

ATTACHMENT 4:

PROPOSED DEVELOPMENT

Earthworks

Earthworks for this site are currently proposed as:

- Road clearance; vested road and local accessways.
- Private accessways
- Building platform clearance.

Approximate earthworks volumes as below:

- Cut = 8,000m³
- Fill = 3,600m³

Over an area of 34,300m². These volumes do not include any topsoil stripping on site.

A condition of consent is offered as part of the application to ensure a soil disturbance and earthworks plan will be developed by a suitably qualified and experienced engineer, which will detail steps to be taken to;

- minimise the extent of soil disturbance and earthworks
- provide for progressive stockpiling of all soils, to be stored in areas which will not unnecessarily increase the overall level of vegetation disturbance on the site, and the utilisation of those soils for restoration and rehabilitation of the site
- avoid or minimise any potential for sediment loss to waterways
- ensure all machinery utilised in subdivision development, and any fill, gravel, roading metals or similar materials is free of weed seeds or vegetation material
- manage traffic, and in particular heavy traffic and earthmoving machinery, utilising the Kumara – Mitchells Road in accordance with all requirements of the Grey District Council
- identify the final offsite destination of any surplus earthworks material which is not required for onsite fill or rehabilitation works.

The Soil Disturbance and Earthworks Plan, will include a specific Erosion and Sediment Control Plan, to address any potential for erosion or sediment from onsite works during development.

Vegetation Removal and Restoration Planting

Vegetation removal will occur in the areas identified for access and driveway formation, and at each designated building pad and house site curtilage area. The maximum total area of vegetation to be cleared is estimated to amount to approximately 16ha, over the proposed lots. Part of this area would be subject to subsequent restoration planting (see below). The total area of clearance equates to less than 5% of the total site area being 382ha. Rehabilitation plantings using locally sourced indigenous species will reduce the extent of clearance further over time.

As part, of the agreement with the Department of Conservation restoration planting will be carried out alongside roadways and accessways, and on any areas of vegetation disturbance or earthworks not required to be maintained as cleared areas as part of the approved subdivision development. A vegetation clearance and restoration plan will be prepared by a suitably qualified ecologist to guide this work and a condition of consent is offered as part of the proposal to ensure this occurs. All restoration planting will involve only the use of locally sourced native plants, either translocated from areas disturbed as part of the subdivision development, or specifically raised from local seed and grown on in a plant nursery for restoration purposes. Where practicable, vegetation direct transfer will be utilised during the initial stages of subdivision development, including when forming access roadways and water tables.

Second, within the designated curtilage of each subdivision property, it is envisaged that each title owner will be able to grow fruit and vegetable species and have an area of lawn, for food production

and amenity purposes. The total area will be limited and specified in the application to be submitted in accordance with the Mitchells 2021 Ltd design guidelines.

Stormwater

Upstream stormwater passes through the development site and concentrates in the existing waterways. The proposal does not alter the existing. further design is required in order to design a suitable passage between Lots 14 & 15 and the Road to Vest. This is likely to involve the construction of a small bridge, or the placing of a culvert.

General stormwater disposal will be via ground for private houses, with roads to discharge to roadside swales, as is consistent with the surrounding stormwater disposal methodology.

Hardstand

Due to the aggregate/gravel surfacing, it is proposed to provide roadside swales for stormwater discharge off roadways. Private lots will be required to discharge their own stormwater.

Roof Water

Roof water from private lots will be discharged to tanks and reused for private water supply.

Wastewater

On-site disposal is required. Disposal method will need to comply with the West Coast Regional Council (WCRC) "Onsite Sewage Wastewater Discharge to Land" application form or will be subject to a separate resource consent process within which effects can be considered. Each house site will have a septic/greywater effluent disposal field of approx. 75 – 90m².

Water Supply

The application site is not served by a reticulated network. It is therefore proposed to collect and use roof water.

Firefighting

Building sites will be required to be self-sufficient in the event of a fire.

Access

An Integrated Transport Assessment has been prepared for the Stage 1 works. The proposal includes a section of new road to vest, which will be a metalled cul-de-sac. There are also five Right of Ways proposed that will provide access to all but one of the new Lots such that the majority will not take direct access from Kumara-Inchbonnie Road.

The proposed road corridor is 20m wide and approximately 114m long to the centre of the cul-de-sac head. This is sufficient to accommodate an unsealed road width of at least 6.5m plus a 9.5m radius turning head at the cul-de-sac end.

The southern Right of Way will serve eight lots (Lots 24 to 31) and is proposed to be 10m wide and approximately 339m long. The metalled carriageway width will be at least 6.5m wide.

The northern Right of Way will serve ten lots (Lots 9 to 18) and is proposed to be 10m wide and up to 362m long to access Lot 9. The metalled carriageway width will be at least 6.5m wide.

The eastern Right of Way will serve ten lots (Lots 4 to 8 and 19 to 23) and is proposed to be 10m wide and approximately 307m long to access Lots 8 and 19. The metalled carriageway width will be at least 6.5m wide.

Lots 1, 2 and 3 will be provided with direct access to Kumara-Inchbonnie Road.

Utilities

Service connections, power and telecommunications network capacity assessments have not been undertaken by ENGCO. However, sufficient power and telecommunication services are available in the general locality of the site. The service provider(s) will be contacted once the loading and point of connection are accurately determined.

Environmental Protection and Enhancement

The proposed subdivision will provide a revenue stream, through a trust mechanism, to enable wider environmental protection and enhancement, across the land, and adjacent areas. In particular, 15% of the sale proceeds will be placed in a trust for pest and weed control purposes on the Land. Additionally, other conservation projects in the Mitchells area that will be funded through the trust would include enhancement of local waterways within the Mitchells catchment through native plantings.

Seed funds expected to be in the range of \$1.1m to \$1.5m (from a % of proceeds from sale of eco subdivision lots) would be put into a mixture of interest-bearing accounts or bonds, interest would be paid out to support the above functions. By doing this the Lynch family are creating a long-term fund that over time will grow and provide support to the Mitchells area in perpetuity.

A technical advisory group (TAG) is envisaged, ideally with input from DOC, Ngāti Waewae, the nearby Predator Free Te Kinga programme, and others with expertise in pest and predator control on the West Coast, to guide annual planning and work programming, and annual funding allocations by the trust.

An overarching management plan will set out longer term strategic objectives and identify opportunities for the management and enhancement of biodiversity on the Tasman Accord lands owned by the Lynches. This is envisaged to be a collaborative document agreed between the Minister of Conservation, as covenantee, and the Lynch Family, through Mitchells 2021 Ltd, as covenantor.

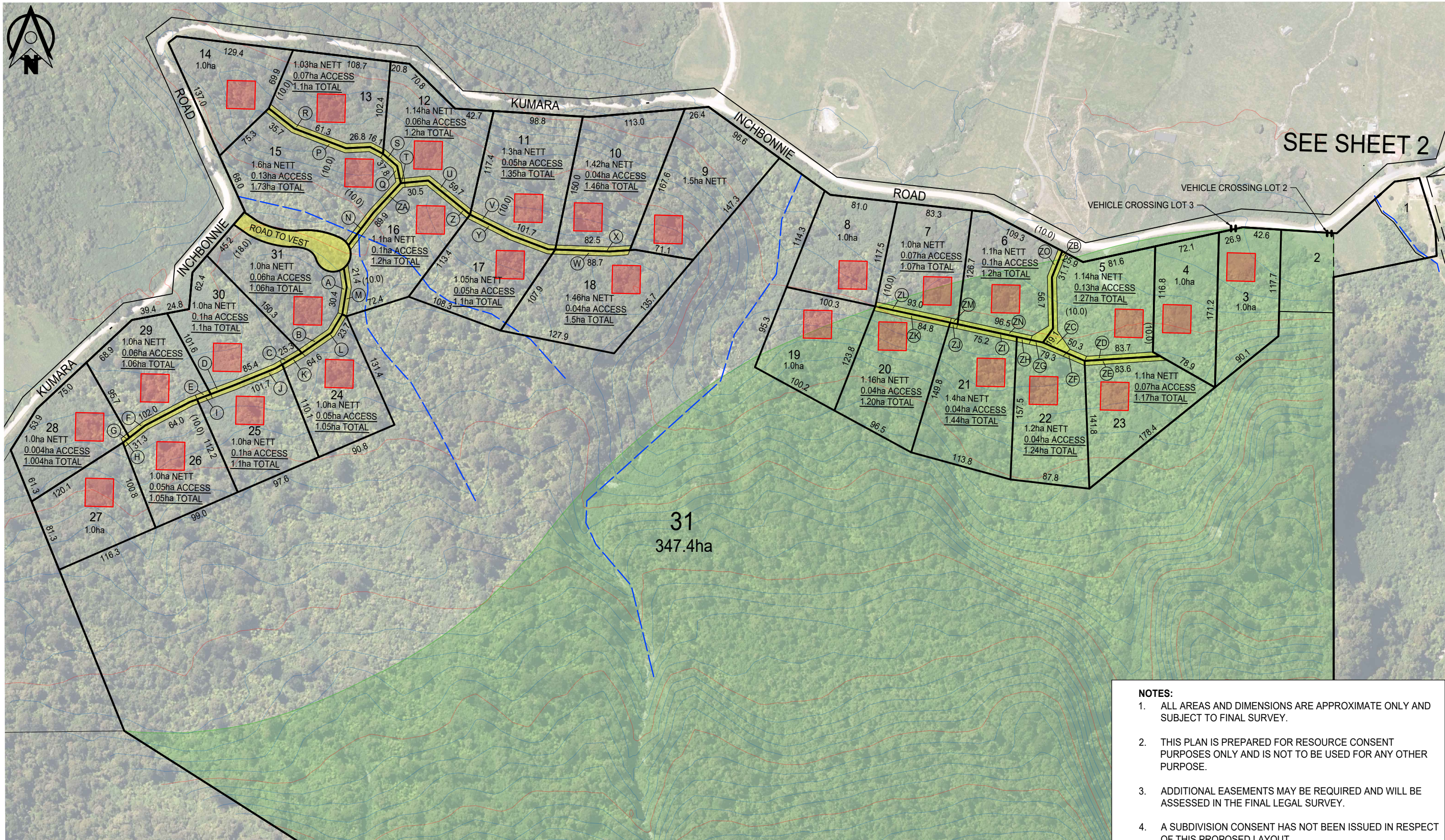
Marina

It is also proposed, separate to the above trust being set up, that the Lynch family will use additional funds realised from the sale of eco subdivision lots to improve Mitchells boat access facilities.

Stage two of this Fast-track application is development of a marina at Mitchell's Lake Brunner/Kotuku. Illustrative concept drawings for the marina facility are shown at **Attachment 3**. The marina would be located on freehold land owned by Mitchell's 2021 Ltd which is not subject to the Tasman Accord Covenant. However, to access the lake a canal across unformed legal road administered by Grey District Council would need to be formed. In addition, some small scale works in the bed of Lake Brunner/Kotuku would likely be required to facilitate boat access to the marina. The marina will significantly enhance recreational and tourism related access opportunities for residents and visitors to this part of the lake.

Discussions regarding this have already commenced with Grey District Council. See **Attachment 3** for concept drawings of the marina facility which could be built on Lynch family land. The marina facility would enhance recreational opportunities within the Mitchells area, and Lake Brunner. The marina facility is not located on land subject to the Tasman Accord, so no approval under the Accord document is required for it to proceed. It would however be subject to a separate resource consent process, and to the extent that it might involve any activity on the bed of Lake Brunner administered by DOC as stewardship area, concession processes under Part 3B of the Conservation Act 1987 may also apply.

At this stage the marina proposal is a concept only. Before applying for resource consents and/or concessions, the Lynch family envisage engagement with Te Rūnanga o Ngāti Waewae, and further engagement with DOC. Management of potential sedimentation during construction or ongoing maintenance of the channel to the lake, biosecurity management (particularly lagarosiphon), and mitigation of potential impacts on sensitive native species such as kākahi (freshwater mussels) would be addressed in these separate application(s). However the key point is that funding for the marina facility is unlikely to be available unless the Mitchells Terrace eco subdivision can proceed.



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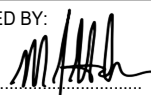
SHEET 1 OF 2

REV	DATE	COMMENT	BY	APP
A	10.03.22	ISSUED FOR DISCUSSION PURPOSES ONLY	LK	MH
B	20.09.23	ISSUED FOR INFORMATION	LK	MH
C	19.01.24	ISSUED FOR INFORMATION	AH	MH
D	02.04.24	LOTS REVISED	LK	MH



MISURA

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PREPARED BY: 

M.J. HANRAHAN
Registered Professional Surveyor

DATE:

DRAWN	L.KIDWELL	DATE	15.09.23
SURVEYED		DATE	
APPROVED	M.HANRAHAN	DATE	
SCALE:	1:4000	A3	

TITLE:

PROPOSED SUBDIVISION
OF LOT 4 DP 440795 & RS 3738

CLIENT: MITCHELLS 2021 LTD

PROJECT:

1950 KUMARA-INCIBONNIE ROAD
COMPRISED IN RT 554111 & 546037
TOTAL AREA = 382.4ha

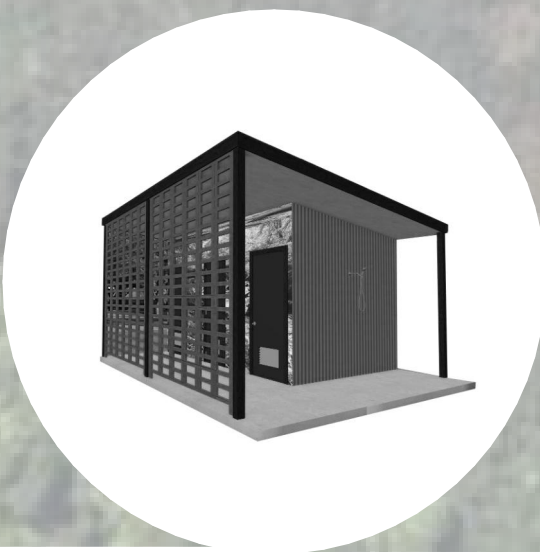
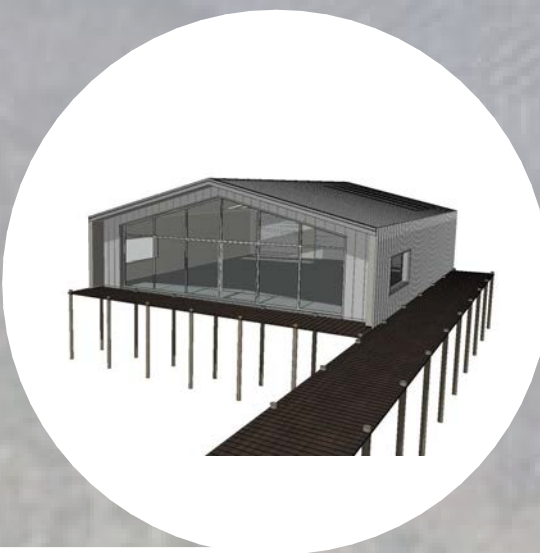
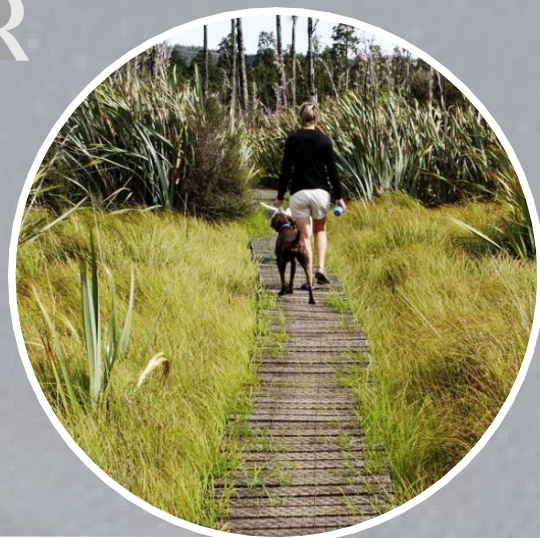
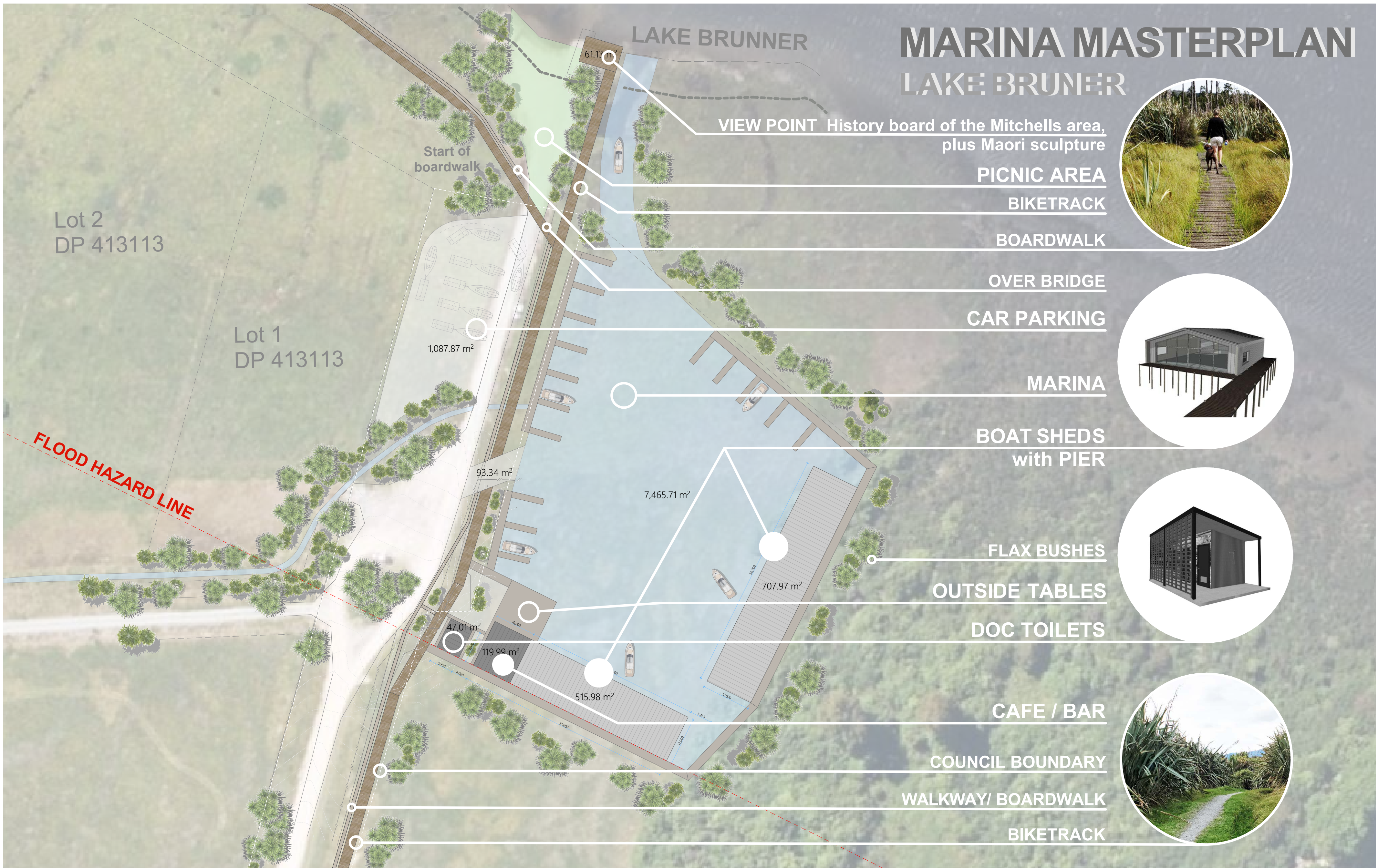
DRAWING NUMBER: 22014-00-001

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- NOTES:**
- ALL AREAS AND DIMENSIONS ARE APPROXIMATE ONLY AND SUBJECT TO FINAL SURVEY.
 - THIS PLAN IS PREPARED FOR RESOURCE CONSENT PURPOSES ONLY AND IS NOT TO BE USED FOR ANY OTHER PURPOSE.
 - ADDITIONAL EASEMENTS MAY BE REQUIRED AND WILL BE ASSESSED IN THE FINAL LEGAL SURVEY.
 - A SUBDIVISION CONSENT HAS NOT BEEN ISSUED IN RESPECT OF THIS PROPOSED LAYOUT.
 - POTENTIAL BUILDING SITES ARE INDICATIVE ONLY, SHOWN TO COMPLY WITH DISTRICT PLAN REQUIREMENTS.
 - REFER TO ATTACHED SHEET FOR EASEMENT SCHEDULE.

MARINA MASTERPLAN

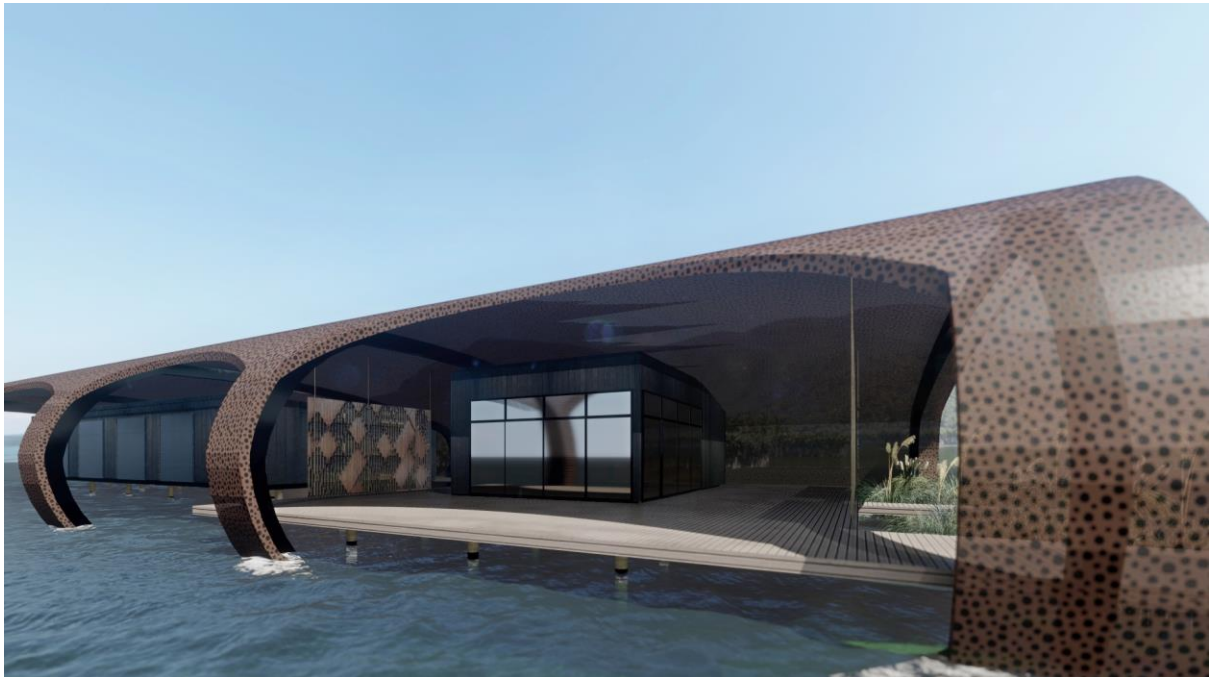
LAKE BRUNNER

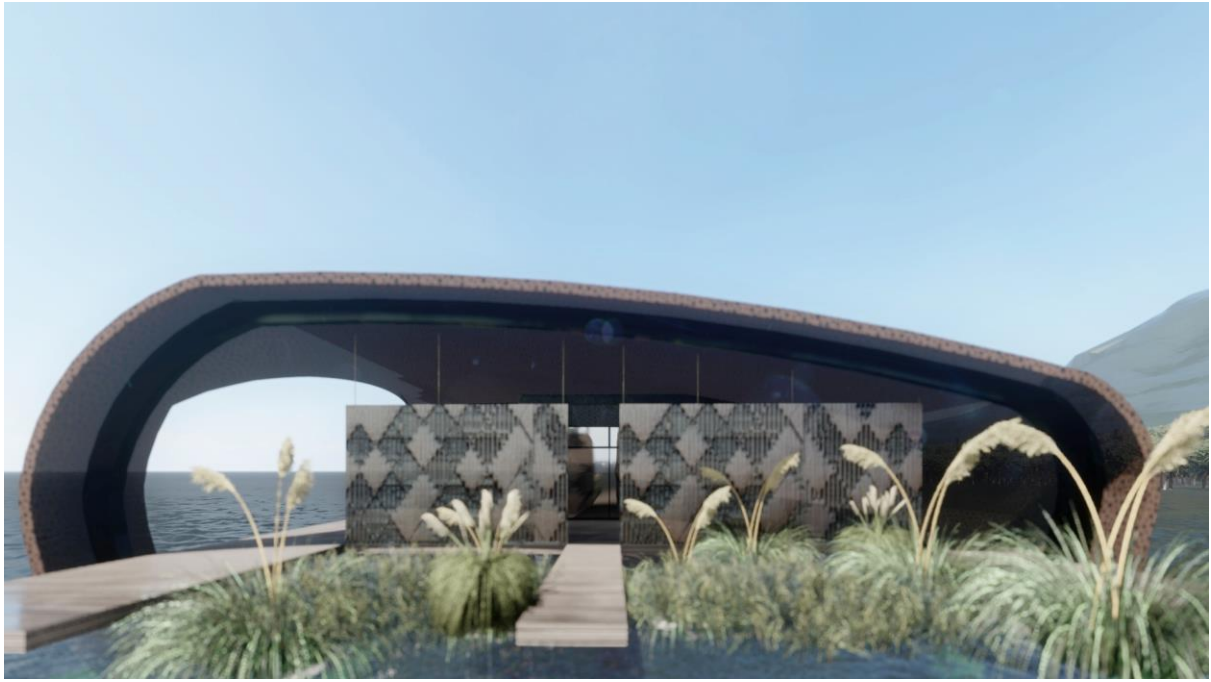


ATTACHMENT 3:

MARINA DEVELOPMENT

*Note Images of Marina remain at concept stage and are subject to detailed design





ATTACHMENT 5:

OBJECTIVES AND POLICIES ASSESSMENT

OPERATIVE DISTRICT PLAN ASSESSMENT

Chapter 4 Landscape

Objective 4.3 requires the protection of outstanding natural features and landscapes in the Grey District from inappropriate subdivision, use and development. The associated Policy 4.4.1 recognises areas of outstanding natural features and landscapes.

Policy 4.4.2 requires proposed subdivision, use and development to be undertaken in accordance with Objective 4.3.2, and in a manner that avoids, remedies, or mitigates adverse effects on outstanding natural features and landscapes that through a resource consent process are determined by Council to exist within the areas identified in Table 4.2 having regard to the criteria in Policy 4.4.1(a) – (f).

Comment:

The subdivision site is not identified on the Operative District Plan planning maps as an “Area of Outstanding Landscape” or a SNA is Schedule 1 of the Operative Plan. Notwithstanding, the design of the subdivision and proposed covenants and design guidelines discussed earlier would ensure that the land use, future buildings and structures will be constructed in harmony with the landscape to the greatest extent practicable given the nature of the proposal. In particular the following is noted:

- The location of the lots is focused on part of the Land that is close to the existing road, and areas where previous historical disturbance has occurred.
- The subdivision, including proposed accessways and building platforms, has been designed to minimize disturbance to old growth vegetation to the greatest extent practicable, and avoid disturbance of waterways.
- All lots will be ‘off grid’, thereby avoiding the need to further disturb existing vegetation through provision for sewage, electricity or telephone reticulation.
- All lots will have restrictions prohibiting cats and dogs.
- Additional covenant conditions will require the use of sustainable building materials, and dedicated building platforms, with requirements on landowners to limit the ability for pest species to establish.
- The proposed subdivision will provide a revenue stream, through a trust mechanism, to enable wider environmental protection and enhancement, across the land, and adjacent areas. In particular, 15% of the sale proceeds will be placed in a trust for pest and weed control purposes on the Land.

The subdivision and land use proposal will create the ability for this development and conservation projects in the Mitchells area to be funded through the trust, including public walking tracks through the remaining block up on to the plateau.

Table 4.1 of the operative District Plan identifies Lake Brunner including adjoining land up to 150m from the boundary of the lake edge road reserve excluding Moana township and urban zoned land at Iveagh Bay. While detailed plans have not yet been prepared for the proposed marina development, the development provides an important opportunity to improve Mitchells boat access and tourism facilities, and undertake enhancement works of local waterways within the Mitchells catchment including native plantings.

Overall, the proposal is considered to mitigate adverse effects on outstanding natural features and landscapes.

Chapter 5 Significant Indigenous Vegetation and Significant Habitats of Indigenous Fauna

Objective 5.3 promotes the protection and where possible enhancement of areas of significant indigenous vegetation and habitats of indigenous fauna. Policy 5.4.1 requires the identification of areas of significant indigenous vegetation and significant habitats of indigenous fauna, the associated Policy 5.4.2 identifies the criteria for recognising such areas. Policy 5.4.3 seeks to avoid, remedy or mitigate adverse effects on the ecological integrity, functioning and habitat values and natural character of areas of significant indigenous vegetation and habitats of indigenous fauna. Policy 5.4.4 seeks to reduce the effect that pests, including the introduction of new pests, can have on significant areas of indigenous vegetation and habitats of fauna.

Comment

The applicant's proposed eco subdivision will provide a substantial income stream to enable enhanced large-scale pest and predator control over and adjoining the Covenant Land aligns consistently with the intent of the objective and policies, and the purposes of the Reserves Act.

The total area of vegetation, associated with the eco subdivision and land use, to be cleared is estimated to amount to approximately 16ha, over the proposed lots. Part of this area would be subject to subsequent restoration planting. The total area of clearance equates to less than 5% of the total site area being 382ha. Rehabilitation plantings using locally sourced indigenous species will reduce the extent of clearance further over time. However, it is acknowledged that the removal of vegetation and associated impact on the habitats of indigenous fauna needs to be carefully managed to ensure the proposal is not inconsistent with these objectives and policies. Vegetation removal will be restricted to those areas identified for access and driveway formation, and at each designated building pad and house site curtilage area.

To help protect and enhance the wider site, as part of the agreement with the Department of Conservation restoration planting will be carried out alongside roadways and accessways, and on any areas of vegetation disturbance or earthworks not required to be maintained as cleared areas as part of the approved subdivision development. A vegetation clearance and restoration plan will be prepared by a suitably qualified ecologist to guide this work and a condition of consent is offered as part of the proposal to ensure this occurs. All restoration planting will involve only the use of locally sourced native plants, either translocated from areas disturbed as part of the subdivision development, or specifically raised from local seed and grown on in a plant nursery for restoration purposes. Where practicable, vegetation direct transfer will be utilised during the initial stages of subdivision development, including when forming access roadways and water tables.

On balance, the proposal is considered to appropriately manage the existing areas of significant indigenous vegetation and significant habitats of indigenous fauna and is therefore considered to be consistent with the above objectives and policies.

Chapter 9 Natural Hazards

Objective 9.3.1 require the adverse effects of natural hazards on people, property and the environment are avoided, or mitigated. The associated Policies 9.4.1 to 9.4.4 seek to adopt an integrated approach recognises the natural and long-term effects of natural hazards and ensures the best defence against potential adverse effects. It also seeks to restrict in areas that are prone to natural hazards, unless the applicant has shown adequate avoidance or mitigation of natural hazards. It also requires an assessment by an appropriately qualified person, where appropriate, for resource consent applications.

Comment:

The eco subdivision site is not identified as being subject to any natural hazards in the operative of proposed District Plans or Regional Plans. Furthermore, this area of the site is not impacted by any potential hazard from inland tsunamis, as the proposed lots are a sufficient distance and highest relative to Lake Brunner.

Potential risk from water from stream overtopping banks within the eco subdivision area can be mitigated through setback and bunding.

The Tasman Accord Covenant makes completing geotechnical testing in accordance, with the MBIE Guidance requirements for subdivision, impractical until the private access roads are established. Therefore, the project engineers, ENGCO recommend that geotechnical testing, in accordance with MBIE Guidance for subdivisions, be undertaken once improved access of the site can be achieved

through clearance of private access roads. This shall be in addition to typical lot specific geotechnical testing undertaken for Building Consent applications. This testing and limited clearing of sites will also allow for more thorough assessment of the site against Section 106 of the RMA.

With respect to the marina site, detailed design has not been undertaken, however it is anticipated that the potential effects from natural hazards can be addressed with the input of appropriately qualified persons.

Overall, it is considered the proposal is consistent with the relevant natural hazard objectives and policies.

Chapter 12 Transport

Objective 12.3.1 promotes the operation of transport infrastructure in a manner that avoids, remedies or mitigates adverse effects. Objective 12.3.2 promotes the safe and efficient use of the District's transport infrastructure. The associated Policies 12.4.1 and 12.4.2 requires activities associated with vehicle movements such as parking, loading and manoeuvring should not adversely affect the transport structure. As part of this a roading hierarchy is implemented.

Policy 12.4.3 requires transport infrastructure to be located and designed in a manner that avoids, remedies or mitigates adverse effects on neighbouring activities as far as practically possible having regard to the sensitivity of those activities.

Comment:

A Transport Assessment has been prepared by suitable qualified and experienced transport engineer and concludes:

- The proposal includes a section of new road to vest, which will be a metalled cul-de-sac. There are also five Right of Ways proposed that will provide access to all but one of the new Lots such that the majority will not take direct access from Kumara-Inchbonnie Road.
- The sight distances at the accesses and proposed intersection have been reviewed in the context of the speed environment. It is considered that there will be sufficient visibility at the accesses to provide a safe arrangement, subject to trimming vegetation at the Lot 2 / 3 and Lot 5 accesses.
- The separation of the accesses has been reviewed, again in the context of the speed environment. The separation proposed is considered appropriate and acceptable.
- The Matters of Control relating to transport for subdivision have been reviewed. The key matter in this instance is considered to be the formation of Kumara-Inchbonnie Road. This has been reviewed and is considered to be acceptable given the low traffic volumes predicted to be generated by the proposed activity.

The proposed development can be supported from a transport perspective and is considered to be consistent with the objectives and policies in Chapter 12 of the Operative District Plan.

Chapter 13 Subdivision

Objective 13.3.1 seeks to ensure that sites that are created by subdivision do not subsequently result in adverse effects on the environment which cannot be avoided, remedied or mitigated. The associated Policy 13.4.1 requires that sites created are able to accommodate any subsequent land use having regard to the characteristics of that use and the rules of the Management Area.

Policy 13.4.2 states that any subdivision should avoid, remedy or mitigate the likely adverse effects on significant indigenous vegetation and habitats, outstanding landscape features, and the natural character of waterbodies and the coastal environment.

Policy 13.4.3 seeks to restrict subdivision in areas of known natural hazard unless the effects of those natural hazards can be adequately avoided or mitigated.

Comment

The assessment of the proposal against the objectives and policies contained in Chapters 4, 5 and 9 above considers the impact of the proposal on the environment, including on significant indigenous vegetation and habitats and outstanding natural landscapes. It also considers the known hazard risk.

For the reasons outlined above, it is considered that the proposal is consistent with the subdivision objective and policies.

Chapter 19 Rural Environment

Objective 19.3.1 promotes the management of resources in the rural environment in a manner that enables people and communities to carry out a variety of activities while ensuring that the resource base is sustainable for future generations and maintaining the life supporting capacity and healthy functioning of ecosystems. Objective 19.3.2 seeks to ensure the retention of the character of the rural environment in which existing amenities include its openness and spaciousness, natural features and presence of indigenous vegetation.

Policy 19.4.1 requires activities to not significantly reduce the long-term potential or availability of the natural and physical resource. Policy 19.4.2 states new activities should not adversely impact on the operation of established activities provided that any effect generated by the established activity does not give rise to a nuisance that would not normally be expected in a rural working environment. Policy 19.4.3 supports a wide range of activities being carried out in a manner that avoids, remedies or mitigates adverse effects.

Policy 19.4.4. requires patterns of subdivision and development retain the openness of the rural environment. It also states that the bulk and location of structures should not affect the character of the rural area or affect the amenities of adjoining properties. Policy 19.4.5 similarly requires activities to not adversely affect the amenities of the rural area or adjoining properties in terms of such matters as effluent disposal, noise, traffic generation, air emissions, odour, shading and visual impact.

Comment:

The effects of vegetation clearance are outlined above. In addition to this assessment, it is noted that in order to ensure the character of the rural area and the amenity of neighbouring properties is retained, each proposed lot is a minimum of 1 hectare and the minimum net areas are in a physically contiguous parcel of land. In addition, the identified building platforms are located more than 5m from internal boundaries, 10m from road boundaries and 10m from the banks of streams. Furthermore, no vegetation clearance is proposed within 10m of the any stream with an average bed width greater than 3m. Building colour schemes will be limited to neutral and recessive natural tones. Electricity supply will be via roof mounted solar panels, rather than reticulated supply. Site specific building height and area restrictions will be applied to limit buildings to a maximum of two levels, and discourage low quality builds. Urban type fencing (as specified in the Fencing Act) will not be permitted. These controls will be implemented through either a consent notice issued on the new lot titles, or a Land Covenant pursuant to section 116(1)(a) and (b) of the Land Transfer Act 2017, or a combination of these mechanisms. The Land Covenant will require compliance with the Mitchells Estates development guidelines. In this way the applicant and Council retain a high degree of control over the development activities to be undertaken on individual on sold lots.

Overall, it is considered that the proposal is consistent with the intent of the objectives and policies of Chapter 19.

PROPOSED TE TAI O POUTINI PLAN – WEST COAST DISTRICT PLAN

Part 2 – District Wide Matters - Natural Environment – Te Taiao

Objective NENV-01 recognises and protects the natural character, landscapes and features, ecosystems and indigenous biodiversity that contribute to the West Coast's character and identity and Poutini Ngāi Tahu's cultural and spiritual values.

Objective NENV-02 seeks to ensure that the rights, interests and values of Poutini Ngai Tahu to natural environment areas and features are protected and provided for and that the ability to exercise kaitiakitanga and tino rangatiratanga is maintained and enhanced.

Objective NENV-03 seeks to recognise:

- a. The substantial contribution to the protection of natural environment values that is made by the existence of public conservation land in protecting significant areas, habitats and features;
- b. The need for infrastructure to sometimes be located in significant areas; and
- c. The need to support the ethic of stewardship and to consider the positive effects of the conservation estate in achieving the requirements of the RMA.

Objective NENV-04 requires the identification of:

- a. Unique and important natural environment areas and features on the West Coast/Te Tai o Poutini which must be protected; and
- b. Areas where subdivision, use and development to enable community economic, cultural and social wellbeing can be sustainably managed.

Comment:

The assessment of the proposal against Chapters 4 and 5 of the District Plan is considered equally relevant to the matters noted above.

With respect to proposed Objective NENV-02 The proposed Stage 1 works are located on private freehold land and will not impact on the rights, interests and values of Poutini Ngai Tahu. Stage 1 will not impact on the natural environment areas and features and the pest control measures that are proposed will enhance the protection of indigenous flora and fauna and maintains the ability to exercise kaitiakitanga and tino rangatiratanga.

Stage 2 requires engagement with ngā hapū o Ngāti Porou and the proposal would ensure that the rights, interests and values of Poutini Ngai Tahu to natural environment areas and features are protected and provided for and that the ability to exercise kaitiakitanga and tino rangatiratanga is maintained and enhanced.

Part 2 – District Wide Matters – Poutini Ngāi Tahu

Objective POU-02 requires the inclusion of Te Tai Poutini wide provisions to support Poutini Ngāi Tahu exercise of cultural rights and interests including:

- a. Establishment of papakāinga;
- b. Access to mahinga kai and cultural materials;
- c. Management of Pounamu and Aotea stone; and
- d. Management of taonga and wāhi tapu.

Objective POU-03 seeks to support Poutini Ngāi Tahu to identify cultural landscapes and sites and areas of significance and provide for their management in ways that preserve the cultural relationships Poutini Ngāi Tahu have with these landscapes, sites and areas.

Objective POU-04 seeks to support Poutini Ngāi Tahu in their exercise of kaitiakitanga and recognise their special relationship with te taiao, Poutini Ngāi Tahu taonga and wāhi tapu through resource management process and decisions.

The most relevant Poutini Ngāi Tahu Strategic Policies include:

- POU - P1 Support the use of Joint Management Agreements and s33 Transfer of Powers for resource management functions on Poutini Ngāi Tahu Land.
- POU - P3 Support the identification of Poutini Ngāi Tahu Cultural Landscapes and provide for their protection through the use of overlays and Plan provisions.
- POU - P4 Provide for papakāinga, marae and Māori cultural activities to be established throughout the West Coast/Te Tai o Poutini settlements and on Poutini Ngāi Tahu land.
- POU - P5 Poutini Ngāi Tahu should be able to freely access mahinga kai sites and cultural materials in accordance with tikanga and to support community wellbeing.
- POU - P7 Provide for active participation by Poutini Ngāi Tahu in the sustainable management of West Coast/Te Tai o Poutini resources.
- POU - P8 Recognise the role of Poutini Ngāi Tahu as kaitiaki and provide for them to exercise kaitiakitanga through the resource management process.
- POU - P9 Recognise Poutini Ngāi Tahu as specialists in tikanga and as being best placed to convey their relationship with their ancestral lands, water, sites, wāhi tapu and other taonga.
- POU - P10 Protect Poutini Ngāi Tahu taonga and cultural sites, including sites and areas of significance to Māori identified in Schedule Three while ensuring Poutini Ngāi Tahu's key role in decision making around their management.

Comment:

As noted above, the proposed Stage 1 works are located on private freehold land and will not impact on the rights, interests and values of Poutini Ngāi Tahu. Stage 1 will not impact on the natural environment areas and features and the pest control measures that are proposed will enhance the protection of indigenous flora and fauna and maintains the ability to exercise kaitiakitanga and tino rangatiratanga.

Stage 2 requires engagement with ngā hapū o Ngāti Porou to ensure that these objectives and policies are met.

Part 2 – District Wide Matters – Tourism - Te Tāpoi

Objective TRM-01 recognises the significance of tourism to the West Coast/Te Tai o Poutini economy by providing for sustainable tourism development while managing the adverse effects on the environment, communities and infrastructure.

Comment:

The proposed marina facility will provide enhanced recreational and tourism related opportunities within the Mitchells area, and Lake Brunner that would be of regional benefit.

Part 2 – District Wide Matters – Urban form and development - Te āhua me te whanaketanga o te tāone

Objective UFD-01 promotes urban environments and built form on the West Coast/Te Tai o Poutini that:

1. Are attractive to residents, business and visitors;
2. Have areas of special character and amenity value identified and their values maintained;
3. Support the economic viability and function of town centres;
4. Recognise the risk of natural hazards whereby new development is located in less hazardous locations;
5. Promote the re-use and re-development of buildings and land, including private and public land;
6. Support inclusivity and housing choice for the diversity within the community now and into the future;
7. Improve overall accessibility and connectivity for people, transport (including walking and cycling) and services;
8. Promote the safe, efficient and effective provision and use of infrastructure, including the optimisation of the use of existing infrastructure and protection of critical infrastructure;
9. Maintain the health and wellbeing of waterbodies, freshwater ecosystems and receiving environments; and

10. Promote and enhance the distinctive character of the districts' towns and settlements.

Comment:

As noted in Section 5, built form controls will be implemented through either a consent notice issued on the new lot titles, or a Land Covenant pursuant to section 116(1)(a) and (b) of the Land Transfer Act 2017, or a combination of these mechanisms. The Land Covenant will require compliance with the Mitchells Estates development guidelines, and will further require prior approval of development plans for each lot by Mitchells 2021 Ltd. In this way Mitchells 2021 Ltd retain a high degree of control over the development activities to be undertaken on individual on sold lots. There is the opportunity for a representative from DOC to also be involved or a certification process with Grey District Council in the approval of final development plans if that were considered desirable.

Part 2 – District Wide Matters – Transport - Te Tūnuku

The following objectives and the associated policies TRN – P1 to TRN – P9 are all considered relevant to the proposed development:

- TRN - O1 To recognise and provide for the critical role land transport infrastructure plays in supporting communities including emergency services, and economic activity on the West Coast/Te Tai o Poutini.
- TRN - O2 To manage the effects of land transport infrastructure on the character, landscape and amenity of the towns, settlements and rural areas and minimise adverse effects on the environment.
- TRN - O3 To enable accessibility, safety and connectivity of land transport infrastructure and consider the amenity of all transport users, including pedestrians and cyclists.
- TRN - O4 To encourage resilience within the transport network to natural hazards and climate change reflecting its vital role in community wellbeing and economic activity.
- TRN - O5 To ensure that the provision of safe and efficient parking, loading and access is consistent with the character, scale and intensity of the zone, the roading hierarchy and the activity being undertaken.

Comment:

For the reasons outlined in the assessment of the proposal against the Chapter 12 Transport provisions of the operative District Plan, the proposed development can be supported from a transport perspective and is considered to be consistent with the objectives and policies in the Transport - Te Tūnuku Chapter of the Operative District Plan.

Part 2 – District Wide Matters – Natural Hazards Objectives

Objectives NH-01 to NH-06 and the associated policies note that a risk-based approach to natural hazards has been taken in Te Tai o Poutini Plan and means that the focus of the natural hazard provisions is in the areas where there is greatest risk. Collectively the provisions seek to reduce the risk to life, property and the environment from natural hazards. It also seeks to restrict in areas that are prone to natural hazards, unless the applicant has shown adequate avoidance or mitigation of natural hazards.

Comment:

For the reasons outlined in the assessment of the proposal against the Chapter 9 Natural Hazards provisions of the operative District Plan, the proposed development is considered to be consistent with the objectives and policies in the Natural Hazards Chapter of the Operative District Plan.

Part 2 – District Wide Matters - Sites and Areas of Significance to Māori - Ngā Wāhi Tāpua ki te Māori

The following objectives and the associated policies SASM – P1 to SASM – P15 are all considered relevant to the proposed development:

- SASM - O1 Sites and areas of significance to Poutini Ngāi Tahu are recognised and identified and Poutini Ngāi Tahu are actively involved in decision making that affects their values to provide for tino rangatiratanga and kaitiakitanga.
- SASM - O2 Poutini Ngāi Tahu are able to access, maintain and use areas and resources of cultural value within identified sites, areas and cultural landscapes.
- SASM - O3 The values of sites and areas of significance to Māori and cultural landscapes are protected from inappropriate subdivision, use and development including inappropriate modification, demolition or destruction.

Comment:

As noted above, the proposed Stage 1 works are located on private freehold land and will not impact on the rights, interests and values of Poutini Ngāi Tahu. Stage 1 will not impact on the natural environment areas and features and the pest control measures that are proposed will enhance the protection of indigenous flora and fauna and maintains the ability to exercise kaitiakitanga and tino rangatiratanga.

Stage 2 requires engagement with ngā hapū o Ngāti Porou and the proposal would ensure that the rights, interests and values of Poutini Ngāi Tahu to natural environment areas and features are protected and provided for and that the ability to exercise kaitiakitanga and tino rangatiratanga is maintained and enhanced.

Part 2 – District Wide Matters - Ecosystems and Indigenous Biodiversity - Ngā Pūnaha Rauropi me te Kanorau Koiora

The following objectives and the associated policies ECO – P1 to ECO P10 are all considered relevant to the proposed development:

- ECO- O1 To identify and protect areas of significant indigenous vegetation and significant habitats of indigenous fauna on the West Coast/Te Tai o Poutini.
- ECO - O2 To provide for appropriate subdivision, use and development within areas of significant indigenous vegetation and significant habitats of indigenous fauna where the values of the area can be maintained or enhanced.
- ECO - O3 To provide for tino rangatiratanga in relation to management of areas of significant indigenous vegetation and significant habitats of indigenous fauna where these are located on Poutini Ngāi Tahu and Te Rūnanga o Ngāi Tahu land.
- ECO - O4 To maintain the range and diversity of ecosystems and indigenous species found on the West Coast/Te Tai o Poutini.

Comment:

For the reasons outlined in the assessment of the proposal against the Chapter 5 Significant Indigenous Vegetation and Significant Habitats of Indigenous Fauna provisions of the operative District Plan, on balance, the proposal is considered to appropriately manage the existing areas of significant indigenous vegetation and significant habitats of indigenous fauna and is therefore considered to be consistent with the above objectives and policies.

Part 2 – District Wide Matters – Natural Features and Landscapes Objective

Objective NFL-01 and the associated Policies NFL – P1 to NFL – P7 seek to protect the values of outstanding natural landscape and outstanding natural features on the West Coast/Te Tai o Poutini, while providing for subdivision, use and development where the values that make the landscape or feature outstanding can be maintained or enhanced.

Comment:

For the reasons outlined in the assessment of the proposal against the Chapter 4 Landscapes provisions of the Operative District Plan, the proposal is considered to mitigate adverse effects on outstanding natural features and landscapes.

Part 2 – District Wide Matters - Natural Character and Margins of Waterbodies - Ngā Āhua me ngā Mahi ka Noho Hāngai ki ngā Hopua Wai

The following objectives and the associated policies NC – P1 to NC – P5 are all considered relevant to the proposed development:

- NC - O1 To preserve the natural character of lakes, rivers and wetlands and their margins while providing for appropriate subdivision, use and development where adverse effects can be avoided or mitigated.
- NC - O2 To recognise and provide for the relationship of Poutini Ngāi Tahu and their traditions, values and interests associated with the natural character of lakes, rivers and wetlands and their margins.
- NC - O3 To provide for activities which have a functional need to locate in the margins of lakes, rivers and wetlands in such a way that the impacts on natural character are minimised.

Comment:

Careful design and implementation of the marina facility will be necessary to ensure the Stage 2 works are not inconsistent with the objectives and policies in this chapter. The marina does have a functional need for its location and can be designed to ensure that the form and scale will minimise impacts on the natural character of the area. Work is ongoing on the Stage 2 development.

Part 2 – District Wide Matters - Subdivision - Te Wawaetanga

The following objectives and the associated policies SUB – P1 to SUB – P9 are all considered relevant to the proposed development:

- SUB - O1 Subdivision achieves patterns of land development that are compatible with the purpose, character and qualities of each zone.
- SUB - O2 Subdivision occurs in locations and at a rate that:
 - a. Is supported by the capacity of existing infrastructure networks, or provides for infrastructure facilities and networks that are sufficient to accommodate growth and development that meets the standards required by the Council and the Plan;
 - b. Facilitates the operation of critical infrastructure;
 - c. Enables access and connectivity;
 - d. Provide for the health, wellbeing and safety of the West Coast/Te Tai o Poutini community;
 - e. Provides for growth and expansion of West Coast/Te Tai o Poutini settlements and businesses; and
 - f. Avoids significant natural hazards and are built to be resilient to natural hazards.
- SUB - O3 Subdivision design and development protects significant coastal, natural, ecological, historical and Poutini Ngāi Tahu features and resources and responds to the physical characteristics and constraints of the site and surrounding environment.
- SUB - O4 Subdivision within the FUZ - Future Urban Zone does not result in the fragmentation of sites that would compromise the potential of land within the FUZ - Future Urban Zone to accommodate integrated and serviced urban development.
- SUB - O5 Esplanade reserves and strips created through subdivision contribute to the protection of identified significant natural heritage and Poutini Ngāi Tahu values, provide natural hazard mitigation, support good water quality and provide for public access to and along rivers and the coastal marine area.
- SUB - O6 Where subdivision occurs, sufficient provision is made for the additional community need for open space.

Comment:

The assessment above of the proposal against the Chapter 13 Subdivision provisions of the Operative District Plan is considered applicable to the aforementioned subdivision provisions in the Proposed Plan. In summary, the proposal is considered to be consistent with the subdivision objective and policies.

Part 2 – District Wide Matters - Activities on the surface of water - Ngā mahi ki te kārewa o te wai

Objective ASW- 01 seeks to ecological, recreational, natural character, amenity and Poutini Ngāi Tahu values of the District's rivers, lakes and lagoons are protected from the adverse effects of activities and structures on the surface of water.

The associated Policy ASW – P3 provides for commercial activities and structures on the surface of West Coast/Te Tai o Poutini rivers, lakes and lagoons provided that the activity does not create:

- a. Adverse effects on
 - i. Significant natural heritage values including identified scheduled sites;
 - ii. Cultural and spiritual values including sites and areas of significance to Māori;
 - iii. Poutini Ngāi Tahu values and in particular as relate to culturally significant rivers and lakes;
- b. Significant adverse effects on
 - i. Amenity values;
 - ii. Ecological values;
 - iii. Natural character;
 - iv. Other recreational uses; and
- c. Cumulative adverse effects with any other structures or activities on the surface of waterbodies.

Comment:

As noted above, Careful design and implementation of the marina facility will be necessary to ensure the Stage 2 works are not inconsistent with the objectives and policies in this chapter. Work is ongoing on the Stage 2 development.

Part 2 – District Wide Matters - Earthworks - Te Huke Whenua

Objective EW – 01 and the associated Policies EW – P1 to EW – P4 provides for earthworks to facilitate subdivision, use and development of the West Coast/Te Tai o Poutini's land resource, while ensuring that their adverse effects on the surrounding environment are avoided or mitigated.

Comment:

A soil disturbance and earthworks plan will be developed by a suitably qualified and experienced engineer, which will detail steps to be taken to;

- minimise the extent of soil disturbance and earthworks
- provide for progressive stockpiling of all soils, to be stored in areas which will not unnecessarily increase the overall level of vegetation disturbance on the site, and the utilisation of those soils for restoration and rehabilitation of the site
- avoid or minimise any potential for sediment loss to waterways
- ensure all machinery utilised in subdivision development, and any fill, gravel, roading metals or similar materials is free of weed seeds or vegetation material
- manage traffic, and in particular heavy traffic and earthmoving machinery, utilising the Kumara – Mitchells Road in accordance with all requirements of the Grey District Council
- identify the final offsite destination of any surplus earthworks material which is not required for onsite fill or rehabilitation works.

The Soil Disturbance and Earthworks Plan, will include a specific Erosion and Sediment Control Plan, to address any potential for erosion or sediment from onsite works during development.

Overall, it is considered that the proposed earthworks will be consistent with the intent of the objectives and policies in the Earthworks Chapter.

Chapter 3 Area Specific Matters – Rural Zones - Ngā Whāinga me ngā Kaupapa Here

Comment:

Submissions on the proposed zoning of the subdivision site are currently being heard as part of the Proposed District Plan process, as such a detailed assessment of the proposal against the proposed Rural Zone objectives and Policies has not been undertaken. However, the assessment above of the proposal against the Chapter 19 Rural provisions of the Operative District Plan is considered broadly applicable. In summary, the proposal is considered to be consistent with the subdivision objective and policies.

**ECOLOGICAL CONSTRAINTS ASSESSMENT
FOR A PROPOSED SUBDIVISION
AND ECO-TOURISM
AT MITCHELLS, LAKE BRUNNER**



 providing
outstanding
ecological
services to
sustain
and improve our
environments



Wildlands

R6650

ECOLOGICAL CONSTRAINTS ASSESSMENT FOR A PROPOSED SUBDIVISION AND ECO-TOURISM ENHANCEMENT AT MITCHELLS, LAKE BRUNNER



Large emergent rimu tree with epiphytic puka, growing above indigenous hardwood forest at Mitchells, February 2023.

Contract Report No. 6650

May 2023

Project Team:

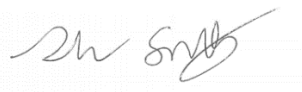
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1. INTRODUCTION

The Lynch family are looking to sustainably develop an area encompassing up to six title blocks¹ adjacent to the Lake Brunner Eco Lodge on the Kumara-Inchbonnie Road, Mitchells, Lake Brunner. Much of the site is covered in regenerating indigenous forest that has had some historical disturbance, and is subject to a covenant under section 77 of the Reserves Act 1977. The proposal allows for sustainable development while generating funds that will be used to protect and enhance the surrounding areas.

The Lynch family are committed to sustainable development and propose the establishment of a charitable trust that would enable private funding to help protect the ecological values of the Mitchells area for future generations. Additional conservation works are being considered, such as pest eradication or a potential bird sanctuary. The Lynch family is also considering a modernised dumping/recycling system in Mitchells and additional surveying to ascertain flora of historical or environmental significance to tie into potential walking tracks.

As the project is still in the development stages, the scope and design have not yet been finalised. Several developments are under consideration as part of this project, including:

- Lakeside block development – four high-spec, one-bedroom units in the forest near the lake front.
- Proposed subdivision west– a 30-ha, 22-lot off grid, eco-friendly residential subdivision, in the forest on the hill slopes above the Kumara-Inchbonnie Road.
- Four new cabins to increase the accommodation offering at the Lake Brunner Eco Lodge.

This report provides a high-level review of ecological features and values that are present at the site in the locations of these proposed developments, and the constraints that these could pose on the proposed development.

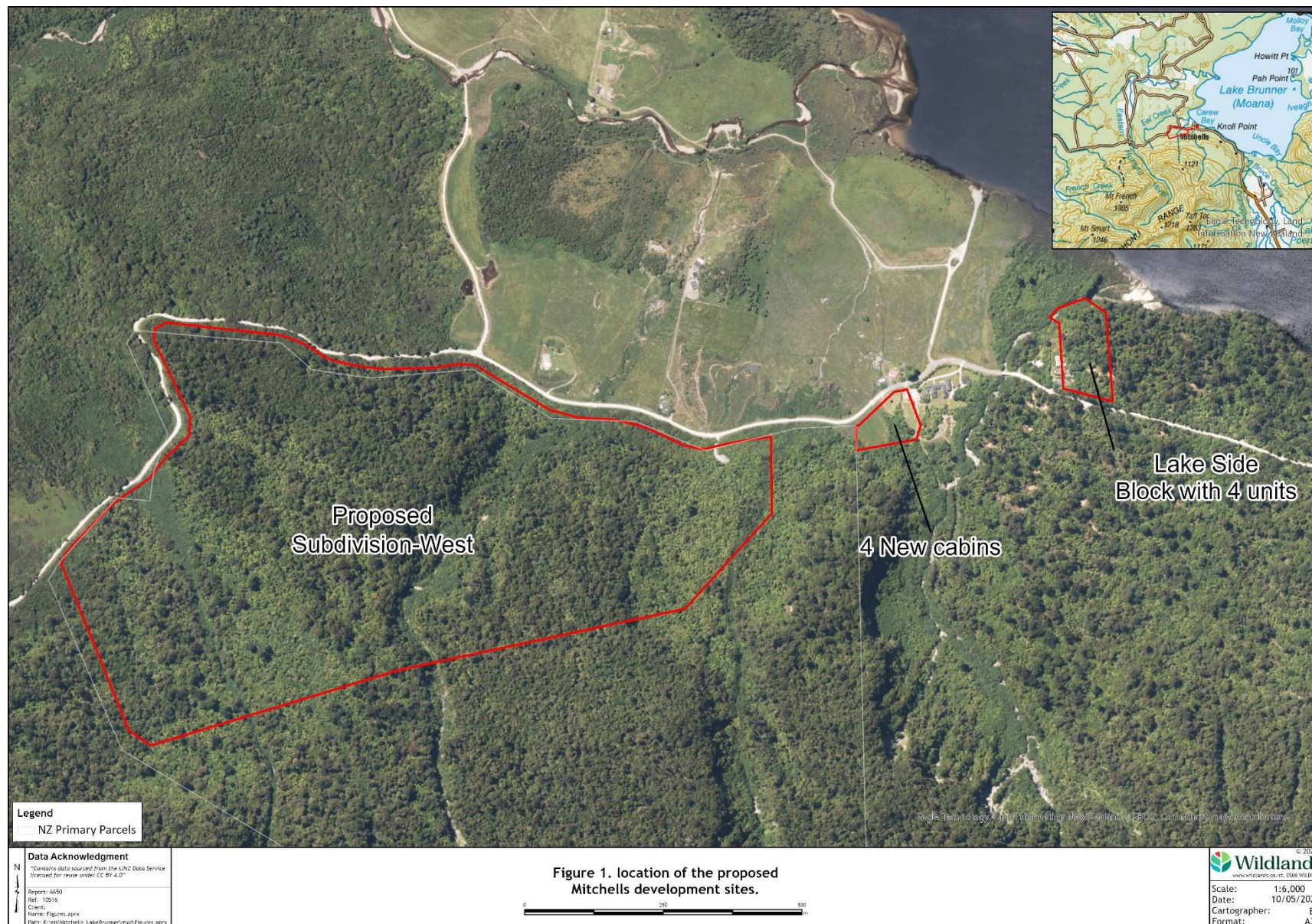
This assessment also provides a foundation for future project requirements. If the project progresses, baseline monitoring of indigenous biodiversity values will be necessary, and the client needs to know which values require baseline monitoring, and appropriate methods, time of year and monitoring intervals. An application to council for resource consent would likely require an Assessment of Ecological Effects (AEE). This is a more detailed assessment of the potential effects of the proposed developments (when finalised) on ecological values, with recommendations for managing and reducing those impacts. This constraints analysis will help guide ecologically sensitive project design before undertaking an AEE.

2. SITE DESCRIPTION

The sites are located at Mitchells, adjacent to Lake Brunner on the West Coast of the South Island. Lake Brunner has a 387 km² catchment area comprising Crooked River, Bruce Creek, Eastern Hohonu River and many much smaller tributaries. Mitchells and the Lake Brunner Eco Lodge are a short distance from the lake shore at Carew Bay, in the western-most point of Lake Brunner, north of the bush-clad Hohonu Peaks.

¹ PT RS 2032, RS 2100, Lot 2 DP 3638, Lot 3 6 & 9 DP 368760, SEC 3738 BLK XI Hohonu SD and 54111 - Lot 4 Deposited Plan 440795

The proposed development sites are located at Mitchells (Figure 1). The lakeside block stretches between Kumara-Inchbonnie Road and the lake, and borders the Carew Stream riparian zone. The proposed subdivision west covers an area of indigenous hardwood-podocarp forest on northern toe slopes on the Hōhonu Ridge, to the west of the Lake Brunner Eco Lodge. This forest block is dissected by four small creeks which all drain into Carew Bay. The site of the four new cabins (not assessed) is located on an open grassy area behind the current Eco lodge.



3. ECOLOGICAL CONTEXT

3.1 Ecological District

The sites of proposed development are located within the Brunner Ecological District. The following description of the Ecological District is adapted from McEwen (1987).

The Brunner Ecological District is characterised by the steep-sided Palaeozoic Era (541-252 million years ago) granite mountains of the Hōhonu Range (1,000-1,356 metres above sea level), Te Kinga (1,126 metres) and Granite Hill; extensive flat to rolling terrain formed from glacial gravels and sands lying over Tertiary Era (66-2.6 mya) deposits; and stream valleys with recent river gravels. Major features include Lake Brunner, the largest lake in the ecological district.

Most of the district is lowland, and the climate is relatively mild, although winter frosts are common. Rainfall is generally high, ranging from 3,000-5,600 mm per annum. Soils are mostly infertile and have poor drainage. They often consist of grey mineral soils that have lost water-soluble nutrients through leaching, with a black organic layer on top. Peaty soils can be found on terraces and moraines. Soils on steeper land tend to be more infertile, while river flats have fertile alluvial soils with imperfect to poor drainage.

This district is unusual in its almost complete absence of beech trees. Unmodified podocarp-hardwood or steep-land hardwood forest covers mid slopes of Te Kinga and Hōhonu mountains: altitudinal vegetation belts include rimu- kāmahī (*Dacrydium cupressinum*, *Weinmannia racemosa*), tāwheowheo (*Quintinia* sp.), and toro forest at low altitudes with some kahikatea swamps, rising to rata-kamahī forest, then kaikawaka (*Libocedrus bidwillii*), pink pine (*Halocarpus biformis*) forest, then leatherwood (*Olearia colensoi*) scrub, and alpine vegetation.

The previously dense podocarp forests of the river plains, low country and lower hill slopes of this district have been almost entirely cleared by logging for dairy farming, and cattle and sheep grazing.

3.2 Threatened Environment Classification

The Threatened Environment Classification characterises land environments into six categories taking into account the extent to which indigenous vegetation cover remains compared to its former extent, as well as the extent of legal protection of areas of indigenous vegetation (Cieraad *et al.* 2015).

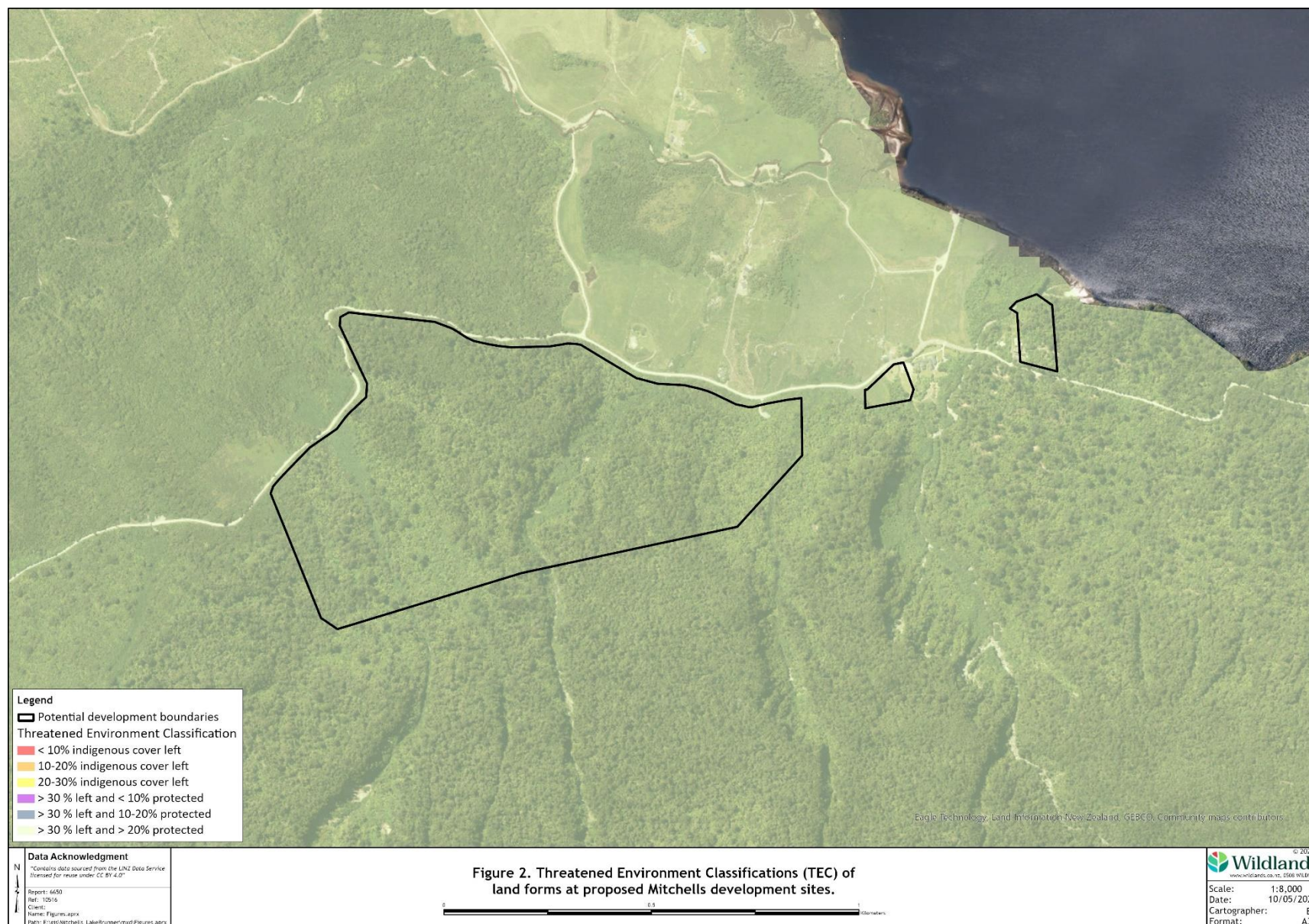
The sites of proposed development are located on land environments that are classified as having > 30% indigenous cover left and >20% protected. Land environments adjacent to the property are similarly classified (Figure 2).

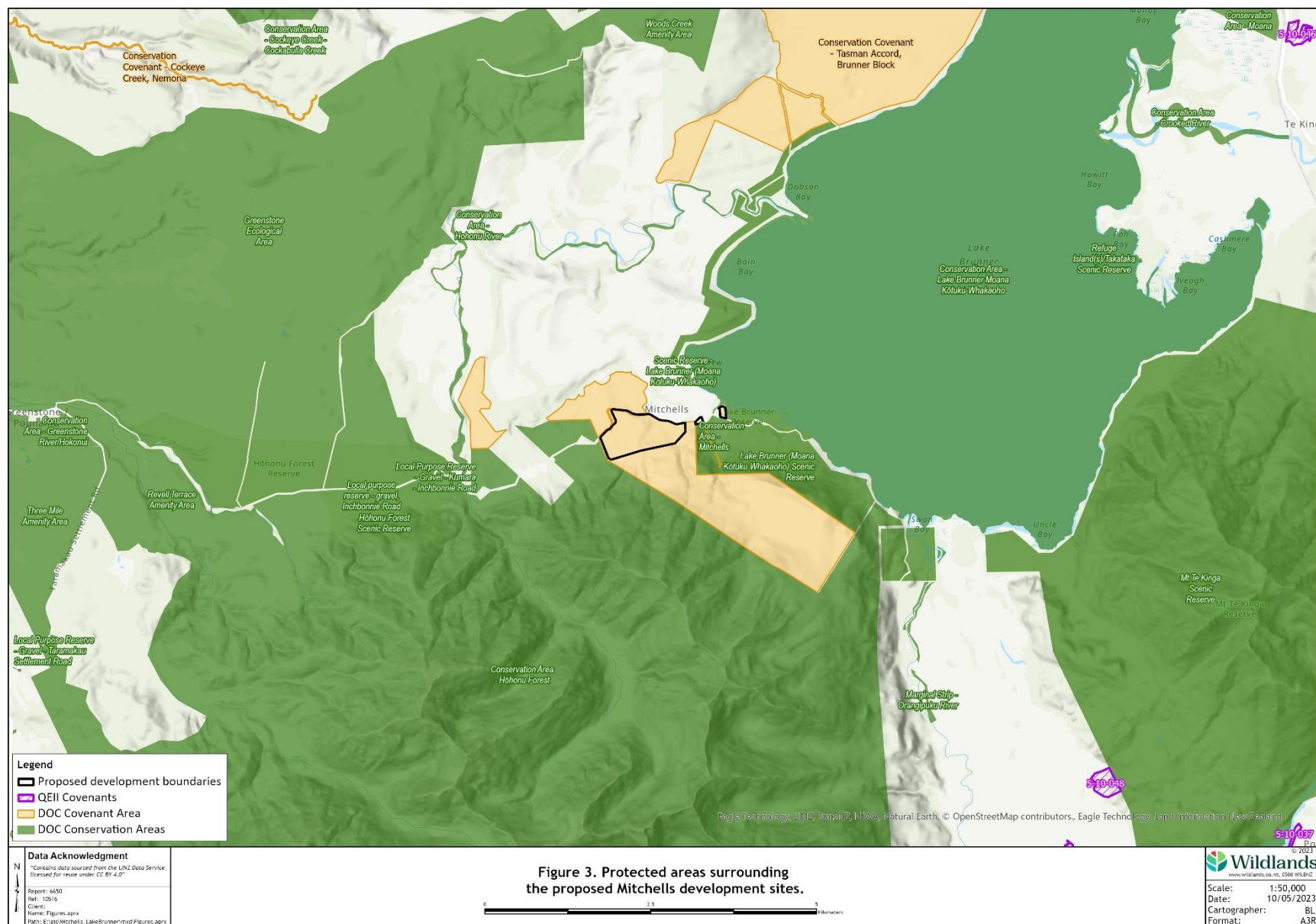
3.3 Protected areas

The project area is partially located on a DOC (Department of Conservation) Covenant Area² and is part of a broader landscape that has a high level of protection (Figure 3). DOC conservation areas border the site from the north, east and south. DOC

² Conservation Covenant - Tasman Accord, Brunner Block

conservation areas adjacent to the site include the Mitchells Conservation Area, the Lake Brunner Scenic Reserve and the Hohonu Forest Conservation Area.





4. METHODS

4.1 Desktop survey

A desktop assessment was undertaken to determine ecological values within the project footprint. This involved reviewing aerial imagery (Canterbury Maps, Google Earth) and undertaking a literature and database search for ecological information on the wider area. Literature reviewed included previous Wildlands reports from the wider area, such as the Te Kinga Ecological Assessment (Wildlands Consultants 2018, 2021). The desktop survey informed the potential vegetation and habitats at the site. This included looking for Threatened and At Risk species recorded in the surrounding area.

Databases searches included the New Zealand Freshwater Fish Database (NZFFD) for fish records in and around Lake Brunner, eBird for bird records within a fifteen-kilometre radius of the site due to the scarcity of data in the immediate area, and the Global Biodiversity Information Facility (GBIF), for invertebrate records within a five-kilometre radius of the site. The New Zealand Plant Conservation Network (NZPCN) records were searched for plant records from the area. The DOC Bioweb Herpetofauna database was searched for lizard observations (accessed May 2022) within 10 kilometres of the site to identify species in the area. iNaturalist was also searched for bird records within 15km of the site, and lizard, invertebrate and plant records within 10 km of the site (accessed January 2023).

4.2 Site survey

The proposed subdivision west and lake block site were surveyed for invertebrates, lizards, fish, and freshwater values on 12 January. Surveys included habitat assessments and hand-searching for invertebrates and lizards. Hand-searching involved looking in and under logs and rocks, and searching the surfaces of trees, the ground, moss, dead wood, and other objects. These sites were visited during the afternoon and then searched for fauna by spotlighting between 9 and 10 pm. The weather was hot and calm, with some daytime cloud.

A freshwater survey was undertaken of two creeks within the subdivision west portion of the site, the western most unnamed stream (formally Slip Creek 0814/17.70) and Slip Creek, which cuts through the middle of the site. Both creeks were spotlighted for between 20-30 minutes, starting at the road and moving upstream. The lakeside block has a short section with a boundary along Carew Stream. This stream was explored during the day and habitat and fish observations noted.

A vegetation and habitat survey was undertaken 21 and 22 of February. Vegetation and habitat types were identified and then mapped and described following the structural classes in Atkinson (1985). Field mapping was digitised onto aerial imagery using ArcGis10.8.

A survey of avifauna at the site was completed on 15 February 2023. Ten five-minute bird counts were undertaken, at ten acoustic monitoring locations (see below). Large trees were checked for roosting birds and any incidental bird sightings were also recorded.

Neighbouring residents' past observations were noted during habitat assessments.

4.3 Acoustic monitoring

Ten AR4 1.5 (black) Automatic Bat Monitors (ABMs), manufactured by DOC running ARM v1.4 software, were deployed to monitor for bats and kiwi on 15 February 2023. ABMs were retrieved on 23 March 2023.

Three were deployed in and around the lakeside block and four were deployed within the proposed subdivision west. Three more were deployed within mature forest on the hill slopes just outside of the proposed subdivision west (Figure 4). Many of these were targeted at natural breaks in the canopy, such as near fallen trees or near slips, which are more likely bat habitat. The GPS locations of ABMs deployed and photographs showing examples of ABM placement locations are presented in Appendix 1.

ABMs were set to record bat signals from before sunset (8:30 pm) until 4:00 am. The analysis of the bat data was undertaken using BatSearch Version 3.11 developed by the Department of Conservation (DOC).

ABMs were also set to monitor for great spotted kiwi (*Apteryx haastii*; Threatened – Nationally Vulnerable) from 4:00 am until sunrise (7.00 am). The analysis of the kiwi data was undertaken using Raven Lite software version 2.0.4.



4.4 Site survey scope

Lakeside block

A survey of the site, lake front and Carew Creek was undertaken to determine if there were any additional streams or fresh water values not noted on the topographic map. A walkthrough survey of vegetation, lizard and notable invertebrate³ habitats was undertaken during the day. Hand-searching for lizards and notable invertebrates was undertaken in suitable habitats.

Proposed subdivision west

A walkthrough survey of the vegetation, lizard and notable invertebrate habitats was undertaken during the day, with hand-searching for lizards and notable invertebrates was also undertaken in suitable habitats.

A freshwater survey was undertaken of two creeks in this site. The outflow for all waterways is the Arnold River, which joins the Grey River before flowing to sea.

Limits to survey scope

Time constraints and a lack of available information meant that an assessment of the site of the four new cabins, adjacent to the Lake Brunner Eco Lodge, was not undertaken.

4.5 Ecological significance assessment

The ecological significance of the vegetation, fauna, freshwater and wetland values at the site was assessed against the significance criteria in Appendix 1 of the West Coast Regional Policy Statement (WCRPS; 2020).

5. SURVEY RESULTS

5.1 Vegetation and habitats

The site survey identified three vegetation and habitats on the site (Figures 5a and b):

1. Kamahi-hardwood-podocarp-forest
2. Secondary hardwood-tree fern forest
3. Tree tutu forest

Kamahi-hardwood-podocarp- forest

Indigenous hardwood forest with secondary and emergent podocarps covers much of the proposed west subdivision site and the lake front site. The canopy is predominantly kamahi (*Weinmannia racemosa*), with, quintinia (*Quintinia acutifolia*), hīnau (*Elaeocarpus dentatus*), and toro (*Myrsine salicina*). The main podocarp species are rimu (*Dacrydium cupressinum*), miro (*Prumnopitys ferruginea*) and kahikatea (*Dacrycarpus dacrydioides*) with occasional mataī (*Prumnopitys taxifolia*) and lowland tōtara (*Podocarpus totara*) (Plate 1). While emergent podocarps are less common and

³ Invertebrates are considered notable if they are new species, threatened, protected, locally endemic, or thought to be declining.

generally scattered or clustered, there are pockets of abundant podocarp regeneration, where they are common through all the height tiers. Subcanopy trees include pigeonwood (*Hedycarya arborea*), kaikomako (*Pennantia corymbosa*), māhoe (*Melicytus ramiflorus*), marbleleaf (*Carpodetus serratus*), and epiphytic puka (*Griselinia lucida*). Smaller broadleaved trees and shrubs include kanono (*Coprosma grandifolia*), shining karamu (*C. lucida*), stinkwood (*C. foetidissima*), mikimiki (*Coprosma dumosa* and *C. rhamnoides*) and New Zealand myrtle/rōhutu (*Neomyrtus pedunculata*, Threatened – Nationally Critical). Tree ferns are also common in parts of the subcanopy and canopy gaps including whekī-ponga (*Dicksonia squarrosa*) and kātote (*Cyathea smithii*). Vines are abundant throughout the forest, particularly supplejack (*Ripogonum scandens*), kiekie (*Freycinetia banksia*), bush lawyer (*Rubus cissoides*) and climbing rata (*Metrosideros diffusa*, *M. fulgens*, *M. perforata*), which is abundant in all height tiers from canopy to ground cover. A wide variety of ferns and ground cover species are present, including kiokio (*Parablechnum novae-zelandiae*), three spleenwort species (*Asplenium bulbiferum*, *A. flaccidum*, *A. polyodon*), hounds' tongue (*Microsorium pustulatum*), leathery shield fern (*Rumohra adiantiformis*), and numerous filmy ferns (*Hymenophyllum* species).

There is abundant animal sign and browse throughout and ground cover is often sparse consisting of less palatable species such as bush rice grass (*Microlaena avenacea*) crown fern (*Lomaria discolor*) and horopito (*Pseudowintera colorata*), with mosses and lichens dominating.



Plate 1: Kamahi-hardwood-podocarp-forest, within the proposed subdivision west site, Mitchells

Secondary hardwood-tree fern forest

Secondary (or regenerating) indigenous hardwood tree fern forest is mostly located within stream gullies on the proposed west subdivision site especially Gulch Creek and the unnamed creeks on the western side.

The canopy in these areas is around 8-12 metres tall and comprises hardwoods including kamahi, pate/seven-finger (*Schefflera digitata*), wineberry (*Aristotelia serrata*), kanono and toro, with tree ferns (mostly whekī-ponga and kātote) (Plate 2). Around the fringes kānuka is (*Kunzea robusta*) sometimes present as well as woody weeds including cotoneaster (*Cotoneaster simonsii*) and gorse (*Ulex europaeus*). There are also occasional emergent podocarps (mostly rimu and kahikatea) scattered very sparsely throughout these areas. The vines supplejack and climbing rata are abundant in these areas. Climbing rata is also a common ground cover in many places along with

bush rice grass, hounds' tongue, crown fern and hook grass (*Carex uncinata*). There are also many open areas where the understory is sparse and signs of animal browse are abundant. Around the road margins a number of weeds are also present in the understorey including tradescantia (*Tradescantia fluminensis*) monbretia (*Crocosmia × crocosmiiflora*) and Himalayan honeysuckle (*Leycesteria formosa*).

Tree tutu forest

There are two areas of tree tutu (*Coriaria arborea*) forest within the proposed west subdivision site, which follow old slip scars down the lines of slip creek and an unnamed creek⁴ in the west of the site. The canopy in these areas is dominated by 10-15 metre tall, tree tutu (Plate 2). These trees are of even height and stature, typical of regeneration on slip scars. Mosses, lichens and ferns are common on trunks and branches particularly leatherleaf fern (*Pyrrosia eleagnifolia*), hounds' tongue and filmy ferns. There is a diverse subcanopy along the creek edges with pate, marbleleaf, wineberry, tree ferns and tree fuchsia (*Fuchsia excorticata*) common. Ground cover includes mikimiki, hook grass, bidibidi (*Acaena anserinifolia*) and prickly shield fern/pūniu (*Polystichum vestitum*).

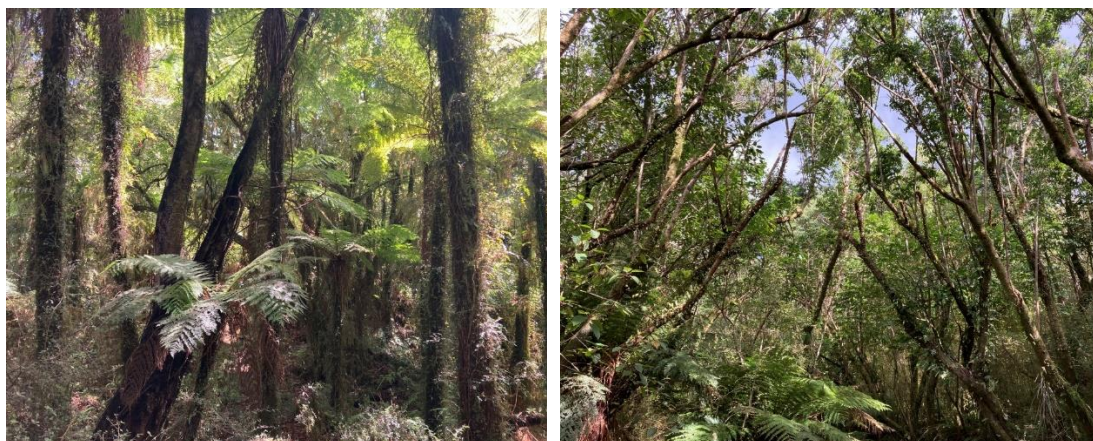
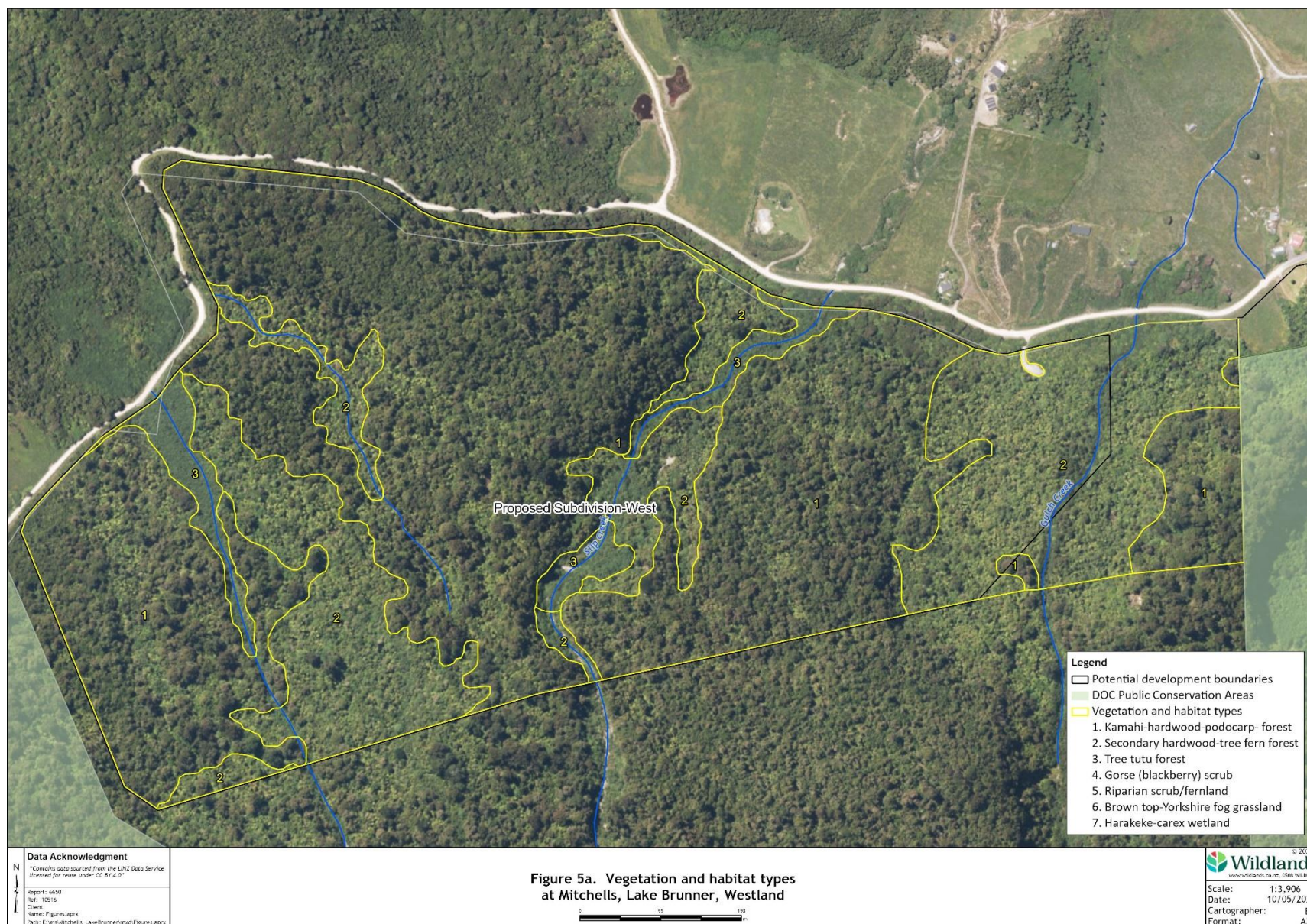
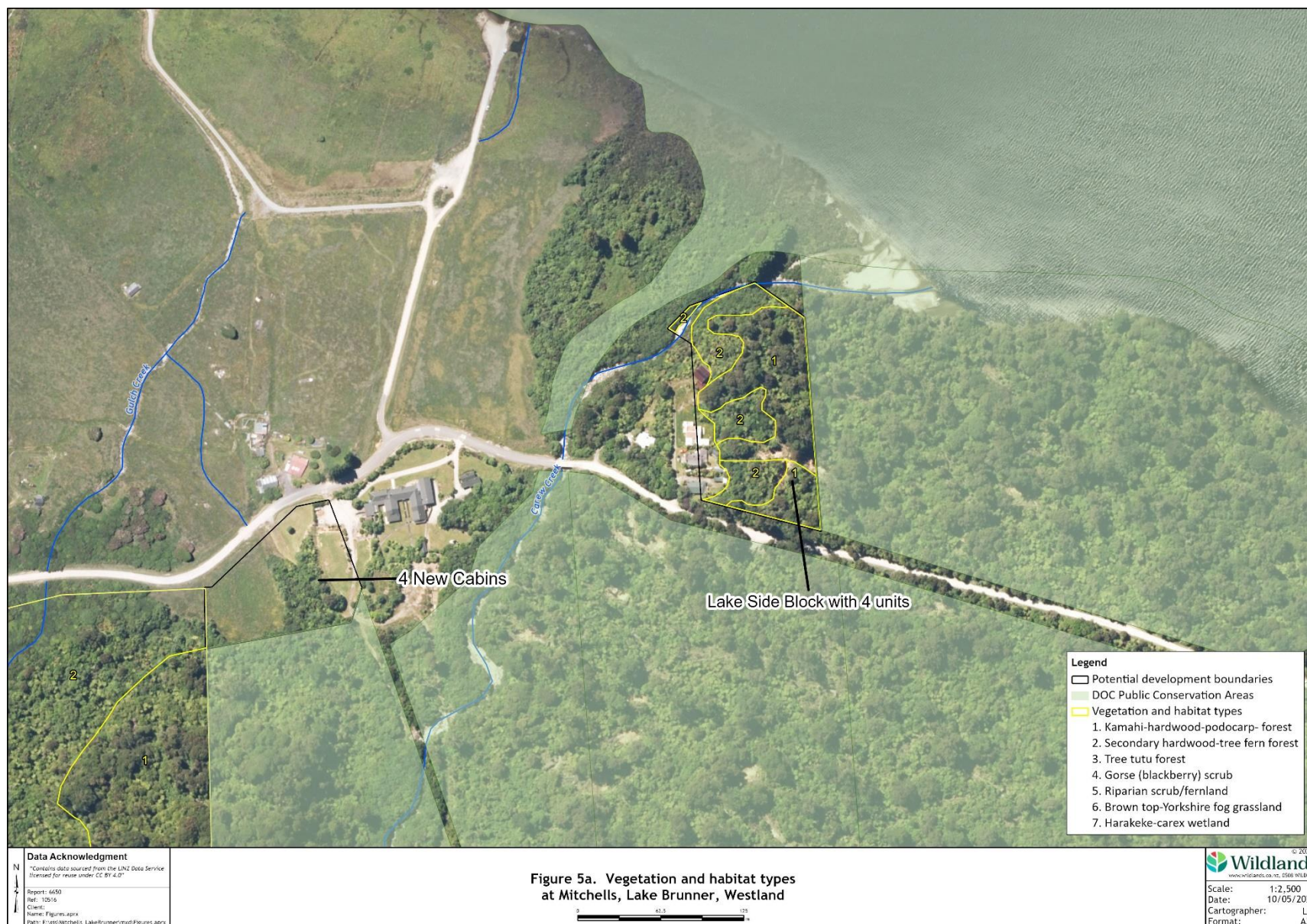


Plate 2: Secondary hardwood-tree fern forest, within the lakeside block (left), and tree tutu forest within proposed subdivision west(right), Mitchells.

⁴ The road sign on this creek reads 'formally slip creek 0814/17.70'





5.2 Flora

One hundred and five indigenous and 35 exotic vascular plant species were recorded during the survey (Appendix 2). A wide variety of unidentified non-vascular plant species (mosses and liverworts), lichens, and fungi were also observed at the site.

5.2.1 Threatened, At-Risk, and locally uncommon species

Six indigenous plant species recorded on the site have a national level classification of Threatened or At Risk (de Lange *et al.* 2018).

- Kānuka (*Kunzea robusta*; Threatened – Nationally Vulnerable)
- New Zealand myrtle/rōhutu (*Neomyrtus pedunculata*; Threatened Nationally – Critical.
- Scarlet rātā (*Metrosideros fulgens*; Threatened – Nationally Vulnerable)
- Southern rātā tree (*Metrosideros umbellata*; Threatened – Nationally Vulnerable)
- White climbing rātā (*Metrosideros diffusa*; Threatened – Nationally Vulnerable)
- White rātā (*Metrosideros perforata*; Threatened – Nationally Vulnerable)

These species are all in the Myrtaceae family and had their threat status was elevated in 2017, after the arrival myrtle rust (*Austropuccinia psidii*) in the North Island of New Zealand. It has since spread to the South Island and has been found along the West Coast from Westport to Hokitika. Myrtle rust is a potentially devastating rust which has no known treatment and its long-term effects still not fully understood. Early indications are that rōhutu is much more severely affected than kānuka and rātā species, hence the highest threat status (Threatened – Nationally Critical) applies to rōhutu. Myrtle rust is widely distributed across the North Island and in the north and west of the South Island.

5.2.2 Pest plants

Four plant species recorded on the site are organisms declared as pests in the Westland Reginal Pest Management Plan (WRPMP; 2018-2028). The site also contains a further three species listed as pests in the National Pest Plant Accord (NPPA) that are banned from sale and distribution in New Zealand (Table).

Table 1: Pest plants listed in WRPMP, the NPPA that were recorded within proposed development sites at Mitchells.

Scientific Name	Common Name(s)	Form	Pest Status
<i>Cotoneaster simonsii</i>	Himalayan cotoneaster, khasia berry	shrub	NPPA pest
<i>Cytisus scoparius</i>	scotch broom	shrub	Progressive containment / Sustained control
<i>Jacobaea vulgaris</i>	ragwort	dicot herb	Sustained control
<i>Leycesteria formosa</i>	Himalayan honeysuckle	shrub	Progressive containment
<i>Hypericum androsaemum</i>	tutsan	dicot herb	NPPA pest
<i>Tradescantia fluminensis</i>	tradescantia	dicot herb	NPPA pest
<i>Ulex europaeus</i>	gorse	shrub	Sustained control

5.3 Bats

5.3.1 Desktop survey

The desktop assessment indicates that the site is within the known range of long-tailed bats (*Chalinolobus tuberculatus*, Threatened–Nationally Critical; DOC 2022). While the site may have historically hosted short-tailed bats (*Mystacina tuberculata*), these have a limited distribution (Molloy, 1995) and are unlikely to occur at the site.

Long-tailed bats preferentially forage in forest edge and riparian habitats of both indigenous and exotic forest types (O'Donnell 2001, Griffiths 2007, Rockell 2017). They also forage over farmland and urban areas (Griffiths 2007, O'Donnell and Borkin 2021). These habitats are prevalent at the site. The large areas of native forest, paired with some forest edge habitat both within and bounding the site could support bat roosting and foraging.

5.3.2 Acoustic monitoring

Weather conditions during the survey period were generally favourable. National Institute of Water and Atmospheric Research (NIWA) weather data is not available within suitable proximity to the site. Therefore, rainfall data was compiled and cross referenced from two NIWA weather stations located at Mt Philistine (EWS 38103) and Hokitika (EWS 41322). Temperature was derived from the weather station at Hokitika only, as Mt Philistine experiences significantly lower temperatures, being located at high altitude. Overnight rain was recorded on 17 nights during the survey period. The weather data records during the survey period are tabulated in Appendix 3.

Weather data was analysed to discern which nights would produce reliable data. Reliable data are those that occurred on clear nights ($\leq 0.1\text{mm}$ of rain recorded overnight). For all sites, a minimum of seven reliable nights of data were recorded and analysed.

One-hundred and twenty-five nights of data were collected by the ABMs across the ten locations. Most ABMs recorded 14 nights of data on nights with favourable weather conditions, which is consistent with the best-practice timeframe for bat monitoring. However, a small number of the ABMs ran out of battery before 14 clear nights of data were collected.

No bats were detected during the survey period. This indicates that bats do not use the habitats in the vicinity of the ABM locations, all of which were considered potential foraging habitat.

5.4 Avifauna

5.4.1 Desktop survey

The desktop survey comprised species that were identified through database searches and those that were deemed possible to be present based on their habitat preferences. The desktop survey identified 33 species and one hybrid taxon. Of these species, 26 were classified as indigenous and eight were exotic. Five species are classified as At Risk, including Declining, pohowera/banded dotterel (*Charadrius bicinctus*), pīhoihoi/New Zealand pipit (*Anthus novaeseelandiae*), tōrea/South Island pied

oystercatcher (*Haematopus finschi*), Recovering kāruhiruhi/pied shag (*Phalacrocorax varius varius*), and Naturally Uncommon kawau tūi/little black shag (*Phalacrocorax sulcirostris*). One species is classified as Threatened Nationally – Vulnerable (roroa/great spotted kiwi *Apteryx maxima*) . One species is classified as Non-resident Native–Vagrant (kawaupaka/little pied shag *Microcarbo melanoleucos melanoleucos*). These species were recorded as being possibly present on or adjacent to the site. The results of the desktop survey are included in Table 2.

5.4.2 Site survey

The site survey results include in-person audio and visual detections as well as calls recorded on ABMs.

During the site survey, thirteen bird species were detected, eleven were classified as indigenous and two exotic (Table 2). The avifauna observed at the site was dominated by indigenous forest birds, typical of the indigenous hardwood forest that comprises much of the site. Two of the avifauna species observed at the site are classified as Threatened or At Risk (Robertson *et al.* 2021).

Kaka (*Nestor meridionalis*; At Risk–Recovering) were recorded at five locations across the site using ABMs. Kaka were recorded at ABM sites 2, 3, 4, 7 and 8 (Figure 4). Kaka inhabit beech and podocarp forests at mid-to-low altitudes (Mariano, Payne, and Seddon 2016).

Kea (*Nestor notabilis*; Threatened–Nationally Endangered) were observed flying directly above the site. Kea are predominantly found in the high alpine, but are known to forage and nest at lower elevations (Bird Life International 2017).

Table 2: Bird species recorded in the desktop assessment, during the site visit and ABM surveys. Threat classifications follow Robertson *et al.* (2021). The likelihood of occurrence for each species and their location is given based on site visit observations and habitat availability.

Common Name(s)	Scientific Name	Threat Classification 2021	Likelihood of Occurrence	Location likely present on site
Indigenous Species				
Banded dotterel/pohowera	<i>Charadrius bicinctus</i>	At Risk - Declining	Possible	Lakeside/grassland
Bellbird /korimako	<i>Anthornis melanura</i>	Not Threatened	Seen	Forest
Brown creeper /pīpī	<i>Mohua novaeseelandiae</i>	Not Threatened	Seen	Forest
Grey warbler /riroriro	<i>Greygane igata</i>	Not Threatened	Seen	Forest
Kākā	<i>Nestor meridionalis</i>	At Risk – Recovering	Recorded	Forest
Kea	<i>Nestor notabilis</i>	Threatened – Nationally Endangered	Seen	Forest (upper elevations)
Great spotted kiwi/roroa	<i>Apteryx maxima</i>	Threatened – Nationally Vulnerable	Possible	Forest
New Zealand pigeon/kereru	<i>Hemiphaga novaeseelandiae</i>	Not Threatened	Seen	Forest
Little black shag/kawau tūi	<i>Phalacrocorax sulcirostris</i>	At Risk-Naturally Uncommon	Possible	Lakeside
Little pied shag/kawaupaka	<i>Microcarbo melanoleucos melanoleucos</i>	Non-resident Native – Vagrant	Possible	Lakeside
Grey duck – mallard hybrid	<i>Anas superciliosa</i> × <i>platyrhynchos</i>	Not Threatened	Possible	Lakeside
New Zealand fantail /piwakawaka	<i>Rhipidura fuliginosa</i>	Not Threatened	Seen	Forest
New Zealand pipit/ Pthoihoi	<i>Anthus novaeseelandiae</i>	At Risk – Declining	Possible	Grassland
New Zealand scaup/pāpango	<i>Aythya novaeseelandiae</i>	Not Threatened	Likely	Lakeside
Paradise shelduck/pūtangitangi	<i>Tadorna variegata</i>	Not Threatened	Likely	Lakeside/grassland
Pied shag/kāruhiruhi	<i>Phalacrocorax varius varius</i>	At Risk-Recovering	Likely	Lakeside
Shining cuckoo/pīpīwharau	<i>Chrysococcyx lucidus lucidus</i>	Not Threatened	Possible	Forest
Silvereye /tauhou	<i>Zosterops lateralis</i>	Not Threatened	Seen	Forest
Southern black-backed gull/karoro	<i>Larus dominicanus dominicanus</i>	Not Threatened	Possible	Lakeside/grassland
South Island pied oystercatcher/tōrea	<i>Haematopus finschi</i>	At Risk-Declining	Possible	Lakeside/grassland
Swamp harrier/kāhu	<i>Circus approximans</i>	Not Threatened	Likely	Grassland
Tomtit/miromiro	<i>Poetroica macrocephala</i>	Not Threatened	Seen	Forest
Tūi	<i>Prosthemadera novaeseelandiae</i>	Not Threatened	Seen	Forest
Weka	<i>Gallirallus australis</i>	Not Threatened	Seen	Forest
New Zealand kingfisher/kōtare	<i>Todiramphus sanctus vagans</i>	Not Threatened	Possible	Lakeside/forest
Welcome swallow/warou	<i>Hirundo neoxena neoxena</i>	Not Threatened	Likely	Grassland
Exotic Species				
House sparrow/tiu	<i>Passer domesticus</i>	Introduced and Naturalised	Likely	Grassland
Eurasian Blackbird/manu pango	<i>Turdus merula</i>	Introduced and Naturalised	Seen	Grassland/forest
Chaffinch/pahrini	<i>Fringilla coelebs</i>	Introduced and Naturalised	Seen	Grassland/forest
Dunnock	<i>Prunella modularis</i>	Introduced and Naturalised	Likely	Grassland/forest
Starling	<i>Sturnus vulgaris</i>	Introduced and Naturalised	Likely	Grassland/forest
Goldfinch	<i>Carduelis carduelis</i>	Introduced and Naturalised	Likely	Grassland/forest
Mallard	<i>Anas platyrhynchos</i>	Introduced and Naturalised	Likely	Lakeside/grassland
Song thrush/manu-kai-hua-rakau	<i>Turdus philomelos</i>	Introduced and Naturalised	Possible	Grassland

5.5 Lizards

5.5.1 Desktop survey

Due to a lack of formal surveys and generally lower population density on the West Coast (resulting in a lower observation rate of lizards), few observations have been recorded within the area both historically and recently. Species likely to be present within the site include the West Coast green and forest geckos, and the Canterbury grass skinks, and skinks that may fall within the *Oligosoma* aff *infrapunctatum* complex. This species complex is a cryptic skink complex where multiple species may be present within a relatively small area. These species are generally indistinguishable without genetic analysis.

Observations from the DOC Bioweb Herpetofauna Database of lizard fauna within the wider area (c. 20 km) include forest gecko, one brown gecko (*Woodworthia* sp.) and one unidentified skink. Lizard species that may be present including their threat classification and habitats are provided in Table 3. At least three of these species are highly likely to be present within the site, one species is moderately likely to be present.

Table 3: Results of the Department of Conservation Bioweb Herpetofauna database search within a 20 kilometre radius of the site and an assessment of the likelihood of the presence of these species at the site. Conservation status as per Hitchmough *et al.* 2021. The likelihood of occurrence for each species is given based on their known habitat preferences and distribution in the area and surrounds.

Species	Common Name	Conservation Status	Nearest Record	Preferred Habitats	Likelihood of Occurrence
<i>Mokopirakau granulatus</i>	Forest gecko	At Risk – Declining	Anecdotally on site, 10.3 km	Scrub, regenerating forest, shrubland.	Highly likely (anecdotally on site)
<i>Naultinus tuberculatus</i>	West Coast green gecko	Threatened – Nationally Vulnerable	None recorded	Scrub, regenerating forest, shrubland.	Highly likely
<i>Woodworthia</i> sp.	Brown gecko species (unconfirmed)	Unknown	3.4 km	Loose rocks, rock tors, and outcrops, and occasionally forest	Possible
<i>Oligosoma</i> aff. <i>polychroma</i> Clade 4	Canterbury grass skink	At Risk - Declining	12.4 km (Unidentified species, most likely to be CGS)	Lowland/montane shrublands grasslands, screes, talus slopes and rocky or boulder areas.	Highly likely
<i>Oligosoma</i> aff. <i>infrapunctatum</i> (spp)	Newman's skink (or unconfirmed <i>infrapunctatum</i> complex)	At Risk – Relict/various	None recorded	Rock tor systems, dry river cobbles, talus, wetland, exotic grasses, herbfield, and tussockland.	Moderately likely

5.5.2 Site survey

Weather conditions on the day of the assessment were hot, calm and clear. Conditions were too hot to visually detect indigenous lizards and the assessment mainly focussed on manual searches and a wider habitat assessment.

Vegetation was assessed for lizard habitat quality throughout the site. Potential lizard habitat is present throughout the sites (nearly all vegetation types), including the following:

- Kamahi-hardwood-podocarp- forest
- Secondary hardwood-tree fern forest
- Tree tutu forest

Potential lizard species present within the various development sites is summarised in Table 4.

Table 4: Potential lizard species present within the various development sites and their habitats, Mitchells.

Site	Species potentially present	Habitats present
Proposed subdivision west	• West Coast green gecko • Forest gecko • Speckled skink	• Kamahi-hardwood-podocarp-forest • Secondary hardwood-tree fern forest • Tree tutu forest
Lakeside block	• West Coast green gecko • Forest gecko • Speckled skink • Canterbury grass skink	• Kamahi-hardwood-podocarp-forest • Secondary hardwood-tree fern forest

Proposed subdivision west

The largest proposed development site, this has the highest lizard value and the highest chance of lizard populations being present, due to the connected nature of the forest, vegetation present and the large size of the site. Species present in this site are likely to be West Coast green gecko, forest gecko, and a species within the *O. aff infrapunctatum* complex. The more emergent forest is likely to have forest gecko and potentially West Coast green gecko. Both of these species are likely to be found within loose bark and within the canopies of the taller podocarps. West Coast green gecko may also be present along the edges of the site where it is exposed to more light. Any areas of open habitat or that have emergent trees with epiphytes are moderately likely to have *O. aff infrapunctatum* complex present.

Lakeside block

The lakeside block may also contain high lizard values. As it is near to the wetland, lake outlet and has tall podocarp species present, it is highly likely that at least four species of lizard are present within this site. Anecdotal reports from neighbours adjacent to the site have observed forest geckos within their properties. It is highly likely forest geckos

are present within the lakeside block. Other species could also be present such as West Coast green gecko and a species within the *O. aff. infrapunctatum* complex. Canterbury grass skink may be present, but associated with the exposed edges of the site in grassed areas.

5.6 Freshwater

5.6.1 Desktop survey

There are 257 survey records in the NZFFD within Lake Brunner and its tributaries., listing eleven indigenous fish and crustacean species and two introduced fish species. Fish and crustacean species recorded during these surveys are listed in Table 5, together with their threat classifications (Dunn *et al.*, 2018, Grainger *et al.*, 2018). The likelihood of a species' presence at the site was estimated based on the frequency of records of the species in the local and wider area, proximity to the site, the event date, number of individuals found, species' migratory status, and habitat availability at the site.

Table 5: Results of the field and desktop fish surveys. Species listed in Lake Brunner and its tributaries in the New Zealand Freshwater Fish Database, along with their threat status, number of records, and estimated likelihood of presence. 'Confirmed' in the Predicted Likelihood column indicates that the species was observed during the site visit, with the location of the observation indicated in the Field Observation columns. Threat status classifications are from Dunn *et al.* 2018 and Grainger *et al.*, 2018. Note that Carew Stream was observed during the day whereas the fish are usually nocturnal, so only presence has been noted.

Common name	Scientific name	Threat status	No. of records	Predicted likelihood: Slip & Unnamed Streams	Predicted Likelihood: Carew Stream	Field observations		
						Slip Creek	Unnamed Stream	Carew Stream
Giant kōkopu	<i>Galaxias argenteus</i>	At Risk - Declining	53	Confirmed	Moderate	Common		
Common bully	<i>Gobiomorphus cotidianus</i>	Not Threatened	44	Moderate	Confirmed			Present
Longfin eel	<i>Anguilla dieffenbachii</i>	At Risk - Declining	41	Confirmed	Moderate	Occasional		
Brown trout	<i>Salmo trutta</i>	Introduced	35	Confirmed	Moderate	Rare		
Kōaro	<i>Galaxias brevipinnis</i>	At Risk - Declining	20	Confirmed	Confirmed		Abundant	Present
Banded kōkopu	<i>Galaxias fasciatus</i>	Not Threatened	16	Unlikely	Unlikely			
Shortfin eel	<i>Anguilla australis</i>	Not Threatened	15	Low	Low			
Kōura / crayfish	<i>Paranephrops zealandicus</i>	At Risk - Declining	14	Confirmed	Low		Occasional	
Goldfish	<i>Carassius auratus</i>	Introduced	9	Unlikely	Unlikely			
Common smelt	<i>Retropinna retropinna</i>	Not Threatened	6	Unlikely	Unlikely			
Kākahi - mussel	<i>Echyridella menziesii</i>	At Risk - Declining	2	Unlikely	Unlikely			
Dwarf galaxias	<i>Galaxias divergens</i>	At Risk - Declining	1	Unlikely	Unlikely			
Freshwater shrimp	<i>Paratya curvirostris</i>	Not Threatened	1	Unlikely	Unlikely			

5.6.2 Site survey

Four species and three genera of indigenous fish and crayfish were recorded and identified during the fish spotlighting survey (Table 5). Species identified were giant kōkopu (*Galaxias argenteus*), longfin eel (*Anguilla dieffenbachii*), kōaro (*Galaxias brevipinnis*) and kōura / crayfish (*Paranephrops zealandicus*). The brown trout (*Salmo trutta*) was the only introduced species observed.

Proposed subdivision west

Both streams surveyed during the site visit flow through the subdivision west. These are tributaries of Eel Creek that flows into Carew Bay on the western of Lake Brunner.

The surveyed streams are close to fully shaded by native bush on both sides and have a granite, cobble-boulder substrate. The water is clear in both streams and tumbles over low boulder cascades into pools, riffles⁵ and runs. There was little leaf litter within the stream, and only occasional woody debris. Fish cover was therefore almost entirely provided by spaces between stones and the ruffled surface. Shading from the canopy precluded aquatic plants and limited algae to very thin, inconspicuous biofilms on the stones. Near the furthest point explored upstream, there is an area where the canopy is open and around six metres of streambed is exposed to full sunlight. This is densely covered with long green algae, to the point that fish and invertebrate habitat quality is considerably reduced.

Despite being adjacent and very similar physically, the two streams had quite different fauna communities. Slip Creek had many giant kōkopu (2-3 in each pool), a few small longfin eels (up to ~70 cm) and one small (~7 centimetre) brown trout. The small unnamed stream had one giant kōkopu and an unidentified eel in the pool immediately upstream of the road, then a high density of kōaro (~5 in each pool) in the stream beyond the enormous boulders. There was also a low number of kēkēwai/crayfish in the unnamed stream. No young-of-the-year giant kōkopu were seen, though young-of-the-year kōaro were present. Fish survey results and abundance are summarised in Table 5.

Three giant kōkopu were seen during the day; two in Slip Creek and a large one in the pool immediately upstream of the road. These daytime-active fish were not likely the dominant fish in their pools. As giant kōkopu are highly territorial and hierarchical, this indicates a large population with competition for food and habitat (David and Stoffels 2003). The giant kōkopu in Slip Creek were all around 12-20 centimetres long, which is a small to moderate adult size. This species can grow to over 35 centimetres, although 25-35 centimetres is a more usual 'large adult' size.

Lakeside block

The lakeside block has a c. 100 metre boundary that zigzags across Carew Stream. This stream was explored during the day and habitat and fish observations noted. Due to time constraints, the large size and often broken surface of the stream, this was not spotlighted.

Carew Stream is third order, with a 5.85 km² catchment area, 262 L/s mean flow, and 39 L/s mean annual low flow. It is wide and generally shallow and wadeable, with

⁵ Fast-flowing, shallow water with a broken, ruffled surface.

increasingly large pools and enormous boulders upstream towards the road bridge. The water is very clear with plentiful leaf litter and brown algal mats on the rocks.

Common bullies were frequently seen, along with occasional kōaro. It is not uncommon for bullies to be active during the day, although they are more active at night. Kōaro are rarely seen during the day.

This property is very close to the lake, which increases the likelihood of the presence of other species as there are no barriers to fish passage. Also, there is a large population of kākahi (freshwater mussels, *Echyridella menziesii*) along the lake edge where Carew Stream connects.

5.7 Invertebrates

5.7.1 Desktop survey

Lake Brunner supports a rich and highly indigenous assemblage of invertebrates. All of the terrestrial species' records identified to genus are indigenous (Table 6).

Table 6: Terrestrial invertebrate desktop survey results. This includes records from the Global Biodiversity Information Facility within five kilometres of the site of the proposed development as well as notable species identified as potentially on-site based on expert experience and the habitats present on-site.

Common name	Scientific name	Threat status	Conservation issues	Likelihood of presence on-site
Short-legged harvestman	<i>Rakaia australis</i>	Not assessed	Locally endemic.	High
Short-legged harvestman	<i>Aoraki denticulata</i>	Not assessed	None known	High
Looper moth	<i>Ischalis variabilis</i>	Not assessed	None known	High
Mite	<i>Oxus</i> sp.	Not assessed	None known	Unknown
Nurseryweb spider	<i>Dolomedes minor</i>	Not assessed	None known	High
Looper moth	<i>Asaphodes stephanitis</i>	Not assessed	Rare coastal species. This is the only record outside of Southland.	Low
Stick insect	<i>Acanthoxyla prasina</i>	Not Threatened	None known	High
Damselfly	<i>Xanthocnemis zealandica</i>	Not Threatened	None known	High
Litter moth	<i>Hierodoris</i> sp.	Unknown	Many species in this genus have Threatened or At Risk statuses.	High
Black fly	<i>Austrosimulium</i> sp.	Unknown	This genus contains many species. The only species that have been assessed are At Risk-Naturally Uncommon.	High
Crane fly	<i>Mischoderus</i> sp.	Either Data Deficient or not assessed.	Could be a new species.	High
Ground beetle	<i>Mecodema ducale</i>	Not assessed	Typically locally endemic, with an exception from Haast. Reliant on moist forest habitat.	High

Giant land snail	<i>Powelliphanta</i> sp.	All species are protected, most are Threatened or At Risk	Highly susceptible to habitat loss, disturbance, and predation by introduced mammals.	Possible
Stag beetle	<i>Geodorcus</i> sp.	All species are protected, most are Threatened or At Risk	Susceptible to habitat loss and predation by introduced mammals.	High

Many invertebrate records were not identified past family, which is common for invertebrates due to difficulties in genus and species identification. These records were not included, as they were of common families and unhelpful in determining notability of the species observed.

Two legally-protected genera (*Powelliphanta* and *Geodorcus*) were not revealed in the desktop survey, but may be present on-site as suitable habitat is available. *Powelliphanta* contains large-bodied carnivorous land snails that inhabit moist forest and require deep litter and grasses or sedges to use as roosts during the day. *Geodorcus* spp. are large-bodied stag beetles that inhabit indigenous forests, where they live in damp spaces in leaf litter, under rocks, or in logs. Their subterranean larvae require good-quality soil in indigenous systems to thrive.

5.7.2 Site survey

Proposed subdivision west and lakeside block

The kamahi-hardwood-podocarp forest at the site of the proposed development is generally highly diverse in terms of invertebrate fauna. The deep litter, rotting logs in a variety of sizes, and diversity of plant species in the forest are conducive to high invertebrate diversity and abundance. Flies, cicadas, ants, and spiders were particularly commonly seen. The species seen were typically common, widespread indigenous forest species.

Outside of the kamahi-hardwood-podocarp forest, invertebrate diversity was noticeably lower, particularly in the tree fern forest which had less deep leaf litter and a more open understorey. However, occasionally large complexes of tree roots and trunks were seen, which provide good habitat for sheetweb spiders and other invertebrates seeking dark, damp shelter. Invertebrate habitat values and species observed are shown in Table 7.

Table 7: Invertebrate and habitat observations and during the invertebrate field survey

Site	Species observed	Habitat values
Proposed subdivision west	• Pill millipedes (<i>Procyliosoma</i> sp.; not assessed) • Scuttling spiders (<i>Cycloctenus</i> sp.; Not Threatened) • Ants (Formicidae; unknown threat status) • Ground beetles (Carabidae; unknown threat status) • Sheetweb spiders (<i>Cambridgea</i> spp.; Not Threatened) • Orb weaver spiders (<i>Zealaranea</i> sp.; Not Threatened) • Small ground beetles (<i>Amarotypus edwardsii</i>; not assessed) • Wolf spider (<i>Anoteropsis hiliaris</i>; Not Threatened) • Dobsonfly (<i>Archicauliodes diversus</i>; Not Threatened)	• Deep leaf litter in old moist forest • Large and small rotting logs • Dense understorey in parts • Complexes of tree roots and tree trunks providing moist hollows for invertebrates to inhabit

Site	Species observed	Habitat values
Lakeside block	• Chorus cicadas (<i>Amphipsalta zelandica</i>; not assessed) • House flies (Muscidae; not assessed) • Blow flies (Calliphoridae; unknown) • Hoverflies (Scirtidae; not assessed) • Soldier flies (<i>Odontomyia</i> sp.; not assessed) • Cave wētā (Rhaphidophoridae; unknown) • Araliad plume moth (<i>Pterophorus monospilalis</i>; not assessed) • Dobsonfly • 2-spotted grass bug (introduced)	• Deep litter • Large and small rotting logs • Thick moss plentiful

The unidentified ground beetle is likely to be a notable invertebrate. Ground beetles are large-bodied, flightless endemic species that tend to be locally endemic and sensitive to predation by introduced mammals. Many species are Threatened or At Risk. No other notable invertebrates were found.

Habitat for *Powelliphanta* spp. was not observed, as there were not enough roosting plants. *Geodorcus* spp. were not observed, but are likely to be present in the kamahi-hardwood-podocarp forest.

6. ECOLOGICAL SIGNIFICANCE

The site as a whole is considered ecologically significant when evaluated against the WCRPS Appendix 1 criteria for identifying significant terrestrial and freshwater indigenous biological diversity (Appendix 4). Habitats vary in the number of significance criteria they satisfy.

Kamahi-hardwood-podocarp forest and tree tutu forest are considered to satisfy at least two of the nine criteria within two of the four significance categories, including representativeness (Criterion 1a) and rarity/distinctiveness (Criterion 2b). Secondary hardwood tree fern forest is considered to satisfy at least one of the nine criteria, rarity/distinctiveness (Criterion 2b). It is considered that vegetation and habitats on the site may also satisfy the ecological context criterion (4c), but further surveys would be required to determine this.

The waterways on the site satisfy four (or five) of the nine criteria, within three of the four significance categories. They contain representative habitat of freshwater fauna (representativeness - Criterion 1a), including three At Risk fish and one At Risk crustacean species present (rarity/distinctiveness - criterion 2b). Species diversity and habitat types is low, therefore the Diversity and Pattern category is not met. The waterways provide for At Risk fish species including important and permanent feeding and spawning habitats, long-term territories that may be held for years, and migratory pathways, satisfying the ecological context criteria 4a and 4c. Two of the At Risk fish species are likely only present due to suitable rearing conditions for their larvae in the lake, as well as juveniles and adults in the streams, which would satisfy an additional rarity/distinctiveness criterion - 2d.

7. ECOLOGICAL CONSTRAINTS

7.1 Vegetation and habitats

7.1.1 Ecologically significant vegetation and habitats

Vegetation and habitat values are high for kamahi-hardwood-podocarp forest and moderately high for secondary hardwood-tree fern forest, tree tutu forest and harakeke-sedge wetlands. These habitats have been identified as ecologically significant, therefore impacts of these habitats must be avoided where possible. If these habitats are cleared for the proposed developments, offsetting the ecological impacts in these habitats will be required.

Exotic dominated scrub and grassland habitats on the site generally have lower habitat values and therefore ecological impacts resulting from projects within these habitats are likely to be lower and associated with fewer constraints. However, further surveys for threatened lizards maybe required. If threated species are found on the site, then their presence will need to be considered when determining the effects of the activity. This is expanded on below is section 7.5.

7.1.2 Vegetation clearance

Vegetation clearance rules are likely to apply to the lakeside block and proposed subdivision west site, due to the adjoining conservation land and (in the case of the proposed subdivision west) the size of the site. However, this would be dependent on the amount of vegetation clearance required for these developments ⁶.

The proposed subdivision west and lakeside block are located on land that is protected under the Tasman Accord (1989). This covenant has not been reviewed as part of this report, but it was put in place for the purpose of ending native forest clearance. Therefore, Tasman Forestry Ltd owned land is likely to be quite restrictive on any further clearance of indigenous forest.

7.1.1 Wetland impacts

Harakeke-sedge wetlands along the lake margins are not within 100 metres of the proposed developments and as such are unlikely to affect the biodiversity within these wetlands. The Resource Management (National Environmental Standards for Freshwater) Regulations 2020 (NES-FM) around earthworks in wetlands and within 100 metres of wetlands could be a possible constraint associated with other developments on the property. These wetlands have significant biodiversity values, including notable avifauna species.

⁶ Grey District Plan; 19 Rural Environmental Area Rules; 5. Indigenous Vegetation Clearance <https://www.greycdc.govt.nz/repository/libraries/id:2cvtsvtyv1cxbyz1k6uz/hierarchy/sitecollectiondocuments/Pre%202021/ourservices/planning/districtplan/chapters/19%20Rural%20Environmental%20Area%20Rules.pdf>

7.1.1 Riparian vegetation

Riparian vegetation is important to aquatic fauna in many ways. The effects of riparian vegetation loss on in-stream habitats include increased sedimentation, warmer water temperatures, increased algae and macrophyte growth, and foodweb changes. Additionally, riparian vegetation provides habitat for the adult/terrestrial stage of many aquatic macroinvertebrates, and overhanging cover for fish. Retaining riparian buffers along waterways is required to minimize these impacts and protect against stream bank erosion.

7.2 Wildlife management

All indigenous lizards, bats, most indigenous birds, and some indigenous invertebrates are protected under the Wildlife Act (1953). It is an offence to disturb or destroy protected wildlife without a Wildlife Act Authorisation (WAA; also known as a wildlife permit) from DOC. A permit may be required from the Department before any protected wildlife (and/or their habitats) can be disturbed, handled, translocated or killed. A wildlife permit is required to carry out modification or land development that may have adverse impacts on indigenous New Zealand wildlife (DOC 2019).

It is important to note that the wildlife permitting process can be lengthy (at least 3-6 months after submission of an application along with the appropriate management plans), and there are seasonal constraints when working with wildlife. Depending on the management options selected, preparation of sites may be required ahead of commencing wildlife management.

7.3 Bats

7.3.1 Targeted surveys

The home range of long-tailed bats is up to 19 kilometres (O'Donnell 2001). They are known to preferentially forage in forest edge and riparian habitats of both indigenous and exotic forest types (O'Donnell 2001, Griffiths 2007, Rockell 2017). They also forage over farmland and urban areas (Griffiths 2007, O'Donnell and Borkin 2021).

No bats were detected in the site surveys. However, the presence of long-tailed bats within the site cannot be ruled out at this stage. Bats can be difficult to detect, as they are small, nocturnal, and mostly inaudible to the human ear (i.e. their echolocation clicks and vocalisations are usually above 20 kHz). ABMs have a limited radius within which they are able to detect bat vocalizations due to the physical limitations of the microphone and hardware. Due to the expansive nature of the site, it is possible that bats are present in areas of the site that were beyond the range of the ABMs. Therefore, DOC may require further ABM surveys before any tree felling can occur.

7.4 Avifauna

7.4.1 Construction disturbance

Forest clearance, road construction, housing development and increased human activity during construction and machinery operations (including noise and vibration) can displace birds, causing a change in behaviour and abandonment or temporarily avoidance of a site (and surrounding area). This leads to behavioural and physiological responses, which are presumed to be costly, and can lead to changes in habitat use, parental care, and reproductive failure, and may have long-lasting effects on populations (Weston *et al.* 2012). There is a risk that the disturbance from construction activities will displace a number of species during the breeding season (July to March), including kaka.

There are several Threatened and At Risk indigenous bird species that have been identified within or adjacent to the proposed land development. The clearance of vegetation, and reduction in foraging or roosting sites, and the movement of machinery could have localised adverse effects on breeding pairs of these species. Construction activities during the breeding season (July–March) may injure or kill breeding birds, eggs and chicks. Ideally, as much construction work as possible should occur outside the bird breeding season. However, given the size of the project, it is inevitable that some of the construction will occur during the breeding season, and therefore a bird management plan should be prepared, including surveying for breeding birds prior to the start of works. A suitably qualified avian ecologist would undertake producing the management plan and pre-works surveys.

7.4.2 Habitat loss

The construction of roads and houses across the forested sites (proposed subdivision west and lakeside block) will result in only a minor reduction in available habitat. However, large mature trees can provide significant roosting and breeding habitat for indigenous birds and, if cleared, will likely impact indigenous bird species. Clearing large mature trees should therefore be avoided.

Construction activities during the breeding season (July–March) may kill breeding birds, eggs and chicks. Ideally, as much construction work as possible should occur outside the bird breeding season, or a pre-construction survey undertaken to determine whether breeding pairs are present, and how they can be avoided.

7.4.3 Risk of increased predators post construction

Site development, especially for residential or accommodation purposes, will increase the frequency that household pets and pests are present in the area. Due to the high number of indigenous species located within close proximity to the proposed developments, pest control should be undertaken in these areas. Moreover, broader pest control should be undertaken on the site to reduce the number of species present that may prey upon or compete with any indigenous bird species. A predator control plan is recommended to be designed and implemented to reduce the impact of increased introduced predators in the site.

Restrictions on household pets, particularly cats, in the proposed subdivisions should be considered.

7.5 Lizards

7.5.1 Lizard surveys

Lizard species on the West Coast are particularly cryptic and intensive and targeted surveys are needed to determine their presence. Without these surveys, it will not be possible to determine species composition, presence and likely distribution of habitats across the site. Therefore constraints on the development, and/or opportunities for effects management, are difficult to conclusively identify without targeted surveys.

It is recommended that targeted surveys should be carried out and comprise of:

- Tree mounted artificial cover objects (ACOs) these should be based on the Turner (2021) design as these have best results with arboreal geckos, and should be set up at least three months prior to surveys in the following habitats:
 - Kamahi-hardwood-podocarp- forest
 - Secondary hardwood-tree fern forest
- Spotlight surveys within the following habitats:
 - Kamahi-hardwood-podocarp- forest
 - Secondary hardwood-tree fern forest
 - Tree tutu forest
- A combination of tracking tunnels (baited with pear) and ACOs (both should be set and left for at least one month in the following habitats:
 - Kamahi-hardwood-podocarp- forest (tracking tunnels)
 - Secondary hardwood-tree fern forest (tracking tunnels)
 - Tree tutu forest (tracking tunnels)

7.5.2 Lizard management plan

As it is highly likely at least one At Risk species of lizard is present on site (and at least three other species), and if adverse effects are unavoidable, the Department of

Conservation are likely to require a Lizard Management Plan (LMP) and associated WAA for the development of the project.

A LMP should follow targeted surveys of lizards, which have determined the presence abundance and clearly outline habitats for lizards on site. The LMP should contain a comprehensive plan that clearly avoids, mitigates, offsets or compensates for the losses of lizard populations and their habitats. Wildlife management actions could include avoidance, and/or relocation of lizards and site management (habitat enhancement, pest management, monitoring) at specific sites. The Department will want to be reasonably confident that, on balance, lizard populations will not be worse off than prior to development of the site. This may include use of in situ mitigation management of lizards or the use of offsetting or compensatory tools elsewhere.

A LMP should be prepared and implemented by a qualified and permitted herpetologist, to ensure the appropriate wildlife management actions are implemented. Together with the LMP, the wildlife permit allows for the impacts on lizards and the management of effects.

We recommend that a LMP should contain:

- Ways to adequately avoid lizards and their habitats where possible.
- A thorough assessment of alternatives to lizard salvage, including
- Compensation or other suitable means to enhance lizard populations offsite.
- Habitat restoration and enhancement, including appropriate indigenous vegetation planting and pest animal and plant control.
- Advice on salvage and relocation of lizards to an alternative location outside of the development footprint, if sufficient avoidance or onsite mitigation is not feasible.

7.6 Fresh water

7.6.1 Water quality - sediment

Any vegetation clearance, earthworks, or heavy machinery required for road or housing construction will result in soil disturbance, which has the potential to enter waterways, impacting water quality and streambed conditions. It is important that sediment entering waterways is minimised and managed to avoid negative impacts on freshwater fauna. Fish and macroinvertebrate species in the area are known to have medium to high sensitivities to turbidity (sediment suspended in the water column) and settled sediment levels (Auckland Regional Council 2002, NIWA 2015). Increased turbidity has the potential to reduce foraging success, abrade gills and fins, and induce downstream drift in macroinvertebrates reducing food availability for fish. Turbidity will have the greatest effects on giant and banded kōkopu, smelt, inanga, and juvenile fish. Deposited sediment will have a greater impact on small, non-migratory fish species and sensitive macroinvertebrates as it fills the spaces between cobbles, buries individuals, and coats hard surfaces. The spaces between and on stones are important areas for foraging, habitat/refuge, and spawning.

Development plans will need to include adequate provision for water use and discharge, during construction and after. The sediment control plan will need to ensure there are no impacts on freshwater habitats. This needs to cover stormwater and sediment retention ponds and flocculant use. Turbidity and deposited sediment in the waterways

should be monitored regularly above and below the site throughout development to ensure the sediment management plans are effective (Cawthron Institute 2011). Monitoring methods need to include quantifiable measures of pass and fail, with adaptive management potential should the monitoring or sediment control methods require amendment.

7.6.2 Water quality - contamination

The use of machinery in the vicinity of a waterway could result in contaminants entering the waterway, including petrochemicals and heavy metals. Petrochemicals can originate from spills, machinery being washed off, or from driving through pooled rainwater which later washes into the waterway. Contaminants can be toxic to aquatic life, causing fatalities, mutations, and affecting physiological processes including reproduction.

A spill response plan needs to be prepared and a spill response kit kept on-site to contain any accidental leaks of fuel or hydraulic fluid from heavy machinery from entering the watercourse. Controls to prevent contaminants entering the stream if there is a spill should be in place prior to earthworks beginning. These controls need to be maintained regularly to ensure they function correctly at all times.

7.6.3 Fish death and injury during construction

Instream or stream-adjacent works can kill or injure fish through crushing, stranding, burial, extreme sediment resuspension and stress. It can also interrupt spawning and migration. These works include bridge and culvert construction, temporary and permanent waterway diversion, vehicle crossings (e.g. fords), bankside works including armouring and vegetation removal, and works where material can fall from an excavator into a waterway.

Under the Freshwater Fisheries Regulations 1983 it is an offence to intentionally kill or destroy indigenous fish, unless they are taken for the purpose of scientific research or for human consumption. As such, if the development proposes any instream works, the consenting authority is likely to require a Fish Management Plan. This will need to be prepared, approved by relevant authorities, and implemented before any works take place. The Plan should detail methods for capturing and/or deterring indigenous fish species, fish welfare, and identify a suitable release site for indigenous fish beyond the affected area.

7.6.4 Fish passage

Several of the species recorded in the area are migratory, and require unimpeded passage between the sea and their inland habitats to complete their lifecycles. Migratory species include giant kōkopu, kōaro, common bullies, and both eel species. While eels are known for their climbing abilities, giant kōkopu, and common bullies are typically considered to be poor climbers, and therefore less able to overcome barriers to fish passage (Bonnett *et al.* 2002). Barriers to fish passage can be obvious, (e.g., a perched culvert set high above the water surface), but they can also be more subtle, (e.g., a culvert with a high flow rate and no low velocity refuges to aid fish in navigating through the structure) (Franklin *et al.* 2018). It is important that fish passage is maintained or improved for both existing structures and any new structures such as culvert or bridge required for access to the proposed development sites.

The following regulation from the NES-FW is applicable to the development of this property, in all waterways currently present:

Section 55(2A) (fish passage) requires that the passage of fish is maintained, or is improved, by instream structures, except where it is desirable to prevent the passage of some fish species in order to protect desired fish species, their life stages, or their habitats.

The exception above, of preventing some fish passage to protect desired fish species, is not relevant at this site.

Any culverts or other such structures proposed for the development will need to comply with the fish passage requirements described in Part 3, Subpart 3 (Passage of fish affected by structures) of the NES-FW.

7.6.5 Flooding

All waterways visited show evidence of carrying large, powerful floods at times, including flood debris in overhead trees and enormous boulders that have been moved and rounded by floods. Any attempt to constrain the waterways, prevent them from flooding using stop banks, or stop erosion through armouring will create bigger erosion and flooding problems for the development, and more damaging floods for the fish fauna. Structures built within the flood zone of each waterway may require rebuilding, which could have repeated impacts on the waterway. This is of particular concern with climate change increasing the power and frequency of storms. Buildings and roads are hard, impermeable surfaces, which increase the volume and speed of stormwater runoff. All of these have detrimental effects on the ecology of the waterway.

As little as possible should be built within the flood zones of each waterway. The waterways should not be constrained, but accepted as a dynamic feature that will change in semi-predictable ways. Impermeable surfaces should be kept to a minimum area across each site and each lot. Rainwater swales and stormwater retention options should be used rather than swift piped disposal of rainwater to the streams.

7.7 Invertebrates

Invertebrate surveying does not give a complete inventory of all species present. Invertebrates are the most speciose group of organisms on Earth. Most New Zealand species have not yet been described, and many described species have not had their threat statuses assessed. Specialist skills are often required to identify invertebrates down to the species level. Therefore other invertebrate values may be present that are not listed below.

Stag beetles (*Geodorcus* sp.) are protected under the Wildlife Act and likely to be on-site. To determine the likelihood of stag beetles being present on-site, and the species present, a stag beetle survey is recommended. This will most likely require a permit to live-trap stag beetles. A stag beetle management plan should be prepared by a qualified entomologist to ensure that stag beetle populations are not detrimentally impacted by the development. This may involve habitat enhancement and translocation of stag beetles, which will require a permit from DOC.

7.7.1 Targeted stag beetle surveys

Targeted surveys for stag beetles are recommended. While surveys cannot rule out a population being present, they can confirm it, and assist a stag beetle management plan in considering available options. Understanding stag beetle presence, distribution, and species composition will help guide actions to protect stag beetles. A stag beetle survey would involve multiple areas of indigenous forest, and methods such as hand-searching by night and live pitfall trapping.

7.7.2 Stag beetle management plan

Unless all areas of stag beetle habitat identified following targeted surveys can be avoided from all impacts of development, then the Department of Conservation may require a stag beetle management plan and WAA for the development project. A stag beetle management plan should contain:

- Ways to adequately avoid stag beetles and their habitats where possible.
- A thorough assessment of alternatives to stag beetle salvage, including habitat restoration and enhancement through log and rock pile creation, the creation of reserves on-site where particularly good habitat exists, and pest animal and plant control.
- Ways in which stag beetle populations can be encouraged to recover on-site from effects of development, for example creation of log stacks in gardens and public areas.
- Salvage and relocation of stag beetles to an alternative location outside the development footprint, if sufficient avoidance or on-site mitigation is not feasible, and enhancement options for that location.

7.8 Summary of key constraints and recommendations

Proposed subdivision west

The proposed subdivision west site contains a large amount of high value habitat for indigenous flora and fauna. The key constraints for development and potential solutions or mitigation options are presented in Table 8. It is recommended that any development of this site is concentrated into the area of secondary hardwood-tree fern forest around the old dump (current recycling) site and avoids kamahi-hardwood-podocarp forest and fragmentation of other habitats. It is also recommended that impacts to freshwater values on the site are avoided by creating buffer zones around streams and limiting or avoiding stream crossings.

Table 8. Summary of potential constraints and mitigation options – proposed subdivision west, Mitchells development site

Values	Constraint	Potential mitigation options
Vegetation	Indigenous vegetation clearance	• Avoid the clearance of higher value kamahi-hardwood-podocarp-forest • Concentrate the development footprint into areas of secondary hardwood-tree fern forest, around the old dump site. • Avoid the clearance of large mature trees. • Offset impacts with weed and animal pest control or other restoration activities. • Create covenants to protect indigenous vegetation on the site and restrict the use of exotic plants in development areas
Lizards	At least one Threatened and two At Risk species may be present	• Additional targeted lizard surveys. For some species this will be possible, but others wouldn't be able to be determined due to lack of survey techniques in forested areas. • Micro-siting of clearance areas (roads and houses) to avoid clearing all trees over a certain diameter would retain optimal lizard habitat. • LMP and WAA– comprising supervised clearance, salvage and relocation, compensation and offset. • Additional protections on each lot would be required
Birds	Kiwi may be present	• Additional targeted kiwi surveys. • Predator control targeting kiwi, kaka and wetland habitats. • If confirmed present, an Avifauna Management Plan is recommended.
Bats	Potential long tailed bat habitat	• ABM surveys at the specific development locations to determine whether impacts on bat populations will occur. • Avoid the clearance of large mature trees.
Invertebrates	Stag beetle and giant land snails may be present	• Stag beetle survey recommended. • Stag beetle management plan, if confirmed present. • Retain and enhance stag beetle habitat where possible (particularly old trees, rotting logs, soil, litter, and rocks). • Salvage and translocation as a last resort if stag beetles are confirmed present, and if habitat cannot be preserved or avoided.
Fresh water	Migratory fish and macro-invertebrates present	• Fish Management Plan. • Freshwater Sediment Control Plan (with monitoring). • Fish passage retained and/or improved for any new or upgraded existing in-stream structures. • Retain riparian vegetation. • Spill Response plan. • Minimise constructed impermeable surfaces. • Stormwater retention through swales, rain gardens, rainwater tanks to reduce flood intensity. • Avoid building in flood zone or constraining/armouring waterway.

Lakeside block development

The proposed lakeside block development contains areas of high value habitat for indigenous flora and fauna. The key constraints for development and potential solutions or mitigation options for this site are presented in Table 9. It is recommended that any development of this site is concentrated into the areas of secondary hardwood-tree fern forest, close to existing residential sites and avoids kamahi-hardwood-podocarp forest. It is also recommended that access for construction is obtained through or via the existing driveway for neighbouring properties to avoid further fragmentation of this area.

Table 9. Summary of potential constraints and potential mitigation options – lakeside block, Mitchells development site

Values	Constraint	Potential mitigation options
Vegetation	Indigenous vegetation clearance	• Avoid the clearance of higher value kamahi-hardwood-podocarp-forest • Concentrating the any development footprint into areas of secondary hardwood-tree fern forest close to existing dwellings. • Avoid the clearance of large mature trees. • Offset with weed and animal pest control and other restoration activities • Create covenants to protect indigenous vegetation on the site and restrict the use of exotic plants in development areas
Lizards	At least one Nationally Vulnerable and two At Risk – Declining species may be present	• Additional targeted lizard surveys. For some species this will be possible, but others wouldn't be able to be determined due to lack of survey techniques in forested areas. • Micro-siting of clearance areas (houses). Avoid clearing all trees over a certain diameter, to retain optimal lizard habitat. • If confirmed present: LMP and WAA– comprising supervised clearance, salvage and relocation, compensation and offset. • Additional protections on lakeside block.
Birds	Kiwi and fernbird potentially present	• Additional targeted surveys. • Predator control targeting habitat suited to these species. • If confirmed present, an Avifauna Management Plan.
Bats	Potential long tailed bat habitat	• Targeted bat surveys required at the specific development locations to determine whether impacts on bat populations will occur. • Avoid the clearance of large mature trees.
Invertebrates	Stag beetle may be present	• Stag beetle survey recommended. • Stag beetle management plan. • Retain and enhance stag beetle habitat where possible (particularly old trees, rotting logs, soil, litter, and rocks)

Values	Constraint	Potential mitigation options
		Salvage and translocation as a last resort if stag beetles are confirmed present, and if habitat cannot be preserved or avoided
Freshwater	Water use Adjacent stream	- Sediment Control Plan (with monitoring). - Retain riparian vegetation. - Spill Response plan. - Minimise constructed impermeable surfaces. - Stormwater retention through swales, rain gardens, rainwater tanks to reduce flood intensity. - Avoid building in flood zone or constraining/armouring waterway.

8. CONCLUSIONS

The proposed Mitchells development sites are located on the lake front and hill slopes around the western edge of Lake Brunner in the Brunner Ecological District. Indigenous vegetation on the site is predominantly a mix of regenerating and old growth forest with high species diversity. The most significant vegetation habitats on the site are kamahi-hardwood-podocarp forest and tutu forest. Developments will need to be carefully designed to minimize impacts in these areas.

8.1 Ecological values

Fourteen indigenous birds were seen or recorded during the site surveys including two species with national threat statuses (kaka and kea). A further 14 indigenous birds are likely or possibly present within the site or adjoining habitats, including seven Threatened or At Risk species. This includes roroa/great spotted kiwi, which could be present in the forest areas of the site.

At least three species of Threatened or At Risk indigenous lizard are highly likely to be present within the site, including the Nationally Vulnerable West Coast green gecko, which may be present in a range forest and scrub habitats.

No bats were recorded during the surveys. However, the site has suitable foraging and roosting habitat for long-tailed bats and is within their known range, and bat presence cannot be completely ruled out at this stage.

Waterways within the site contain at least four At Risk indigenous fish and crayfish species. A further eight indigenous fish and macroinvertebrate species have been recorded within Lake Brunner and its tributaries including three more At Risk species that could be present around the lake margins.

Kamahi-hardwood-podocarp forest on the site was found to have high diversity of invertebrate fauna with flies, cicadas, ants, and spiders commonly observed during the survey. Other habitats on the site were found to have noticeably lower invertebrate diversity. No threatened or legally protected invertebrates were found during the survey. However, stag beetles may be present on-site particularly in kamahi-hardwood-podocarp forest, which has areas of potentially suitable habitat.

Due to time and information constraints the area, which is proposed for new cabins next to the eco lodge, was not surveyed.

8.2 Constraints

Constraints to developments at the site include high value forest areas that support Threatened plants and At Risk birds and highly likely to support At Risk lizards. These areas also contain potential habitat for At Risk birds, long tailed bats and protected invertebrates. Several waterways on the site also contain high freshwater values, supporting At Risk fish species. The main considerations for development around streams and freshwater ecosystems are sedimentation and maintaining adequate fish passage, and a waterway management plan may be required as part of the development scheme. If indigenous lizards are disturbed or killed as part of the site development, a WAA is likely to be required, and this would involve preparation of a lizard

management plan. Further surveys may be required to assess impacts on lizards and potential impacts on other fauna including invertebrates, birds and bats.

The proposed development sites both contain areas of high ecological value kamahi-hardwood-podocarp forest, which is likely to constrain development. It is recommended that any proposed development of these sites is restricted to areas of secondary hardwood-tree fern forest around the old dump and current recycling site (for the proposed subdivision west) and adjacent to existing dwellings (lakeside block).

Potential adverse effects that may result from the proposed developments include:

- Permanent and temporary loss of indigenous vegetation.
- Permanent and temporary loss of indigenous fauna habitat.
- Permanent and temporary loss of permanent, intermittent, and ephemeral watercourses.
- Permanent and temporary loss of riparian values.
- Creation of a permanent network of edges within the forest.
- Increased impervious surfaces.
- Sediment discharge from earthworks during construction.
- Discharge of treated wastewater and stormwater
- Escape of pest plants and animals into the forest.

Measures to minimise or mitigate these effects may include:

- Avoidance of works within the 10-metre riparian zone of the permanent streams (where practical).
- Maintaining hydrological connectivity, and retaining streams/watercourses, including intermittent and ephemeral ones, where possible.
- Aquatic fauna management (including fish and freshwater invertebrates).
- Sediment and erosion control at a level appropriate for the extent of the development, in line with industry best practice.
- Low Impact Design for stormwater infrastructure, in line with industry best practice.
- Considered wastewater infrastructure design and location, in line with industry best practice.
- Riparian restoration.
- Covenant on residential sections to restrict pet species, garden plant species, dwelling size, total impervious surface area, rainwater collection use and discharge,

Opportunities for positive effects largely centre around mammalian pest control in adjoining protected habitats to benefit populations of indigenous fauna in these locations, control of weeds and financial contributions to local conservation projects.

The next steps for this project would be an Assessment of Ecological Effects, and this would be best done once development plans are more advanced.

ACKNOWLEDGMENTS

We would like to thank Brenda Lynch for site access and the retrieval of Acoustic Bat Monitors.

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LOCATIONS OF ACOUSTIC BAT MONITORING DEVICES AT MITCHELLS, LAKE BRUNNER

GPS locations of Acoustic Bat Monitoring (ABM) devices at Mitchells, Lake Brunner.

Site number.	Device ID	Easting	Northing
1	ABM69	1469028.226	5278243.908
2	ABM103	1468947.615	5278225.833
3	ABM36	1468920.215	5278104.677
4	ABM99	1467258.635	5278207.033
5	ABM72	1467400.187	5278117.651
6	ABM73	1467905.125	5278064.083
7	ABM37	1468203.499	5277581.098
8	ABM111	1468004.931	5277491.673
9	ABM80	1467742.902	5277436.134
10	ABM70	1467784.167	5277908.368



Plate A1: Locations of ABM36, (site 3¹) and ABM103 (site 2), both in the lakeside block.

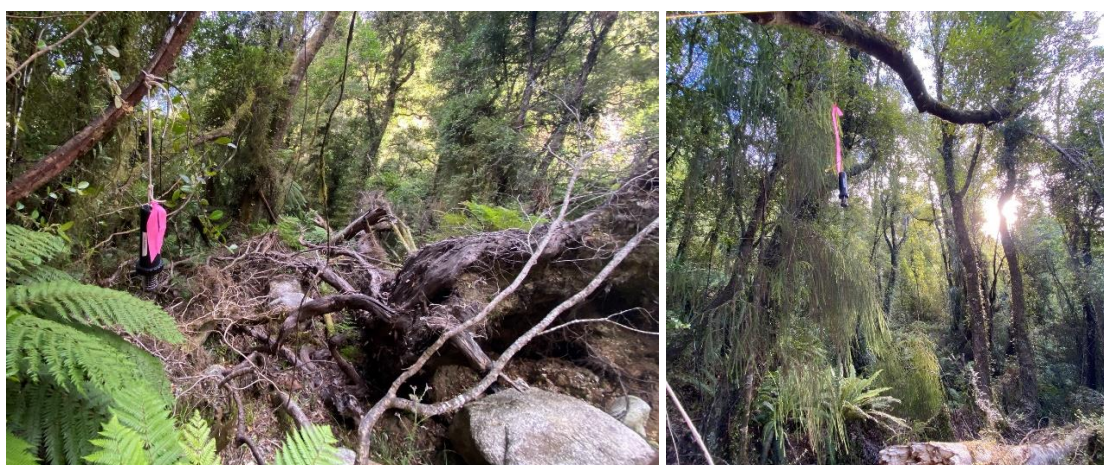


Plate A2: Locations of ABM111 (site 8) and ABM37 (site 7) on the hill slopes above the proposed subdivision west

¹ Refer to Figure 4

PLANT SPECIES RECORDED AT MITCHELLS, LAKE BRUNNER

A. Indigenous Plant Species

Scientific Name	Common Name	Life Form
<i>Acaena anserinifolia</i>	bidibidi, piripiri	dicot herb
<i>Aristotelia serrata</i>	wineberry, makomako	tree
<i>Asplenium bulbiferum</i>	hen & chicken's fern	fern
<i>Asplenium flaccidum</i>	hanging spleenwort, raukatauri	fern
<i>Asplenium polyodon</i>	sickle spleenwort	fern
<i>Astelia fragrans</i>	kakaha, bush lily	monocot herb
<i>Astelia solandri</i>	bush lily	monocot herb
<i>Austroblechnum colensoi</i>	Colenso's hard fern, peretao	fern
<i>Austroblechnum lanceolatum</i>	lance fern	fern
<i>Austroderia richardii</i>	toetoe	grass
<i>Blechnum discolor</i>	crown fern, piupiu	fern
<i>Blechnum fluviatile</i>	kiwakiwa	fern
<i>Blechnum novae-zelandiae</i>	kiokio	fern
<i>Blechnum procerum</i>	small kiokio	fern
<i>Brachyglottis repanda</i>	rangiora, bushmans friend	tree
<i>Calystegia tuguriorum</i>	NZ bindweed, pōwhiwhi	vine
<i>Carpodetus serratus</i>	marbleleaf, putaputāwētā	tree
<i>Carex sinclairii</i>	Sinclair's sedge	sedge
<i>Clematis paniculata</i>	puāwananga	vine
<i>Coprosma dumosa</i>	mikimiki	shrub
<i>Coprosma foetidissima</i>	stinkwood, hupiro	tree
<i>Coprosma grandifolia</i>	kanono	tree
<i>Coprosma lucida</i>	karamū	tree
<i>Coprosma propinqua</i>	mingimingi, mikimiki	shrub
<i>Coprosma rhamnoides</i>	mingimingi, mikimiki	shrub
<i>Coprosma rotundifolia</i>	round-leaved coprosma, mikimiki	shrub
<i>Coriaria arborea</i>	tree tutu	shrub
<i>Cordyline australis</i>	cabbage tree, tī kōuka	tree
<i>Cordyline banksii</i>	tī rakau, cabbage tree	tree
<i>Cortaderia richardii</i>	toetoe	grass
<i>Coriaria sarmentosa</i>	tutu	shrub
<i>Corybas species</i>	spider orchid	orchid
<i>Cranfillia fluviatilis</i>	kiwakiwa	fern
<i>Cranfillia vulcanica</i>	triangular hard fern	fern
<i>Ctenopteris heterophylla</i>	comb fern	fern
<i>Cyathea smithii</i>	Smith's tree fern, kātote	fern
<i>Dacrydium cupressinum</i>	rimu	tree
<i>Dacrycarpus dacrydioides</i>	kahikatea, white pine	tree
<i>Dicksonia squarrosa</i>	whekī, rough tree fern	fern
<i>Earina autumnalis</i>	easter orchid, raupeka	orchid
<i>Earina mucronata</i>	bamboo orchid, peka-a-waka	orchid
<i>Freycinetia banksii</i>	kiekie	vine
<i>Fuchsia excorticata</i>	tree fuchsia, kōtukutuku	tree
<i>Gahnia procera</i>	giant sedge, gahnia	sedge
<i>Grammitis billardierei</i>	common strap fern	fern
<i>Griselinia littoralis</i>	broadleaf, kāpuka	tree

Scientific Name	Common Name	Life Form
<i>Griselinia lucida</i>	shining broadleaf, puka	tree
<i>Hedycarya arborea</i>	pigeonwood, porokaiwhiri	tree
<i>Histiopteris incisa</i>	water fern, mātātā	fern
<i>Hydrocotyle moschata</i>	pennywort	dicot herb
<i>Hymenophyllum demissum</i>	filmy fern	fern
<i>Hymenophyllum dilatatum</i>	filmy fern, matua mauku	fern
<i>Hymenophyllum flabellatum</i>	filmy fern	fern
<i>Isolepis cernua</i>	slender club rush	sedge
<i>Isolepis species</i>	club rush	sedge
<i>Kunzea robusta</i>	kānuka, rawirinui, kopuka	tree
<i>Lastreopsis hispida</i>	hairy shield fern	fern
<i>Leptopteris superba</i>	Prince of Wales feathers, heruheru	fern
<i>Lycopodium varium</i>	clubmoss	fern
<i>Lycopodium volubile</i>	climbing clubmoss, waewaekoukou	fern
<i>Melicytus ramiflorus</i>	māhoe, whiteywood	tree
<i>Metrosideros diffusa</i>	white climbing rātā	vine
<i>Metrosideros fulgens</i>	climbing rātā	vine
<i>Metrosideros perforata</i>	white rātā	vine
<i>Metrosideros umbellata</i>	southern rātā	tree
<i>Microlaena avenacea</i>	bush rice grass	grass
<i>Microsorium pustulatum</i>	hounds tongue, kōwaowao	fern
<i>Muehlenbeckia australis</i>	large-leaved pōhuehue	vine
<i>Myrsine divaricata</i>	weeping matipo, weeping māpou	tree
<i>Myrsine salicina</i>	toro	tree
<i>Neomyrtus pedunculata</i>	rōhutu, myrtle	tree
<i>Nertera depressa</i>	nertera	dicot herb
<i>Paesia scaberula</i>	ring fern, pig root fern	fern
<i>Parsonsia capsularis</i>	native jasmine, akakaikiore	vine
<i>Pellaea rotundifolia</i>	round-leaved fern, tarawera	fern
<i>Pennantia corymbosa</i>	kaikōmako, ducks foot	tree
<i>Phormium tenax</i>	lowland flax, harakeke	monocot herb
<i>Pittosporum eugeniioides</i>	tarātā	tree
<i>Pneumatopteris pennigera</i>	gully fern, pākau	fern
<i>Podocarpus totara</i>	lowland tōtara	tree
<i>Polystichum vestitum</i>	prickly shield fern, pūniu	fern
<i>Prumnopitys ferruginea</i>	miro	tree
<i>Prumnopitys taxifolia</i>	mataī, black pine	tree
<i>Pseudowintera colorata</i>	horopito, peppertree	tree
<i>Pseudopanax crassifolius</i>	lancewood, horoeka	tree
<i>Pyrrosia eleagnifolia</i>	leatherleaf fern	fern
<i>Quintinia serrata</i>	quintinia, tawheowheo	tree
<i>Ranunculus reflexus</i>	hairy buttercup, maruru	dicot herb
<i>Raukaua simplex</i>	three-finger	tree
<i>Ripogonum scandens</i>	supplejack, kareao	vine
<i>Rubus cissoides</i>	bush lawyer, tātarāmoa	vine
<i>Rumohra adiantiformis</i>	leathery shield fern	fern
<i>Schefflera digitata</i>	patē, seven-finger	tree
<i>Schoenus pauciflorus</i>	bog rush	sedge
<i>Streblus heterophyllus</i>	small-leaved milk tree, tūrepo	tree
<i>Tmesipteris elongata</i>	fork fern	fern
<i>Uncinia species</i>	hook grass	sedge
<i>Uncinia uncinata</i>	hook grass	sedge
<i>Weinmannia racemosa</i>	kamahi	tree

B. Exotic Plant Species

Scientific Name	Common Name	Life Form
<i>Agrostis capillaris</i>	brown top	grass
<i>Anthoxanthum odoratum</i>	sweet vernal	grass
<i>Buddleja davidii</i>	buddleia	shrub
<i>Callitriche stagnalis</i>	starwort	dicot herb
<i>Carduus nutans</i>	nodding thistle	dicot herb
<i>Chamaecyparis lawsoniana</i>	Lawson cypress	tree
<i>Cirsium arvense</i>	Californian thistle	dicot herb
<i>Cirsium vulgare</i>	Scotch thistle	dicot herb
<i>Conyza sumatrensis</i>	fleabane	dicot herb
<i>Cotoneaster glaucophyllus</i>	bright bead cotoneaster	shrub
<i>Crepis capillaris</i>	hawksbeard	dicot herb
<i>Crocosmia x crocosmiiflora</i>	monbretia	monocot herb
<i>Cytisus scoparius</i>	scotch broom	shrub
<i>Erythranthe guttata</i>	monkey musk	dicot herb
<i>Holcus lanatus</i>	Yorkshire fog	grass
<i>Hypericum androsaemum</i>	tutsan	shrub
<i>Jacobaea vulgaris</i>	ragwort	dicot herb
<i>Juncus articulatus</i>	jointed rush	rush
<i>Juncus bufonius</i>	toad rush	rush
<i>Juncus conglomeratus</i>	soft rush	rush
<i>Juncus effusus</i>	soft rush	rush
<i>Leycesteria formosa</i>	Himalayan honeysuckle	shrub
<i>Lolium arundinaceum</i> subsp. <i>arundinaceum</i>	tall fescue	grass
<i>Lotus pedunculatus</i>	lotus	dicot herb
<i>Plantago lanceolata</i>	narrow-leaved plantain	dicot herb
<i>Plantago major</i>	broad-leaved plantain	dicot herb
<i>Polygonum hydropiper</i>	water pepper	dicot herb
<i>Prunella vulgaris</i>	selfheal	dicot herb
<i>Rubus fruticosus</i>	blackberry	shrub
<i>Rumex acetosella</i>	sheeps sorrel	dicot herb
<i>Rumex crispus</i>	curled dock	dicot herb
<i>Rumex obtusifolius</i>	broad-leaved dock	dicot herb
<i>Stellaria alsine</i>	bog stitchwort	dicot herb
<i>Tradescantia fluminensis</i>	tradescantia	dicot herb
<i>Ulex europaeus</i>	gorse	shrub

**NIGHTLY WEATHER RECORDS FROM NIWA WEATHER
STATIONS AT MT PHILLISTINE (EWS, 38103) AND HOKITIKA
(EWS, 41322)**

Date	Total nightly rainfall Mt Phillistine (mm)	Total nightly rainfall Hokitika(mm)	Average nightly temperature Hokitika (°C)
15/02/2023	0.2	0	17
16/02/2023	0	0	11.2
17/02/2023	0	0	13.1
18/02/2023	0	0.1	14.4
19/02/2023	0	0	13.6
20/02/2023	1.4	5.8	16.2
21/02/2023	15.8	22.1	17.7
22/02/2023	0.6	0.1	8.8
23/02/2023	0	0	7.1
24/02/2023	0	0	6.8
25/02/2023	0	0	9.2
26/02/2023	2.4	0	12
27/02/2023	0	0	10.8
28/02/2023	0	0	13.8
1/03/2023	7.8	17.5	14
2/03/2023	0	0	12.8
3/03/2023	0	0.1	15.2
4/03/2023	1.4	7.3	12.4
5/03/2023	0.2	0	6.7
6/03/2023	0	0	9.8
7/03/2023	14.8	12.3	13.8
8/03/2023	68.8	26.8	16.5
9/03/2023	2	2.5	12.7
10/03/2023	0.2	0	9
11/03/2023	0.2	1.1	12.9
12/03/2023	55.2	14.4	14.7
13/03/2023	0	0	9.3
14/03/2023	0	0	8.6
15/03/2023	0	0	11.4
16/03/2023	113	54.6	14.5
17/03/2023	8.6	3.2	7.1
18/03/2023	0	0	8.8
19/03/2023	0.4	1	13.8
20/03/2023	86	16.6	11.2
21/03/2023	0	0	3.8
22/03/2023	0	0	6.1

**EVALUATION OF THE ECOLOGICAL SIGNIFICANCE OF TERRESTRIAL AND FRESHWATER INDIGENOUS BIOLOGICAL DIVERSITY, AT MITCHELLS,
WEST COAST REGIONAL POLICY STATEMENT APPENDIX 1 CRITERIA**

Habitats	Kamahi-hardwood- podocarp- forest	Secondary hardwood tree fern forest	Tree tutu forest	Streams / freshwater
1 Representativeness				
a) Indigenous vegetation or habitat of indigenous fauna that is representative, typical or characteristic of the natural diversity 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 biodiversity in some areas.	Criterion met; for vegetation , kamahi-hardwood- podocarp- forest is representative of ecological district.	Not met	Criterion met; for vegetation , mature tree tutu forest is characteristic of the natural diversity the ecological district	Criterion met for characteristic regional habitat of indigenous freshwater fauna .
b) Indigenous vegetation or habitat of indigenous fauna that is a relatively large example of its type within the relevant ecological district.	Not met	Not met	Not met	Not met
2 Rarity/Distinctiveness				
a) 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.	Not met	Not met	Not met	Not met
b) 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.	Criterion met; for vegetation and birds and may be met for bats, lizards and invertebrates. At least six Threatened plant species and one At Risk bird species present. Two Threatened bird species may be present. One Threatened bat species may be present. One Threatened and two At-Risk lizard species may be present. A protected and possibly Threatened invertebrate species (stag beetle) may be present.	Criterion met; for vegetation and birds and may be met for bats, lizards and invertebrates. At least five Threatened plant species and one At Risk bird species present. Two Threatened bird species may be present. One Threatened bat species may be present. One Threatened and two At-Risk lizard species may be present.	Criterion met; vegetation and birds and may be met for bats, lizards and invertebrates. At least four Threatened plant species and one At Risk bird species present. Two Threatened bird species may be present. One Threatened bat species maybe present. One Threatened and two At-Risk lizard species may be present. At least one protected invertebrate species maybe present.	Criterion met; for fish and crustaceans . Three At Risk fish and one At Risk crustacean species present.
c) The site contains indigenous vegetation or an indigenous species at its distribution limit within West Coast Region or nationally.	Not met	Not met	Not met	Not met
d) 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.	Not met	Not met	Not met	Criterion may be met. Two At Risk fish species are likely present due to unusual habitat juvenile habitat nearby and adult habitat at site.
3 Diversity and Pattern				
a) 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 natural features or ecological gradients.	Not met	Not met	Not met	Not met
4 Ecological Context				
a) Vegetation or habitat of indigenous fauna that provides or contributes to an important ecological linkage or network, or provides an important buffering function.	Not met	Not met	Not met	Criterion met for fish . Provides a critical migratory pathway for At Risk fish at the sites and upstream.
b) A wetland which plays an important hydrological, biological or ecological role in the natural functioning of a river or coastal system.	Not met	Not met	Not met	Not met
c) 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.	Criterion may be met. May provide important habitat for Threatened and/or At Risk fauna (refer Criterion 2 b above). Further surveys required	Criterion may be met. May provide important habitat for Threatened and/or At Risk fauna (refer Criterion 2 b above). Further surveys required	Criterion may be met. May provide important habitat for Threatened and/or At Risk fauna (refer Criterion 2 b above). Further surveys required	Criterion met. Provides permanent important feeding and spawning habitats, long-term territories, and migratory pathways for At Risk fish species.



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