Boffa Miskell

Manapouri Lake Control Improvement Project

Landscape Effects Assessment
Prepared for Meridian Energy Limited

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Cover photograph: Manapouri Lake Control structure, © BML, 2022

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1.0 Introduction

1.1 Scope of the report

Boffa Miskell Limited (BML) was engaged by Meridian Energy Limited in August 2022 to undertake a Landscape Effects Assessment (LEA) for the proposed excavation and disposal of spoil, for the proposed "parallel channel' under the proposed Manapouri Lake Control Improvement Project (MLCIP), (collectively referred to as The Site in this report).

Meridian Energy Limited (Meridian) releases flows through the Manapōuri Lake Control Structure (MLC) to the Lower Waiau River (LWR) in accordance with existing resource consent conditions. The types of flow released include minimum flows, lake and flood flows, recreational flows and flushing flows. Each of these assists with managing nuisance periphyton growth and has benefits for river health. However, the current channel depth and alignment, and gravel accumulation in the Waiau Arm immediately upstream of the MLC, have been identified as the primary physical constraints affecting flow conveyance and reliability, particularly for flushing flows.

The aim of this Project is to reduce these constraints by constructing a new and deeper channel adjacent and parallel to the Waiau Arm and by removing accumulated gravel, and to provide for any necessary maintenance of the new channels. Following construction of the new and deeper channel, more reliable conveyance of consented flows into the LWR is expected. A more comprehensive description of the Project, and the proposed methodology, is included in the AEE, and the construction methodology report prepared by Damwatch Engineering Ltd.

The entire Site is zoned Rural within the Southland District Plan.

The following report assesses the natural character, landscape and visual effects of the Project as identified in the AEE and supporting Damwatch Methodology Report.

1.2 Assessment Process

This assessment has been undertaken with reference to Te Tangi a Te Manu, Aotearoa New Zealand Landscape Assessment Guidelines[1] to consider both effects within the Site and its surrounding rural character. The approach to this assessment is outlined in **Appendix 1** of this report. In summary, this assessment has adopted the following scale applied to relevant RMA circumstances (refer to diagram below[2]), acknowledging low and very low adverse effects generally equate to 'less than minor' effects, below moderate equate to no more than minor effects and high / very high effects generally equate to significant effects.

In order to assess the landscape effects of this application, a Site visit was undertaken on 7 December 2022 to assess the existing Site and its visibility in the broader landscape. The Site

[1] Te Tangi a Te Manu, Aotearoa New Zealand Landscape Assessment Guidelines, New Zealand Institute of Landscape Architects (NZILA), 2022

[2] Ibid, page 151.

visit was completed on a partially overcast but clear day with good visibility. During the Site visit the level of Lake Manapōuri was recorded as 177.96m[3] and within the main operating range.

2.0 Existing Environment

Meridian owns and operates the Manapōuri Power Scheme (MPS), the largest single hydroelectric scheme in the country. Water in Lake Manapōuri is used to generate electricity at the underground station at West Arm. The MPS is operated under the Operating Guidelines for Lakes Manapōuri and Te Anau (the Guidelines) which was set in place under the Manapōuri – Te Anau Development Act 1963 (MTADA) and gazetted on 21 November 2002.

The Site adjoins the confluence between the Waiau Arm and the Mararoa River, immediately upstream of the Manapōuri Lake Control (MLC) structure. This section of the Waiau Arm effectively forms part of Lake Manapōuri.

2.1 Landscape Context

The Site is located at the southern end of the Te Anau Basin, between Lake Manapōuri and the Takitimu Mountains.

The Site and its immediate surroundings are not identified as part of any existing or proposed Outstanding Natural Feature and Landscape or Visual Amenity Landscape within the Southland District Plan (SDP). The Site is zoned Rural in the SDP with the nearest Outstanding Natural Landscape currently located over 2 kilometres to the west encompassing the eastern extents of Fiordland National Park (see **Figure 1**). A brief understanding of the key landscape attributes which relate to the Site and wider southern Te Anau Basin landscape are set out below.

Physical aspects of the landscape

The Te Anau Basin has a complex geological history influenced by the subsidence of the north-east trending Moonlight Fault System filled with sedimentary rocks. Both Lake Te Anau and Lake Manapōuri were subsequently gauged out by glaciers during the last ice age. The rivers which continue to flow out of the surrounding inland mountains, further shaped the basin with the gravels they transport and their eroding forces creating sequences of terraces which remain evident.

Following human arrival, extensive clearance of native vegetation took place in parts of the basin, although several larger areas of forest and other habitats close to the western and northern edges of the basin remain. The high rainfall and unusual soil complexes support several wetlands of different types.

More recently, the Manapōuri Power Scheme has resulted in extensive modification through parts of the basin including construction of the MLC structure and realignment of the Mararoa River in the immediate vicinity of the Site. This was completed in 1976 following which the Lower Waiau River flows remain modified and subject to ongoing operational requirements alongside resource consent requirements. Alongside the visible MLC structure in the immediate vicinity of the Site, evidence of previous modification includes regular shaped gravel islands and

[3] Based on Deep Cove (1960) Datum.

lagoons formed within the Waiau Arm and linear rock revetment defining the margins of the Mararoa River.

Te Anau and Manapōuri are the largest settlements and have dual roles in servicing the agricultural and tourist and recreation industries. Whilst some rural living spreads into some of the areas near the settlements, no apparent rural lifestyle development has occurred in the vicinity of the Site.

Associative aspects of the landscape

The Te Anau Basin provides the main access into Fiordland National Park, Lake Te Anau and Lake Manapōuri. The basin provides the foreground and setting to iconic and highly valued views towards the surrounding mountains.

The Waiau River was named during the southern voyages of Tamatea Ure Haea, and his waka Takitimu. Takitimu was wrecked near the mouth of the river (Te Waewae Bay) and the survivors who landed named the river Waiau due to the swirling nature of its waters.

The river was a major travel route connecting Murihiku and Te Ara a Kiwa (Foveaux Strait) to Te Tai Poutini. Summer expeditions to Manapouri for mahinga kai, and access to pounamu, were the main motivations for movement up and down the Waiau.

The river was a major source of mahinga kai for Ngāi Tahu, with some 200 species of plants and animals harvested in and near the river.

Ngāi Tahu ki Murihiku exercises mana whenua over this area. The Site is not identified as a site of significance in any publicly available records.

Perceptual aspects of the landscape

The history of glaciation remains legible as do more recent alluvial processes relating to river erosion and the ongoing management of water levels associated with power generation. The broader Te Anau Basin landforms vary across a rolling and flattened rural landscape which express a mix of alluvial terraces and large lateral moraine deposits along the eastern edge of the larger natural mountain backdrop of Fiordland National Park.

The scenic lookout along Weir Road provides a local vantage point overlooking the Site and MLC in the midground below a broader vista which encompasses the Kepler Mountains. This view remains subject to seasonal changes and differences in atmospheric conditions as part of the broader inland landscape and mountain backdrop.

2.2 Site Description

The Site occupies a total area of approximately 127.5 hectares and encompasses the MLC structure and upstream modified parts of both the Waiau Arm and Mararoa River alongside adjoining areas of land (see **Figure 2**). The proposed works primarily occur adjacent to the existing active channel of the Waiau Arm with generated spoil spread across an adjoining modified lower river terrace.

The Site has previously undergone extensive modification associated with the construction of the Manapōuri Power Scheme in the 1970s including construction of the MLC upstream from the confluence of the Mararoa and Waiau Rivers (see **Plate 1**). Whilst built structures and the subsequent realignment of the Mararoa River remain apparent, much of the previous landform modification has been re-established in pasture across a flattened terrace plane that ties in with the surrounding rural land use characteristic of surrounding areas within the Te Anau Basin.

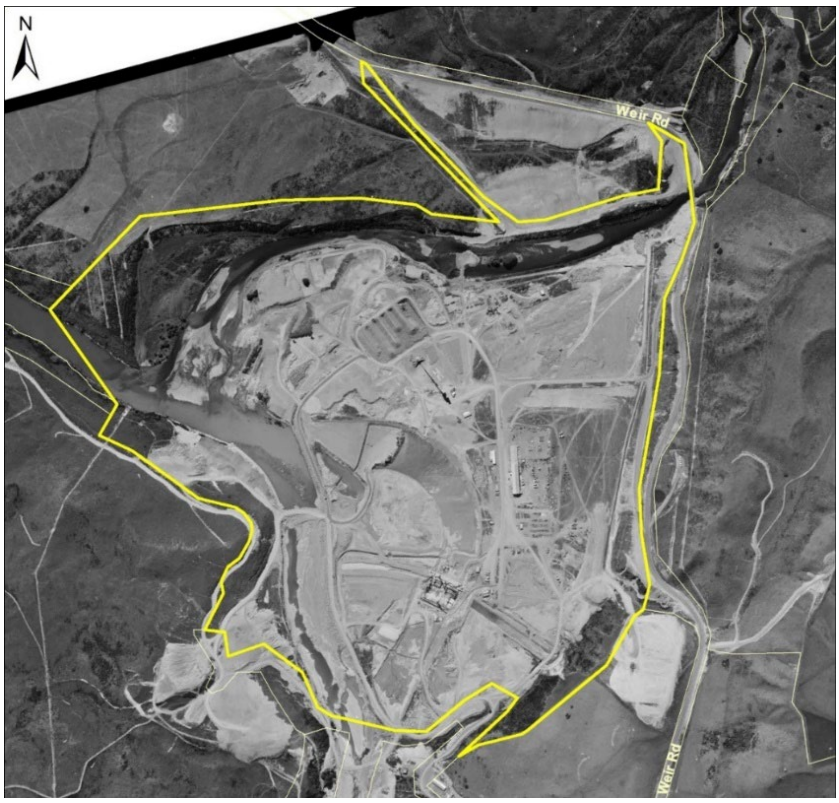


Plate 1: 1974 Aerial of the Site (sourced from http://retrolens.co.nz and licensed by LINZ CC-BY 3.0)

An existing gravel track accesses the Site to the north off Weir Road and traverses the scarp which rises approximately 10m above the lower terrace where works are proposed. An exotic shelter belt has been established along the top of this scarp and further defines this distinct change in level through the Site. The former alignment of the Mararoa River extends along the toe of this scarp and contains some residual ponding along former riverbed channels with bands of willow trees and access tracks also apparent. Much of the remaining land area of the Site is established in exotic pasture and small areas of planted eucalyptus trees which have failed to thrive.

To assist understanding the existing character of the Site, four Site Appraisal Photographs (A-D) were taken from within the Site and focus on the general areas where development is proposed. Their locations are illustrated on **Figure 2**, and are briefly described below:

Site Appraisal Photograph A is taken from within the modified terrace between the Waiau Arm and the Mararoa River and illustrates the predominant exotic pasture landcover characteristic of the area where spoil disposal is proposed. Beyond this in the centre of the photograph, an existing gravel stockpile is visible, which is located within the centre of the Site. From this perspective, the broader Site remains relatively well enclosed by the surrounding topography which includes Paddock Hill to the left and a legible river scarp with a shelter belt established along the top beyond the former alignment of the Mararoa River seen to the right.

Further to the north, **Site Appraisal Photograph B** shows the view from the top of the scarp looking south across the Site towards the MLC structure. This provides an elevated view from within the Site overlooking the area where spoil disposal is proposed across part of the lower terrace below. Beyond this, the Weir Road Scenic Lookout is visible to the left of the photo with the elevated landform of Paddock Hill visible to the right.

Site Appraisal Photograph C is taken from the eastern end of the MLC structure looking north towards the confluence of the Waiau Arm and Mararoa River. From here

the Waiau Arm provides a broader sinuous form which extends towards increasing areas of willow towards Lake Manapōuri in the left-hand side of the photograph. The comparatively straightened alignment of the Mararoa River flowing from the Weir Road Bridge is visible to the right beyond which the modified banks of the river and more distant gravel stockpiles are visible.

Site Appraisal Photograph D is taken along the true left back of the Waiau Arm looking southeast towards the MLC structure. From here the Waiau Arm is visible in the foreground of a series of surrounding rural hills which include the Weir Road Scenic Lookout which overlooks the Site. Gravel shorelines and islands are also a characteristic feature of this section of the Waiau Arm reflecting modification resulting from constructing the MLC structure.

2.3 Visual Catchment

Potential external views towards the Site are limited to transient views from adjoining sections of Weir Road and Duncraigen Road roads. Beyond such views, the Site remains well enclosed within the context of surrounding terraces which contain the modified alignment of the Mararoa River and its confluence with the Waiau Arm. Potential transient views are also available from a scenic lookout along Weir Road which overlooks the Site in the context of the MLC structure and distant view of the Kepler Mountains beyond.

Private views of the Site remain limited to surrounding rural land holdings and typically in the context of the existing MLC structure. The nearest rural dwelling from which potential views towards the Site are available is located on Duncraigen Station along the true right of the Waiau Arm and approximately 370 metres upstream from the proposed extraction within Waiau Arm at its nearest point (see **Figure 3**). Whilst long distance oblique views of parts of the Site may be available from this dwelling, primary views appear to be orientated north and away from the Site and largely obscured by the nature of intervening topography. No other dwellings have been identified from which potential visual effects may occur.

To assist in understanding the nature of existing views, four representative Visual Appraisal Photographs (1- 4) were obtained to understand views towards the Site within its existing landscape context. Their locations are illustrated on **Figure 3** and described below:

Visual Appraisal Photograph 1 is taken from the scenic lookout area along Weir Road overlooking the Site. From here, the MLC structure is visible to the left above which the Waiau Arm and Mararoa River extend upstream on the respective left- and right-hand sides of this view. Beyond this, the area of the Site proposed to accommodate excavated spoil is visible on a lower terrace beyond the Mararoa River within a broader undulating and stepped pastoral landscape. Beyond this, the Kepler Mountains within Fiordland National Park are visible as a striking mountain backdrop along the skyline.

Visual Appraisal Photograph 2 is taken from the Weir Road Bridge looking downstream along the Mararoa River. This view is obtained from users approaching the vicinity of the Site from the north. From here, the Site is visible to the right of the straightened alignment of the Mararoa River and associated with a lower modified terrace between the Mararoa and Waiau Arn. Beyond this, the MLC is visible along the alignment of the Mararoa River. Rural land and a broader backdrop of Paddock Hill is visible along the skyline.

Visual Appraisal Photograph 3 is taken from Weir Road to the north of the Site along an elevated terrace above the Site. From here views towards the Site are largely curtailed by existing shelter planting along the top of the scarp which steps above the

Site. The existing MLC structure can be seen through an existing gap in shelter planting. The larger form of Paddock Hill remains visible to the right.

Visual Appraisal Photograph 4 is taken from Duncraigen Road approaching the Lower Waiau River downstream of the MLC structure to the south of the Site. From here the Site is visible beyond the MLC structure continuing along the lower terrace adjoining the Waiau Arm.

3.0 Relevant Statutory Provisions

As part of this assessment, there are several planning provisions that are relevant to this project. Specifically, they include:

The Resource Management Act:

- ***Section 6a****: the preservation of natural character of lakes, rivers, wetlands and their margins*
- ***Section 7c****: maintain and enhance amenity values*
- ***Section 7f****: maintain and enhance the quality of the environment*

Regional Water Plan for Southland (April 2010)

Policy 32 of the Regional Plan relates to managing structures and bed disturbance activities in the beds of rivers (including streams and modified watercourses) to avoid, remedy or mitigate adverse effects on: *"(f) natural character and outstanding natural features".*

Proposed Southland Water and Land Plan

The Proposed Southland Land and Water Plan (PSWLP) is now well advanced and was made partially operative in January 2021.

Policy 28 of the PSWLP relates to managing structures, bed disturbance activities and associated discharges in the beds and margins of lakes, rivers and modified watercourses, to avoid, remedy or mitigate adverse effects on: *"(8) natural character values and outstanding natural features; and (13) landscape values"*.

Operative Southland District Plan

Section 3 of the District Plan relates to the Rural Zone which encompasses the Site and includes the following relevant objectives and policies:

Objective RURAL.2 seeks to maintain amenity values including rural character.

Policy RURAL.2 requires that resource consents:

> *"Manage subdivision, land use and development in a manner that maintains or enhances amenity values, including rural character and landscapes".*

Policy RURAL.8 relates specifically to earthworks and requires resource consents to:

> *"Avoid, remedy or mitigate the adverse effects of earthworks".*

4.0 Project Description

4.1 Construction Works

Meridian proposes to improve flow conveyance and reliability by constructing a new and deeper channel adjacent to, and parallel to, the Waiau Arm and removing accumulated gravel and bed material. The Project will involve the construction of this new channel, largely offline. Approximately 225,000 m^3 of bed material will be excavated and disposed of on Meridian owned land near the new channel.

This “parallel channel” option has been selected following a robust assessment of alternatives and advice from multiple technical specialists. The option has been selected as it minimises the duration of works within the wet channel of the Waiau Arm. As such, it has been assessed as the least effects option for releasing suspended and deposited sediment to the Lower Waiau River (LWR) during the excavation works, while appropriately managing all other environmental effects.

Subject to obtaining resource consents, and hydrological conditions, Meridian proposes to undertake the works within a 10-month window of January to October 2025. The overall construction period within this window is envisaged to be approximately 4 – 5 months. The up and downstream cuts to connect the parallel channel to the current bed and channel requiring works in water is anticipated to take approximately 5 weeks if undertaken simultaneously. The remainder of the construction window is required for establishment, excavation, disestablishment, and rehabilitation activities. Works are proposed to occur on a 7-days per week and up to 24 hours per day basis.

The bulk channel excavation works are targeted to the time of year when hydrological conditions are likely most favourable for safe and efficient delivery of the work. The construction window has also been identified to limit disruption to Meridian’s monitoring requirements under existing resource consent conditions.

Full details of the Project, and the proposed construction methodology and sequencing, are contained in the AEE.

4.2 Site Rehabilitation

Following completion of the channel excavation within Waiau Arm, rehabilitation activities will include:

- Removal of temporary bunding by spreading material on riverbank flats.
- Contouring of spoil areas to allow runoff to be appropriately directed.
- Replacement of topsoil cover on spoil areas.
- Re-grassing or planting of spoil areas.

As part of rehabilitating the resultant spoil area, a defined ‘gravel stockpile cell’ of approximately 3.5 ha is proposed to provide an ongoing source of extracted gravel material made available to local contractors.. Rehabilitation in this area shall ensure:

- Gravel extraction is confined within the defined ‘gravel stockpile cell’ and operates sequential ‘bands’ from south to north enabling work to be progressively rehabilitated.

- Once gravel is extracted, the resultant surface should be scarified and sown in exotic pasture species to much the surroundings.

It is recommended the ongoing management of spoil and operation of gravel extraction is set out in a landscape management plan to define ongoing works, monitor outcomes, and ensure progressive rehabilitation will occur.

5.0 Assessment of Effects

Landscape and visual impacts result from natural or induced change in the components, character or quality of the landscape. Natural character effects consider the proposed changes to natural elements, patterns and process which occur along rivers, wetlands and their margins. Usually these are the result of landform or vegetation modification or the introduction of new structures, facilities or activities. All these impacts are assessed to determine the level and nature of effects on the character and quality of the landscape, as well as amenity in terms of public and private views.

In this study, the assessment of potential effects is based on a combination of the landscape's character and values together with the nature and scale of the development proposal.

Particular effects considered relate to the following:

- Natural character effects.
- Landscape / rural character effects.
- Visual amenity effects from public and private locations; and
- Effects in relation to statutory provisions.

The principal elements of the proposal that will give rise to natural character, landscape and visual effects are:

- Temporary disturbance in the active bed and margins of the Waiau Arm
- Temporary change in landcover prior to revegetation
- Changes in landform in the context of a contained area of modified rural landscape

5.1 Natural Character Effects

Natural character can be interpreted as[4]:

- *The naturalness of degree of modification of an area; and*
- *An area's distinct combination of natural characteristics and qualities.*

In terms of assessing levels of natural character, the highest degree of naturalness occurs where there is the least amount of human induced modification. Structures, such as the MLC and its ongoing operation including managed water levels can adversely alter the natural character of an area. The significance of this effect is dictated by the size, location and sensitivity of the receiving environment.

[4] NZILA 2022, Te Tangi a te Manu: Aotearoa New Zealand Landscape Assessment Guidelines, page 205.

The proposed works will represent relatively localised and ongoing modification in the context of an existing modified reach of the Waiau Arm. The confluence of the Waiau Arm and Mararoa River underwent substantial modification associated with the construction of the Manapōuri Power Scheme in the 1970s as illustrated in **Plate 1** above. Whilst the full extent of modification is now less apparent over much of the Site given the subsequent cover of pasture, the area remains part of a modified river landscape which includes built structures, engineered river margins, gravel stockpiles, exotic pasture, willow trees and managed flow rates with no more than **low-moderate** existing levels of natural character overall.

During construction, the proposed modification within and along the margins of Waiau Arm will be apparent and will result in the presence of unnatural elements within the immediate upstream context of the MLC. Earthworks and the introduction of temporary structures will accentuate ongoing human modification which remains apparent in this area with more limited indirect effects on the broader natural landscape within which the Site forms. Earthworks avoid identified albeit modified wetlands. Any temporary reduction in natural character is therefore considered to remain localised in the context of this modified Site with no more than low level effects in the context of the existing ongoing modification along both the Waiau Arm and the Mararoa River within which work will be apparent.

Once completed, Waiau Arm will be reinstated to remain broadly consistent within the context of an active river channel and adjoining undulating rural floodplain. There will be no changes downstream of the MLC. The excavation of a parallel channel will expand the presence of surface water and visible gravel islands within the Waiau Arm. Such disturbance will be temporary as unnatural lines will be influenced by future flood events and resemble a broad semi-braided context which presently characterises the modified confluence with the Mararoa River. The former channels within the Mararoa River will remain hydrologically connected and the removal of bunding will ensure resultant islands can be formed to resemble natural patterns subjected to ongoing natural elements and processes characteristic of an active, albeit modified, river margin.

Once operational, the broader Site will become re-assimilated within its working rural context including the continued operation of a progressive gravel stockpile within the spoil area and retain **low-moderate** levels of natural character overall, with corresponding **very low** natural character effects.

5.1.1 Summary of Natural Character Effects

Overall, potential adverse natural character effects are considered to remain relatively localised and predominantly temporary within the context of the existing MLC structure and associated modification which includes the realigned form of the Waiau Arm. During construction, the proposed activity and extent of modification within the Site will appear more evident with temporary moderate adverse natural character effects in the context of existing apparent modification. Removal of bunds and re-spreading of material on islands should resemble a sinuous organic form which ensures the potential for any longer terms adverse natural character effects will be mitigated. Once established the overall level of natural character will remain commensurate with existing levels of modification apparent.

5.2 Landscape Effects

Landscape character is derived from the distinct and recognisable pattern of elements that occur consistently in a particular landscape. It reflects the physical combinations of geology, landform, soils, vegetation, land use and features of human settlement alongside related human

perceptions and associations. It creates the unique sense of place and identity which is recognised by people and communities as landscape.

During construction, the proposed development will have a direct physical effect on an existing modified channel, margins and adjoining context of part of the Waiau Arm. This will entail a contractor's establishment area, construction of temporary bunds and dewatering ponds and establishing haul roads from which excavation and spoil disposal will occur. The proposed works commence along the margins of the Waiau Arm near the former confluence with the Mararoa River which has previously been straightened and realigned. This ensures the overall extent of the project occurs within the relative enclosure of a lower modified river terrace which remains strongly influenced by the proximity of the MLC and previous extensive modification.

To prepare the spoil area, existing vegetation and topsoil will be stripped, with topsoil and existing gravels stockpiled up to 3m as perimeter silt control bunds, for later reinstatement over the area. Once established, temporary bunds will be removed and the project will entail the spread of some 225,000m^3 and up to approximately 2 metres above existing ground level of extracted riverbed material across an area of approximately 14.5ha as part of the existing lower terrace at the confluence of the Waiau Arm and Mararoa River. Where relevant this has been set back a minimum of 10m from adjoining wetlands which have been identified in this area (Boffa Miskell, 2023). Once established, this will resemble the existing lower terrace and its gently undulating form which will be re-established in pasture.

In landcover terms, parts of the lower terrace were previously planted in gum trees, however most of this planting failed to establish and now primarily supports recolonisation with exotic pasture. A small area of crack willow has also established along part of the true left bank of the Waiau Arm, part of which will be removed because of excavating an expanded channel along the margins of the Waiau Arm. Except for some local areas of wetland which have been identified and will be avoided in accordance with ecologists' recommendations, the existing landcover remains broadly consistent with the wider working rural landscape, albeit subject to previous substantial modification.

In terms of potential broader impacts on perceptual and associative aspects of landscape character, the Site will continue to reflect a modified and working part of the broader southern Te Anau Basin landscape. During operation, this landscape will continue to remain expressive of previous glacial and alluvial process overlaid by areas of more extensive modification associated with the Manapōuri Power Scheme and surrounding rural activity including pasture and plantation forest. Such views are frequently juxtaposed against a distant natural and majestic backdrop of Fiordland National Park. Within this context, potential impacts on landscape character will remain limited given the Site's high level of visual enclosure created by the stepped nature of the surrounding terraced river topography defining the Site and strong existing associations with the adjoining MLC structure.

As with any site or river undergoing earthworks or extraction activity, there will be an apparent change from the existing active river margin adjoining a vegetated pastoral context which is progressively transformed throughout the construction period. During construction, earthwork activity and movement of large machinery will be apparent and will expose relatively large areas of bare ground and gravel to a degree which is atypical of the scale of normal day to day working rural activities that currently prevail. In landscape terms, the effect of this work will largely appear temporary and relatively internalised once bunds have been removed, and river margins and pasture or planting is re-established. Throughout this work, the Site will remain characterised by a strong working rural character associated with the Manapōuri Power Scheme and which includes stepped river scarps enclosing more extensive landform modification and associated gravel extraction alongside existing visible infrastructure.

When viewed from the limited public areas beyond the Site, the proposed layout of extraction activity and spoil disposal has responded to the existing grain or pattern of a lower undulating river terrace adjoining the confluence of the Waiau Arm and Mararoa River. This also includes the formation and retention of gravel islands and a lagoon approaching the confluence with the Mararoa River within the current active bed. Spoil disposal and spread following extraction works will retain a broad undulating form which responds to the established lower stepped river terrace evident in this area, including operational gravel stockpiles which will remain. Once the proposed landform modification has been completed, the Site contour will be re-established in pasture or planted to become assimilated and appear consistent with its surrounding rural landscape setting. Disturbed areas, including resultant islands should be maintained to ensure these are not subjected to spread of pest species including crack willow.

5.2.1 Rural Character Effects

Ensuring that activities in the Rural Zone maintains or enhances amenity values including its rural character is a specific policy in the Operative Southland District Plan.

Rural landscapes are a combination of natural and human introduced elements. The type of rural activity and associated land use that overlay them are also factors which contribute to their character. In rural landscapes, natural patterns are evident and natural systems operate; however rural activities, such as pastoral farming and cropping, prevail. In rural character terms, the Site is dominated by low producing exotic pasture and colonising vegetation which adjoins visible built infrastructure. In this context, the Site retains legible albeit modified pastoral terraces adjoining the confluence of the Waiau Arm and Mararoa River and remains strongly associated with the Manapōuri Power Scheme and MLC which appears integrated within this broader working rural context.

While the appearance of the Site will change during operation, including visible machinery, evidence of extraction and bare ground subsequently reinstated with pasture and planting, it will still retain a distinctive rural character both during and after the project. During earthworks activity, movement of large machinery and earthworks will be evident in the Waiau Arm and margins and atypical of the normal day to day farming activities that currently prevail. However, given the relative containment of the Site and temporary nature of extraction activity and associated earthworks activity, the effects of the proposed development on rural character would be limited and readily absorbed within the surrounding landscape.

Once works are completed, the form and scale of the landform itself and the pattern of proposed reinstatement with an equivalent landcover would retain a wholly consistent working rural character and in context to the ongoing management of the broader hydro scheme.

5.2.2 Summary of Landscape Effects

Overall, the proposal will remain well contained in the context of a defined and modified lower river terrace influenced by the adjoining MLC and broader Manapōuri Power Scheme which forms part of the broader rural context of the southern Te Anau Basin. In this context, the level and nature of landscape effects are influenced by the Site's established working rural character including existing built energy infrastructure and the relative topographical containment of the Site encompassing extraction, spreading spoil disposal and subsequent rehabilitation. Given this context, the proposal is assessed as having temporary **low-moderate** adverse landscape effects during construction which reduce to **very low** and less then minor once works are completed, and the Site is rehabilitated.

5.3 Visual Amenity Effects

Visual amenity effects are influenced by several factors including the nature of the proposal and the landscape character and values within which the proposal occurs. Visual amenity effects are also dependent on distance between the viewer and the proposal, the nature and duration of the view including its value and importance.

As set out in Section 2.3 above, public views of the Site are primarily limited to adjoining sections of Weir Road and Duncraigen Road. There is also a scenic lookout along Weir Road which obtains open views across the Site as part of a broader panoramic view which includes the MLC structure in the midground and a distant backdrop of the Kepler Mountains where visible on clear days.

5.3.1 Visual Simulations

To assist understanding of the changes proposed within the Site, a series of visual simulations have been prepared from the Weir Road Scenic Lookout. These show the changes proposed during construction **(VS1A)** and at completion once the spoil area is re-established in grass and material within the identified gravel stockpile cell remains exposed **(VS1B)**. To assist further understanding of the proposed ongoing removal of gravel from the identified gravel stockpile cell, further simulations have been prepared to show gravel extraction approximately midway through operation (**VS1C**) and the stockpile at the end of operation once gravel has been progressively removed (**VS1D**).

The visualisations have been produced in accordance with the Tuia Pito Ora New Zealand Institute of Landscape Architects (NZILA) Best Practice Guidelines for Visual Simulations (BPG 10.2) and Boffa Miskell's internal Visualisation Guidelines. To prepare visual simulations, a GPS photograph was taken with a Canon digital SLR camera fitted with a 50mm focal length lens, mounted on a tripod and panoramic head. Visual simulations have been prepared based on the georeferenced panoramic photograph obtained. Each simulation is reproduced using a 90^{o} horizontal field of view using rectilinear projection on a A3 sheet and generally set up to compare the existing and proposed views.

As change is observed over long distances (beyond approximately 500m), and to assist understanding the extent to which change may appear visible, a single frame 'cropped' image at a 40^{o} horizontal field of view has also been included following the simulated 90^{o} panoramic view. This enables the resultant site photography and simulation to be held at a comfortable viewing distance when printed at A3 to observe and understand the extent of visual change which would occur if standing at the viewpoint location. In all instances the field of view, projection used and image reading distance has been specified to ensure an observer can correctly reconstruct the perspective seen from the viewpoint location.

In addition, a series of simulations have been prepared to show the Project at completion during various lake levels cross its operational range. The levels for each visual simulation are summarised below, with visual simulations included within the Graphic Supplement:

- **Visual Simulation 1E - 1:** Water level of lake within the high operating range (179.5m)
- **Visual Simulation 1E - 2:** Water level of lake within the high operating range (179m)
- **Visual Simulation 1E - 3:** Water level on day of Site Visit (177.9m)
- **Visual Simulation 1E - 4:** Water level of lake within the main operating range (177.59m)
- **Visual Simulation 1E - 5:** Water level of lake within the low operating range (176.08m)
- **Visual Simulation 1E - 6:** Water level of lake within the low operating range (175.86m)

5.3.2 Effects from public vantage points

5.3.2.1 Weir Road Scenic Lookout

Weir Road Scenic Lookout is the main publicly accessible location in the vicinity of the Site from which observers may typically pause and obtain views of the proposed development. This forms a wider vista which includes the MLC structure in the midground, and a distant backdrop of the Kepler Mountains within Fiordland National Park on clear days. From here, the entire Site is visible within which the proposed parallel channel will extend along part of the margin of the Waiau Arm. The deposit of spoil will also be visible at a distance of approximately 420 metres and beyond the straightened Mararoa River. All activity will be visible immediately upstream of the existing MLC.

During construction, the temporary construction of bunds and haul roads within and along the margins of the Waiau Arm will be visible alongside the operation of machinery and removal of crack willow adjoining the river margin (see **VS1A**). Such views will expand visible modification in the midground context which contains the existing MLC structure and rock revetment evident along the margins of the adjoining rivers as part of the broader more natural landscape backdrop. This temporary change will result in some temporary adverse visual effects, moderated by their duration and the existing modified working context within which they occur. Such effects will initially be **low-moderate adverse** and will progressively reduce as the Site works are completed and the site is progressively rehabilitated.

Following completion and ongoing operation of the excavated channel within the Waiau Arm, some ongoing modification will also occur in relation to the gravel stockpile embedded within the larger spoil area as this is progressively removed (**VS1B**). During this aspect of operation, this may include the ongoing use of machinery as gravel is progressively extracted from south to north. This is illustrated by **VS1C** showing works approximately midway through the gravel stockpile and **VS1D** once the gravel stockpile has been depleted. During this work, it is recommended that a landscape management plan is applied to ensure this completed surface will be rehabilitated and re-established in pasture (**VS1E**).

Following the creation of the expanded channel of the Waiau Arm, this will remain subject to dynamic natural processes in responses to changes in water level. During high lake operating levels (**VS1E 1** and **2**), much of the extent of the Waiau Arm will remain submerged, with all but the tops of isolated vegetation and part of a gravel island remaining visible between the excavated and existing channels. The former channels within the Mararoa River will remain hydrologically connected and may also be visible during these times.

During the lake's main operating levels including those present during the day of the Site visit (**VS1E 3** and **4**), gravel islands including the existing Bird Island will become evident in the channel of Waiau Arm. These islands become more extensive in the context of a broad braided forms separating two remaining channels during the lake's low operating levels (**VS1E 5** and **6**).

Overall, any change once completed will remain readily assimilated within this existing dynamic river channel which includes varied braided forms within the context of the existing dam weir and broader rural landscape with **very low adverse** effects.

5.3.2.2 Weir Road

Views from remaining parts of Weir Road are limited for a section of approximately 1.1km between the Weir Road Bridge (**Visual Appraisal Photograph 2**) and a point about 200m south of the Weir Road lookout. Any such views will be transient and typically oblique in the context of fleeting views of the existing MLC structure and modified sections of both the Waiau Arm and the Mararoa River within a broader rural and natural backdrop which includes a distant backdrop of Fiordland National Park. During operation, the temporary visibility of machinery and modification along the margins of the Waiau Arm will be apparent, with some localised **low adverse** effects. Once completed, the proposed works will remain assimilated within this contained rural landscape with neutral visual effects.

5.3.2.3 Duncraigen Road

Views from Duncraigen Road are limited to a brief section approaching the Lower Waiau River. Any views of the project from this perspective will remain beyond the more immediate context of the MLC structure and limited in the broader working and modified rural landscape beyond with no more than temporary **low adverse** effects. Once established, the project will appear assimilated in the working rural context with neutral effects.

5.3.3 Private Effects from private vantage points

Any views from surrounding rural properties will remain fleeting and largely consistent with the existing working rural context adjoining the MLC. The only dwelling from which potential views of the Site have been identified is located within Duncraigen Station and from which no more than temporary **low** visual effects are anticipated. **Very low** or negligible visual effects have been identified from the remaining private properties surrounding the Site.

5.3.3.1 Duncraigen Station

The nearest dwelling is located within Duncraigen Station (164 Duncraigen Road), approximately 1 kilometre from the proposed spoil area and orientated north and away from the Site. No other dwellings with potential views have been identified. Where visible from here, some long distance partial or glimpse oblique views may occur given the nature of intervening topography. In this context, any potential transient views are expected to remain largely incidental in the context of ongoing working rural activity which occurs with no more than **low** adverse effects. Once established, the modified landform associated with the Waiau Arm adjoining the MLC will be rehabilitated and remain assimilated within a contained area of working rural landscape. Any broader views to the north-west along the Waiau Arm and towards a dramatic distant backdrop of Fiordland National Park will remain unchanged.

5.3.4 Summary of Visual Effects

The Project will generally remain visually well contained with views primarily limited to surrounding roads and a scenic lookout located along Weir Road. The lookout on Weir Road provides an isolated public location from which potential observers may pause and overlook the Site and its relationship between the existing MLC structure against majestic backdrop of the Keppler Mountains and Fiordland National Park. From here there will be some minor temporary adverse effects during operation which dissipate following site rehabilitation. The remaining public views are fleeting and seen in the midground beyond which Fiordland National Park remains a focus in clear days over longer distances. In this context the proposed development

will remain embedded within an existing modified working rural landscape with no more than minor adverse effects.

5.4 Effects in relation to Statutory Provisions

The proposed development avoids any outstanding natural landscapes and features or visual amenity landscapes subject to RMA s.6(b).

Whilst the proposed development will extend modification within and along the margins of the Waiau Arm for which natural character must be preserved under RMA s.6(a), the extent of apparent modification will remain temporary and includes measures which ensure any adverse effects will be remedied or mitigated in accordance with Policy 32 of the Regional Water Plan and Policy 28 pf the PSLWP.

In rural character terms the proposed development will remain well integrated within an established working rural landscape and includes progressive rehabilitation of all earthworks introduced beyond the margins of the Waiau Arm and within an undulating lower terrace to appear consistent with the existing rural landscape in line with Policies RURAL.2 and RURAL.8 of the Operative Southland District Plan.

6.0 Recommendations

The proposal identifies that Site Rehabilitation will occur within the next available planting season following completion of the channel extraction. This outcome is supported from a landscape perspective in addition to the following recommendations:

- The gravel extraction, constructors' yard, gravel stockpiles and spoil disposal area shall be maintained in a tidy state during operation, so the visual and natural character of the riverbed and its margins are maintained.
- The final form of any exposed islands created within Waiau Arm shall be finished to avoid linear engineered forms and ensure sinuous organic shapes which reflect natural patterns subjected to natural elements and processes.
- Ongoing gravel extraction from within the spoil disposal area shall be limited to within the defined 'gravel stockpile cell'. The extraction of gravel from within this area shall be completed in sequential stages moving from south to north to facilitate progressive rehabilitation.
- Once gravel is removed from within the 'gravel stockpile cell', the resultant surface shall be scarified to promote plant growth and sown with exotic pasture species or similar to assimilate within the revegetated spoil disposal area within the next available planting season.
- No machinery shall be stored within the active riverbed when not in use.

To ensure the above outcomes are achieved, it is recommended that ongoing rehabilitation is set out in an adopted landscape management plan. This shall set out the nature of ongoing operation relating to the spoil area including gravel extraction within the 'stockpile cell' and incorporate a process of monitoring anticipated outcomes to guide future management direction to ensure a final cover of pasture or similar vegetation is progressively established over the resultant spoil disposal area.

7.0 Conclusion

The proposed parallel channel extraction and spreading of spoil within a lower terrace at the confluence of the Waiau Arm and Mararoa River will remain relatively well contained within a modified working rural landscape. Whilst disturbance along the margins of the Waiau Arm and associated spread of spoil including the operation of large machinery may be evident from surrounding areas and atypically of day-to-day rural activity during operation, any adverse landscape effects will be temporary and localised resulting in no more than minor effects, including low-moderate effects from Weir Road lookout. Once established, the Site can be readily re-assimilated within its surrounding modified river and working rural environment which remains within the context of existing built infrastructure and a broader majestic backdrop of the Fiordland National Park with no more than low and less than minor landscape effects.

8.0 References

Boffa Miskell (2023). Memo: Manapōuri Lake Control Structure – Spoil Disposal Area Wetland Assessments. Project № BM220277A. 11 January 2023.

Damwatch (2023) Proposed Manapōuri Lake Control Improvement Project. Prepared for Meridian Energy.

Appendix 1: Landscape Effects Assessment Method

22 June 2023

This assessment method statement is consistent with the methodology (high-level system of concepts, principles, and approaches) of 'Te Tangi a te Manu: Aotearoa New Zealand Landscape Assessment Guidelines', Tuia Pito Ora New Zealand Institute of Landscape Architects, July 2022. The assessment provides separate chapters to discuss landscape, visual and natural character effects where relevant, but is referred to throughout as a Landscape Effects Assessment in accordance with these Guidelines. Specifically, the assessment of effects has examined the following:

- *The existing landscape;*
- *The nature of effect;*
- *The level of effect; and*
- *The significance of effect.*

The Existing Landscape

The first step of assessment entails examining the existing landscape in which potential effects may occur. This aspect of the assessment describes and interprets the specific landscape character and values which may be impacted by the proposal alongside its natural character where relevant as set out further below. The existing landscape is assessed at a scale(s) commensurate with the potential nature of effects. It includes an understanding of the visual catchment and viewing audience relating to the proposal including key representative public views. This aspect of the assessment entails both desk-top review (including drawing upon area-based landscape assessments where available) and field work/site surveys to examine and describe the specific factors and interplay of relevant attributes or dimensions, as follows:

Physical –relevant natural and human features and processes;

Perceptual –direct human sensory experience and its broader interpretation; and

Associative – intangible meanings and associations that influence how places are perceived.

Engagement with tāngata whenua

As part of the analysis of the existing landscape, the assessment should seek to identify relevant mana whenua (where possible) and describe the nature and extent of engagement, together with any relevant sources informing an understanding of the existing landscape from a Te Ao Māori perspective.

Statutory and Non-Statutory Provisions

The relevant provisions facilitating change also influence the consequent nature and level of effects. Relevant provisions encompass objectives and policies drawn from a broader analysis of the statutory context and which may anticipate change and certain outcomes for identified landscape values.

The Nature of Effect

The nature of effect assesses the outcome of the proposal within the landscape. The nature of effect is considered in terms of whether effects are positive (beneficial) or negative (adverse) in the context within which they occur. Neutral effects may also occur where landscape or visual change is benign.

It should be emphasised that a change in a landscape (or view of a landscape) does not, of itself, necessarily constitute an adverse landscape effect. Landscapes are dynamic and are constantly changing in both subtle and more dramatic transformational ways; these changes are both natural and human induced. What is important when assessing and managing landscape change is that adverse effects are avoided or sufficiently mitigated to ameliorate adverse effects. The aim is to maintain or enhance the environment through appropriate design outcomes, recognising that both the nature and level of effects may change over time.

The Level of Effect

Where the nature of effect is assessed as **'adverse'**, the assessment quantifies the level (degree or magnitude) of adverse effect. Assessing the level of effect entails professional judgement based on expertise and experience provided with explanations and reasons. The identified level of adverse natural character, landscape and visual effects adopts a universal seven-point scale from **very low** to **very high** consistent with Te Tangi a te Manu Guidelines and reproduced below.

Landscape Effects

A landscape effect relates to the change on a landscape's character and its inherent values and in the context of what change can be anticipated in that landscape in relation to relevant zoning and policy. The level of effect is influenced by the size or spatial scale, geographical extent, duration and reversibility of landscape change on the characteristics and values within the specific context in which they occur.

Visual Effects

Visual effects are a subset of landscape effects. They are consequence of changes to landscape values as experienced in views. To assess where visual effects of the proposal may occur requires an identification of the area from where the proposal may be visible from, and the specific viewing audience(s) affected. Visual effects are assessed with respect to landscape character and values. This can be influenced by several factors such as distance, orientation of the view, duration, extent of view occupied, screening and backdrop, as well as the potential change that could be anticipated in the view as a result of zone / policy provisions of relevant statutory plans.

Natural Character Effects

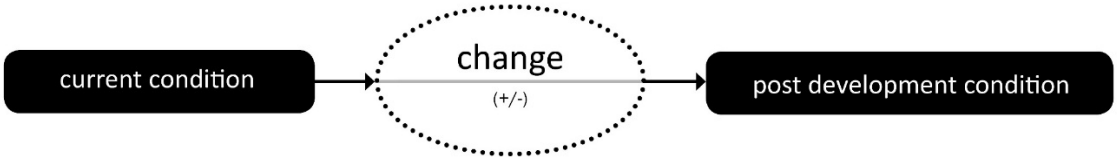
Natural Character, under the RMA, specifically relates to *'the preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development'*. Therefore, the assessment of natural character effects only involves examining the proposed changes to natural elements, patterns and process which may occur in relevant landscape / seascape contexts.

As with assessing landscape effects, the first step when assessing natural character effects involves identifying the relevant physical and experiential characteristics and qualities which occur and may be affected by a proposal at a commensurate scale. This can be supported

through the input of technical disciplines such as geomorphology, hydrology, marine, freshwater, and terrestrial ecology as well as input from tāngata whenua. An understanding of natural character considers the level of naturalness and essentially reflects the current condition of the environment assessed in relation to the seven-point scale. A higher level of natural character means the waterbody and/or margin is less modified and vice versa.

A natural character effect is a change to the current condition of parts of the environment where natural character occurs. Change can be negative or positive. The resultant natural character effect is influenced by the existing level of naturalness within which change is proposed; a greater level of effect will generally occur when the proposal reduces the naturalness of a less modified environment. In short, the process of assessing natural character effects can be summarised as follows:

- Identify the characteristics and qualities which contribute to natural character within a relevant context and defined spatial scale(s), including the existing level of naturalness;
- Describe the changes to identified characteristics and qualities and the consequent level of natural character anticipated (post proposal); and
- Determine the overall level of effect based on the consequence of change.



The Significance of Effects

Decision makers assessing resource consent applications must evaluate if the effect on individuals or the environment is less than minor[5] or if an adverse effect on the environment is no more than minor[6]. For non-complying activities, consent can only be granted if the s104D 'gateway test' is satisfied, ensuring adverse effects are minor or align with planning objectives. In these situations, the assessment may be required to translate the level of effect in terms of RMA terminology.

This assessment has adopted the following scale applied to relevant RMA circumstances[7] (refer to diagram below), acknowledging low and very low adverse effects generally equate to 'less than minor' and high / very high effects generally equate to significant[8].

[5] RMA, Section 95E

[6] RMA, Section 95E

[7] Seven-point level of effect scale. Source: Te tangi a te Manu, Pg. 15

[8] The term 'significant adverse effects' applies to specific RMA situations, including the consideration of alternatives for Notices of Requirement and AEEs, as well as assessing natural character effects under the NZ Coastal Policy Statement.

About Boffa Miskell

Boffa Miskell is a leading New Zealand professional services consultancy with offices in Auckland, Hamilton, Tauranga, Wellington, Christchurch, Dunedin and Queenstown. We work with a wide range of local and international private and public sector clients in the areas of planning, urban design, landscape architecture, landscape planning, ecology, biosecurity, cultural heritage, graphics and mapping. Over the past four decades we have built a reputation for professionalism, innovation and excellence. During this time we have been associated with a significant number of projects that have shaped New Zealand's environment.

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