or geothermal activity.	Diversity.

Table 4 – Appendix E: Criteria Framework for Determining Significance and Natural Heritage Values for Purposes of Section 6(c) of the Resource Management Act 1991 (RPS, WDP, TTPP) and Natural Heritage Values (CMS) Ctd.

RPS (Policy 7.1(a)) TTPP Policy ECO - P1(2)(i)	WDP (Policy 4.9D)	CMS (Policy 3.3.2.3(1))
2(d) Rarity/Distinctiveness. Indigenous vegetation or an association of indigenous species that is distinctive, of restricted occurrence, occurs within an originally rare ecosystem, or has developed as a result of an unusual environmental factor or combination of factors.	(iii) Distinctiveness. The area has indigenous species or an association of indigenous species which is unusual or rare in the ecological district, or endemic or reaches a distribution limit in the ecological district. The area may be distinctive because of the influences of factors such as altitude, water table, soil type or geothermal activity.	Diversity.
3(a) Diversity and Pattern. Indigenous vegetation or habitat of indigenous fauna that contains a high diversity of indigenous ecosystem or habitat types, indigenous taxa, or has changes in species composition reflecting the existence of diverse biological and physical features or ecological gradients.	(iii) Distinctiveness. The area has indigenous species or an association of indigenous species which is unusual or rare in the ecological district, or endemic or reaches a distribution limit in the ecological district. The area may be distinctive because of the influences of factors such as altitude, water table, soil type or geothermal activity.	Diversity.
3(a) Diversity and Pattern. Indigenous vegetation or habitat of indigenous fauna that contains a high diversity of indigenous ecosystem or habitat types, indigenous taxa, or has changes in species composition reflecting the existence of diverse biological and physical features or ecological gradients.	(viii) Scientific or Other Cultural Value. The area is a type, locality or other scientific reference area, is listed as a geopreservation site, or has a distinctive amenity value (e.g., it contributes to a distinctive and outstanding landscape of the district, has other significant cultural value or is of international importance).	Natural Landscape Character, Taonga Species and Habitat.
4(a) Ecological Context. Vegetation or habitat of indigenous fauna that provides or contributes to an important ecological linkage or network, or provides an important buffering function.	(v) Connectivity. The area is connected to one or more other significant areas in a way (including through ecological processes) which makes a major contribution to the overall value or natural functioning of those areas.	Diversity, Viability.
4(b) Ecological Context. Indigenous vegetation or habitat of indigenous fauna that provides important habitat (including refuges from predation, or key habitat for feeding, breeding or resting) for indigenous species, either seasonally or permanently.	vii) Migratory Species. An inter-tidal area or area of forest, wetland, lake, estuary or other natural habitat that is important for migratory species or for breeding, feeding or other vulnerable stages of indigenous species.	Diversity, Taonga Species and Habitat.
No matching criterion.	(iv) Protected Status. The area has been set aside by New Zealand Statue or Covenant for protection and preservation or is a recognised wilderness area.	No matching criterion.

The majority of Scheme components in Areas 1 and 2 and the predominantly indigenous vegetation types they occur in are within the Wilberg Ecological District, with a minor component affected by Scheme infrastructure (approximately 175 metres of proposed access road and the same distance of transmission line at 10 metres wide each, giving c. 0.35 hectares) in the Harihari Ecological District.

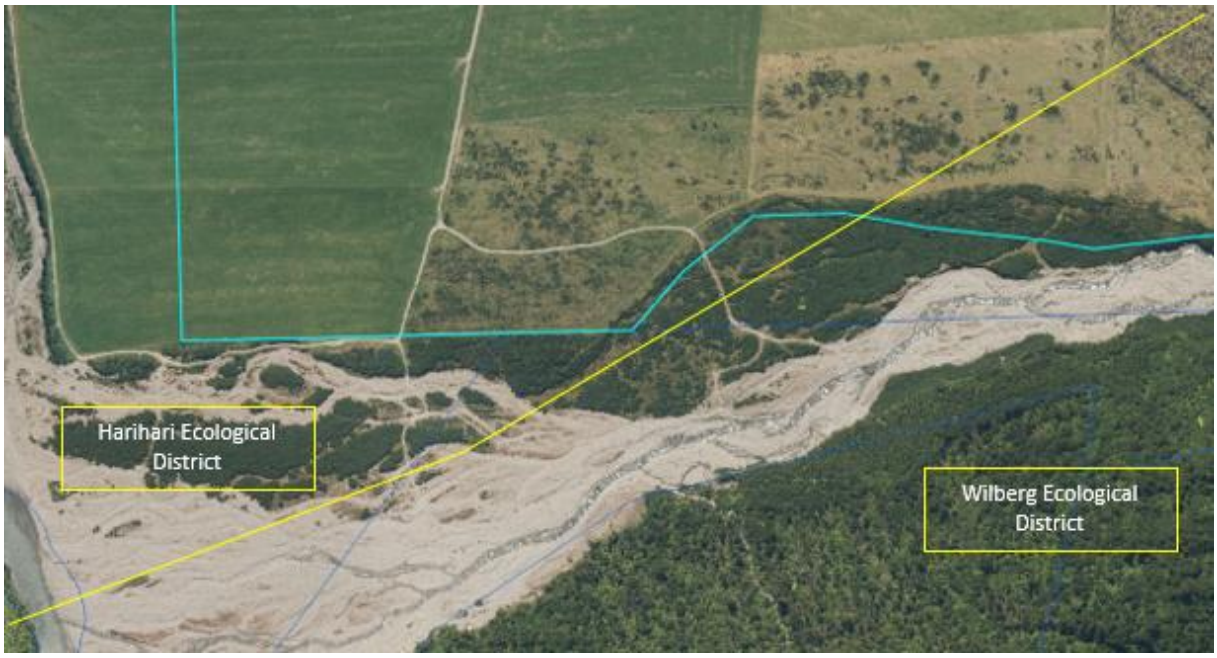
The developed or partially developed farmland included in Area 3 and surrounding it to west and north, is in the Harihari Ecological District, as is the small area of indigenous vegetation and the developed farmland and public road comprising the remainder of Area 4.

Note: For Area 3 there are deemed no viable indigenous vegetation communities, so no assessment of significance of the values of terrestrial flora is necessary for it.

The estimate of indigenous vegetation affected by Area 4 Scheme components within the Harihari Ecological District is:approximately 85 metres of proposed new transmission line at 10 metres wide, giving c. 0.085 hectares, plus 0.120 ha attributable to upgrading of an existing farm track as a part of the Scheme's access road, giving a total area of 0.2050 hectares.

Diagram A shows the demarcation/boundary between the two ecological districts.

Diagram A: Boundary between Wilberg and Harihari Ecological Districts is indicated by the yellow line.



For Areas 1 and 2 where vegetation is predominantly indigenous and unmodified, comparison of vegetation type occurrence/distribution in considering significance and natural heritage values, and to provide context between areas potentially affected by the Scheme compared to the areas in the locale and further afield, is done by the same method. This involved a GIS analysis[3] using New Zealand Land Cover Database (LCDB)[4] land cover classes aligned as far as practicable to their counterpart vegetation types as described above for the Scheme area, done at three levels:

1. For the Wilberg Ecological District for Area 1 and Area 2 Vegetation Types 2/1 - 2/9 and for the Harihari Ecological District for Area 2 Vegetation Type 2/10 and Area 4 (**Appendix I, Map 5**).

[3] GIS mapping and GIS area data procurement services supplied by Boffa Miskell Ltd., Christchurch. Data analysis and summarisation by TACCRA Ltd.
[4] *Ref*: https://lris.scinfo.org.nz - Land Cover Database v.5.0, 2020.

2. For the Waitaha catchment being all that area within the catchment south of the NZTM 2000 North 5229000 gridline so as to exclude lowland cover types and areas not relevant for purposes of this comparison (**Appendix I, Map 6**). Note: This catchment delineation captures the area of Vegetation Type 2/10 in Area 2 that is within the Harihari Ecological District, so applies to both for assessment purposes. It does not capture the small c. 3.21 hectare area of Vegetation Type 4/1, that is considered an outlier but assessed relative to the Waitaha catchment delineation used for the other Areas, given its relative proximity and similarities.

3. For a Base Area within the Wilberg Ecological District, as defined in Appendix F and as shown on **Appendix I, Map 7 and Appendix I, Map 8**, considered the Scheme's Area 1 and Area 2 locale and that of the small area of indigenous vegetation in Area 2 (Vegetation Type 2/10) within the Harihari Ecological District. The c. 3.21 hectares of Vegetation Type 4/1 is a minimal area and discrete outlier to the Base Area - extension of the Base Area to include it was not considered to give any practical analysis benefit. Therefore, considering its relative Base Area proximity, and consistency of type and location of occurrence with the LCDB broadleaved indigenous hardwood land cover class of the Base Area, it has been assessed against those parameters.

While the different LCDB land cover classes are mapped for individual areas down to one hectare, the land cover class descriptions are necessarily broad, with 33 land cover/land use classes covering all land cover and land use (including urban/infrastructure and agricultural) activities across mainland New Zealand. The detailed field survey undertaken as a basis of this report and the differentiation and mapping of vegetation cover gives a much finer stratification.

Area 1 and Area 2 Analysis Result - Wilberg Ecological Area

To enable comparison by area, Vegetation Types described for Area 1 and Area 2 are, where necessary, amalgamated to fit with the most applicable LCDB land cover type, with results given in Table 5.

Total land area within the Wilberg Ecological District is c. 84 114 hectares and within the Waitaha catchment (as previously defined) is c. 15 999 hectares. Of these total areas, 62 655 hectares = 75% of the Wilberg Ecological District and 12 023 hectares = 75% of the Waitaha catchment, carry indigenous vegetation of some type under the LCDB land cover classes (i.e., the above areas exclude exotic forest, deciduous hardwoods, high producing exotic grassland, lakes and ponds, permanent ice and snow, gravel and rock and river land cover classes).

GIS analysis undertaken using the LCDB land cover classes matched to the indigenous forest type assemblages (all Vegetation Types excluding Vegetation Type 1/4) potentially affected by the Scheme shows these are present:

- Across 27 851 hectares comprising 45% of the Wilberg Ecological District indigenous vegetation cover.

- Across 4358 hectares comprising 36% of the Waitaha catchment indigenous vegetation cover.

They are therefore common and widely represented in both Wilberg Ecological District and the Waitaha catchment. The indigenous forest assemblages also occur extensively in catchments of similar valleys throughout central Westland (James *et al*., 1973; Wardle, 1979).

Vegetation Type 1/4, a small area of which is also potentially affected by the Scheme, is analogous to the LCDB Sub Alpine Shrubland cover class. Under those criteria, GIS analysis shows it is present:

- Across 17 726 hectares comprising 28% of the Wilberg Ecological District indigenous vegetation cover.

- Across 4256 hectares comprising 35% of the Waitaha catchment indigenous vegetation cover.

As for the indigenous forest vegetation, this shrubland vegetation is also common and widely represented, not only in the areas noted above but in other valleys throughout central Westland (James *et al*., 1973; Wardle, 1979).

Area 2 (Vegetation Type 2/10) and Area 4 Analysis Result – Harihari Ecological Area

A similar approach for comparison as used for Areas 1 and 2 is applied for Area Vegetation Type 2/10 and Area 4, with the indigenous Vegetation Types described being allocated to fit with the most applicable LCDB land cover type, with results given in Table 5.

Total land area within the Harihari Ecological District is c. 92 493 hectares and within the Waitaha catchment (as previously defined) is c. 15 999 hectares. Of these total areas, 55 605 hectares = 60% of the Harihari Ecological District and 12 023 hectares = 75% of the Waitaha catchment, carry indigenous vegetation of some type under the LCDB land cover classes (i.e., the above areas exclude built-up area, surface mine or dump, urban parkland or open space, exotic forest, herbaceous freshwater vegetation, herbaceous saline vegetation, deciduous hardwoods, high producing exotic grassland, flaxland, lakes and ponds, estuarine open water, permanent ice and snow, gravel and rock and river land cover classes).

GIS analysis undertaken using the LCDB land cover classes matched to the indigenous vegetation assemblage (Vegetation Type 2/10) potentially affected by the Scheme in Area 2 in the Harihari Ecological District shows this is present:

- Across 4251 hectares comprising c. 13% of the Harihari Ecological District indigenous vegetation cover.

- Across 126 hectares comprising c. 1% of the Waitaha catchment indigenous vegetation cover.

Whilst a minor component of the indigenous vegetation assemblages of the Waitaha Catchment this seral (successional) colonising vegetation is not uncommon at the Ecological District scale, and occurs in the lowland catchment areas of similar valleys throughout central Westland (James *et al*., 1973; Wardle, 1979) on sites of recent or repeated disturbance.

Table 5: Appendix E: Area 1, Area 2, and Area 4 LCDB Land Cover Class and Analogous Vegetation Type Area Summaries and Comparisons for Wilberg Ecological District, Harihari Ecological District, Waitaha Catchment and Base Area and the Scheme's Project Footprint.

LCDB Land Cover Class + *Corresponding Vegetation Type(s)**	Area in Ecological District [Wilberg] *(Harihari)*	Area in Waitaha Catchment	Area In Base Area	Area of Scheme Project Footprint in LCDB Cover Class - Vegetation Type(s)	Area in Base Area as % of LCDB Cover Class - Vegetation Type(s) in Ecological District [Wilberg] *(Harihari)*	Area of Scheme Project Footprint as % of LCDB Cover Class - Vegetation Type(s) in Ecological District [Wilberg] *(Harihari)*	Area of Scheme Project Footprint as % of LCDB Cover Class - Vegetation Type(s) in Waitaha Catchment	Area of Scheme Project Footprint as % of LCDB Cover Class - Vegetation Type(s) in Base Area
Alpine Grass/Herbfield	[2989.10] *(0.0)*	[506.50] *(0.0)*	[0.0] *(0.0)*	[0.0] *(0.0)*	[0.0] *(0.0)*	[0.0] *(0.0)*	0.0	0.0
Broadleaved Indigenous Hardwoods *(2/4, 2/4A, 2/10 & 4/1)*	[369.60] *(4251.0)*	125.80	30.2	3.3261	[8.2] *(0.7)*	[0.9] *(0.01)*	2.6	11.0
Deciduous Hardwoods	[0.00] *(32.30)*	1.30	0.10	0.00	[0.0] (0.3)	[0.0] *(0.0)*	0.0	0.0
Exotic Forest	[4.10] *(5372.20)*	0.00	0.00	0.00	[0.0] (0.0)	[0.0] *(0.0)*	0.0	0.0
Fernland	[0.20] *(1351.50)*	0.00	0.00	0.00	[0.0] *(0.0)*	[0.0] *(0.0)*	0.0	0.0
Gorse and/or Broom *(2/9)*	[129.40] *(1623.50)*	62.70	21.6	0.1400	[16.7] *(1.3)*	[0.1] *(0.0)*	0.1	0.6
Gravel and Rock *(2/8)*	[14 953.70] *(3950.20)*	3262.10	41.3	0.4165	[0.3] *(1.0)*	[0.003] *(0.0)*	0.01	1.0
High Producing Exotic Grassland	[311.30] *(20 609.7)*	62.30	0.00	0.00	[1.8] *(0.03)*	[0.0] *(0.0)*	0.0	0.0

Table 5: Appendix E: Area 1, Area 2, and Area 4 LCDB Land Cover Class and Analogous Vegetation Type Area Summaries and Comparisons for Wilberg Ecological District, Harihari Ecological District, Waitaha Catchment and Base Area and the Scheme's Project Footprint Ctd.

LCDB Land Cover Class + *Corresponding Vegetation Type(s)**	Area in Ecological District [Wilberg] (Harihari)	Area in Waitaha Catchment	Area In Base Area	Area of Scheme Project Footprint in LCDB Cover Class - Vegetation Type(s)	Area in Base Area as % of LCDB Cover Class - Vegetation Type(s) in Ecological District [Wilberg] *(Harihari)*	Area of Scheme Project Footprint as % of LCDB Cover Class - Vegetation Type(s) in Ecological District [Wilberg] (Harihari)	Area of Scheme Project Footprint as % of LCDB Cover Class - Vegetation Type(s) in Waitaha Catchment	Area of Scheme Project Footprint as % of LCDB Cover Class - Vegetation Type(s) in Base Area
Indigenous Forest *(1/1, 1/2, 1/3, 2/1, 2/2, & 2/3)*	[27 352.20] *(45 598.0)*	4169.50	343.7	2.2039	[1.3] *(0.8)*	[0.01] *(0.0)*	0.05	0.6
Lake and Pond	[27.50] *(677.80)*	43.40	0.00	0.00	[0.0] *(0.0)*	0.0	0.0	0.0
Landslide	[104.10] *(12.0)*	15.10	2.90	0.00	[2.8] *(24.0)*	0.0	0.0	0.0
Low Producing Grassland	[145.20] *(1164.2)*	1.60	0.00	0.00	[0.0] *(0.0)*	0.0	0.0	0.0
Manuka and/or Kanuka	[3.90] *(2327.3)*	0.50	0.00	0.00	[0.0] *(0.0)*	0.0	0.0	0.0
Permanent Snow and Ice	[5561.10] (0.00)	533.30	0.00	0.00	[0.0] *(0.0)*	0.0	0.0	0.0
River	[343.00] *(1539.1)*	56.40	16.2	0.00	[4.7] *(1.1)*	0.0	0.0	0.0
Sub Alpine Shrubland *(1/4)*	[17 725.50] *(384.3)*	4255.90	10.70	0.7032	[0.1] *(2.8)*	[0.004] *(0.0)*	0.02	6.6

Table 5: Appendix E: Area 1, Area 2, and Area 4 LCDB Land Cover Class and Analogous Vegetation Type Area Summaries and Comparisons for Wilberg Ecological District, Harihari Ecological District, Waitaha Catchment and Base Area and the Scheme's Project Footprint Ctd.

LCDB Land Cover Class + *Corresponding Vegetation Type(s)**	Area in Ecological District [Wilberg] *(Harihari)*	Area in Waitaha Catchment	Area In Base Area	Area of Scheme Project Footprint in LCDB Cover Class - Vegetation Type(s)	Area in Base Area as % of LCDB Cover Class - Vegetation Type(s) in Ecological District [Wilberg] *(Harihari)*	Area of Scheme Project Footprint as % of LCDB Cover Class - Vegetation Type(s) in Ecological District *[Wilberg] (Harihari)*	Area of Scheme Project Footprint as % of LCDB Cover Class - Vegetation Type(s) in Waitaha Catchment	Area of Scheme Project Footprint as % of LCDB Cover Class - Vegetation Type(s) in Base Area
Tall Tussock Grassland	[14 085.00] *(58.8)*	2902.40	0.0	0.0	[0.0] *(0.0)*	0.0	0.0	0.0
Mixed Exotic Shrubland	[8.90] *(142.6)*	0.0	0.0	0.0	[0.0] *(0.0)*	0.0	0.0	0.0
Matagouri or Grey Scrub	[0.0] *(10.8)*	0.0	0.0	0.0	[0.0] *(0.0)*	0.0	0.0	0.0
Totals	**[84 114]** ***(89 105)***	**15 999**	**447.5**	**6.7897**	**[0.8]** ***(0.6)***	**n.a.**	**n.a.**	**n.a.**

Note: All area figures in the above table are hectares.
*Note: The Waitaha catchment is not entirely contained within either of the Wilberg Ecological District or Harihari Ecological District (see **Appendix I, Map 4 and Map 5**) therefore it can exhibit individual LCDB land cover class areas greater than those for either Ecological District, e.g., Lake and Pond.*
Note: Project Footprint as used in the above table refers to the area that encompasses temporary (i.e. construction) and permanent installations, infrastructure and accessways.
*Note: * Denotes the Vegetation Types identified in this report e.g., 2/1, 2/2, 2/3 etc. as assigned to their respective or most representative LCDB land cover class as mapped under the LCDB. In this case Vegetation Type 2/7 and Vegetation Type 2/8 are shown as Gravel and Rock and Vegetation Type 2/9 is shown as Gorse and/or Broom under LCDB mapping whereas they would more aptly be classified Broadleaved Indigenous Hardwood. Likewise, Vegetation Types 2/4 and 2/4A are more analogous with Indigenous Forest than a Broadleaved Indigenous Hardwood type.*

E.1/ Area 1, Area 2 And Area 4 Vegetation Type(s) – Significance and Natural Heritage Value Assessment

The criteria or criteria groups contained in Table 4 are used as the basis for discussion and analysis in determining which, if any, result in terrestrial flora being considered significant indigenous vegetation or of high natural heritage value, and if so, what effects of the Scheme would be on it.

RPS 7.1(a)1(a) and TTPP ECO-P1(2)(i)1(a) – Representativeness - Indigenous vegetation or habitat of indigenous fauna that is representative, typical or characteristic of the indigenous biodiversity of the relevant ecological district. This can include degraded examples where they are some of the best remaining examples of their type, or represent all that remains of indigenous biological diversity in some area.

WDP 4.9D(ii) – Representativeness - The area is one of the best examples of an association of species which is typical of its ecological district.

CMS *3.3.2.3(1) – Representativeness* and *Diversity.*

Area 1 & Area 2 Vegetation Characteristics Compared to Criteria RPS 7.1(a)1(a), TTPP ECO-P1(2)(i)1(a), WDP 4.9D(ii) & CMS 3.3.2.1(1):

The vegetation encompassed by Area 1 and Area 2 is typical of that observed on streamsides, alluvial flats, terrace sequences and hill footslope and side-slope areas across a relatively wide altitudinal range (e.g. 100 – 600 m.a.s.l.) within forested catchments. For example, the Wilberg Ecological District (including the Waitaha, Wanganui, Poerua and majority of the Perth catchments) contains in excess of 45 500 hectares of similar vegetation cover. The Waitaha catchment contains in excess of 8600 hectares.

While typical, none of the Vegetation Types in Area 1 or Area 2 would alone or together be distinguished as one of the best examples of a species association noted as characteristic of the Wilberg Ecological District, these being: mixed podocarp-hardwood forest on lower slopes; rata-kamahi forest at higher altitudes; subalpine scrub; snow tussockland; cushion bogs; herbfield and high-alpine vegetation (McEwen, 1987).

Therefore, while it would not be considered significant under the WDP 4.9D(ii) Representativeness criterion as among best example(s), Vegetation Types 1/3 and 2/3 (mature podocarp/hardwood hill forest) within the Scheme footprint do correlate to the more broadly defined 'mixed podocarp-hardwood forest on lower slopes' component of vegetation noted by McEwen, 1987, as characteristic of the Wilberg Ecological District. Other species assemblages present within the Scheme footprint and its environs do not display degrees of representativeness or diversity that distinguish these areas from counterparts in their location in the Waitaha catchment, in the Wilberg Ecological District or the region.

Area 1 and Area 2 Significance/Natural Heritage Value Outcome: Significant indigenous vegetation, based on Types 1/3 and 2/3 being typical of the Wilberg Ecological District as per the RPS and TTPP criterion element *'characteristic'* of the relevant ecological district.

Area 2 Vegetation Type 2/10 and Area 4 Vegetation Characteristics Compared to Criteria RPS 7.1(a)1(a), TTPP ECO-P1(2)(i)1(a), WDP 4.9D(ii) & CMS 3.3.2.1(1):

Vegetation Type 2/10 of Area 2, and the indigenous vegetation in Area 4 is in the Harihari Ecological District. The small indigenous vegetation areas (c. 20.7 hectares of Type 2/10 and c. 3.21 hectares of Type 4/1) in which the Scheme's footprint occurs is typical of that observed on streamsides, alluvial flats, and recent terrace sequences in lowland catchment zones in Westland where recent or repeated natural disturbance events occur. For example, the Harihari Ecological District (including the lower Waitaha, Wanganui and Whataroa catchment zones contain in excess of 4251 hectares of similar vegetation cover.

While typical, the Type 2/10 and Type 4/1 vegetation (broadleaved indigenous hardwoods) in Area 2 and Area 4 would not be distinguished as one of the best examples of a species association noted as typical, nor as characteristic or representative of the Harihari Ecological District, these parameters

being: *"Podocarp and podocarp-hardwood forests with marked florisitic uniformity; beech absent; extensive swamps in valleys; nikau on the coast northwest of Harihari township"* (McEwen, 1987).

Area 2 Vegetation Type 2/10 and Area 4 Significance/Natural Heritage Value Outcome: Not significant indigenous vegetation.

RPS 7.1(a)1(b) and TTPP ECO-P1(2)(i)1(b) – Representativeness - Indigenous vegetation or habitat of indigenous fauna that is a relatively large example of its type within the relevant ecological district.

WDP 4.9D(i) – Intactness and Size - The area is unmodified by human activity, comprises a predominantly intact indigenous system and is not affected in a major way by weed or pest species;
AND,
The area of indigenous vegetation has a predominant cover of 5 hectares or more.

CMS 3.3.2.3(1) – Viability and Intactness.

Area 1 & Area 2 Vegetation Characteristics Compared to Criteria RPS 7.1(a)1(b), TTPP ECO-P1(2)(i)1(b), WDP 4.9(i) & CMS 3.3.2.1(1):

Vegetation present in Area 1 and Area 2 is part of a predominantly intact indigenous system greater than 5 hectares in cover and is not affected in a major way by weed or pest species. It has not been modified to any marked extent by human activity.

Additionally, Vegetation Types 1/3 and 2/3 (mature podocarp/hardwood hill forest) within the Scheme footprint are contiguous with a large example of their counterpart 'mixed podocarp-hardwood forest on lower slopes' noted by McEwen, 1987, as characteristic of the Wilberg Ecological District, this forest type occurring on all footslopes on both sides of the Waitaha Valley.

Environmental and physical influences on vegetation in the Waitaha catchment are unlikely to change in the long term. Effects of natural events (including catastrophic disturbance by e.g., major earthquake) may alter current vegetation characteristics (including species mix, frequency of occurrence, size class distributions, change from mature to regenerational phases of forest cover) over time, however the area should retain viability, intactness and integrity of processes.

Area 1 and Area 2 Significance/Natural Heritage Value Outcome: Significant indigenous vegetation, based on area and lack of modification. Areas exhibit high natural heritage value due to intactness and viability retention potential.

Note: Effects of the Scheme on the area's vegetation viability, quality, integrity and intactness are likely to be inconsequential considering its small project footprint within the surrounding contiguous area (total footprint of 6.61 hectares within the indigenous vegetation cover of the Base Area of c. 447.5 hectares, representing an affected area of 1.5%), combined with measures to be implemented wherever practicable, that avoid affecting important habitat components e.g., large forest trees.

Area 2 Vegetation Type 2/10 Vegetation Characteristics Compared to Criteria RPS 7.1(a)1(b), TTPP ECO-P1(2)(i)1(b), WDP 4.9(i) & CMS 3.3.2.1(1):

While the c. 20.7 hectares of Vegetation Type 2/10 in Area 2 exhibit a degree of modification due to an existing tracking network established to access Macgregor Creek and weed species (particularly the woody weeds *Ulex europaeus* and *Leycesteria formosa*) are present at low levels, the combination of these attributes do not detract severely from the area's intactness. It is therefore a predominantly intact (and viable) indigenous system, although not considered a large example of its type in the Harihari Ecological District.

Area 2 Vegetation Type 2/10 Significance/Natural Heritage Value Outcome: Significant indigenous vegetation, based on intactness and being of sufficient area to impart a reasonable prospect of viability as far as may be expected in an area subject to recurring natural disturbances.

Area 4 Vegetation Characteristics Compared to Criteria RPS 7.1(a)1(b), TTPP ECO-P1(2)(i)1(b), WDP 4.9(i) & CMS 3.3.2.1(1):

Vegetation Type 4/1 of Area 4 exhibits a degree of modification due to farm access tracking and a very low incidence of exotic weed species and while a predominantly intact indigenous system, at c. 3.210 hectares in extent it is not considered a large example of its type in the Harihari Ecological District, and its small area is an inherent viability risk.

Area 4: Significance/Natural Heritage Value Outcome: Not significant indigenous vegetation.

RPS 7.1(a)2(a) and TTPP ECO-P1(2)(i)2(a) – Rarity/Distinctiveness - Indigenous vegetation or habitat of indigenous fauna that has been reduced to less than 20% of its former extent in the region, or relevant land environment, ecological district, or freshwater environment.

WDP 4.9D(i) – Intactness and Size - The area is unmodified by human activity, comprises a predominantly intact indigenous system and is not affected in a major way by weed or pest species;
AND,
The area of indigenous vegetation has a predominant cover of 5 hectares or more.

CMS 3.3.2.3(1) – Viability and Intactness.

Area 1 & Area 2 Vegetation Characteristics Compared to Criteria RPS 7.1(a)2(a), TTPP ECO-P1(2)(i)2(a), WDP 4.9D(i) & CMS 3.3.2.1(1):

None of the prescribed conditions for determining significance under *RPS 7.1(a)2(a) and TTPP ECO-P1(2)(i)2(a) – Rarity/Distinctiveness* apply to vegetation encompassed by Area 1 and Area 2.

While the aligned *WDP 4.9D(i) – Intactness and Size* criterion and its 'AND' qualifier re this could be considered to apply to Vegetation Types 1/3 and 2/3 (mature podocarp/hardwood hill forest) and 2/10 (colonising/pioneering shrub hardwood) within the Scheme footprint, this area consideration has already been captured under *RPS 7.1(a)1(b) and TTPP ECO-P1(2)(i)1(b)* and the aligned WDP 4.9D(i) and CMS 3.3.2.1(1) criteria thereunder so is not considered to apply again here.

Area 1 & Area 2 Significance/Natural Heritage Value Outcome: Not significant indigenous vegetation.

Area 4 Vegetation Characteristics Compared to Criteria RPS 7.1(a)2(a), TTPP ECO-P1(2)(i)2(a), WDP 4.9D(i) & CMS 3.3.2.1(1):

None of the prescribed conditions for determining significance under *RPS 7.1(a)2(a) and TTPP ECO-P1(2)(i)2(a) – Rarity/Distinctiveness* apply to vegetation encompassed by Area 4 and its small (3.210 hectare) fragmented area and element of existing modification as a viability risk mean the WDP 4.9D(i) – Intactness and Size criterion is not applicable.

Area 4 Significance/Natural Heritage Value Outcome: Not significant indigenous vegetation.

RPS 7.1(a)2(b) and TTPP ECO-P1(2)(i)2(b) – Rarity/Distinctiveness - Indigenous vegetation or habitat of indigenous fauna that supports an indigenous species that is threatened, at risk, or uncommon, nationally or within the relevant ecological district.

WDP 4.9D(vi) – Threat - The area supports an indigenous species or community of species which is threatened within the ecological district or threatened nationally.

CMS 3.3.2.3(1) – Threatened Species and Habitat.

Area 1 & Area 2 Vegetation Characteristics Compared to Criteria RPS 7.1(a)2(b), TTPP ECO-P1(2)(i)2(b), WDP 4.9D(vi) & CMS 3.3.2.1(1):

Neomyrtus pedunculata and *Metrosideros* spp. (both of the family Myrtaceae) are present within Vegetation Types within the Scheme's footprint and were classified as Threatened – Nationally Critical and Threatened – Nationally Vulnerable respectively (de Lange *et al.,* 2017), due to the uncertain impact of *Austropuccinia psidii* (myrtle rust), now present in New Zealand. The risk classification for the Myrtaceae family species present in the Area 1 and Area 2 has been recently reassessed and revised, the outcome being that all are currently classed as not threatened (de Lange *et al.*, 2023).

However, *Coprosma rubra* is present in Vegetation Types 2/2 and 2/6 in Area 2 and whereas it was previously classified as Not Threatened (de Lange et al., 2017) its risk status has been recently reassessed and revised and is now classified as At Risk - Declining (de Lange et al., 2023).

Apart from *Coprosma rubra*, no other species are identified in the Scheme's Area 1 and Area 2 footprint or its environs that are classified as threatened, at risk, or uncommon, nationally or within the Wilberg Ecological District.

Area 1 Significance/Natural Heritage Value Outcome: Not significant indigenous vegetation.

Area 2 Significance/Natural Heritage Value Outcome: Significant indigenous vegetation due to presence of *Coprosma rubra* in Vegetation Types 2/2 and 2/6, this species classified as At Risk – Declining.

Area 4 Vegetation Characteristics Compared to Criteria RPS 7.1(a)2(b), TTPP ECO-P1(2)(i)2(b), WDP 4.9D(vi) & CMS 3.3.2.1(1):

Although an extremely infrequent occurrence, *Metrosideros diffusa* (of the family Myrtaceae) is present within Vegetation Type 2/10 and within Vegetation Type 4/1 within the Scheme's footprint and was previously classified as Threatened – Nationally Vulnerable (de Lange *et al.,* 2017), due to the uncertain impact of *Austropuccinia psidii* (myrtle rust), now present in New Zealand. The risk classification for *Metrosideros diffusa* has been recently reassessed and revised, the outcome being that it is currently classed as not threatened (de Lange *et al.*, 2023), and no other species are identified in the Scheme's Area 3 and Area 4 footprint or its environs that are classified as threatened, at risk, or uncommon, nationally or within the Harihari Ecological District.

Area 4 Significance/Natural Heritage Value Outcome: Not significant indigenous vegetation.

RPS 7.1(a)2(c) and TTPP ECO-P1(2)(i)2(c) - Rarity/Distinctiveness - The site contains indigenous vegetation or an indigenous species at its distribution limit within the West Coast region or nationally.

WDP 4.9D(iii) – Distinctiveness - The area has indigenous species or an association of indigenous species which is unusual or rare in the ecological district, or endemic or reaches a distribution limit in the ecological district. The area may be distinctive because of the influences of factors such as altitude, water table, soil type or geothermal activity.

CMS 3.3.2.3(1) - Diversity.

Area 1 & Area 2 Vegetation Characteristics Compared to Criteria RPS 7.1(a)2(c), TTPP ECO-P1(2)(i)2(c), WDP 4.9D(iii) & CMS 3.3.2.1(1):

None of the vegetation assemblages or species comprising them (as far as is known) encompassed by Area 1 and Area 2 are at distribution limits nationally, within the West Coast or the Wilberg Ecological District. Predominant vegetation encompassed is typical of that observed on streamsides, alluvial flats, terrace sequences and hill footslope and side-slope areas across a relatively wide altitudinal range (e.g. 100 – 600 m.a.s.l.) within forested catchments. For example, the Wilberg Ecological District (including the Waitaha, Wanganui, Poerua and majority of the Perth catchments) contains in excess of 45 500 hectares of similar vegetation cover. The Waitaha catchment contains in excess of 8600 hectares. The area exhibits no distinctiveness due to influences of altitude, water table, soil type or geothermal activity.

Area 1 & Area 2 Significance/Natural Heritage Value Outcome: Not significant indigenous vegetation.

Area 2 Vegetation Type 2/10 and Area 4 Vegetation Characteristics Compared to Criteria RPS 7.1(a)2(c), TTPP ECO-P1(2)(i)2(c), WDP 4.9D(iii) & CMS 3.3.2.1(1):

Neither Vegetation Type 2/10 or the species comprising it (as far as is known) are at distribution limits nationally, within the West Coast or the Harihari Ecological District. The Type is typical of that observed on recent landform surfaces or colonising sites of natural disturbance including streamsides, alluvial flats, terrace sequences and slip areas within lowland (and upper) catchments. For example, the Harihari Ecological District (including the Wanganui, Poerua and Whataroa catchment lowland areas) and neighbouring Wilberg Ecological District (including the Waitaha, Wanganui, Poerua and majority of the Perth catchments) together contain in excess of 4600 hectares of similar vegetation cover. The area exhibits no distinctiveness due to influences of altitude, water table, soil type or geothermal activity. The same applies to Vegetation Type 4/1.

Area 2 Vegetation Type 2/10 and Area 4 Significance/Natural Heritage Value Outcome: Not significant indigenous vegetation.

RPS 7.1(a)2(d) and TTPP ECO-P1(2)(i)2(d) - Rarity/Distinctiveness - Indigenous vegetation or an association of indigenous species that is distinctive, of restricted occurrence, occurs within an originally rare ecosystem, or has developed as a result of an unusual environmental factor or combination of factors.

WDP 4.9D(iii) – Distinctiveness - The area has indigenous species or an association of indigenous species which is unusual or rare in the ecological district, or endemic or reaches a distribution limit in the ecological district. The area may be distinctive because of the influences of factors such as altitude, water table, soil type or geothermal activity.

CMS 3.3.2.3(1) - Diversity.

Area 1 & Area 2 Vegetation Characteristics Compared to Criteria RPS 7.1(a)2(d), TTPP ECO-P1(2)(i)2(d), WDP 4.9D(iii) & CMS 3.3.2.1(1):

Vegetation types and assemblages are widely represented in the Wilberg Ecological District and in neighbouring ecological districts (refer discussion under *RPS 7.1(a)2(c) and TTPP ECO-P1(2)(i)2(c) - Rarity/Distinctiveness, WDP 4.9D(iii) – Distinctiveness, and CMS 3.3.2.1(1) – Diversity,* above). No species observed reaches a distribution limit or is endemic here and physical factors do not promote distinctiveness. Species diversity is no more or less varied for vegetation types in these areas than in their counterparts in the general area (Base Area), other parts of the Wilberg Ecological District or at similar sites in other valleys of central Westland and would not differentiate Area 1 or Area 2 as having high natural heritage value.

Significance/Natural Heritage Value Outcome: Not significant indigenous vegetation.

Area 2 Vegetation Type 2/10 and Area 4 Vegetation Characteristics Compared to Criteria RPS 7.1(a)2(d), TTPP ECO-P1(2)(i)2(d), WDP 4.9D(iii) & CMS 3.3.2.1(1):

Area 2 Vegetation Type 2/10 and Vegetation Type 4/1 are widely represented in the Harihari Ecological District and in neighbouring ecological districts (refer discussion under *RPS 7.1(a)2(c) and TTPP ECO-P1(2)(i)2(c) - Rarity/Distinctiveness, WDP 4.9D(iii) – Distinctiveness, and CMS 3.3.2.1(1) – Diversity,* above). No species observed reaches a distribution limit or is endemic here and physical factors do not promote distinctiveness. Species diversity is no more or less varied for this vegetation type in this area than in its counterparts in the general area (Base Area), other parts of the Harihari Ecological District or at similar sites in other valleys of central Westland and would not differentiate Area 3 or Area 4 as having high natural heritage value.

Area 3 and Area 4 Significance/Natural Heritage Value Outcome: Not significant indigenous vegetation.

RPS 7.1(a)3(a) and TTPP ECO-P1(2)(i)3(a) – Diversity and Pattern - Indigenous vegetation or habitat of indigenous fauna that contains a high diversity of indigenous ecosystem or habitat types, indigenous taxa, or has changes in species composition reflecting the existence of diverse biological and physical features or ecological gradients.

WDP 4.9D(iii) – Distinctiveness - The area has indigenous species or an association of indigenous species which is unusual or rare in the ecological district, or endemic or reaches a distribution limit in the ecological district. The area may be distinctive because of the influences of factors such as altitude, water table, soil type or geothermal activity.

CMS 3.3.2.3(1) - Diversity.

Area 1 & Area 2 Vegetation Characteristics Compared to Criteria RPS 7.1(a)3(a), TTPP ECO-P1(2)(i)3(a), WDP4.9D(iii) & CMS 3.3.2.1(1):

The Scheme's footprint does not encompass a high diversity of indigenous ecosystem or habitat types. The alluvial river flats, recent terraces and hill footslopes within the Scheme's footprint and environs contain vegetation principally exhibiting regeneration and successional phases of forest, phases linked to landform age – it is not considered to exhibit a high diversity of indigenous ecosystem or habitat types, indigenous taxa, or have changes in species composition reflecting the existence of diverse biological and physical features or ecological gradients. It is deemed low diversity in terms of ecosystem/habitat type and species composition change compared to e.g., an area encompassing wetland/pakihi, forest, sub-alpine and alpine vegetation at a small scale.

No characteristic(s) distinguish vegetation in Area 1 or Area 2 of the Scheme's footprint from similar assemblages present over a similar range of altitude and landforms in other parts of the Waitaha Valley and neighbouring valleys. For example, the Wilberg Ecological District (including the Waitaha, Wanganui, Poerua and majority of the Perth catchments) contains in excess of 45 500 hectares of similar vegetation cover. The Waitaha catchment contains in excess of 8600 hectares. The range of types are also represented in valleys further north (Hokitika/Whitcombe) and south (Wanganui, Whataroa, Franz Josef, Fox, Cook, Copeland/Karangarua) in central and south Westland. None of the vegetation assemblages or species comprising them encompassed by Area 1 and Area 2 are unusual or rare, endemic or reach distribution limits in the ecological district, or endemic or reach distribution limits nationally, regionally or within the Wilberg Ecological District. The area exhibits no distinctiveness due to influences of altitude, water table, soil type or geothermal activity.

No species observed reaches a distribution limit or is endemic here and physical factors do not promote distinctiveness. Species diversity is no more or less varied for vegetation types in these areas than in their counterparts in the general area (Base Area), other parts of the Wilberg Ecological District or at similar sites in other valleys of central Westland and would not differentiate Area 1 or Area 2 as having high natural heritage value.

Significance/Natural Heritage Value Outcome: Not significant indigenous vegetation.

Area 2 Vegetation Type 2/10 and Area 4 Vegetation Characteristics Compared to Criteria RPS 7.1(a)3(a), TTPP ECO-P1(2)(i)3(a), WDP4.9D(iii) & CMS 3.3.2.1(1):

The c. 20.7 hectares of indigenous Vegetation Type 2/10 and the c. 3.210 hectares of indigenous vegetation Type 4/1 do not represent a high diversity of indigenous ecosystem or habitat types. The alluvial river flats, and recent terraces within the Scheme's footprint and in the wider area carry vegetation principally exhibiting regeneration and successional phases linked to landform age (recent) – it is not considered to exhibit a high diversity of indigenous ecosystem or habitat types, indigenous taxa, or have changes in species composition reflecting the existence of diverse biological and physical features or ecological gradients. It is deemed low diversity in terms of ecosystem/habitat type and species composition change compared to e.g., an area encompassing wetland/pakihi, forest, sub-alpine and alpine vegetation at a small scale.

No characteristic(s) distinguish Area 2 Vegetation Type 2/10 or that of Area 4 of the Scheme's footprint from similar assemblages present over a similar range of landforms in other parts of the lower

Waitaha Valley and neighbouring valleys. For example, the Harihari Ecological District (including the lower Kakapotahi, Waitaha, Wanganui, Poerua, Whataroa and Waitangitaona catchments) contains 4251 hectares of similar vegetation cover. The type is also represented in valleys further north (Hokitika/Whitcombe) and south (Franz Josef, Fox, Cook, Copeland/Karangarua) in central and south Westland. Neither Area 2 Vegetation Type 2/10 or Vegetation Type 4/1 as assemblages, or the individual species comprising these, are unusual or rare, endemic or reach distribution limits in the ecological district, or endemic or reach distribution limits nationally, regionally or within the Harihari Ecological District. The areas exhibit no distinctiveness due to influences of altitude, water table, soil type or geothermal activity.

No species observed reaches a distribution limit or is endemic here and physical factors do not promote distinctiveness. Species diversity is no more or less varied for vegetation in these areas than in their counterparts in the general area (Base Area), other parts of the Harihari Ecological District or at similar sites in other valleys of central Westland and would not differentiate the Vegetation Type 2/10 sub-area of Area 2 or Area 4 as having high natural heritage value.

Area 2 Vegetation Type 2/10 and Area 4 Significance/Natural Heritage Value Outcome: Not significant indigenous vegetation.

RPS 7.1(a)3(a) and TTPP ECO-P1(2)(i)3(a) – Diversity and Pattern - Indigenous vegetation or habitat of indigenous fauna that contains a high diversity of indigenous ecosystem or habitat types, indigenous taxa, or has changes in species composition reflecting the existence of diverse biological and physical features or ecological gradients.

WDP 4.9D(viii) - Scientific or Other Cultural Value - The area is a type, locality or other scientific reference area, is listed as a geopreservation site, or has a distinctive amenity value (e.g. it contributes to a distinctive and outstanding landscape of the district, has other significant cultural value or is of international importance).

CMS 3.3.2.3(1) - Natural Landscape Character, Taonga Species and Habitat.

Area 1 & Area 2 Vegetation Characteristics Compared to Criteria RPS 7.1(a)3(a), TTPP ECO-P1(2)(i)3(a), WDP4.9D(viii) & CMS 3.3.2.1(1):

The wider area of the true-right of the Waitaha Valley, encompassing Area 1 and the major portion of Area 2 (with exception of a minor portion of its northern end), is part of a larger area of both sides of the Waitaha Catchment currently identified as Outstanding Natural Landscape (TTPPC, 2022, Map 86). This is part of a far larger contiguous area thus identified that extends northward to the Taramakau River and beyond, eastward to the main divide, southward to the head of the Poerua River and Barlow River (a tributary of the Perth River), and westward into the coastal lowland zone. This identification is at a large and coarse scale and is not based on floristic characteristics or analysis.

Vegetation present in Area 1 and Area 2 is not unique or distinguished floristically. It is the arbitrary designation in the TTPP mapping that gives effect to the outstanding natural landscape component of *WDP 4.9D(viii) - Scientific or Other Cultural Value* and *CMS 3.3.2.3(1) - Natural Landscape Character*, not vegetation, that distinguishes this zone – vegetation present would not preclude the activity here. N.B: Assessment of other components of natural landscape character are beyond the scope of this report and are covered by other Scheme reporting (refer Boffa Miskell Ltd., 2025).

Flora species listed as Taonga Species (N.Z. Government, 1998) are present within the Base Area and to varying levels of occurrence within Areas 1 and 2 (see Appendix J, Species List). Therefore, the cultural value component of *WDP 4.9D(viii) - Scientific or Other Cultural Value* and *CMS 3.3.2.3(1) Taonga species and Habitat* apply. However the species concerned are not unique to, concentrated in or limited in range/distribution to Area 1, Area 2, the Base Area or the Waitaha Catchment – their presence would not preclude the Scheme or warrant special mitigation/management. No parts of Area 1 or Area 2 containing the Scheme project footprint as it affects indigenous terrestrial vegetation are listed geopreservation sites or scientific reference areas, or have other significant cultural value besides Taonga species as noted above, that would preclude the Scheme (as far as is known at time of preparation of this report)[5] or are of international importance.

Significance/Natural Heritage Value Outcome: Significant indigenous vegetation due to being a component of an outstanding natural landscape area, and to Taonga species' presence.

Area 4 Vegetation Characteristics Compared to Criteria RPS 7.1(a)3(a), TTPP ECO-P1(2)(i)3(a), WDP4.9D(viii) & CMS 3.3.2.1(1):

Area 4 of the Scheme is not part of an Outstanding Natural Landscape area (TTPC, 2022).

Flora species listed as Taonga Species (N.Z. Government, 1998) are present at varying levels of occurrence within Vegetation Type 4/1 (see Appendix J, Species List). Therefore, the cultural value component of *WDP 4.9D(viii) - Scientific or Other Cultural Value* and *CMS 3.3.2.3(1) Taonga species and Habitat* applies. However the species concerned are not unique to, concentrated in or limited in range/distribution to Vegetation Type 4/1, the Base Area or the Waitaha Catchment – their presence

[5] *Source:* Internal correspondence (letter dated 18/7/2024) from Te Rūnanga o Ngati Waewae and Te Rūnanga o Makaawhio to P. Armstrong, Chief Executive Officer, Westpower/Electronet, noting that a cultural values assessment may be undertaken by Poutini Ngai Tahu in association with Westpower as a component of application for consents or other approvals. No significant concerns or issues have been raised to date re indigenous vegetation, with Te Rūnanga o Ngati Waewae, Te Rūnanga o Makaawhio and Poutini Ngai Tahu expressing support for the Scheme.

would not preclude the Scheme or warrant special mitigation/management. No parts of Area 4 containing the Scheme project footprint as it affects indigenous terrestrial vegetation are listed geopreservation sites or scientific reference areas, or have other significant cultural value besides Taonga species as noted above, that would preclude the Scheme (as far as is known at time of preparation of this report)[6] or are of international importance.

Area 4 Significance/Natural Heritage Value Outcome: Significant indigenous vegetation due to Taonga species' presence.

RPS 7.1(a)4(a) and TTPP ECO-P1(2)(i)4(a) - Ecological Context - Vegetation or habitat of indigenous fauna that provides or contributes to an important ecological linkage or network, or provides an important buffering function.

WDP 4.9D(v) – Connectivity - The area is connected to one or more other significant areas in a way (including through ecological processes) which makes a major contribution to the overall value or natural functioning of those areas.

CMS 3.3.2.3(1) – Diversity and Viability.

Area 1 and Area 2 Vegetation Characteristics Compared to Criteria RPS 7.1(a)4(a), TTPP ECO-P1(2)(i)4(a), WDP4.9D(v) & CMS 3.3.2.1(1):

The indigenous vegetation cover of Area 1 and Area 2 is contiguous with the extensive area of similar types that form a continuous unbroken sequence both north-west from the Waitaha River to higher altitude forest of the eastern side of the Hitchen Range, and from north to south on the true-right side of the Waitaha River from the lower to upper valley. It is therefore connected to, and is a component of, habitat of other significant areas however the amount contained in the Scheme's project footprint is extremely small (1.4% of Base Area vegetation) and would not make a major contribution to the overall value or functioning of those other areas or detract from their viability if modified.

Significance/Natural Heritage Value Outcome: Not significant indigenous vegetation.

Area 4 Vegetation Characteristics Compared to Criteria RPS 7.1(a)4(a), TTPP ECO-P1(2)(i)4(a), WDP4.9D(v) & CMS 3.3.2.1(1):

The c. 3.210 hectares of Vegetation Type 4/1 is adjacent to historically logged podocarp/hardwood forest occupying the isolated hill landform to its west on the Lot 1, DP 376096 landholding. This landholding is subject to a Conservation Covenant; however the area of Vegetation Type 4/1 is not included in that landholding or covenanted area. Its location and isolation (predominantly surrounded by developed farmland) is not deemed to provide an important ecological linkage, network or buffering function or to contribute in a major way to the functioning of the podocarp/hardwood hill forest of the covenanted area on the neighbouring Lot 1, DP 376096.

Significance/Natural Heritage Value Outcome: Not significant indigenous vegetation.

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[6] *Op. cit. 5.*

RPS 7.1(a)4(b) and TTPP ECO-P1(2)(i)4(b) - Ecological Context - Indigenous vegetation or habitat of indigenous fauna that provides important habitat (including refuges from predation, or key habitat for feeding, breeding or resting) for indigenous species, either seasonally or permanently.

WDP *4.9D(vii) Migratory Species* - An inter-tidal area or area of forest, wetland, lake, estuary or other natural habitat that is important for migratory species or for breeding, feeding or other vulnerable stages of indigenous species.

CMS 3.3.2.3(1) - Diversity, Taonga Species and Habitat.

Area 1, Area 2 and Area 4 Vegetation Characteristics Compared to Criteria RPS 7.1(a)4(b), TTPP ECO-P1(2)(i)4(b), WDP4.9D(vii) & CMS 3.3.2.1(1):

While migratory fauna species are present e.g. Long-tailed cuckoo in summer as an international migrant and kereru, tui and bellbird throughout the year as locally seasonal migrants (Buckingham, 2025) in habitat afforded by the flora present, neither Area 1, Area 2 or Area 4 indigenous vegetation would constitute important habitat for migratory species to a degree that would compromise their presence in the remainder of the Base Area or beyond, given the small areas they contain and the widespread occurrence of the assemblages in other areas in the Waitaha catchment and other central Westland valleys. The same assessment applies re natural values and as noted by Wildlife Surveys (2014) and Buckingham (2025), the Scheme is expected to have little influence on migratory species.

Significance/Natural Heritage Value Outcome: Not significant indigenous vegetation.

RPS 7.1(a) and TTPP ECO-P1(2)(i) – No matching criterion.

WDP(iv) – Protected Status - The area has been set aside by New Zealand Statue or Covenant for protection and preservation or is a recognised wilderness area.

CMS 3.3.2.3(1) – No matching criterion.

Area 1 & Area 2 Vegetation Characteristics Compared to Criterion WDP4.9D(iv):

The majority of the Scheme project area carrying indigenous flora is within the Waitaha Forest conservation unit. As conservation land (stewardship land), the area is administered under New Zealand statute. It is not part of a recognised wilderness area.

A section of the Scheme's proposed access road and transmission line in Area 2 bisects predominantly indigenous Vegetation Type 2/10 where it occurs on a land parcel assigned 'Hydro', as N.Z. Primary Hydro Parcel I.D. number 7500647. This is land administered by Land Information New Zealand (LINZ), a Hydro Parcel being defined as: *"A Primary Parcel defining the residual or balance portion of the bed of a lake, river, stream or the sea..."*.[7] This is not deemed to constitute having been set aside by any of the protected status instruments listed in WDP(iv) specifically protection, preservation or a recognised wilderness area.

Significance/Natural Heritage Value Outcome: Significant indigenous vegetation due to protected status as Stewardship Land, administered under Part 5 of the Conservation Act 1987 (N.Z. Government, 1987).

Note: This WDP(iv) Protected Status criterion prescribes an arbitrary designation. It does not infer or confer high vegetation values. The land area of Westland is approximately 1,140,000 hectares. Approximately 85% (969,850 hectares) is administered by the Department of Conservation (WDC, 2002), therefore the protected status characteristic is very common. The Scheme would not affect status of land administration for the Waitaha Forest conservation unit, and the activity would not be precluded on the basis of vegetation present in the Scheme project footprint.

Area 4 Vegetation Characteristics Compared to Criterion WDP4.9D(iv):

The Scheme's proposed access road and new transmission line segment in Area 4 where it affects Vegetation Type 4/1 is private freehold land.

Area 4 Significance/Natural Heritage Value Outcome: Not significant indigenous vegetation.

[7] *Source:* https://www.linz.govt.nz/guidance/survey/cadastral-survey-guidelines/parcel-intent-usage#fee-simple

E.2/ Summary of Vegetation Significance and Natural Heritage Value

None of the seven criteria/guidelines set out in the CMS Part 3, Section 3.3.2.3 Prioritising Natural Heritage Work, Policy 1, applied to assessment of vegetation in Area 1, Area 2 (Area 3, not carrying indigenous vegetation is excluded) or Area 4 result in high natural heritage value status determination where there is no correspondence/alignment of a criterion from Policy 4.9D of the WDP.

The same applies to significant indigenous vegetation status determination using the criteria in the RPS - Section 7 Ecosystems And Indigenous Biological Diversity Policy 1, and those of the TTPP - Part 2 - Natural And Environment Values, Ecosystems and Indigenous Biodiversity, Policy ECO- P1 where a significant indigenous vegetation outcome is not also concomitant with correspondence/alignment of a criterion in Policy 4.9D of the WDP.

- Indigenous vegetation of Area 1 and Area 2 (being contiguous with a greater area within the Waitaha catchment) is significant indigenous vegetation under the WDP on the basis of five WDP (Policy 4.9D) criteria – representativeness, intactness and size of area, threat, scientific or other cultural value, and protected status. The arbitrary designation as per the WDP (Policy 4.9D) protected status criterion stands alone, pertaining to land administration and does not infer or confer high vegetation values.

- Indigenous vegetation of Area 3 (being contiguous with a greater area within the Waitaha catchment) is significant indigenous vegetation under the WDP on the basis of five WDP (Policy 4.9D) criteria – representativeness, intactness and size of area, threat, and scientific or other cultural value.

- Indigenous vegetation of Area 4 is significant indigenous vegetation under the WDP on the basis of two WDP (Policy 4.9D) criteria – threat, and scientific or other cultural value.

Work undertaken by Westpower:

1. Contributes to a record of vegetation in this area at a more detailed level of stratification and accuracy of description than available via the LCDB land cover type stratification. Examples are Vegetation Type 2/7 being mixed scattered indigenous hardwood shrub cover and grassed alluvial flat mapped as Gravel and Rock in the LCDB system, and Vegetation Type 2/9, being indigenous streamside vegetation, mapped under the LCDB system as Gorse and/or Broom.

2. Adds detail to vegetation records for the Wilberg Ecological District, where the summary in McEwen (1987, p. 3) states:

   "Vegetation: a sequence of vegetation belts characteristic of high rainfall areas where beech is lacking: mixed podocarp-hardwood forest on lower slopes; rata-kamahi forest at higher altitudes; subalpine scrub; snow tussockland, cushion bogs, herbfield and high-alpine vegetation. Little botanical knowledge."

These advances are consistent with management objectives and policies of the CMS Section 3.3.2.1: Knowledge and Information Needs, Objective 1, Policies 3 and 4 and under Section 3.3.2.1: Knowledge and Information Needs rationale where it is acknowledged that extra information: *"…may assist with the management of conservation values."* (DOC, 2010, p. 73).

The criteria under which significance and high heritage values accrue to Area 1 and Area 2 indigenous vegetation are predominantly arbitrary (land status, size of area, landscape mapping). Nothing was identified in the field survey that suggests any vegetation community uniqueness, attributes or species presence that would distinguish Area 1, Area 2 or Area 4 indigenous vegetation from any other similar sites throughout the central Westland area and that would preclude these areas in total or in part from the proposed Scheme activities on the basis of vegetation. Reasons are:

- No species of flora identified is endemic to the areas, and with exception of *Coprosma rubra* no threatened flora species were identified.

- Species recorded have a wide distribution range in the Waitaha catchment, the Wilberg Ecological District, Harihari Ecological District and other neighbouring Ecological Districts e.g., Whitcombe Ecological District to the north and Glaciers Ecological District to the south.

- The Scheme's design that aims to minimise affected area by utilising tunnel access to headworks infrastructure, aligning transmission line route and access road to reduce clearance area and locating these wherever practicable on landforms that require least earthworks, and where the few small wetland areas and mature podocarp/hardwood forest are least prevalent.

- For Area 1 and Area 2 that exhibit predominantly indigenous vegetation in intact, unmodified state, the project footprint of the Scheme is a very small component of its locale (1.2% of the Base Area), and the operational footprint (area permanently cleared of vegetation) is still less at 0.9% of the Base Area. Clearance of these amounts of vegetation of the types involved would have inconsequential effect on vegetation connectivity, intactness, or viability as high ecosystem natural heritage values.

- The Scheme would not affect status of land administration for the Waitaha Forest Conservation Unit and the activity would not be precluded on the basis of vegetation present in the Scheme's project footprint area because its protected status designation is arbitrary, not a consequence of vegetation.

- Scheme components in Area 3 affect c. 20.32 hectares in total, however affected area is on freehold partially developed or developed farmland and the extremely minor presence of indigenous species here is not considered a viable indigenous vegetation community or imparting the ecosystem function of an indigenous vegetation assemblage, being more correctly classed and considered an exotic assemblage.

- Except for the 0.085 hectares of new transmission line and 0.120 hectares of access road route widening in Vegetation Type 4/1 (where expected effect on this is deemed negligible, i.e., less than minor), Scheme components in the remainder of Area 4 have a zero nett effect on indigenous vegetation.

APPENDIX F: POTENTIAL EFFECTS OF THE SCHEME

F.1/ Method And Parameters Applied In Effects Assessment

The potential effects of each infrastructure component of the Scheme are described below as to the size of affected area within each Vegetation Type, within riparian margins if applicable, and in total.

All distance and area figures given in the **Appendix F** tables are indicative. The site works may be subject to variation depending on final location, access, and construction requirements established through detailed design, though any differences in location, effect and assessment conclusions are expected to be minor. The areas within which the works could be expected to be relocated if necessary have been assessed in field work and considered in analyses and conclusions in this report.

Areas given as construction, permanent and riparian (construction) in the tables are not additive. The construction area is the expected maximum area potentially affected by each Scheme component and the construction total is an indication of the Scheme's project footprint as it pertains to vegetation effect. Areas given as permanent and riparian areas are sub-areas for purposes of describing amount of vegetation clearance associated with a given Scheme component. In the case of permanent areas these indicate the operational footprint of each Scheme component and for the Scheme in total.

Where riparian areas are identified as being affected by a Scheme component with an estimated affected area calculated, these are for streams >3metres wide where provisions of the Regional Land and Water Plan (WCRC, 2014) and the Westland District Plan (WDC, 2002) prescribe 10 metre riparian margin widths. Riparian areas are listed where relevant because activities affecting indigenous vegetation in riparian margins will require consideration for regional and district planning provision purposes. Vegetation types present in riparian margins in Areas 1, 2 and 4 are not unique or distinguished floristically from their counterparts not occupying a riparian strip. It is the arbitrary riparian designation of fixed-width distance from stream bank, not vegetation, that distinguishes these zones and that may have environmental planning restrictions that would not apply otherwise.

For streams 1 – 3 metres wide, provisions of the Regional Land and Water Plan (WCRC, 2014) prescribes 10-metre-wide riparian margins if dominant slope angle is >12^{o} and 5 metre riparian margins otherwise. This requirement will add some (expected to be relatively minor) area to available estimates of affected riparian area. The detailed field survey and mapping of small stream location was not a component of work undertaken as the basis of this report. The number and exact location of streams 1 - 3 metres wide that are potentially affected will need to be determined and will add some area to riparian zone area estimates given in Table 2. However, based on a conservative approach it is expected that the area to be added will be minor at worst and it is not considered that potential effects on vegetation will be any greater than assessed and considered without these minor additions.

An arbitrarily defined Base Area, being a zone encompassing Area 1 and Area 2, plus an additional area representative of the vegetation types they exhibit, is considered the Scheme's general locale. This Base Area is delineated by the 400-metre contour from the true-left margin of Macgregor Creek at NZTM E1417875 N5225100 through to the Waitaha River true-right margin in the Waitaha Gorge at NZTM E1419938 N5222050, thence by the true-right margin of the Waitaha River to the true right margin of Macgregor Creek and east to the freehold farmland boundary, continuing east along this to cross Macgregor Creek to its true left margin and eastward along this to finally join with the commencement point at c. NZTM E1417875 N5225100. Where necessary the delineation around the Kiwi Flat area has been adjusted with reference to 2010 - 2012 aerial photography to account for minor river channel changes and vegetation colonisation since topographic map compilation. The Base Area is shown on **Appendix I, Map 7 and Appendix I, Map 8**. It encompasses a total area of c. 447.5 hectares comprising primarily indigenous vegetation (436.8 hectares lowland forest/10.7 hectares subalpine shrubland) broadly classified as lowland forest/seral low forest (James *et al*., 1973; Wardle, 1979). These c. 447.5 hectares of lowland forest/seral low forest are the basis for percentage calculations in computing scale of indigenous vegetation clearance effects of the Scheme components and in total for Area 1, Area 2 and Area 4.

In assessing the level of potential effects of clearance of indigenous vegetation associated with the Scheme a range of potential effects was considered based on a commonly available continuum/guideline[8]. The scale of effects adopted for these purposes was:

Nil Effect.

Less than Minor = Negligible Effect.

Minor Effect.

More than Minor Effect.

Significant Effect.

For classifying potential effect of activities on indigenous vegetation in Area 1, Area 2 and Area 4 a conservative approach was adopted based, at the lowest end of the scale, on observed disruption to vegetation (i.e., landslip, erosion etc.) that occurs naturally within the Scheme locale. Accordingly, the following scale is applied:

Negligible Effect:

The total area of any temporary effect(s) associated with a Scheme component in an Area is no more than 0.5 ha or 1.0% (whichever is greater) of the total area of similar vegetation type assemblages in the locale;

AND

The total area permanently affected by a Scheme component in an Area is no more than 0.5% of the total area of similar vegetation type assemblages in the locale.

Minor Effect:

The total area of any temporary effect(s) associated with a Scheme component in an Area is no more than 1.0 ha or 2.0% (whichever is greater) of the total area of similar vegetation type assemblages in the locale;

AND

The total area permanently affected by a Scheme component in an Area is no more than 1.0% of the total area of similar vegetation type assemblages in the locale.

Note: No Area 1, Area 2 or Area 4 Scheme effects were identified as being greater than negligible (i.e., less than minor) or minor relating to indigenous vegetation clearance in terms of this assessment, and Area 3 does not contain indigenous vegetation cover such that it would be considered an indigenous community and therefore no indigenous clearance effect pertains there.

[8] *Source*: Quality Planning website (www.qualityplanning.org.nz).

F.2/ Scheme Effects In Area 1

The following section provides separate descriptions for each Scheme component and its predicted effect(s) in Area 1.

F.2.1 Weir/Training Wall and Kayak Access

The effect of weir and associated components' works on vegetation is negligible, given that construction activities and the weir structure are principally located in the active bed of the river on already exposed bedrock with minimal vegetative cover. The area of activity is not deemed to be in riparian margin as it is in the bed of the river. Vegetation that is present is Type 1/1 (see **Appendix I, Map 2**).

Assuming permanent site occupancy area of the weir and its associated components is c. 50 square metres as shown on Appendix I Map 2, and a construction-affected area of 220 square metres, potentially affected areas (combined construction and permanent site occupancy by structure) by vegetation type are shown in Table 6. As a maximum, 25% is deemed to carry some vegetation, the remainder being un-vegetated bedrock and active river channel and therefore not included in the Table 6 areas.

Natural regeneration of current vegetation cover could be expected to occur relatively soon after cessation of construction activities on all but the permanently occupied area, as scale and type of disturbance is similar to that occurring at or about the site by natural causes e.g. minor slips and major flood events and existing vegetation has established following these disturbances.

A further possible effect on vegetation could be that caused by any re-grading of the riverbed after weir construction, however investigations into possible sedimentation buildup/change indicate effects of the weir in its proposed location are unlikely to be substantial. The lower end of Kiwi Flat is subject to regular, natural 'swamping' during flood events caused by the choking effect of Morgan Gorge (Hicks, 2025). If any small areas of existing vegetation were to be covered over by sediment aggradation or cut away as new river channel(s) form as a result of weir effect, this process appears likely to be confined to a minor portion of lower Kiwi Flat. It would be expected to be short term and would not be inconsistent with the fluvial processes by which the flat has formed and is maintained (Hicks, 2024). Natural regeneration would be expected in a matter of years, and this should exhibit the range of species currently present, as it would if it were a site of natural disturbance. Effect of proposed works is deemed negligible.

Table 6: Appendix F: Combined Weir/Training Wall/Kayak Access Construction Distances and Potentially Affected Areas Within Vegetation Type.

Vegetation Type	Distance (m)	Construction (ha)	Permanent (ha)	Placement Within Riparian Margins: Distance (m)	Placement Within Riparian Margins: Construction (ha)
1/1	True-right side of Waitaha River = 25%	0.0014	0.0003	0.0	0.0
1/1	True-left side of Waitaha River = 75%	0.0041	0.0010	0.0	0.0
Totals		**0.0055**	**0.0013**	**0.0**	**0.0**

F.2.2 Intake Channel and Sluice Channel

Effect of the intake channel and sluice channel structures on vegetation is negligible, given that construction activities and the intake channel are principally on already exposed bedrock or boulder covered areas with minimal if any vegetative cover. The area of activity is not deemed to be in riparian margin as it is in the bed of the river. Vegetation that is present is Type 1/1 (**Appendix I, Map 2**).

Assuming permanent site occupancy area of both channels is 1940 square metres (accommodating cut of bedrock) and a construction-affected area of an additional 400 square metres, total potentially affected area is c. 2340 square metres. Area (combined construction and permanent site occupancy by structure) by vegetation type is shown in Table 7. As a maximum, 25% of the affected area is deemed to carry some vegetation, the remainder being un-vegetated bedrock and boulder area and therefore not included in the Table 7 area. Overall effect of proposed works is likely negligible.

Table 7: Appendix F: Intake Channel and Sluice Channel Potentially Affected Areas Within Vegetation Type.

Vegetation Type	Construction (ha)	Permanent (ha)	Placement Within Riparian Margins: Construction (ha)
1/1	0.0585	0.0485	0.0
Totals	**0.0585**	**0.0485**	**0.0**

F.2.3 Intake Structure and Intake Tunnel Portal

The bedrock walls at the entrance to, and within Morgan Gorge, are scoured clean of vegetation by flood events up to c. 8.0 meters. Sparse vegetation cover that is present above the clear zone contains liverwort/moss, herbaceous and monocot components of Vegetation Type 1/1 in a narrow band of a few meters wide before merging to Vegetation Type 1/3 shrub cover in the gorge and with Vegetation Type 1/2 about and upstream of the gorge entrance.

Scheme design plans give a construction affected area of 270 square meters, reducing to a permanent site occupancy area of 190 square metres for this component combination. An estimate is that 50% of total affected area may be vegetated, and that the construction area/permanently occupied area difference i.e., 80 square metres may become revegetated over time. This work is likely to be within Vegetation Type 1/1 and Vegetation Type 1/2 in an affected area ratio of c. 1/3 and 2/3 respectively. Potentially affected areas by vegetation type are shown in Table 8. Overall effect of proposed works is likely negligible.

An estimated 50% of the affected area is contained within what could be considered true-right riparian margin of the Waitaha River. Vegetation types present in this area are not unique or distinguished floristically from their counterparts not occupying the riparian strip. It is the arbitrary riparian designation in the Regional Land and Water Plan (WCRC, 2014) and Westland District Plan (WDC, 2002) of fixed-width distance from stream bank, not vegetation, that distinguishes this zone – vegetation present would not preclude the activity here. Vegetation recovery on any disturbed area not occupied by structures is likely to occur naturally, and to exhibit the range of species currently present.

Table 8: Appendix F: Intake Structure Including Intake Channel Excavation And Intake Tunnel Portal Potentially Affected Areas Within Vegetation Types.

Vegetation Type	Construction (ha)	Permanent (ha)	Placement Within Riparian Margins: Construction (ha)
1/1	0.0045	0.0032	True-right side of Waitaha River = 0.0023
1/2	0.0090	0.0063	True-right side of Waitaha River = 0.0045
Totals	**0.0135**	**0.0095**	**0.0068**

F.2.4 Headworks Access Tunnel Portal Entrance and Wingwall(s)

The tunnel portal entrance and associated small wingwalling will likely be located in Vegetation Type 1/2 and Vegetation Type 1/3 in approximately equal proportions. The indicative dimensions of the tunnel portal are 5 metres high x 5 metres wide giving 25.0 m^2 cleared (although this may need to be adjusted to suit construction plant requirements). To this is added an allowance for side margin vegetation clearance effect of 3 metres each side and top margin effect of 4 metres, giving an estimated total of 99.0 square metres or 0.0099 hectares for construction. It is assumed side wingwall and top margin areas can revegetate, with just the portal entry area remaining permanently occupied. Potentially affected area (combined construction and permanent site occupancy by structure) by vegetation type are shown in Table 9. Tunnel portal entrance siting at c. 6.0 metres higher than the intake portal should mean works are outside any riparian margin. Overall effect of proposed works on vegetation is considered negligible.

Table 9: Appendix F: Access Tunnel Portal Entrance and Wingwall(s) Potentially Affected Areas Within Vegetation Types.

Vegetation Type	Construction (ha)	Permanent (ha)	Placement Within Riparian Margins: Construction (ha)
1/2	0.00495	0.00125	0.0
1/3	0.00495	**0.00125**	0.0
Totals	**0.0099**	**0.0025**	**0.0**

F.2.5 Access Tunnel Portal to Intake Structures Access Road and River Protection

A minor section (c. 66 metres long) of road is proposed providing ongoing/operational access between the headworks access tunnel portal and intake structures and portal. Width of this section varies for construction however average is expected to be 12.0 metres, so construction affected area is c. 792 square metres and expected permanent post-construction occupancy width is 10 metres – permanently affected area is therefore 600 square metres. Vegetation type is 1/2, with c. 75% of width likely to be in riparian margin. Potentially affected areas are shown in Table 10. Overall effect of proposed works on vegetation is considered negligible.

Table 10: Appendix F: Access Tunnel Portal To Intake Structures Access Road And River Protection Potentially Affected Areas Within Vegetation Type.

Vegetation Type	Distance (m)	Construction (ha)	Permanent (ha)	Placement Within Riparian Margins: Construction (ha)
1/2	66	0.0792	0.0600	0.0594
Totals	**66**	**0.0792**	**0.0600**	**0.0594**

F.2.6 Road to Construction Staging Area 1

Access to a proposed construction staging area on an alluvial terrace upstream of the headworks access tunnel portal entrance requires formation of c. 143 metres of road (in addition to the section described in F.2.5, above), sufficient to allow machinery traverse. The final dimensions and location of this road are to be confirmed during detailed design, but for purposes of this assessment the location is as per Appendix I, Map 2, with the roading consisting of an average 1 metre wide water tabling disturbance, plus 3.5 meter wide cut/fill allowance and a 4.5 metre wide carriageway for the 143 metre distance. Therefore this section may affect c. 1287 m^2, predominantly of Vegetation Type 1/2 (est. 75%) the remainder being Vegetation Type 1/4. It may be possible to position this road outside (north) of the Waitaha River riparian margin, however available area is narrow and may not allow complete riparian margin avoidance. For vegetation effect assessment purposes and contingency, it is assumed that c. 40 meters of the road distance will be partially in riparian margin, affecting a 5-metre-wide zone i.e., 200 m^2 of riparian margin predominantly within Vegetation Type 1/2. Vegetation present in the riparian area is not unique or distinguished floristically from its counterpart not occupying the riparian strip. It is the arbitrary riparian designation in the Regional Land and Water Plan (WCRC, 2014) and Westland District Plan (WDC, 2002) of fixed-width distance from stream bank, not vegetation, that distinguishes this zone – vegetation present would not preclude the activity here.

Potentially affected areas by vegetation type are shown in Table 11. This section of road will not be required post-construction of the headworks infrastructure. The area can be rehabilitated or left to regenerate naturally (see **Appendix G** regarding recommended mitigation). At this scale, and considering the temporary nature of the site occupancy, effect of proposed works on vegetation is within the scale of natural disturbance events in this environment and considered negligible.

Table 11: Appendix F: Road to Construction Staging Area 1 Distances and Potentially Affected Areas Within Vegetation Types.

Vegetation Type	Distance (m)	Construction (ha)	Permanent (ha)	Placement Within Riparian Margins: Construction (ha)
1/2	107	0.0965	0.0	True-right side of Waitaha River 40 m x 5 m strip = 0.0200
1/4	36	0.0322	0.0	0.0
Totals	**140**	**0.1287**	**0.0**	**0.0200**

F.2.7 Construction Staging Area 1

A construction staging area of c. 6710 square metres is proposed, to be located in the most practicable siting on the first available flat zone of sufficient area upstream of Morgan Gorge (**Appendix I, Map 2**). Final dimensions and location may be subject to change from those shown as a result of detailed design. However, this staging area may only be relocated no more than 15 metres beyond the laydown area as indicated on **Appendix I, Map 2**). This 15 metre adjustment area is therefore an input for the effects assessment. The area is all within Vegetation Type 1/4 and site configuration and placement should be able to be adjusted so as to avoid works in the Waitaha River riparian zone. In any case, vegetation types present in this riparian area are not unique or distinguished floristically from their counterparts not occupying the riparian strip. It is the arbitrary riparian designation of fixed-width distance from stream bank set by provisions of the Regional Land and Water Plan (WCRC, 2014) and the Westland District Plan (WDC, 2002), not the vegetation, which distinguishes this zone – vegetation present would not preclude the activity. Table 12 gives potentially affected areas by vegetation type.

This staging area will not be required post-construction. The area can be rehabilitated or left to regenerate naturally (see **Appendix G** regarding recommended mitigation). Considering the temporary nature of the site occupancy, effect of proposed works on vegetation is considered minor.

Table 12: Appendix F: Construction Staging Area 1 Potentially Affected Area Within Vegetation Type.

Vegetation Type	Construction (ha)	Permanent (ha)	Placement Within Riparian Margins: Construction (ha)
1/4	0.6710	0.0	0.0
Total	**0.6710**	**0.0**	**0.0**

F.2.8 Geophysical Drilling Test Site(s)

Four vertical test drilling sites are proposed on the forested terrace north-northwest along the tunnel-line from the intake portal. These are all included under Area 1 infrastructure description for simplicity, although sites 3 and 4 below are intermediate between headworks and Power Station. Final locations may vary slightly to avoid trees in the area and subject to engineering and geological considerations, but currently are:

1. At or near the intake gate location at approximately NZTM2000 E1415830 N5222249

2. At or near the headgate/stoplog location at approximately NZTM 2000 E1415783 N5222357 or an alternative at NZTM E1415775 N5222347.

3. Approximately 400 metres north-northwest along the tunnel line from the intake at approximately NZTM E1415721 N5222548 or an alternative at NZTM E1415721 N5222563.

4. Approximately 908 metres north-northwest along the tunnel line from the intake at approximately NZTM E1415566 N5223013 or an alternative at NZTM E1415570 N5223040.

Scheme plans provided by Westpower indicate 10 metre x 10 metre clearance areas for drill rig placement and operation. This would be in Vegetation Type 1/3, not be permanently occupied, and the sites could be expected to regenerate naturally (see **Appendix G** regarding recommended mitigation). Considering the temporary nature of the site occupancy, effect of proposed works on vegetation is considered negligible i.e., less than minor.

Note: A fifth geophysical test drilling site is also proposed, this to be for horizontal drilling and sited c. NZTM E1415847 N5222176 between the intake and access tunnel portals and likely subsequently subsumed by the portal area(s). Therefore, no vegetation effect has been assigned to this horizontal test drilling site.

Table 13: Appendix F: Geophysical Test Drilling Potentially Affected Area Within Vegetation Type.

Vegetation Type	Construction (ha)	Permanent (ha)	Placement Within Riparian Margins: Construction (ha)
1/3	0.0400	0.0	0.0
Total	**0.0400**	**0.0**	**0.0**

F.3/ Scheme Effects in Area 2

The following section provides separate descriptions for each Scheme component and its predicted effect(s) in Area 2.

F.3.1 Access Road From Farmland Boundary Across Macgregor Creek and a Short Section West on Macgregor Creek True Left (Separate From Transmission Line)

A short (c. 383 metre x average 10 metre wide) section of access road separate from the transmission line, is proposed, extending from the freehold farmland boundary on the true right side of Macgregor Creek southward across the creek bed to its true left side. Of this, c. 175 metres traverses Vegetation Type 2/10, the remaining 208 metres being unvegetated as the active bed of Macgregor Creek. Vegetation present in the riparian margin in this area is not necessarily unique or distinguished floristically from its counterpart not occupying the riparian strip. It is the arbitrary riparian designation of fixed-width distance (10 metres) from stream bank contained in the Regional Land and Water Plan (WCRC, 2014) and WDP, not vegetation, that distinguishes this zone – vegetation present would not preclude the activity. This section of access road then continues via a traverse west for another c. 180 metres along the true left of Macgregor Creek before entering Vegetation Type 2/8 - for potentially affected area calculations it is assumed an average width of affected area is 10 metres for the c. 180 metre route distance as indicatively mapped, however the area traversed is a recent portion of the Macgregor Creek outwash fan being stone and gravel with little or no vegetative cover – in terms of effect it is deemed unvegetated.

Affected area details are given in Table 14. Vegetation effects are considered negligible i.e., less than minor.

F.3.2 Transmission Line From Farmland Boundary Across Macgregor Creek and a Short Section West on Macgregor Creek True Left (Separate From Road)

A short (c. 383 metre x average 10 metre wide) section of transmission line separate from the access road, extending from the freehold farmland boundary on the true right side of Macgregor Creek southward across the creek bed to a point on the hill slope on its true left side (this point to be determined in the subsequent final Scheme design phase). The objective of this is to utilise height for placement of a double pole on the hill footslope to increase line span and avoid having any pole(s) in the Macgregor Creek bed. Of this, c. 175 metres traverses Vegetation Type 2/10, the remaining 208 metres being unvegetated as the active bed of Macgregor Creek. Vegetation present in the riparian margin in this area is not necessarily unique or distinguished floristically from its counterpart not occupying the riparian strip. It is the arbitrary riparian designation of fixed-width distance (10 metres) from stream bank contained in the Regional Land and Water Plan (WCRC, 2014) and WDP, not vegetation, that distinguishes this zone – vegetation present would not preclude the activity.

A further short section of the transmission line is proposed to run from the point on the hill slope, west to converge with the access road at a point on the true left of Macgregor Creek. The actual location of this portion of transmission line may be adjusted subject to engineering considerations during detailed design. However, the line may only be relocated within a 30 metre 'corridor', that is, a maximum of 15 metres either side of the centreline of the indicative route. This 'corridor' has been considered as part of the assessment. For the potentially affected area calculations it is assumed an average width of affected area is 10 metres for the c. 250 metre route distance as indicatively mapped (**Appendix I, Map 3**).

Affected area details are given in Table 14. Vegetation effects are considered negligible i.e., less than minor.

F.3.3 Access Road and Transmission Line (Together/Parallel Segment)

The location of the proposed access road with power transmission line parallel, is indicated on **Appendix I, Map 3**. This combined access road/transmission line segment continues from the separate access road and transmission line segments described in F.3.1 and F.3.2, above, and runs west for c. 240 metres along the true-left side of Macgregor Creek, then south to the site of power station construction.

Although affected areas within vegetation types are estimates, variation from figures given herein is expected to be negligible (if any). An average expected construction width for the access road and

transmission line where these are adjacent is 17.5 metres. In the case of transmission line pole location, this is intended to follow the road alignment wherever practicable and where straight-line distances are reasonable but may depart from the road alignment (subject to topographical suitability and large tree avoidance considerations) to reduce angles in the line. Where this occurs, some small area of vegetation clearance would be required at individual pole sites that are additional to the road width, however this will likely be concomitant with a reduction in cleared zone width that accommodates only the road in such departure zones.

Potentially affected area calculations are based on an estimated 1892 metre route distance (including the side cuts involved in the Granite Creek temporary crossing) as indicatively mapped (**Appendix I, Map 3**). The actual location of the road/transmission line may be adjusted subject to engineering considerations, to avoid large trees where practicable, or to facilitate alignment, during field layout/survey. However, the road may only be relocated within a 30 metre 'corridor', that is, a maximum of 15 metres either side of the centreline of the indicative route. This 'corridor' has been considered as part of the assessment.

It is noted that wetland areas are avoided and adequately buffered via access road and transmission line location to achieve this as a part of Scheme design.

Affected area details are given in Table 14. Vegetation effects are considered minor.

Indicative Affected Areas re Access Roading and Transmission Line (F.3.1, F.3.2 and F.3.3)

It is likely that the majority of area required for access road/transmission line construction purposes in Area 2 will need to remain permanently cleared of vegetation to enable continued access and facility inspection and maintenance, however some natural regeneration of indigenous cover is expected on e.g., cut/fill surfaces and outer berm areas. Therefore, two widths are applied for affected area assessment a.) construction-affected width of 17.5 metres, and b.) permanently occupied width of 15.0 metres. Natural regeneration of the range of indigenous ground cover and shrub species present in the Vegetation Types affected is expected to occur relatively quickly (over one to three growing seasons post construction), with regeneration of tree species also occurring (at least as seedlings in this timeframe) to reduce the 17.5 metre construction width for the access road/transmission line combination to the 15 metre permanent occupancy width without need for remediation.

There is a requirement for a permanent single span bridge over Granite Creek. The affected area associated with the construction and permanent occupancy of this bridge as a component of the access road is included in road distance and affected area calculations, however Scheme roading plans include separate sections of side-cut on each side of Granite Creek to get access and grade from the principal road alignment on the terrace either side of the Granite Creek channel, to and from a temporary bridge crossing of the waterway. These separate cuttings and the temporary bridge will remain in place until the permanent bridge is completed and will then be removed. Each side-cut is estimated to be c. 30 metres long and 15 metres wide on average, giving total construction area of 900 square metres added to that of the main/permanent road alignment. Approximately 50% will be in each of Vegetation Types 2/4 and 2/9, 300 square meters of which is within the Granite Creek Vegetation Type 2/9 riparian margins. The sites could be expected to regenerate naturally.

Total construction-affected area, at c. 3.9112 hectares, is 0.90% of the Base Area vegetation and considered minor.

Given the above, the most likely vegetation types affected under components F.3.1, F.3.2 and F.3.3 and areas of each are shown in Table 14. Vegetation types present in riparian margins in this area are not necessarily unique or distinguished floristically from their counterparts not occupying a riparian strip. It is the arbitrary riparian designation of fixed-width distance (10 metres) from stream bank contained in the Regional Land and Water Plan (WCRC, 2014) and WDP, not vegetation, that distinguishes these zones – vegetation present would not preclude the activity, and effect is deemed negligible.

Table 14: Appendix F: Access Road And Transmission Line Distances And Potentially Affected Areas Within Vegetation Types In Area 2.

(Note: Table lists individual segments within vegetation type starting at the freehold farmland boundary on the true right side of Macgregor Creek and proceeding to the power station site (see Appendix I, Map 3)). Permanent areas for Vegetation Types 2/4 and 2/9 are individual figures and NOT derived from construction distance multiplied by 15 metres because construction distance given for Vegetation Types 2/4 and 2/9 includes distances within each for the temporary cuttings associated with the proposed Granite Creek crossing. Permanent distances for these, to be multiplied by 15 metres, are shown italicised and in square brackets.

Access Road Separate From Transmission Line Segment (F.3.1)					
Vegetation Type	**Distance (m)**	**Construction (ha)**	**Permanent (ha)**	**Crossings of Riparian Margins: Distance (m)**	**Crossings of Riparian Margins: Construction (ha)**
2/10	175	0.1750	0.1750	True right side of Macgregor Creek 10.0	True right side of Macgregor Creek 0.010
N/A	388	0.0	0.0	0.0	0.0
Note: This section of access road is located south across (208 meters) and west down a true left part (180 meters) of what is deemed the active gravel outwash fan of Macgregor Creek that is predominantly bare and therefore not assessed/included as vegetated area.					
Transmission Line Separate From Access Road Segment (F.3.2)					
Vegetation Type	**Distance (m)**	**Construction (ha)**	**Permanent (ha)**	**Crossings of Riparian Margins: Distance (m)**	**Crossings of Riparian Margins: Construction (ha)**
2/10	175	0.1750	0.1750	0.0	0.0
N/A	208	0.0	0.0	0.0	0.0
Note: This section of transmission line is located south across (208 meters) of what is deemed the active gravel outwash fan of Macgregor Creek that is predominantly bare and therefore not assessed/included as vegetated area.					
2/3	250	0.2500	0.2500	0.0	0.0
Access Road And Transmission Line Combined Segment (F.3.3)					
Vegetation Type	**Distance (m)**	**Construction (ha)**	**Permanent (ha)**	**Crossings of Riparian Margins: Distance (m)**	**Crossings of Riparian Margins: Construction (ha)**
2/8	238	0.4165	0.3570	True left side of Macgregor Creek 10.0	True-left side of Macgregor Creek 0.0175
2/4	271 *[256]*	0.4743	0.3840	0.0	0.0
2/9	80 *[50]*	0.1400	0.0750	Both sides of Granite Creek (x 2) 40.0	Both sides of Granite Creek (x 2) 0.0700
2/4	96 *[81]*	0.1680	0.1215	0.0	0.0
2/4A	441	0.7718	0.6615	0.0	0.0
2/4	653	1.1428	0.9795	Both sides of Alpha Creek (Distance accounted for under separate waterway training/flood protection works at this site, see Component F.3.9, below, so not included again here)	Both sides of Alpha Creek (Area accounted for under separate waterway training/flood protection works at this site, see Component F.3.9, below, so not included again here)
2/3	69	0.1208	0.1035	0.0	0.0
2/1	44	0.0770	0.0660	0.0	0.0
Subtotal	*1892*	*3.3112*	*2.7480*	*50.0*	*0.0875*
Totals [Vegetated]	***2492***	***3.9112***	***3.348***	***60.0***	***0.0975***

F.3.4 Total Platform Area Including Tunnel Portal Access and Turning Area, Batter Slopes, Tunnel Portal Exits, Portal Headwalling, Power Station, Switchyard, Tailbay, and Slope Protection Works

The twin tunnel portal exits are located at or about NZTM E1415349; N5223586. Removal of vegetation will be required across the east-west width of the footslope at this site to access the foot of the main terrace riser, and for some distance north and south of the tunnel portal area, to give machinery access and allow room for construction, equipment, and spoil handling. A continuation of the power station access platform, the portal access turning bay includes a formed area to and at the access portal exit large enough to enable vehicles to turn 90 degrees into the tunnel. It is proposed to be either concrete or gravel and permanently occupied. The power station itself, along with its access platform, rockfill/batter slopes, switchyard, walling and tailbay are included and Scheme plans indicate the above infrastructure combination involves an area of c. 5180 square metres for construction and for permanent occupancy.

A concrete wall (permanent) approximately 6 metres high at its highest point will span between and around the tunnel portals. The slope protection/stabilisation e.g., forepoleing and shotcreteing treatment above the portal structures is included in the vegetation disturbance allowance for construction, however a proportion of this area should regenerate naturally after cessation of construction, in the range of species currently present. Protection from falling rocks is necessary, and this may consist of a post and wire mesh system, possibly up to 70 metres long. Scheme plans show an anticipated slope protection area of 830 square metres in addition to the other infrastructure noted above. It is likely that some portion of this area will attain a vegetative cover of a range of herbaceous, monocot and fern species that are present in the surrounding area via natural processes post-construction This is estimated to be 33% for the purpose of permanently occupied area calculation, giving a permanently affected area for the slope protection works of 556 square metres in Vegetation Type 2/1.

Vegetation Types 2/1 and 2/2 will be affected (see **Appendix I, Map 3**), an estimate being half of area in Type 2/1, and half in Type 2/2. Table 15 gives potentially affected areas by vegetation type. Vegetation effect is considered negligible i.e., less than minor.

Table 15: Appendix F: Total Platform Area Including Tunnel Portal Access and Turning Area, Tunnel Portal Exits, Portal Headwalling, Power Station, Switchyard, Tailbay, and Slope Protection Works Within Vegetation Types.

Vegetation Type	Construction (ha)	Permanent (ha)	Placement Within Riparian Margins: Construction (ha)
2/1	0.3005	0.2731	0.0
2/2	0.3005	0.3005	0.0
Totals	**0.6010**	**0.5736**	**0.0**

F.3.5 Tailrace

The tailrace will be of concrete construction, with tapering sides. Construction-affected and permanently occupied area is c. 1470 square metres. The excavation depth combined with extension beyond the river bank means not all construction or permanently occupied area will affect vegetation. Vegetated area potentially affected by construction and permanent occupancy is approximately 66% of total area i.e., c. 970 square metres, all of which is Vegetation Type 2/2. A component of this is in the Waitaha River true right riparian margin through which the tailrace passes obliquely – an average distance within the riparian vegetation is estimated as 40 metres, with the strip being 10 metres wide and therefore affecting an area of c. 400 square metres. Vegetation types present in riparian margins in this area are not necessarily unique or distinguished floristically from their counterparts not occupying a riparian strip. It is the arbitrary riparian designation of fixed-width distance (10 metres) from stream bank contained in the Regional Land and Water Plan (WCRC, 2014) and WDP, not vegetation, that distinguishes these zones – vegetation present would not preclude the activity, and overall effect on vegetation is considered negligible i.e., less than minor. Table 16 gives Vegetation Types and affected areas.

Table 16: Appendix F: Tailrace and Tailrace Weir Potentially Affected Area Within Vegetation Type.

Vegetation Type	Construction (ha)	Permanent (ha)	Placement Within Riparian Margins: Construction (ha)
2/2	0.0970	0.0970	0.0400
Totals	**0.0970**	**0.0970**	**0.0400**

F.3.6 Construction Staging Area 2

An area of clearance is proposed to provide for vehicle and machinery operation, materials handling and machine positioning/access to work on key construction components. This zone comprises:

1. Part of the alluvial flat commencing from a point abuting the tailrace and extending north along the upper margin of the Waitaha River true right bank for c. 85 metres and thence from the bank eastward to abut the access road/powerhouse access ramp and its batter slope, and southward to abut the powerhouse and tailrace. Predominant cover is Vegetation Type 2/2, within which is an estimated 100 metre long by 10 metre wide strip of riparian margin.

2. Part of the alluvial flat commencing from the power station retaining wall and tailrace and extending south along the upper margin of the Waitaha River true right bank for c. 125 metres, to meet the terrace footslope margin, thence north again to the power station retaining wall. Predominant cover here is also Vegetation Type 2/2, within which is an estimated 125 metre long by 10 metre wide strip of riparian margin.

Scheme design indicates that the total area involved is c. 8185 square metres, however at least half of the proposed 1470 square metre tailrace area is also located within this, so if that half is deducted to avoid double counting the area specific to Construction Staging Area 2 becomes c. 7450 square metres.

Vegetation type present in the riparian margin in this area is not necessarily unique or distinguished floristically from its counterpart not occupying a riparian strip. It is the arbitrary riparian designation of fixed-width distance (10 metres) from stream bank contained in the Regional Land and Water Plan (WCRC, 2014) and WDP, not vegetation, that distinguishes these zones – vegetation present would not preclude the activity.

This potential construction disturbance area will be minimised as far as practicable so may or may not be used in its entirety, with Table 17 giving estimated maximum affected area. It will not be permanently occupied and therefore can be rehabilitated and revegetated post construction. Remedial planting with a range of species naturally present on the site is recommended for the area affected and subject to this, overall vegetation effects are deemed negligible i.e., less than minor.

Table 17: Appendix F: Potential Construction Disturbance Affected Area Within Vegetation Type.

Vegetation Type	Construction (ha)	Permanent (ha)	Placement Within Riparian Margins: Construction (ha)
2/2	0.7450	0.0	0.2250
Totals	**0.7450**	**0.0**	**0.2250**

F.3.7 Waterway Training and Flood Protection - Alpha Creek

An area of flood protection works is proposed on a portion of Alpha Creek where the creek exits the terrace/terrace face to the east where, until that point, it is in an incised/defined channel, but after exiting the terrace can flow in a number of directions. It is proposed to control and train any flow to a defined channel within the creek. Proposed works may include the development of a single, defined channel (including stopbanks on both sides) of a segment of the lower portion of Alpha Creek to train and divert flows, in

particular flood flows, to a single flow path within the existing outwash fan. The aim of the works is to prevent large flood flows and associated alluvium affecting the access road and to contain the stream as a c. 4.0 metre wide channel by leading to and from the access road crossing point. This will be a concrete box culvert with upstream and downstream rock aprons. The general zone of works is indicated on **Appendix I, Map 3**. Stream containment is proposed to be by upstream (c. 90 metre long) and downstream (c. 36 metre long) sections of gravel bunding with rock rip rap. Construction affected area is assessed from the Scheme roading plan at c. 2142 square metres (126 metre distance and 17 metres average wide), all of which is within Vegetation Type 2/4.

This work will therefore involve a c. 126 metre long portion of riparian vegetation on each side of Alpha Creek. Provisions of the Regional Land and Water Plan (WCRC, 2014) and the WDP prescribe 10 metre riparian margin widths for streams >3 metres wide whether permanently flowing or not. The proposed flood protection work zone is likely to involve the majority (assumed to be 85% for assessment purposes) of the 10 meter wide riparian margin on each side depending on final route location relative to the current stream channel(s). Vegetation types present in riparian margins in this area are not necessarily unique or distinguished floristically from their counterparts not occupying a riparian strip. It is the arbitrary riparian designation of fixed-width distance (10 metres) from stream bank contained in the Regional Land and Water Plan (WCRC, 2014) and WDP, not vegetation, that distinguishes these zones – vegetation present would not preclude the activity.

The current stream course(s) run beneath closed canopy forest cover, and it is expected that regeneration of the range of indigenous species currently present would occur naturally and it is possible that a proportion of the construction-affected area could become revegetated, giving a permanently affected (deemed due to possible maintenance requirements) area of 50% of construction-affected area i.e., c. 1125 square metres. This is likely to also apply to a similar portion of any riparian margin area affected by construction.

The scale of vegetation clearance involved in this Scheme component is within that of naturally occurring disturbance events e.g. slips and stream channel changes in this locality and environment. Evidence of these occurrences is the set of two different-aged but relatively recent slips, one regenerating, the other fresh, in this same stream c. 400 metres upstream of its confluence with the Waitaha River (see Appendix I, Map 3). Areas potentially affected by this Scheme component are shown in Table 18. Vegetation effects are considered negligible i.e., less than minor.

Table 18: Appendix F: Waterway Training and Flood Protection Works (Alpha Creek) Distance and Potentially Affected Area Within Vegetation Type.

Vegetation Type	Distance (m)	Construction (ha)	Permanent (ha)	Placement Within Riparian Margins: Distance (m)	Placement Within Riparian Margins: Construction (ha)
2/4	126	0.2142	0.1071	Both sides of Alpha Creek 2 x 126 m long strips = 252	Both sides of Alpha Creek 126 m x 2 x 10 m strips x 0.85 = 0.2142
Totals	**126**	**0.2142**	**0.1071**	**252**	**0.2142**

F3.8 Geophysical Drilling Test Sites

Three geophysical test drilling sites are proposed:

1. A horizontal drilling site, to be located near the terrace base and the water tunnel portal exit, in Vegetation Type 2/1. It is expected that area associated with this test drilling site will be subsumed within the area of the later excavation of the portal area, Therefore, no vegetation area effect has been assigned to this horizontal test drilling site.

2. A vertical drilling site, located within the proposed power station footprint, in Vegetation Type 2/2. The area associated with this test drilling site will be subsumed within the area of the later excavation for the power station. Therefore, no vegetation area effect has been assigned to this vertical test drilling site.

3. A vertical drilling site, located at c. NZTM E1415404 N5223549 on the upper terrace surface and approximately on the alignment of the proposed access tunnel. Scheme plans provided by Westpower indicate a 10 metre x 10 metre clearance area for drill rig placement and operation. This would be in Vegetation Type 2/3, not be permanently occupied, and the site could be expected to regenerate naturally (see **Appendix G** regarding recommended mitigation). Considering the temporary nature of the site occupancy, effect of proposed works on vegetation is considered negligible i.e., less than minor.

Table 19: Appendix F: Geophysical Test Drilling Potentially Affected Area Within Vegetation Type.

Vegetation Type	Construction (ha)	Permanent (ha)	Placement Within Riparian Margins: Construction (ha)
2/3	0.0100	0.0	0.0
Total	**0.0100**	**0.0**	**0.0**

F.4/ Scheme Effects in Area 3

The following section provides separate descriptions for each Scheme component and its predicted effect(s) in Area 3.

F4.1 Spoil Disposal Areas

Two spoil disposal areas will be located on the private farmland and outside the true right margin of Macgregor Creek (**Appendix I, Map 4**), the western of the two being c. 9.0 hectares, the eastern 8.12 hectares, to which excess spoil and vegetation material from Scheme construction activities will be carted and spread.

These combined areas (total 17.12 hectares) affect exotic vegetation deemed a non-indigenous community, and will be rehabilitated to pasture post construction completion.

F4.2 Staging Area 3

A staging area of c. 3.2 hectares will also be on the private farmland and outside the true right margin of Macgregor Creek (**Appendix I, Map 4**). This area will be levelled and the site of construction facilities/infrastructure including project management and staff facilities and buildings, storage areas and repair facilities for vehicles and machinery, and concrete batching plant.

This area affects exotic vegetation deemed a non-indigenous community, and will also be rehabilitated to pasture post construction completion.

F4.5 Access Road and Transmission Line

Note: Approximately 175 metres of the proposed access road/transmission line combined route is located within the spoil disposal areas and staging area – no adjustment has been made to the totals (to avoid double-counting) given for those areas in F4.1 and F4.2, above and none is deemed necessary given these areas have Vegetation Type 3/1 cover i.e., predominantly exotic, and deemed a non-indigenous community, with no area assigned in assessing Scheme effects under Area 3.

F.5/ Scheme Effects in Area 4

Category 1 - Vegetation Type 4/1

Scheme design/infrastructure placement avoids effect of the new components on indigenous community/assemblages in the majority of the Scheme's Area 4 footprint except for two sites on the freehold land within the McLean Farm (see **Appendix I, Map 5** and **Figures 46** and **47**) described under F5.1 and F5.2.

F5.1 Section of Transmission Line

This short (c. 85 metre distance) of new transmission line runs through the strip of Vegetation Type 4/1 that includes riparian vegetation along both sides of the unnamed waterway that bisects it. Vegetation present in the riparian margin in this area is not necessarily unique or distinguished floristically from its counterpart not occupying the riparian strip. It is the arbitrary riparian designation of fixed-width distance (10 metres) from stream bank contained in the Regional Land and Water Plan (WCRC, 2014) and WDP, not vegetation, that distinguishes this zone – vegetation present would not preclude the activity. Table 20 gives affected area details for this component, and effects are considered negligible i.e., less than minor.

Table 20: Appendix F: Transmission Line Section (New) Bisecting Indigenous Vegetation - Distance and Potentially Affected Area Within Vegetation Type.

Vegetation Type	Distance (m)	Construction (ha)	Permanent (ha)	Placement Within Riparian Margins: Distance (m)	Placement Within Riparian Margins: Construction (ha)
4/1	85	0.0850	0.0850	Both sides of unnamed waterway in freehold farmland 10 x 2	Both sides of unnamed waterway in freehold farmland 0.020
Totals	**85**	**0.0850**	**0.0850**	**20**	**0.020**

F5.2 Section of Access Road

The section of access road that traverses Vegetation Type 4/1 within the freehold farmland utilises the existing farm tracking, having a current carriageway width of c. 4.0 metres that is proposed for widening to 6.0 metres with an additional shoulder clearance of 0.5 metres each side and 1.0 metre on uphill side for water table/drain formation. The vegetation clearance width attributable to upgrade is a strip along the eastern side c. 5.0 metres wide for a distance of c. 240 meters giving affected area of 1200 square metres. This access road section includes a box culverted crossing of the unnamed waterway within Vegetation Type 4/1 however indigenous vegetation at the crossing point is minimal. Approximately half of the affected riparian margin area could be considered to carry some indigenous cover that may be affected by installation of the culvert and any associated upstream and downstream rock riprap/protection. An estimate of affected area is based on a 10 meter width applied to each side, with only half vegetated, giving 100 square metres possibly affected. Vegetation present in the riparian margin in this area is not necessarily unique or distinguished floristically from its counterpart not occupying the riparian strip. It is the arbitrary riparian designation of fixed-width distance (10 metres) from stream bank contained in the Regional Land and Water Plan (WCRC, 2014) and WDP, not vegetation, that distinguishes this zone – vegetation present would not preclude the activity. Table 21 gives affected area details for this component, and effects are considered negligible i.e., less than minor.

Table 21: Appendix F: Access Road Route (Existing Farm Tracking Upgrade Section) - Distance and Potentially Affected Area(s) that Include Sight Distance Clearance Within Vegetation Type.

Vegetation Type	Distance (m)	Construction (ha)	Permanent (ha)	Placement Within Riparian Margins: Distance (m)	Placement Within Riparian Margins: Construction (ha)
4/1	240	0.1200	0.1200	Both sides of unnamed waterway 2 x 10 m strips = 20	Both sides of unnamed waterway 2 x 10 m strips x 0.50 = 0.010
Totals	**240**	**0.1200**	**0.1200**	**20**	**0.010**

Category 2 - Farmland/Rural Development Area:

F5.3 Access Road And Transmission Line (Parts)And Transmission Line Upgrade (Part)

The non-indigenous assemblage of the farmland/rural development area is principally pasture or roadside grass verge and pertains to the majority (c. 11.7 kilometre distance or c. 87%) of the Area 4 Scheme footprint. Typical cover in this zone is illustrated by Figures 50 - 62 being a sequence progressing northward from the north margin of the proposed staging area, through the developed farmland along the Waitaha Road, justifying the non-indigenous community/assemblage assignation. Therefore, Scheme infrastructure is deemed to have no clearance effect attributable here.

Category 3 - Indigenous Vegetation in Which Scheme Components Occur With Zero Nett Clearance Effect:

F5.4 Transmission Line Upgrade (Part)

Scheme infrastructure here involves upgrading of c. 0.33 kilometres of the existing transmission line along the Waitaha Road to its junction with State Highway 6, and for a further c. 2.4 kilometres adjacent to State Highway 6 (in podocarp/hardwood vegetation on its south side) westward to near the State Highway 6 Waitaha River Bridge, then north and north east (in regenerating lowland podocarp forest) to join with the existing Westpower network at the Waitaha Substation on the WDC administered Bold Head Road. Because Scheme effects in this area will only be due to upgrade of the existing transmission line and subsequent line maintenance, and will not involve any additional clearance, this area is not attributed any Scheme clearance area effects, as in nett they are nil here, i.e., no more clearance effect is attributable to the Scheme than has occurred or will occur from current transmission line existence, irrespective of the Scheme.

APPENDIX G: PROPOSED MANAGEMENT OF EFFECTS

The Scheme's design minimises effects of infrastructure placement and permanently occupied area and effects associated with construction, on indigenous vegetation in Area 1, Area 2, Area 3 and Area 4. The Scheme's overall effect on indigenous vegetation is considered no more than minor and no biodiversity offsetting or biodiversity compensation is deemed necessary.

There are two potential effects on flora other than the areas involved. These are weed incursion risk, and the number of large trees that may be affected. Recommended measures aimed at reducing these effects or risk at sites of Scheme activities/infrastructure follow.

G.0 Weed Risk Monitoring and Control Prescription:

Applicable to those Scheme activities/infrastructure where weed risk is noted in sections G.1 – G.3 below, weed monitoring and control (focusing on, but not limited to the species listed in Table 22) entails:

1. Detection monitoring for weed plant presence/occurrence on an annual basis, undertaken at least twice, with one time in the period September – November and one time in the period February – April of each year:

    i. For construction-only affected areas, during site use, and subsequently, ceasing at a site when no weeds have been found at that site for a period of two consecutive years, but in every case having been conducted for no less than five consecutive years from the date of completion of construction and site decommissioning. Note: This provides a practical balance of monitoring cessation at five years where weed establishment is not occurring, as well as a trigger for continued monitoring beyond five years if weeds are being found late in the initial (five-year) period. It would apply as shown for the hypothetical scenarios in Table 23 (and various other possibilities not included in those examples).

    ii. For operational areas, during the construction period and ongoing (i.e., of unlimited duration).

2. If found necessary as a result of Step 1./ above, weed control undertaken as soon as practicable in the most effective season for best control results for the species concerned, but in any case prior to plants attaining seeding maturity.

3. Control monitoring for efficacy and success where control measures have been necessary. Timing for checking of post-control effectiveness will depend on the date of control application and method, however should be undertaken within three months of the date of application of any control measure.

4. Subsequent control application (if found necessary as a result of Step 3./ above) to be undertaken as soon as practicable in the most effective season for best control results for the species concerned, but in any case, prior to plants attaining seeding maturity.

5. Repeating Steps 3./ and 4./ for the durations prescribed in Step 1./.

6. Records to be maintained for every monitoring and/or control event undertaken in accordance with Steps 1./ - 4./ will include:

    i. Where, when, and by whom the activity was undertaken.

    ii. Any weeds found (location, species, size, density/frequency).

    iii. Control measures implemented, with date, method, and herbicide and rate of application used if a chemical application.

Table 22: List Of Key Weed Species To Be The Focus Of Monitoring And Control.

Woody/Shrub Species		
Botanical Name	**Common Name**	**Life Cycle**
Cotoneaster glaucophyllus	Large leaved cotoneaster	Perennial
Cytisus scoparius	Scotch broom	Perennial
Erica lusitanica	Spanish heath	Perennial
Leycesteria formosa	Himalayan honeysuckle	Perennial
Rubus spp.	Blackberry	Perennial
Solanum mauritianum	Woolly nightshade	Perennial
Ulex europaeus	Gorse	Perennial
Climbing Species		
Botanical Name	**Common Name**	**Life Cycle**
Clematis vitalba	Old man's beard	Perennial
Tropaeolum speciosum	Chilean flame creeper	Perennial
Broadleaved Herbaceous and Monocot Species		
Botanical Name	**Common Name**	**Life Cycle**
Cirsium arvense	Californian thistle	Perennial
Cirsium vulgare	Scotch thistle	Biennial
Crocosmia xcrocosmiiflora	Montbretia	Perennial
Digitalus purpurea	Foxglove	Biennial/Shortlived perennial
Hypericum perforatum	Saint John's wort	Perennial
Jacobaea vulgaris	Ragwort	Biennial/Perennial
Reynoutria japonica	Asiatic knotweed	Perennial

Note: Species listing does not imply any order of threat/risk, or control priority – those listed are deemed most likely to present either introduction risk, competition risk to indigenous vegetation within the Scheme footprint, or both, and are drawn from McAlpine and Howell (2024). This list represents a starting point and may be expanded prior to, or at any time during Scheme activities if additional species posing risk in the Scheme's footprint environment are identified.

Table 23: Hypothetical Scenarios Demonstrating Weed Monitoring And Control Duration Undertaken As Per Prescription G.0 1(i) In Response To Varying Incidence Of Weed Occurrence.

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Scenario 1	Site is decommissioned	Zero weeds	Zero weeds	Zero weeds	Zero weeds	Zero weeds	-	-	-	-
Scenario 2	Site is decommissioned	Zero weeds	Zero weeds	Weeds and control	Zero weeds	Zero weeds	-	-	-	-
Scenario 3	Site is decommissioned	Weeds and control	Weeds and control	Weeds & control	Weeds and control	Weeds and control	Zero weeds	Zero weeds	-	-
Scenario 4	Site is decommissioned	Zero weeds	Weeds and control	Zero weeds	Zero weeds	Weeds and control	Weeds and control	Zero weeds	Zero weeds	-
Scenario 5	Site is decommissioned	Weeds, no control	Weeds and control	Zero weeds	Zero weeds	Zero weeds	-	-	-	-

Notes to table:
"Zero weeds" means monitoring is undertaken, with no weeds found.
"Weeds and control" mean monitoring is undertaken, identifies weed presence, and control is undertaken.
"Weeds, no control" means monitoring is undertaken, weed presence is identified and control is undertaken but with control timing just beyond the year of occurrence identification.
Dashes mean monitoring and control has ceased and remains so.

G.1/ Area 1 - Monitoring/Mitigation:

G.1.1 All Places in Area 1 Where Earthmoving/Drilling Machinery Enters

Machinery should be thoroughly washed down (track-gear, undercarriage, engine bay, cab and engine covers, etc.) prior to entering any part of Area 1 so as to reduce risk of weed seed or vegetative transport.

G.1.2 Access Road To Construction Staging Area 1

While no uniqueness in terms of overall vegetation type(s) is attributable to the general area in which the possible road to the construction laydown area is proposed, defining a route that results in least damage to all vegetation, and especially large (60+ cm dbh) hardwood trees and podocarp trees (30+ cm dbh) will be a priority. The construction staging area access road route and area may be subject to variation depending on final route location and construction requirements that can only be determined after final line marking and survey is complete. This report has considered the road 'corridor' within which this road may be relocated during detailed design. Incidence of large trees is extremely low (and may be zero) in this area however a check is warranted. A component of the detailed design would be to enumerate and mark any large trees within a fixed width of the road formation centerline and use these data to make road alignment adjustments, subject to engineering considerations, to avoid such trees where practicable.

This section of road will not be required after completion of headworks construction. During site activity, and post-construction and site decommissioning, weed monitoring and control will be important, particularly if any gravel is carted in as this is a likely source of *Ulex europaeus* seed, and possibly other weeds. Weed risk monitoring and control prescribed above in Section G.0 is required.

It is expected that natural regeneration of indigenous cover would occur relatively quickly if scarification/ripping of compacted surfaces was undertaken and that it would comprise a range of species present prior to works.

G.1.3 Construction Staging Area 1

This area will not be required post-construction of the headworks infrastructure and the area can be left to regenerate naturally or rehabilitated via supplementary planting. It is expected that natural regeneration would comprise a range of indigenous species present prior to works, and occur relatively quickly if scarification/ripping of compacted surfaces to provide fresh, loose gravel substrate was undertaken.

During site activity and post-construction and site decommissioning, weed monitoring and control will be important, particularly where gravel is carted in as this is a likely source of *Ulex europaeus* seed, and possibly other woody weeds e.g., *Leycesteria formosa*. Weed risk monitoring and control prescribed above in Section G.0 is required.

G1.4 Geophysical Test Drilling Sites (Vertical)

There may be limited options to vary the locations of these due to design and engineering considerations, but if practicable, minor adjustment to location to avoid large (60+ cm dbh) hardwood trees and podocarp trees (30+ cm dbh) is desirable.

Branch trimming may be appropriate on large trees where trimming one or more branches can achieve sufficient clear vertical access for helicopter long-lining of drilling equipment and materials without having to fell the tree to attain this. Applicability of and practicality of branch trimming needs to be assessed on a tree by tree basis given the wide variation that will exist in tree form, branching habit, crown architecture and expanse, and existing natural damage, overall health/vigour status and the requirement to leave sufficient crown and foliage to maintain health and vigour of the particular tree. A qualified arborist should be engaged to assess any trees proposed for branch trimming and determine whether this is a practicable and acceptable treatment, case-by-case. Any branch trimming should be undertaken by or at least supervised by a suitably qualified and experienced arborist.

Natural regeneration would comprise a range of indigenous species present prior to works, and occur relatively quickly – no remediation work is deemed necessary here however weed monitoring and control prescribed above in Section G.0 is recommended.

Note: There is no mitigation deemed necessary for the headworks horizontal test drilling site given its location at the access tunnel portal entrance site and it subsequently being subsumed by the access tunnel portal entrance works.

G.2/ Area 2 - Monitoring/Mitigation:

G.2.1 All Places In Area 2 Where Earthmoving/Drilling Machinery Enters

Machinery should be thoroughly washed down (track-gear, undercarriage, engine bay, cab and engine covers, etc.) prior to entering any part of Area 2 so as to reduce risk of weed seed or vegetative transport.

G.2.2 Access Road/Transmission Line

While no uniqueness in terms of overall vegetation type(s) is attributable to the general area in which the possible access road and transmission line is proposed, defining a route that results in least damage to all vegetation, and especially large (60+ cm dbh) hardwood trees and podocarp trees (30+ cm dbh) will be a priority. Field observations indicate trees of these sizes are in very low densities in all vegetation types likely to be affected by access road and transmission line construction.

The access road/transmission line route and area may be subject to variation depending on large tree location that can only be determined after final line marking and survey is complete. This report has however considered the road 'corridor' within which this road may be relocated during detailed design. A component of the detailed design would be to enumerate and mark all large trees within a fixed width of the road/transmission line formation centerline and use these data to make any practicable alignment adjustments to avoid as many of these large trees as practicable. Relatively easy terrain of the landforms where this infrastructure construction is likely should allow some route variation if required. Avoidance of large podocarps, and some degree of avoidance for large hardwood trees should be achievable, so that effect on large forest trees is not considered a factor that would preclude any parts of the general area from the activity.

Branch trimming may be appropriate on large trees that are rooted outside the corridor width but lean into it or their canopy architecture is such that branch extension is pronounced and where trimming one or more branches can achieve at least a four metre vegetation clearance from transmission line conductors without having to fell or remove the tree to attain this. Applicability of and practicality of branch trimming needs to be assessed on a tree by tree basis given the wide variation that will exist in tree form, branching habit, crown architecture and expanse, and existing natural damage, overall health/vigour status and the requirement to leave sufficient crown and foliage to maintain health and vigour of the particular tree. A qualified arborist should be engaged to assess any trees proposed for branch trimming and determine whether this is a practicable and acceptable treatment, case-by-case. Any branch trimming should be undertaken by or at least supervised by a suitably qualified and experienced arborist.

Natural regeneration of the range of indigenous ground cover and shrub species present in the Vegetation Types affected is expected to occur relatively quickly (over one to three growing seasons post construction), with regeneration of tree species also occurring (at least as seedlings in this timeframe) to reduce the 17.5 metre construction width for the access road/transmission line combination to the 15.0 metre permanent occupancy width without need for remediation.

Gravel carted in is a likely source of *Ulex europaeus* seed, and possibly other weeds, while continuing vehicle use to access the various facilities during construction and subsequently during the operation of the Scheme poses a lesser risk of weed conveyance. Although there is a varying incidence of these species already in the area of Macgregor Creek and without the Scheme their expansion in occupancy has been occurring and is likely to continue, this should not be exacerbated in areas of direct Scheme influence, and preferably have control implemented aimed at eliminating any that may exist on the proposed route now, and preventing further incursion from the access road margins and the transmission line route. Therefore, weed monitoring and control at least on the access road margins and centre strip, and in the width of the transmission line corridor will be important and

should be a scheduled component of Scheme maintenance, to be undertaken as prescribed above in Section G.0.

G.2.3 Total Platform Area Including Tunnel Portal Access and Turning Area, Batter Slopes, Tunnel Portal Exits, Portal Headwalling, Power Station, Switchyard, Tailbay, and Slope Protection Works

Gravel and rock carted in presents the same risks at these infrastructure sites as for the access road/transmission line, while continuing vehicle use to access the various facilities during construction and the subsequent operation of the Scheme poses a lesser risk of weed conveyance. For all areas of these facilities not covered by buildings or hard surface (e.g., concrete/seal) weed monitoring and control will be important and should be a scheduled component of Scheme maintenance, to be undertaken as prescribed above in Section G.0.

G.2.4 *Construction Staging Area 2:*

Remedial planting with a range of tree, shrub and monocot species naturally present on the site is recommended as effects mitigation. To increase success of plant survival, deposition of soil and organic material (obtained from other Scheme component construction) would be highly beneficial prior to any supplementary planting. The Scheme report by Boffa Miskell (2025) discusses possible site remedial work, and a separate Vegetation Management Plan has been developed and prescribes remediation work here.

Weed monitoring and control will be important, particularly if gravel is carted in as this is a likely source of *Ulex europaeus* seed, and possibly other weeds. Weed risk monitoring and control prescribed above in Section G.0 is required.

G.2.4 Alpha Creek Flood Protection:

Natural regeneration of the range of species present prior to any clearance would be expected to occur relatively quickly on any of the above areas not permanently occupied, e.g., the site of the former Amethyst Power Scheme pipeline and access, exhibiting similar landform and vegetation types, had become completely overgrown by indigenous vegetation within c. 10 years of cessation of use. Supplementary planting could enhance speed of re-vegetation if required and where suitable substrate exists.

Weed monitoring and control will be important, particularly if gravel or rock is carted in as this is a likely source of *Ulex europaeus* seed, and possibly other weeds. Weed risk monitoring and control prescribed above in Section G.0 is required.

G. 2.6 *Transmission Line Upgrade:*

Branch trimming may be appropriate on large trees where trimming one or more branches can achieve at least a four metre vegetation clearance from line conductors without having to fell the tree to attain this. Applicability of and practicality of branch trimming needs to be assessed on a tree by tree basis given the wide variation that will exist in tree form, branching habit, crown architecture and expanse, and existing natural damage, overall health/vigour status and the requirement to leave sufficient crown and foliage to maintain health and vigour of the particular tree. A qualified arborist should be engaged to assess any trees proposed for branch trimming and determine whether this is a practicable and acceptable treatment, case-by-case. Any branch trimming should be undertaken by or at least supervised by a suitably qualified and experienced arborist.

G.3/ Area 3 - Monitoring/Mitigation:

G.3.1 All Places In Area 3 Where Earthmoving/Drilling Machinery Enters

Machinery should be thoroughly washed down (track-gear, undercarriage, engine bay, cab and engine covers, etc.) prior to entering any part of Area 3 so as to reduce risk of weed seed or vegetative transport.

APPENDIX H: REFERENCES AND ACKNOWLEDGEMENTS

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D. J. Derks
For:
TACCRA Ltd.

APPENDIX I: SCHEME MAP SET PERTAINING TO TERRESTRIAL FLORA (MAPS 1 – 11 @ A3 SIZE)

Map List

Appendix I Map 1: Project Area General Location.

Appendix I Map 2: Infrastructure Locations and Vegetation Type Delineations – Area 1.

Appendix I Map 3: Infrastructure Locations and Vegetation Type Delineations – Area 2.

Appendix I Map 4: Infrastructure Locations and Vegetation Type Delineations – Area 3.

Appendix I Map 5: Infrastructure Locations and Vegetation Type Delineations – Area 4.

Appendix I Map 6: Wilberg Ecological District and Waitaha Catchment With LCDB Land Cover Types.

Appendix I Map 7: Base Area Delineation on Topographic Mapping.

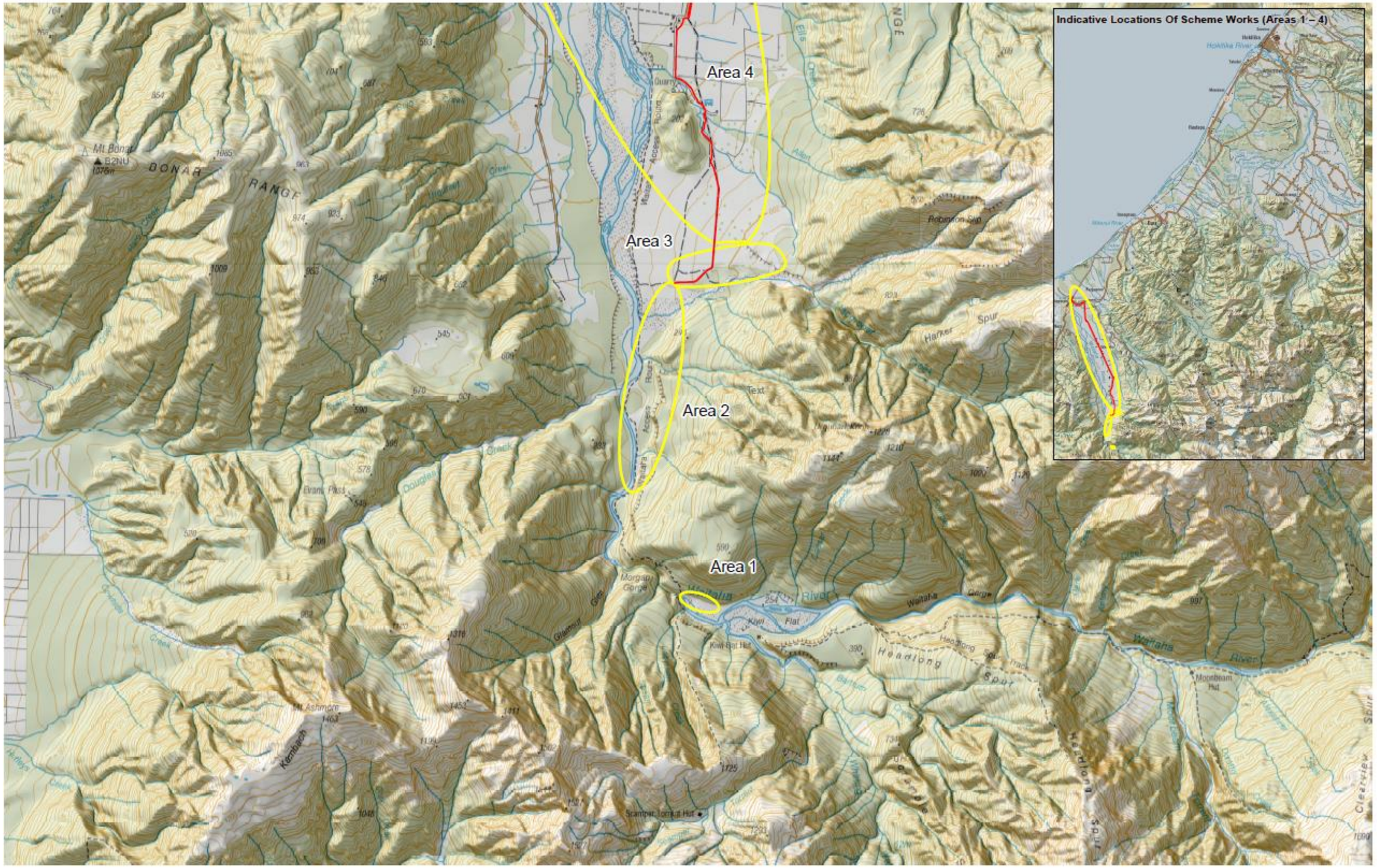
Appendix I Map 8: Base Area LCDB Land Cover Types.

Appendix I Map 9: Wetland Site Locations.

Appendix I Map 10 Origin Positions of Figures 54 - 58 Along the Scheme's Proposed Transmission Line Upgrade Route.

Appendix I Map 11 Origin Positions of Figures 59 – 72 Along the Proposed Transmission Line Upgrade Route.

File Ref: C12105_201_veg_overview.mxd



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Data Sources: topographical map sourced from LINZ topo50 map series. Crown copyright reserved.

Projection: NZGD 2000 New Zealand Transverse

Legend

- Proposed transmission line (generally adjacent to proposed access)
- Proposed transport access
- Area 1: General area of various headworks and associated infrastructure activities
- Area 2: General area of access road, powerhouse, tunnel portal exit and associated infrastructure and activities
- Area 3. Spoil disposal and associated infrastructure activities
- Area 4: Transmission line and transport access (indicative) - refer inset

Waitaha Hydro

Map 1: Locations Of Key Works

Date: 28 May 2025 | Revision: 5

Plan Prepared by Boffa Miskell Limited

Author: brian.mcauslan@boffamiskell.co.nz | Checked: JDe

Note to Map 2: The label identifying the small area that is Vegetation Type 1/2 is partially obscured by the intake infrastructure overlay, so grey arrow is used to indicate Vegetation Type 1/2.

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Data Sources:
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Waitaha Hydro

Map 2: Infrastructure Locations and Vegetation Type Delineations – Area 1

Date: 28 May 2025 | Revision: 7

Plan Prepared by Boffa Miskell Limited

Author: brian.mcauslan@boffamiskell.co.nz | *Checked:* JDe

File Ref: C12108_203_veg_Powerhouse.mxd

5225000 5224000

1416000

1415000

Proposed works

- Vegetation type boundaries
- Indicative transmission line route
- Surveyed area
- Staging Area 2 Boundary
- Possible veritcal test drill sites (indicative) - works location adjustment may occur
- Access road (indicative)
- Ecological district

Type 2/1 – Regenerating Podocarp/Hardwood Forest (Stage 1)
Type 2/2 – Grass, Sparse Shrub and Tree Fern Combination (Early Successional)
Type 2/3 – Mature Podocarp/Hardwood Hill Forest
Type 2/3A – Mature Hardwood Forest, Podocarp Element Reduced/Absent
Type 2/3B – Poorly Drained Lower Stature Hardwood Forest With Minor Presence of Dacrycarpus dacrydioides
Type 2/4 – Regenerating Podocarp/Hardwood Forest (Stage 2; Average Canopy Height > Stage 1)
Type 2/4A - Regenerating Podocarp/Hardwood Forest (Stage 3; Average Canopy Height > Stage 2)
Type 2/5 – Regenerating Podocarp/Hardwood Tree and Shrub Admixture With Occasional Emergent Trees
Type 2/6 – Regenerating Hardwood Tree/Shrub/Tree Fern Admixture With Grassed Clearings
Type 2/7 – Sparse Colonising Hardwood Shrub Admixture Within Grassed Alluvial Flat
Type 2/8 – Tree Fern/Hardwood Shrub/Monocot With Low Incidence of Dacrycarpus dacrydioides
Type 2/9 – Mixed Ground Cover/Shrub Hardwood Riparian
Type 2/10 – Colonising/Pioneering Shrub Hardwood

2/10 2/3 2/3A 2/3B 2/8 2/9 2/4 2/4A 2/7 2/5 2/6 2/1 2/2

Harihari Ecological District
Wilberg Ecological District
Granite Creek
Alpha Creek

1: 3800

Tunnels
Slope protection
Powerhouse and associated infrastructure
Transmission line
Alpha Creek works outline
Construction Staging Area 2 – Part
Access Road
Staging Area 2 - Part

0 200 m
1:6,000 @ A3

Data Sources:
Conecpt design sourced from Westpower Ltd's GIS portal

Projection: NZGD 2000 New Zealand Transverse

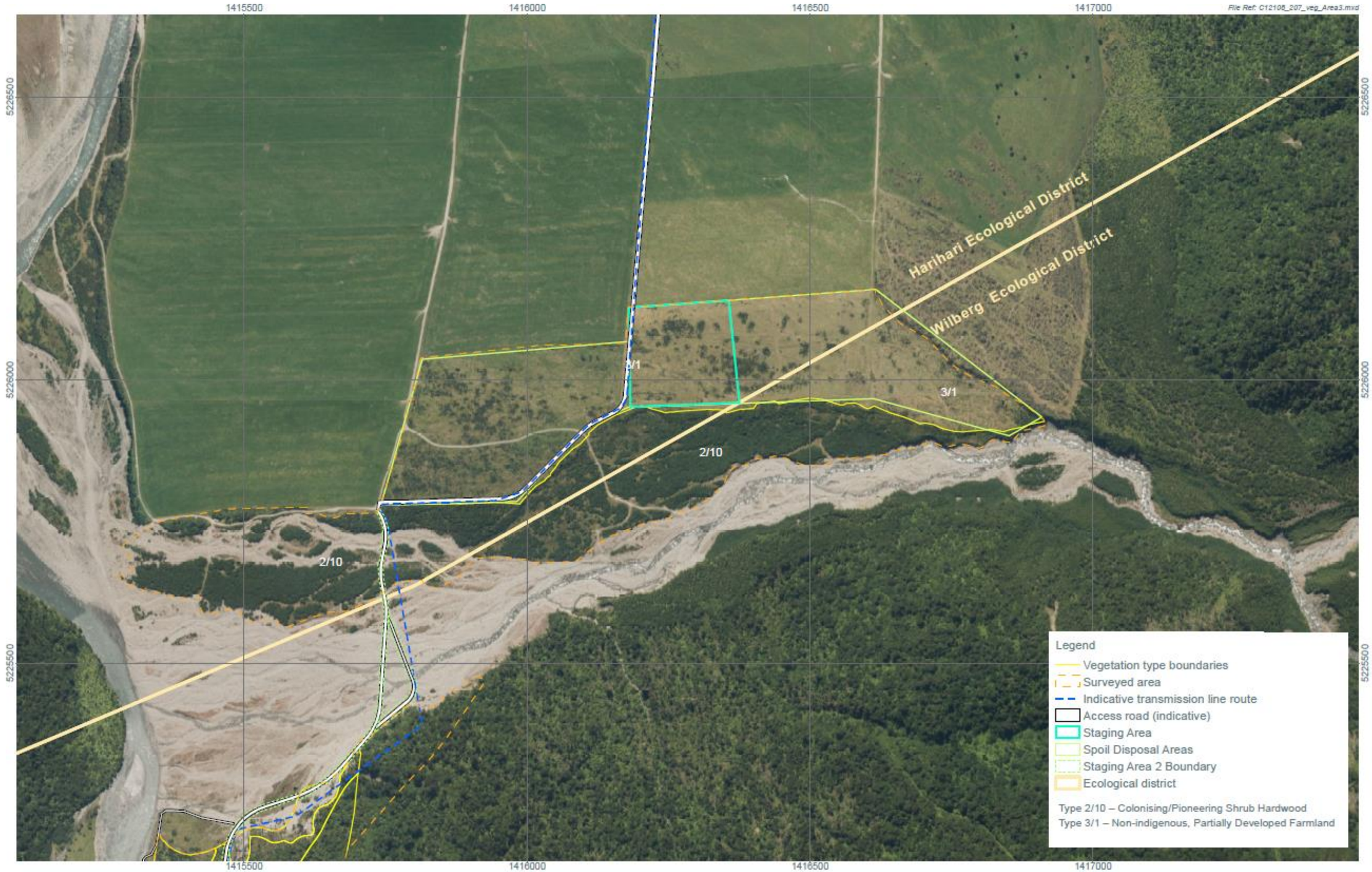
Waitaha Hydro

Map 3: Infrastructure Locations and Vegetation Type Delineations – Area 2

Date: 28 May 2025 | Revision: 8

Plan Prepared by Boffa Miskell Limited

Author: brian.mcauslan@boffamiskell.co.nz | *Checked:* JDe



0 200 m

1:6,000 @ A3

Data Sources:
Conecpt design sourced from Westpower Ltd

Projection: NZGD 2000 New Zealand Transverse

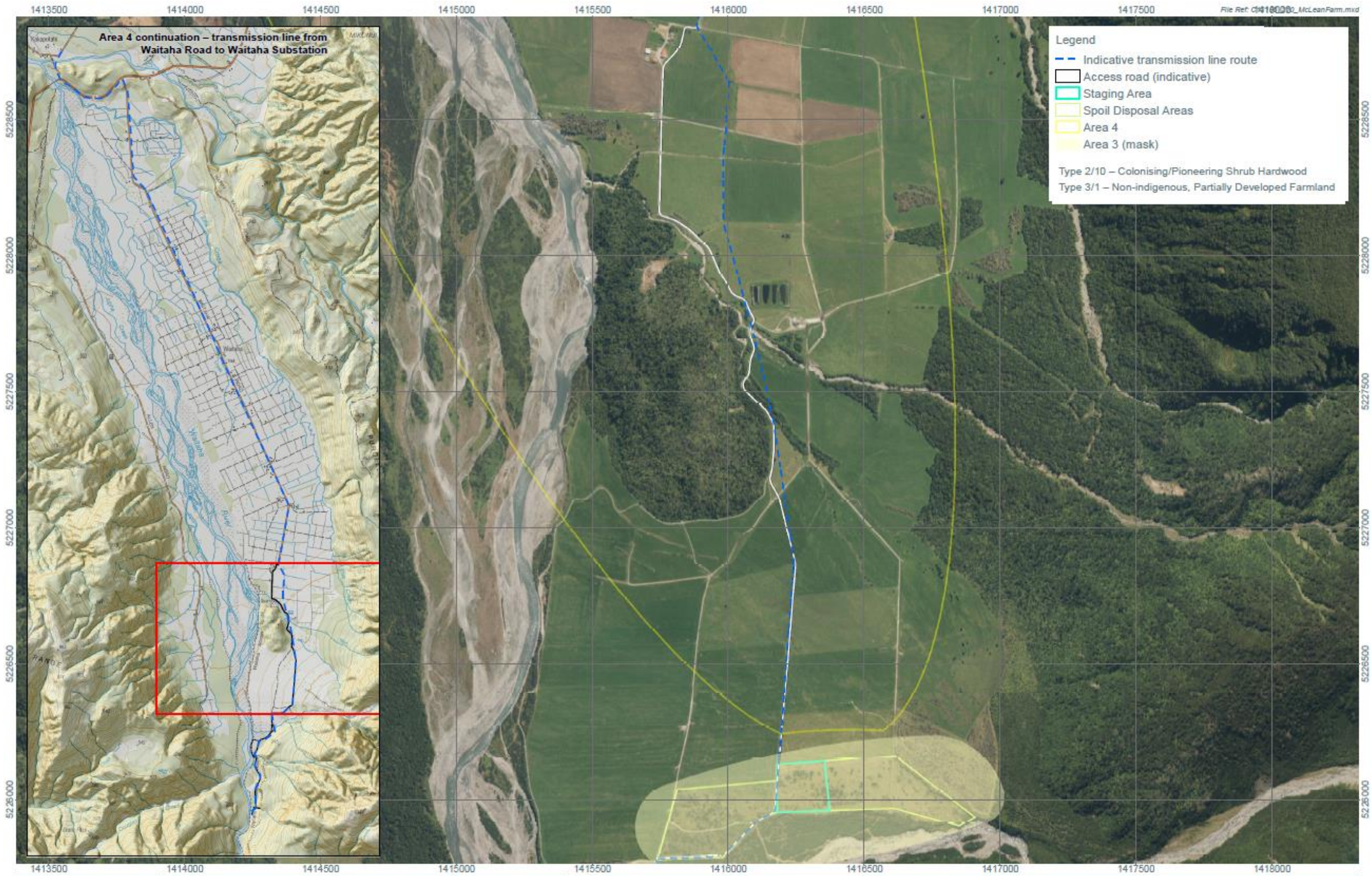
Waitaha Hydro

Map 4: Infrastructure Locations and Vegetation Type Delineations – Area 3

Date: 28 May 2025 | Revision: 1

Plan Prepared by Boffa Miskell Limited

Author: brian.mcauslan@boffamiskell.co.nz | *Checked:* JDe



0 400 m

1:12,500@ A3

Data Sources:
Concept design sourced from Westpower Ltd

Projection: NZGD 2000 New Zealand Transverse

Waitaha Hydro

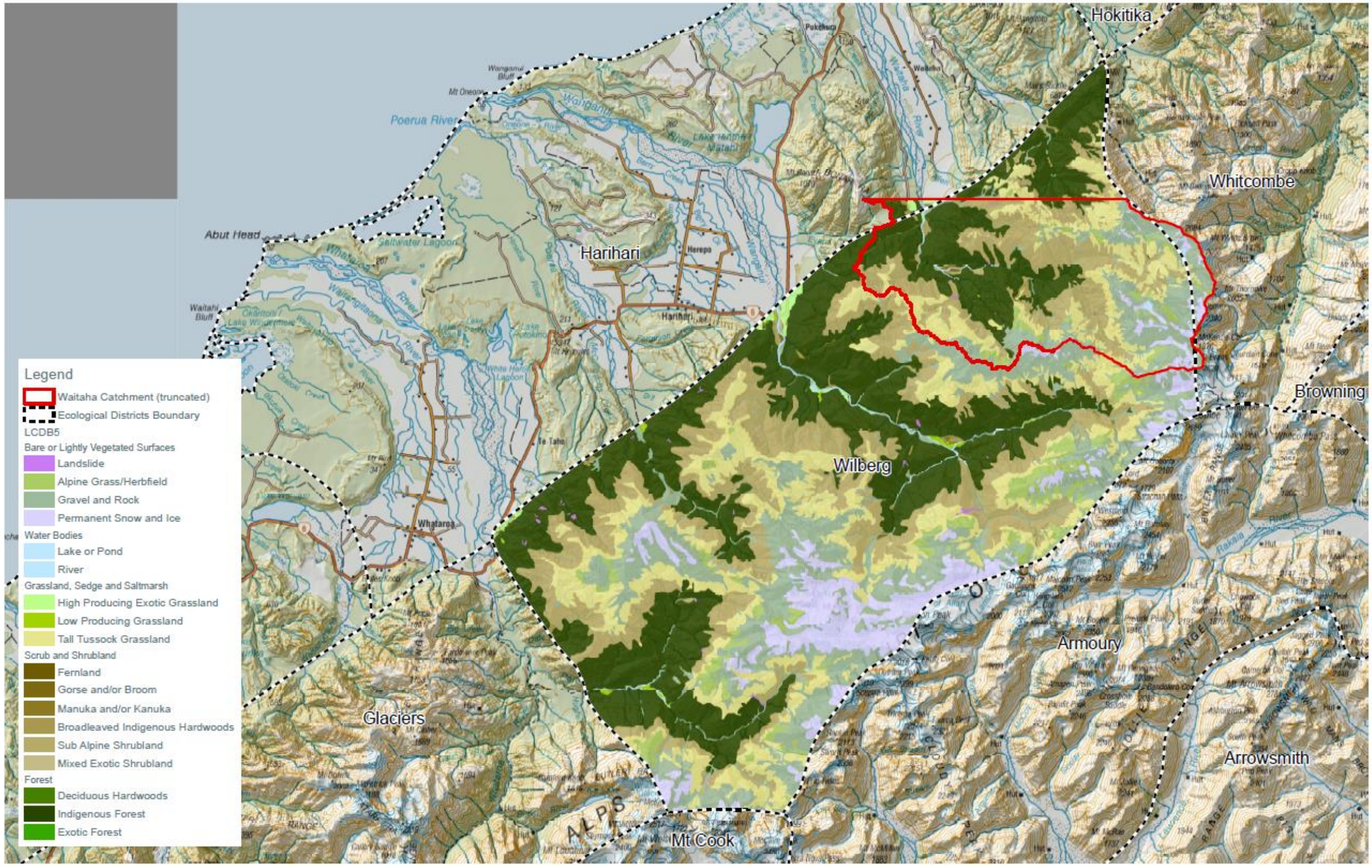
Map 5: Infrastructure Locations and Vegetation Type Delineations – Area 4 (McLean Farm Part)

Date: 28 May 2025 | Revision: 0

Plan Prepared by Boffa Miskell Limited

Author: brian.mcauslan@boffamiskell.co.nz | Checked: JDe

File Ref: C12108_204_LCDB_EcoDistrict.mxd



0 5 km

1:200,000@ A3

Data Sources: topographical map sourced from LINZ topo50 map series. Crown copyright reserved.
Land Cover data sourced from the Ministry for the Environment, LCDB database version 5.
Ecological District data sourced from the Ministry for the Environment
Waitaha Catchment sourced from NZREC
Projection: NZGD 2000 New Zealand Transverse Mercator

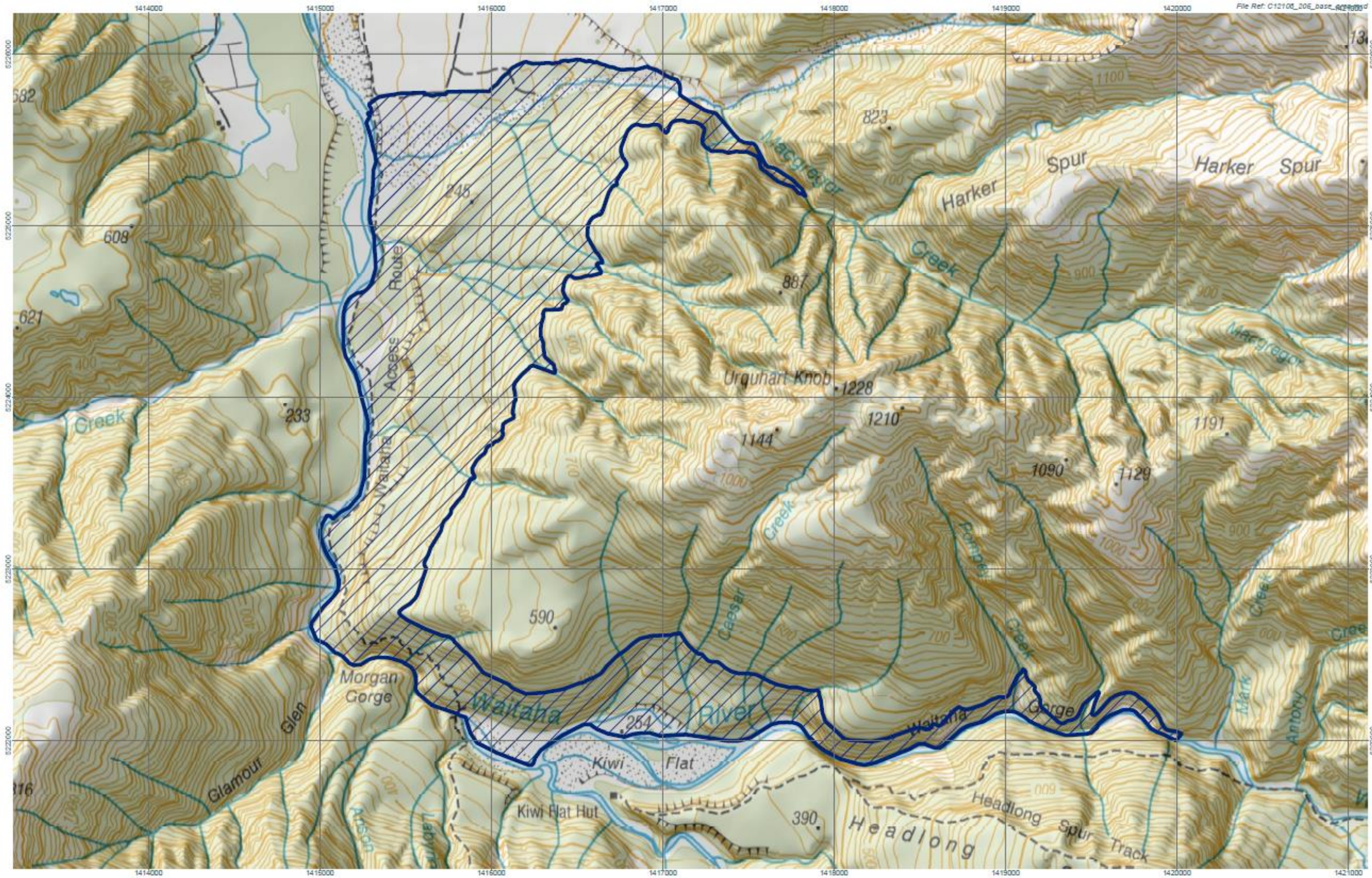
Waitaha Hydro

Map 6: Wilberg Ecological District - Landcover Database v5

Date: 27 May 2025 | Revision: 5

Plan Prepared by Boffa Miskell Limited

Author: brian.mcauslan@boffamiskell.co.nz | *Checked:* JDe



0 500 m

1:20,000 @ A3

Data Sources: topographical map and data sourced from LINZ topo50 map series. Crown copyright

Projection: NZGD 2000 New Zealand Transverse

Legend

Base Area

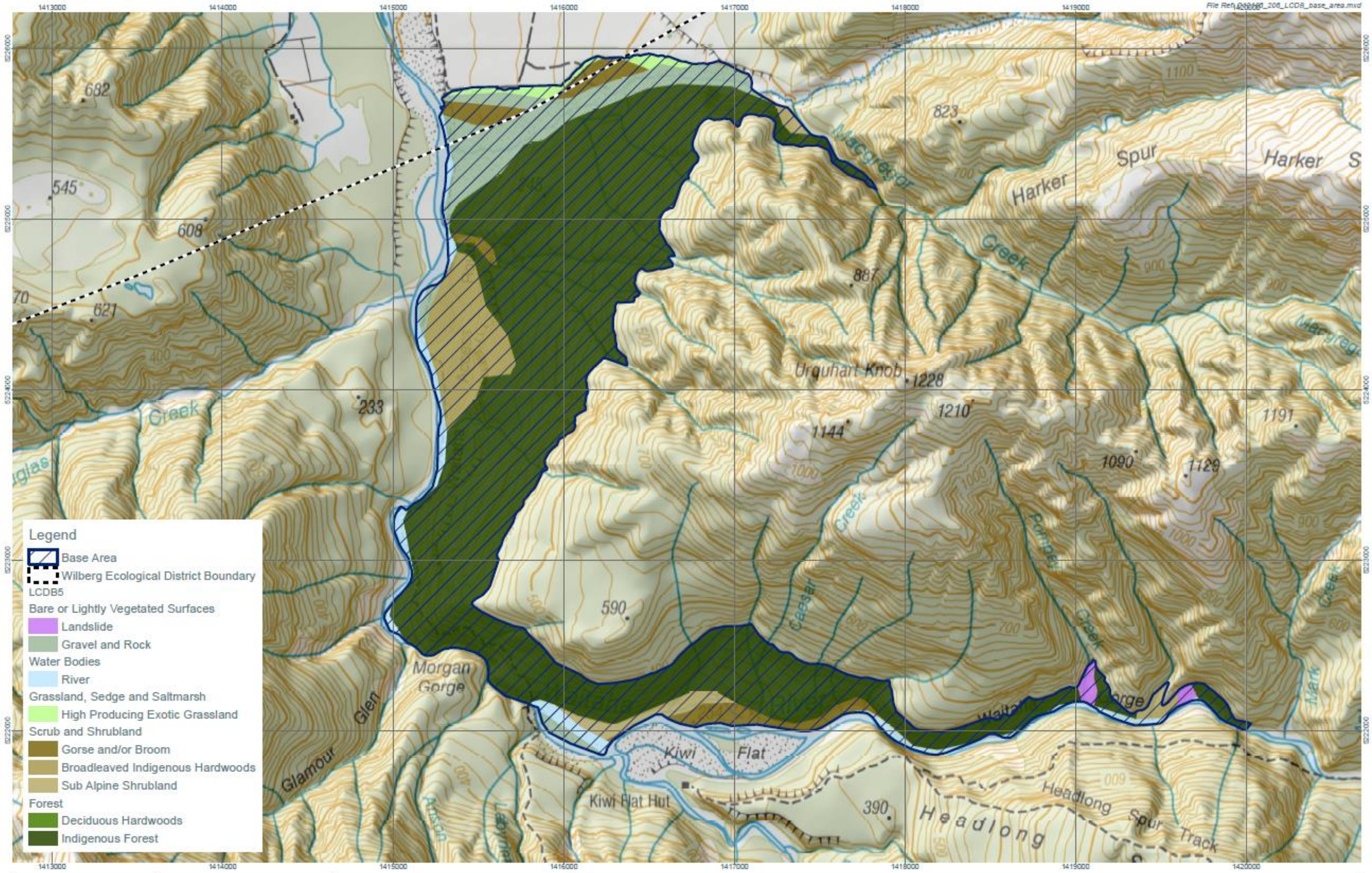
Waitaha Hydro

Map 7: Base Area

Date: 27 May 2025 | Revision: 4

Plan Prepared by Boffa Miskell Limited

Author: brian.mcaulan@boffamiskell.co.nz | *Checked:* JDe



0 550 m

1:20,000 @ A3

Data Sources: topographical map sourced from LINZ topo50 map series.
Crown copyright reserved.
Land Cover data sourced from the Ministry for the Environment, LCDB database version 5.
Ecological District data sourced from the Ministry for the Environment
Waitaha Catchment sourced from NZREC
Projection: NZGD 2000 New Zealand Transverse Mercator

Waitaha Hydro

Map 8: Base Area - Landcover Database v5

Date: 27 May 2025 | Revision: 5

Plan Prepared by Boffa Miskell Limited

Author: brian.mcauslan@boffamiskell.co.nz | *Checked:* JDe

0 160 m

1:5,000 @ A3

sign sourced from Westpower Ltd

Projection: *verse*

Waitaha Hydro

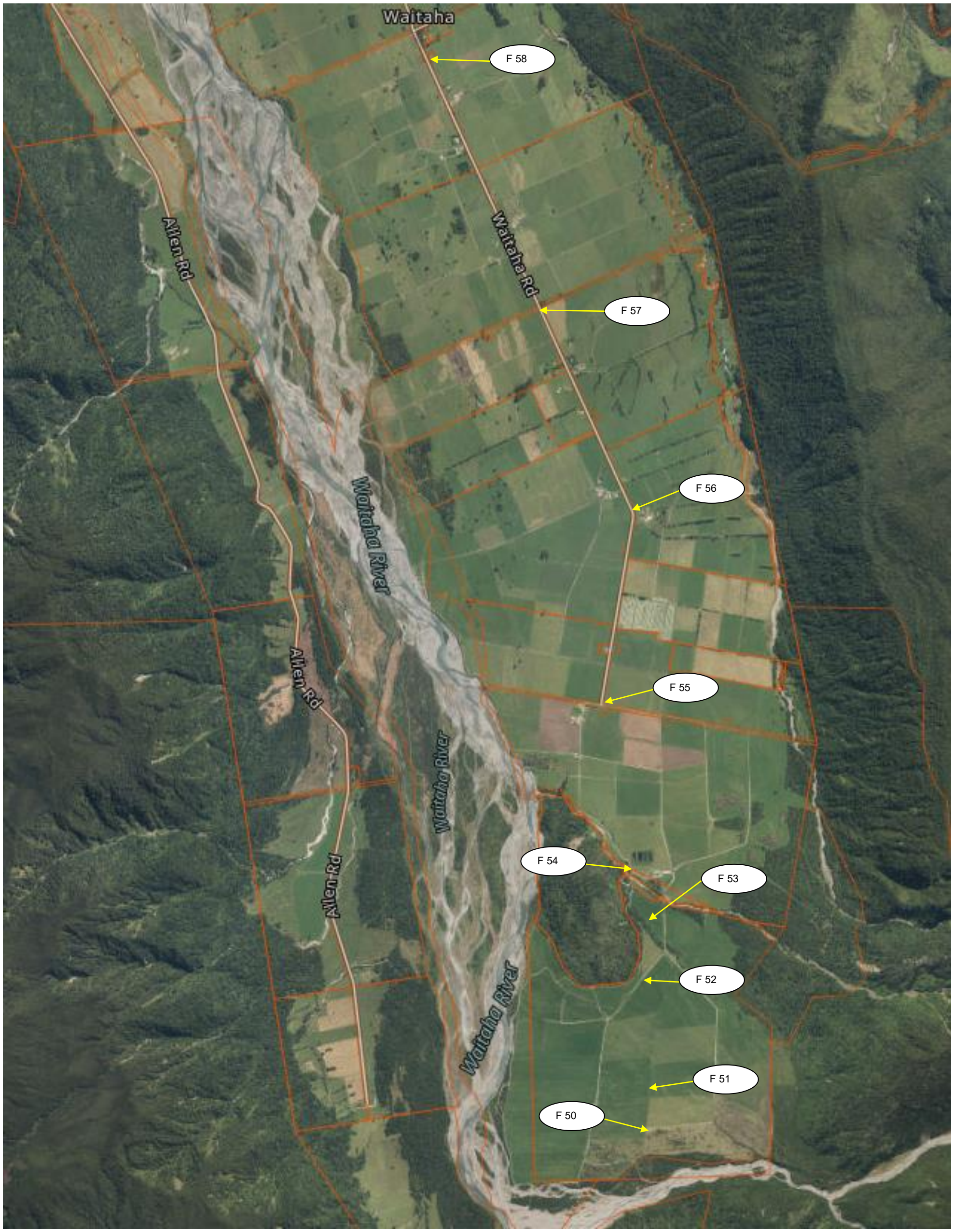
Map 9: Wetland and Waterway Locatons

Date: 27 May 2025 | Revision: 2

Plan Prepared by Boffa Miskell Limited

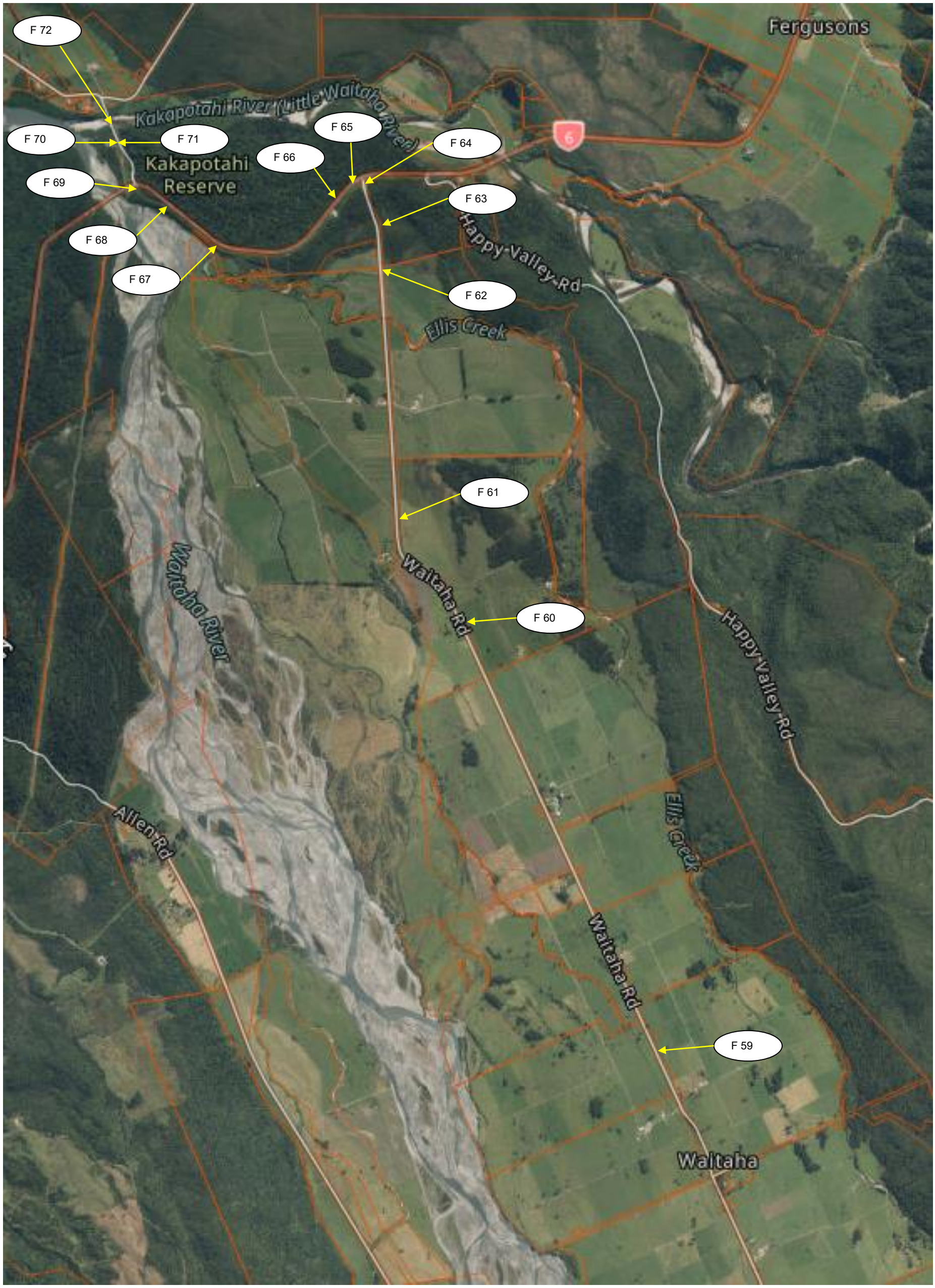
Author: brian.mcauslan@boffamiskell.co.nz | *Checked:* JDe

Map 10: Origin Positions of Figures 50 - 58 Along the Scheme's Proposed Transmission Line Upgrade Route



*Note: Arrows extending from labels F 50, F 51, F 52 etc., indicate the locations along the Scheme's proposed transmission line route that the photographs corresponding to Figure 51, Figure 52, Figure 53 etc., in **Appendix D** were taken from. These points are not necessarily the exact location of the line - they were chosen as representative locations that best illustrate vegetation present in a progression along the route and its environs.*

Map 11: Origin Positions of Figures 59 – 72 Along the Scheme's Proposed Transmission Line Upgrade Route



*Note: Arrows extending from labels F 59, F 60, F 61 etc., indicate the specific locations along the Scheme's proposed transmission line route that the photographs corresponding to Figure 59, Figure 60, Figure 61 etc., in **Appendix D** were taken from. These points are not necessarily the exact location of the line -they were chosen as representative locations that best illustrate vegetation present in a progression along the route and its environs.*

APPENDIX J: SPECIES LIST WITH MAORI AND COMMON NAMES AND THREAT STATUS

Note: nt = not threatened. For higher plants status is ex de Lange *et al.* (2023); for mosses from Rolfe *et al.*, (2014) cross-referenced with Hitchmough *et al.*, (2007); and for liverworts/hornworts from de Lange *et al.* (2020);

Note: * denotes exotic species.

Grey shading denotes Taonga Species (N.Z. Government, 1998).

Status Codes: Threatened, nationally critical = **tnc**; Threatened, nationally vulnerable = **tnv**; At Risk, Declining = **ard**; Not threatened = nt.

Large Trees		
Botanical Name	**Maori Name (& Other Common Name)**	**Status**
Dacrydium cupressinum	Rimu (Red pine)	nt
Dacrycarpus dacrydioides	Kahikatea (White pine)	nt
Griselinia littoralis	Kapuka (Broadleaf)	nt
Libocedrus bidwillii	Kaikawaka (New Zealand cedar)	nt
Metrosideros umbellata	Rata (Southern rata)	nt
Pectinopitys ferruginea	Miro (Brown pine)	nt
Podocarpus laetus	Totara-kiri-kotukutuku (Hall's totara)	nt
Pterophylla racemosa	Kamahi	nt
Quintinia serrata	Tawheowheo (Westland Quintinia)	nt
Smaller Trees/Shrubs		
Botanical Name	**Maori Name (& Other Common Name)**	**Status**
Archeria traversii	(Shrubby mountain heath)	nt
Aristotelia serrata	Makomako (Wineberry)	nt
Ascarina lucida	Hutu	nt
Carmichaelia arborea	(Tree broom)	nt
Carpodetus serratus	Putaputaweta (Marble leaf)	nt
Coprosma acerosa	-	nt
Coprosma areolata	(Thin leaved coprosma)	nt
Coprosma elatirioides	-	nt
Coprosma cheesmanii	-	nt
Coprosma ciliata	-	nt
Coprosma colensoi	-	nt
Coprosma dumosa	-	nt
Coprosma foetidisima	Hupiro (Stinkwood)	nt
Coprosma grandifolia	Raurekau (Large-leaved coprosma)	nt
Coprosma linariifolia	Mikimiki (Yellow-wood)	nt
Coprosma lucida	Karamu	nt
Coprosma propinqua	Mingimingi	nt
Coprosma rhamnoides	-	nt
Coprosma rotundifolia	-	nt
Coprosma rigida	-	nt
Coprosma rubra	-	**ard**
Coprosma rugosa	-	nt
Coprosma sp.	-	nt
Coriaria arborea	Tutu	nt
Dracophyllum longifolium	Inaka (Turpentine scrub)	nt
Fuchsia excorticata	Kotukutuku (Tree fuchsia)	nt
Hedycarya arborea	Porokaiwhiri (Pigeonwood)	nt
Hoheria glabrata	Houhi (Mountain lacebark)	nt
Leycesteria formosa	Himalayan honeysuckle	*
Melicytis ramiflorus	Mahoe (Whitey wood)	nt
Myrsine australis	Mapou (Red matipo)	nt
Myrsine divaricata	Mapou (Weeping mapou)	nt
Neomyrtus pedunculata	Rohutu	nt
Olearia arborescens	(Tree daisy)	nt
Olearia avicenniifolia	(Mountain akeake)	nt
Olearia ilicifolia	Hakeke (Mountain holly)	nt
Pennantia corymbosa	Kaikomako	nt
Phyllocladus alpinus	Toatoa (Mountain toatoa)	nt

Species List Ctd.

Smaller Trees/Shrubs Ctd.		
Botanical Name	**Maori Name (& Other Common Name)**	**Status**
Pseudopanax colensoi	Orihou (Three finger)	nt
Pseudopanax crassifolius	Horoeka (Lancewood)	nt
Pseudowintera colorata	Horopito (Pepperwood)	nt
Raukaua anomalus	-	nt
Raukaua simplex	Haumakoroa	nt
Schefflera digitata	Pate (Seven finger)	nt
*Ulex europaeus**	(Gorse)	*
Veronica salicifolia	Koromiko	nt
Veronica subalpina	-	nt
Tree Ferns/Ferns/Fern Allies		
Botanical Name	**Maori Name (& Other Common Name)**	**Status**
Alsophila cunninghamii	Ponga (Gully tree fern)	nt
Alsophila smithii	Katote (Soft tree fern)	nt
Asplenium bulbiferum	Pikopiko (Hen and chickens fern)	nt
Asplenium flaccidum	Raukatauri (Hanging spleenwort)	nt
Asplenium polyodon	(Sickle spleenwort)	nt
Austroblechnum colensoi	Peretao (Colenso's hard fern)	nt
Austroblechnum lanceolatum	Nini (Lance fern)	nt
Austroblechnum penna-marina subsp. *alpina*	(Little hard fern)	nt
Cranfillia deltoides	-	nt
Cranfillia fluviatilus	Kiwakiwa (Creek fern)	nt
Dicksonia lanata subsp. *lanata*	-	nt
Dicksonia squarrosa	Wheki (Rough tree fern)	nt
Histiopteris incisa	Mata (Water fern)	nt
Hymenophyllum demissum	Irirangi (Filmy fern)	nt
Hymenophyllum multifidum	(Much divided filmy fern)	nt
Hymenophyllum nephrophyllum	Raurenga (Kidney fern)	nt
Hymenophyllum revolutum	(Filmy fern)	nt
Hymenophyllum spp.	(Filmy ferns)	nt
Hypolepis rufobarbata	-	nt
Lastreopsis hispida	(Hairy fern)	nt
Leptolepia novae-zelandiae	(Lace fern)	nt
Leptopteris superba	Heruheru (Prince of Wales fern)	nt
Lomaria discolor	Piupiu (Crown fern)	nt
Notogrammitis angustifolia susp. *nothofageti*	(Strap fern)	nt
Notogrammitis billardierei	(Common strap fern)	nt
Notogrammitis heterophylla	Taupeka (Comb fern)	nt
Paesia scaberula	(Ring fern, Scented fern)	nt
Parablechnum novae-zealandiae	Kiokio (Palm-leaf fern)	nt
Pakau pennigera	Piupiu (Gully fern)	nt
Phlegmariurus varius	(Clubmoss)	nt
Polyphlebium venosum	(Veined filmy fern)	nt
Polystichum vestitum	Puniu (Prickly shield fern)	nt
Pseudodiphasium volubile	Waewaekoukou (Climbing clubmoss)	nt
Pteridium esculentum	Aruhe (Bracken fern)	nt
Pyrrosia eleagnifolia	(Leather-leaf fern)	nt
Rumohra adiantiformis	(Leathery shield fern)	nt
Sticherus cunninghamii	Waekura (Umbrella fern)	nt
Tmesipteris tannensis	(Chain-fern)	nt
Zealandia pustulata subsp. *pustulata*	Kowaowao (Hound's tongue)	nt

Species List Ctd.

Climbers/Spreading/Perching		
Botanical Name	**Maori Name (& Other Common Name)**	**Status**
Dendrobium cunninghamii	Pekapeka, Winika (Christmas orchid)	nt
Earina autumnalis	Raupeka (Autumn orchid)	nt
Freycinetia banksii	Keikei	nt
Metrosideros diffusa	Akatorotoro (White climbing rata)	nt
Metrosideros fulgens	(Rata vine)	nt
Metrosideros perforata	Akatea (White rata)	nt
Meuhlenbeckia australis	Pohuehue	nt
Ripogonum scandens	Karaeopirita (Supplejack)	nt
Rubus cissoides	Tataramoa (Bush lawyer)	nt
Rubus parvus	(Creeping lawyer)	nt
Rubus schmidelioides	Tataramoa (Bush lawyer)	nt
Sedges/Tussocks/Grasses/Rushes		
Botanical Name	**Maori Name (& Other Common Name)**	**Status**
Agrostis dyeri	-	nt
*Agrostis capillaris**	(Browntop)	*
*Anthoxanthum odoratum**	(Sweet vernal)	*
Arthropodium candidum	Repehina-papa (Forest floor lily)	nt
Astelia fragrans	Kahaha (Bush flax)	nt
Austroderia richardii	Toetoe	nt
Carex goyenii	(Goyen's sedge)	nt
Carex sp.	(Hookgrass)	nt
Carex uncinata	(Hookgrass)	nt
Festuca sp.	(Fescue tussock)	nt
Gahnia sp.	(Giant sedge)	nt
Hierochloe novae-zelandiae	(Holy grass)	nt
*Holcus lanatus**	(Yorkshire fog)	*
Juncus edgariae	Wiwi	nt
Microlaena avenacea	(Bush rice grass)	nt
Phormium cookianum	Whararíki (Mountain flax)	nt
Poa colensoi	-	nt
Poa sp.	(Annual poa)	nt
Rytidosperma setifolium	(Bristle tussock)	nt
Schoenus pauciflorus	(Sedge grass)	nt
Trisetum tenellum	-	nt
Herbaceous/Ground Cover		
Botanical Name	**Maori Name (& Other Common Name)**	**Status**
Acaena anserinifolia	Piripiri (Bidibid)	nt
Anisotome hastii	(Haast's carrot)	nt
Cardamine forsteri	(N.Z. Bitter cress)	nt
Celmisia coriacea	Tikumu (Mountain daisy)	nt
*Cirsium arvense**	(Californian thistle)	*
*Cirsium vulgare**	(Scotch thistle)	*
Digitalus purpurea	(Foxglove)	*
Epilobium brunnescens subsp. *brunnescens*	(Creeping willowherb)	nt
Epilobium nerteroides	(Willowherb)	nt
Epilobium pedunculare	(Creeping willowherb)	nt
Forstera tenella	-	nt
Geum leiospermum	(Mountain avens)	nt
Gingidia montana	(Mountain anise)	nt
Gunnera monoica	(Native gunnera)	nt
Gunnera prorepens	(Native gunnera)	nt
*Hypochoeris radicata**	(Catsear or flatweed)	*
Hyrocotyle moschata	(Hairy pennywort)	nt

Species List Ctd.

Herbaceous/Ground Cover Ctd.		
Botanical Name	**Maori Name (& Other Common Name)**	**Status**
Hydrocotyle novae-zelandiae	(Pennywort)	nt
Hyrocotyle sulcata	(Pennywort)	nt
*Jacobaea vulgaris**	(Ragwort)	*
Lobelia angulata	Panakenake	nt
*Lotus pedunculatus**	(Lotus)	*
Luzuriaga parviflora	Nohi (Lanternberry)	nt
Nertera ciliata	-	nt
Nertera depressa	(Bead plant)	nt
Nertera villosa	-	nt
Plantago raoulii	-	nt
Ranunculus acaulis	Sand buttercup	nt
*Ranunculus repens**	Buttercup	*
Raoulia tenuicaulis	Tatahuna (Mat daisy)	nt
*Rumex obtusifolius**	(Broadleaved dock)	*
*Stellaria media**	(Chickweed)	*
*Taraxacum officinale**	(Dandelion)	*
*Trifolium repens**	(White clover)	*
Urtica dioica subsp. *dioica**	(Stinging nettle)	*
Veronica lyallii	(Lyall's speedwell)	nt
Viola filicaulis	(Forest violet)	nt
Mosses/Liverworts		
Botanical Name	**Maori Name (& Other Common Name)**	**Status**
Cyathophorum bulbosum	Moss	nt
Dawsonia superba	Giant moss	nt
Dendroligotrichum dendroides	Giant moss	nt
Hymenophyton flabellatum	Liverwort	nt
Hypopterygium novae-seelandiae	(Umbrella moss)	nt
Marchantia berteroana	(Thallose liverwort)	nt
Monoclea forsteri	(Thallose liverwort)	nt
Mniodendron dendroides	(Umbrella moss)	nt
Ptychomnian aciculare	(Pipe cleaner moss)	nt
Schistochila appendiculata	(Liverwort)	nt
Schistochila nobilis	(Liverwort)	nt
Thuidiopsis furfurosa	(Carpet moss, Feather moss)	nt
Weymouthia mollis	Angiangi (Hanging moss)	nt

APPENDIX K: DAVID JAN DERKS (PRINCIPAL, TACCRA LTD.) – QUALIFICATIONS AND EXPERIENCE

Credentials	Bachelor of Forestry Science degree with first class honors, Canterbury University School of Forestry. Registered Member of the New Zealand Institute of Forestry.
Experience	Involvement with a range of indigenous forest and vegetation management and assessment activities, spanning a forty nine year period, including: 1./ New Zealand Forest Service, Harihari (1976 – 1982). General hand and bushman engaged in indigenous timber cruising, sale area layout line cutting, surveying, tree selection/marking for felling, log scaling, indigenous tree felling/logging and back country track, hut, and amenity maintenance. 2./ Aorangi Forest Industries, Greymouth (1982 – 1983). Log yard supervisor, involved with indigenous and exotic log acquisitions (peeler logs for plywood manufacture) and stock control, indigenous timber drying and grading for parquet flooring application. 3./ Paynter Sawmills, Whataroa (1983 – 1985). Bushman, indigenous timber logging. 4./ Self-employed (1985 – 1994). Indigenous timber logging and sawmilling, establishing/setting up all aspects of an indigenous timber sawmilling venture, including resource and equipment supply and acquisition, hands-on harvesting, conversion and processing, grading, development of markets and sales including customer liaison, record keeping and financial management. 5/ Student at Canterbury University (1994 – 1996). Full time adult student studying toward degree of Bachelor of Forestry Science. 6./ Timberlands West Coast Ltd., Harihari (1996 – 1998). Sustainable Management Supervisor, responsible for planning, co-ordinating and overseeing aerial extraction of the entire sustainable management harvest of podocarp species under a single tree and small group selection regime, planning forest roading and supervising construction contractors, planning and undertaking forest inventory and involvement with ecological assessment and monitoring, and animal pest/weed control. 7./ Self-employed trading as TACCRA Ltd. (1998 – Present); providing consultancy services involving indigenous environmental management in the following key areas: i. Contract forestry advice and management to private landowners and Government agencies, focusing on indigenous forest inventory design (ecological and timber assessment) field implementation, monitoring and data analysis, with particular reference to forest monitoring through Permanent Sample Plot (PSP) methods and reconnaissance (RECCE) methods. ii. Promotion of sustainable management of indigenous forests to landowners, industry and community stakeholders, Sustainable Forest Management (SFM) Plan preparation as required under the Resource Management Act 1991 and the Forests Act 1949. iii. Indigenous vegetation assessment for vegetation/habitat significance against criteria in Regional and District Plans as input to Resource Consent applications by agricultural and forest landowners, miners, and other land users. iv. Advice and research re *Sphagnum* spp. moss production and management in wetland environments, formulation of wetland restoration planning. v. Planning, advice, and monitoring services re mine site rehabilitation using planted indigenous forest/shrub species.

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