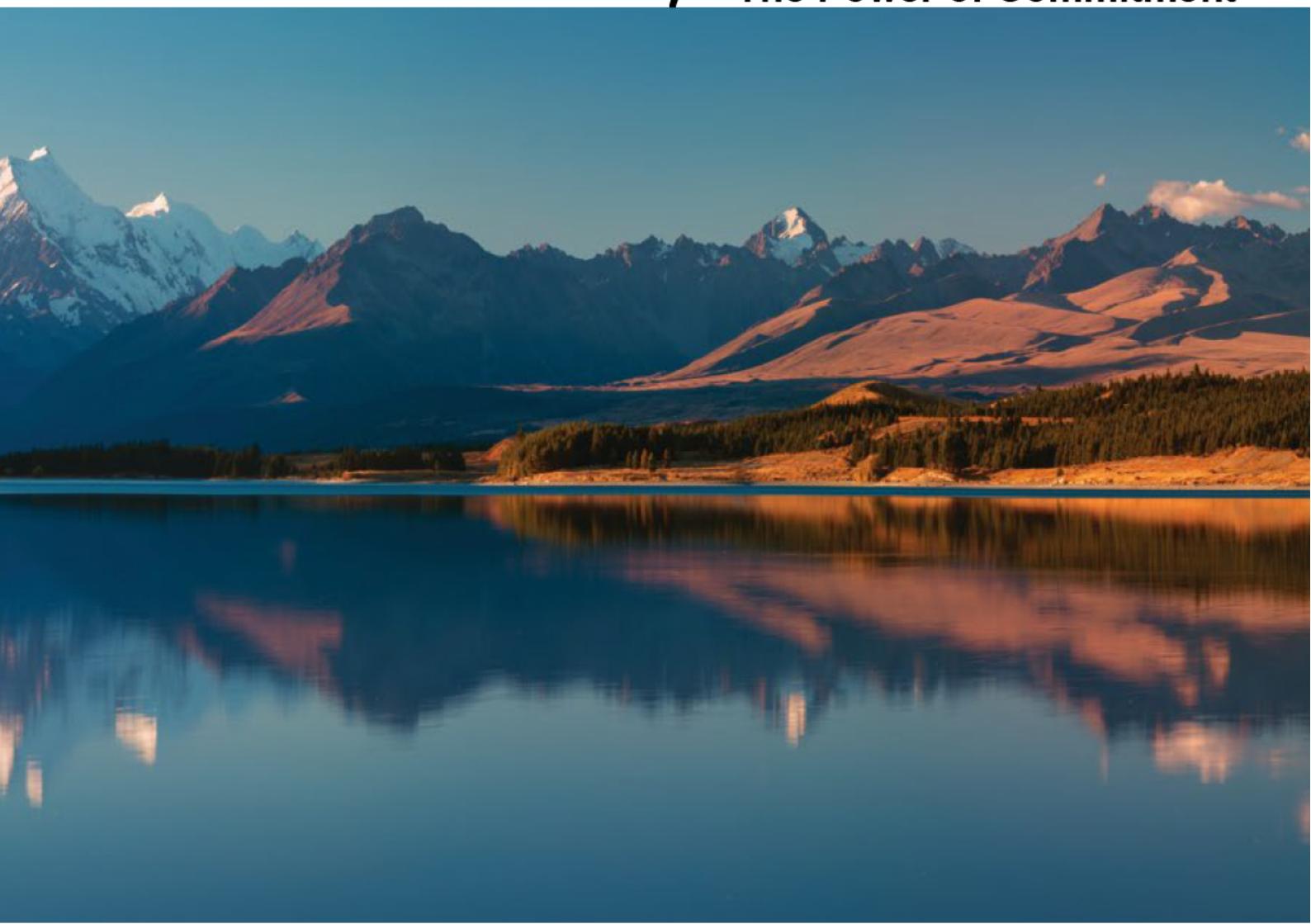
Lake Pūkaki Hydro storage and dam resilience works

Fast-track Referral Application

Meridian Energy Limited

17 April 2025

→ The Power of Commitment



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2. Project Detail

2.1 Project background

2.1.1 Waitaki Power Scheme

The Waitaki Power Scheme (WPS) is a nationally and regionally significant component of New Zealand's electricity supply infrastructure. It is New Zealand's largest and most flexible hydroelectricity power scheme and therefore has a critical role to play in the electricity system and economy. It consists of six power stations, commissioned between 1936 and 1985, together having an installed capacity of 1,553 MW, being ~29% of New Zealand's installed hydro capacity.

The WPS has a current Meridian asset value of $4.5 billion (September 2021). Annually, Meridian invests an estimated $30 million in the management, upkeep, and improvement of the WPS.

2.1.2 Lake Pūkaki Operations

Lake Pūkaki is a modified natural lake and is managed as part of the WPS. It is New Zealand's largest hydro storage lake and provides an average of 1,767 GWh of stored water in normal operating conditions with an additional 546 GWh available during a hydro shortage, being at its largest, 47.5%, of New Zealand's historical average hydro storage (seasonal limits and emergency storage conditions apply to some other NZ reservoirs).

Under resource consent CRC905321.7, Meridian is authorised to dam the Pūkaki River to control and operate Lake Pūkaki between the levels of 518 m above mean sea level (mRL) (normal consented minimum lake level) and 532.5 mRL (maximum consented storage level).

The lake may be operated outside of this range in the following circumstances:

- At times of a Security of Supply Alert, the lake may be operated between the alert minimum control level of 515 mRL and 518 mRL (provided for under existing consent CRC185833) which expires in April 2025 and which a replacement consent application has been lodged (CRC240441).
- During an electricity supply emergency in which an Official Conservation Campaign is commenced, the lake can be operated between the minimum control level of 513 mRL and 518 mRL (provided for as a permitted activity under Rule 17 of the Waitaki Catchment Allocation Plan).
- Above 532.5 mRL in accordance with established flood rules (CRC905321.7, Condition 6)

The ability to utilise contingent hydro storage in Lake Pūkaki is related to electricity system supply triggers being initiated by the System Operator ((SO)Transpower). These triggers are described below.

Security of Supply Alert

If reported storage falls below the New Zealand or South Island Alert Contingent Storage Release Boundary, a Security of Supply Alert (SSA) is issued by the system operator (SO). At this point, there is a 4% risk of a shortage.

Official conservation campaigns

An Official Conservation Campaign (OCC) is a period during which the system operator calls on New Zealanders to voluntarily reduce their electricity usage.

An OCC is declared (by the SO) when the risk of electricity supply shortage (as assessed under the Security of Supply Information and Forecasting Policy (SOSFIP), exceeds 10% and is forecast to continue to do so for at least one week.

Meridian believes the current security of supply regime has been shown to be unworkable and does not give energy system participants (both generators and customers) confidence that the contingent storage will be available when it is needed.

In August 2024, the SO had to make an urgent, ad hoc adjustment to the way security release boundaries were modelled, and the storage accessed. Transpower's decision to only adjust the buffer on a temporary basis means that there remains significant uncertainty regarding access to contingent storage in 2025, 2026 and 2027, a period of potential electricity shortages.

It is noted that Transpower, in their role as SO, have recently announced that they will be undertaking a review of SOSFIP. While it is encouraging that the SO recognises the need to review current security settings, the review's outcomes and completion date are not assured, and the duration of any change is unclear.

2.2 Proposed activities

Meridian is seeking approval to apply under the Fast-track Approval Act 2024 for consent to temporarily ease access restrictions on Lake Pūkaki contingent storage, allowing it to operate between 518 mRL and 513 mRL over the next three years in winters 2025, 2026 and 2027, a period of potential electricity shortages, without SSA or OCC triggers. Given the date of submission of this application, Meridian seeks flexibility to confirm the duration sought during the substantive application process. The reason being that based on current timelines it is possible that the consent may not be in place for the winter of 2025, thus subject to the decision makers' approval, Meridian may seek to amend the duration to be the three consecutive winters following the granting of the consent.

Additionally, Meridian is seeking approval to permanently install rock armouring at Pūkaki Dam to ensure the structure's resilience to wave erosion when operating the lake at lower levels (below 518 mRL). Undertaking this work is dependent upon suitably low lake levels and the rock, once placed, will be permanent. The consent for this aspect is therefore intended to be enduring, allowing the work to be carried out at a future date when conditions allow. Meridian has had material stockpiled ready for rock armouring since 2014, but the work has not been undertaken due to the supply triggers never being initiated by the SO.

The national benefit of allowing eased access to contingent storage include:

- Making additional stored water available, providing approximately 546 GWh of realisable energy. This is equivalent to the annual output of Meridian's new 176 MW Harapaki wind farm or the annual electricity consumption of 75,000 average New Zealand residential households.
- Further protection (through rock armouring) of a nationally and regionally significant component of New Zealand's electricity supply infrastructure, which has a current Meridian asset value of $5.4 billion.
- Lower wholesale prices (an average reduction of $11/MWh or 7%) and lower price volatility in the market.
- Lower overall costs to electricity consumers (a reduction of $527 million per annum or $1.58 billion over 2025-27).
- Reduced carbon emissions (a decrease of 224 kT CO2 equivalent per annum) as hydroelectric power is utilised over thermal generation.

2.2.1 Lake Pūkaki operation levels

In Winter 2024 New Zealand experienced an energy shortage caused by naturally low hydro inflows, naturally low wind generation, and an unexpected shortage of gas. Through this period there was a real possibility that Meridian would need to manage Lake Pūkaki below 518 mRL in accordance with the Waitaki Catchment Water Allocation Regional Plan (WAP), existing resource consent and the mitigation and monitoring agreements in place with Waitaki Rūnaka and other major stakeholders (refer to **Appendix A**).

During this period, the ability to utilise contingent storage via the issuing of an SSA or commencement of an OCC was highly uncertain. This uncertainty impeded Meridian's ability to plan for the use of contingent storage and impacted the use of stored water below and, importantly, above the consented minimum (518 mRL). In short, Meridian was required to assume that contingent storage would not necessarily become available and therefore, plan on the basis that the lake level would potentially have to remain at or above 518 mRL, even if that resulted in unnecessary or avoidable power shortages. This uncertainty results in higher electricity costs and increased emissions due to greater reliance on thermal generation, as hydro storage availability remains uncertain. It also undermines confidence in the security of the electricity system.

Operating Lake Pūkaki between 518 mRL and 513 mRL and making readily available the additional stored water, provides approximately 546 GWh of realisable energy. This is equal to the entire annual output of Meridian's new 176 MW Harapaki wind farm or, the annual electricity consumption of 75,000 average New Zealand residential households.

Of the options available, contingent hydro storage represents fuel that is currently available to the system and is lower cost than the alternatives. Removing blocks to accessing that storage is the most efficient, straightforward and cost-effective way to boost New Zealand's energy reserves. It does not rely on external supply chains or on upstream production performance. It simply requires the removal of restrictions which currently prevent its use, even in situations of shortage. Meridian seeks temporary access to this currently restricted hydro storage capacity for three years in winters 2025, 2026 and 2027, a period of potential electricity shortages, while new generation and battery capacity along with demand responses closes the supply-demand gap. Given the date of submission of this application, Meridian seeks flexibility to confirm the duration sought during the substantive application process. The reason being that based on current timelines it is possible that the consent may not be in place for the winter of 2025, thus subject to the decision makers' approval, Meridian may seek to amend the duration to be the three consecutive winters following the granting of the consent.

2.2.2 Modelling results – restricted verses eased access

Meridian has undertaken modelling to inform operational decisions regarding the management of water stored in Lake Pūkaki, comparing the current restricted operating regime to the proposed regime with the SSA and OCC triggers removed (see **Appendix B**). The modelling was based on 91 years of catchment hydrological and meteorological data, using the current understanding of the New Zealand energy system (supply and demand analysis) and applying this to the forecast period between January 2025 and January 2028 (the period of interest for the Fast-track application).

In summary, enabling access to contingent storage is expected to result in a wider lake operating range i.e. Lake Pūkaki being able to be operated more flexibly providing support to New Zealand's electricity system. While lake levels are held lower on average (but still with the permitted normal operational range of 518 MRL to 532.5 mRL),

they are only expected to fall below the current controlled storage minimum (518m amsl) around 3% of the time. This equates to approximately 33 days on average over the three-year period. In Meridian's view, this is in line with what would be expected for a resource termed 'contingent storage' i.e. occasional usage during extreme periods to support system security. In contrast, under current settings, contingent storage has never been used.

In addition, with access to contingent storage enabled, Meridian's analysis shows that in no cases – even the most extreme of historical dry sequences – do Lake Pūkaki storage levels reach the bottom of the currently permitted range (513 mRL). This is consistent with the strong incentives on hydro operators to prudently manage storage.

The modelled excursions below 518 mRL are less than that which was assessed by independent decision-makers in Plan Change 1 (PC1), a Private Plan Change to the WAP sought by Meridian in 2012. This plan change introduced a new minimum lake level for Lake Pūkaki during electricity supply emergencies when the System Operator had commenced an OCC. PC1 allows additional water from Lake Pūkaki to be used for generating emergency electricity as a permitted activity when an OCC is declared by the System Operator. Within PC1, the duration of an entire event (time below 518 mRL) was considered likely to be between 4-7 months (this includes the time spent operating below 518 mRL, as well as the time required to restore the lake level to above 518 mRL).

The analysis also found that, during normal market conditions, easing access to contingent storage will result in:

- Lower wholesale prices (-$11/MWh or 7% on average) and lower price volatility.
- Lower overall costs to electricity consumers (-$527 million per annum or -$1.58 billion over 2025-27).
- Lower hydro spill (-321 GWh per annum on average) meaning this energy can be used to generate electricity and displace higher cost thermal fuels that also release carbon emissions.
- Lower emissions (-224 kT CO2 equivalent per annum).

On this basis, the current restrictions on utilisation of contingent storage can be seen as having an adverse impact on New Zealand electricity consumers with wholesale electricity prices being higher earlier than the 'eased' scenario. In the context of tight security of supply market conditions and other upwards pressures on electricity prices, enabling access to contingent storage is a highly effective step that can be taken to support better consumer outcomes across the whole electricity market.

2.2.3 Pūkaki Dam rock armouring

Protective rip-rap will be installed on the upstream face of the Pūkaki dam and its left and right abutments to provide protection from wave erosion during periods when the lake level is below 518 mRL. Assuming low lake levels occur, dependent on hydrology, it is anticipated that this would occur in early winter 2025. Construction would be deferred to future years if low lake levels do not eventuate, or a consent is not in place for the winter of 2025. The rip-rap placement construction is expected to be undertaken in a single stage with works being sequenced as follows:

1. Monitor lake level trends.
2. Finalise Environmental Management Plans I.e. Dust Management Plan, Erosion and Sediment Control Plan, Emergency Spills Response Plan and Accidental Discovery Protocol (Further details regarding these plans and other mitigation measures to be implemented are detailed in Appendix F).
3. Update traffic management and safety plans.
4. Establish the site as the lake level lowers below 520 mRL and there is an expectation of the lake level continuing to drop to below 518 mRL.
5. Construct access tracks and ramps.
6. Begin rip-rap work on the dam and its abutments when lightly or unarmored areas requiring protection become accessible (accurate rip-rap placement is possible to a depth of around 1 m).
7. Extend rip-rap protection by placing rock to levels as low as possible before lake level rises.
8. Remove construction benches and ramps by reinstating an evenly sloping dam face and abutments.

Overall, the rock armouring works are estimated to take 10-12 weeks. A sequence plan of the proposed works is provided in **Appendix C** and further detail on the activities required is provided below.

2.2.3.1 Construction methodology stages

Preconstruction:

- **Site office and facilities setup:** Establish the site office and necessary facilities in the designated area.
- **Equipment transportation:** Deliver a 20-tonne (t) excavator to the designated stockpile areas. The rock for armoring is already sourced and positioned in two stockpiles south of State Highway (SH) 8 (Refer to Figure 2).
- **Work area fencing:** Secure the work area and close the carpark that is located on Meridian's core land on the dam, and the Mt Cook Alpine Salmon (MCAS) shop.
- **Excavator positioning:** Place 45 t excavators at the high dam car park area and the left abutment via an existing access track.

Establish Road Truck Access:

- **High dam and true right abutment:** Access the dam face via a track from the east end of the Meridian carpark, with minor repositioning of the A2O trail to retain accessibility.
- **True left abutment:** Access via SH8, with trucks exiting at the east end of the dam and using an off-road track before transitioning to a prepared track on the left-hand side of the abutment.

Constructing Access to Dam Face:

- **Create access tracks:** Use 45-t excavators to move large rocks aside and create construction access tracks.
- **Import gravel:** Road trucks deliver gravel for the 45-t excavator to spread and fill rock voids, creating a running course for road trucks.

Constructing Work Benches:

- **High dam:** Clear the existing construction bench at RL517. Strip a 3-m wide strip of rock along the outer edge using a 45-t excavator. Stockpile the removed rock for use as rip-rap material for armoring down to RL514. Replace stripped material with new rock as work progresses.
- **Right abutment:** Create access by clearing existing rip-rap at RL517 with a 45-t excavator. Cut a 5 m wide construction bench into the abutment. Stockpile or transport removed material to the Rock Stockpile Area for temporary storage.
- **Left abutment:** Clear existing rip-rap and create a 5 m wide track, similar to the right abutment.

Construct Toe/Key Along High Dam:

- **Create keyway:** Use a 45-t excavator to create a keyway for rock placement, forming a 'toe' at the base of RL514. Use rock from the RL517 bench in this area.

Rock Placement on High Dam:

- **Rip-rap enhancement:** Strip existing rock from the 517 mRL construction bench and place it as rip-rap enhancement down to 514 mRL. Road trucks will deliver new rock from the stockpile area to replace the used material.

Rock Delivery:

- **Load and transport rock:** Load rock from the stockpile area into road trucks using a 20-ton excavator with a grab bucket. Trucks will reverse down the construction track to deliver rock to the excavators.

Rock Placement on Abutments:

- **Construct groynes for excavator access:** Use a 45-t excavator to construct groynes perpendicular to the dam face, extending the new rip-rap enhancement down to 514 mRL. As road trucks deliver rock, the

excavator will place it down the dam slope and build a groyne at least 5 m wide at the top. Once the groyne is of a sufficient size for the excavator to reach 514 mRL, place rock along the toe. Deconstruct the groyne and use the material for rip-rap enhancement. Repeat this process every 15 m to armour the entire area.

Decommissioning Activities

- Transport any remaining stockpiled rock back to the original stockpile area.
- Remove any temporary access tracks created for the project, including gravel and other materials used to fill rock voids.
- Re-establish any original paths or trails that were altered during the project, ensuring they are safe and accessible.
- Remove the site office and any other temporary facilities.

Key Equipment:

- 20-t Excavators for sorting and loading rock.
- 45-t Excavators for construction work.
- Heavy-duty road trucks for transporting materials.

2.3 Activity eligibility

The proposed temporary removal of operational triggers on the lake levels to allow for planning and utilisation of the realisable electricity generating capacity of Lake Pūkaki, together with the associated rock armouring works, meet the eligibility criteria for the fast-track approvals process under section 22 of the Fast-track Approvals Act.

The project will deliver significant regional and national economic benefits by enhancing electricity supply security and lowering wholesale electricity prices on average and during shortage, which are essential for economic growth. Providing a consistent and dependable power source to businesses and industries reduces the risk of outages and price spikes, preventing operational disruptions, financial losses, and productivity difficulties. Furthermore, a lower price and secure electricity supply supports the development of new businesses and industries, attracting investment and creating jobs.

Referring the project to the fast-track approvals process will enable it to proceed, as there is currently no statutory approval pathway allowing Lake Pūkaki levels to be lowered below 518 mRL without a third party instigating the triggers, as it is a prohibited activity pursuant to the WAP.

Fast-tracking is crucial due to the urgent need to address the issues experienced in Winter 2024 and improve market planning and utilisation of all of the realisable generation capacity of Lake Pūkaki and the connecting WPS, and to ultimately improve customer and price outcomes in the electricity pricing market. The WPS is the largest hydro scheme in New Zealand and the proposed fast-track approval is the largest single opportunity to improve security and market performance that is immediately available. Fast-tracking will also enable rock armouring works to be completed as soon as practicable. These works must occur when lake levels are lowered.

Of the options available, contingent hydro storage represents fuel that is currently available to the system and is lower cost than the alternatives. Removing blocks to accessing that storage is the most efficient, straightforward and cost-effective way to boost New Zealand's energy reserves. It does not rely on external supply chains or on upstream production performance. It simply requires the removal of restrictions which currently prevent its use, even in situations of shortage such as winter 2024.

The project will also support climate change mitigation by reducing greenhouse gas emissions by -224 kT CO2 equivalent per annum. By increasing the availability of hydroelectric power, the project will reduce New Zealand's reliance on coal generation, diesel power and thermal generation during energy shortage periods. The temporary removal of Lake Pūkaki storage restrictions will further enhance the operability of the largest hydro storage reservoir in New Zealand (nationally significant electricity infrastructure) and provide the necessary flexibility to manage hydro storage effectively, supporting the establishment of other renewable electricity generation sources. This aligns with New Zealand's goals for reducing emissions and transitioning to renewable energy sources.

The project is unlikely to affect the efficient operation of the fast-track approvals process. The temporary consents sought for the next three winters are specific and time-bound, ensuring a streamlined review and approval process. Additionally, the consent for the permanent rock armouring will not disrupt the fast-track approvals process. This is due to Meridian's efforts in developing a detailed construction methodology, which has allowed for the identification and mitigation of potential environmental effects, ensuring the approval process remains smooth and timely.

The project does not involve any ineligible activities under Section 5 of the Act. The proposed works are focused on improving hydro storage availability and do not include activities that would be subject to determinations under sections 23 or 24 of the Act.

The proposed activity has been assessed against the relevant national policy statements and national environmental standards. Overall, the proposal is consistent with, and not contrary to, the relevant objective and associated policies (refer to Section 3 of this report).

The project has been assessed as being consistent with aspects of the local and regional planning documents particularly the Canterbury Regional Policy Statement, the Canterbury Land and Water Plan Regional Plan, the Canterbury Air Regional Pan and the Waitaki Catchment Water Allocation Plan (WAP). Specifically, it will support the social and economic well-being of communities by enhancing the security of electricity supply while ensuring that adverse environmental impacts are properly mitigated. Additionally, Policy 37 of the WAP allows for the temporary lowering of Lakes Tekapo, Pūkaki, and Ōhau when necessary for the maintenance or rehabilitation of electricity generation infrastructure. The proposed activity is consistent with and supports this policy.

Given the activities prohibited status, there is some tension between the activity and some objectives and policies which specifically relate to the lowering of lake levels only in times of national or South Island electricity shortage as established by the Electricity Commission. However, the overall positive effects of the proposal, such as enhancing electricity supply security, reducing wholesale electricity prices on average and during shortages, and supporting climate change mitigation, are considered to outweigh these conflicts. Furthermore, the effects associated with lake level utilisation are consistent with those anticipated by the WAP and the resource consents held by the scheme operator.

2.4 Project location

2.4.1 Lake Pūkaki

Lake Pūkaki, located approximately 10 kilometers (km) north of Twizel in the Mackenzie Basin, is a modified natural lake and is the largest hydroelectricity storage lake in New Zealand.

Lake Pūkaki water levels have been controlled since the early 1950’s, when it was raised by 9 m via a low dam. In the late 1970s water from Lake Tekapo was directed into Lake Pūkaki via the Tekapo Canal and during this time Lake Pūkaki was raised by a further 37 m with the construction of the Pūkaki high dam (referred to as the Pūkaki Dam).

Lake Pūkaki is fed by natural inflows and diverted inflows, which include snow melt, in particular from the Tasman and Hooker Rivers, as well as from Lake Tekapo via the Tekapo Canal and Tekapo B Power Station. It covers an area of approximately 179 square kilometres and reaches a depth of 107 m.

Meridian owns land and the bed of Lake Pūkaki in the vicinity of and including the Pūkaki Dam and holds an easement in gross over the bed and margin of the remainder of the lake (operating easement granted by Land Information New Zealand (LINZ)). Titles and the Operating Easement are included in **Appendix D.**

The outflow of water from Lake Pūkaki is generally into the Pūkaki Canal via the Pūkaki Canal inlet (Gate 18). As necessary, flows can also be released into the Pūkaki River via the spillway situated within the Pūkaki Dam (Gate 19). Refer to Figure 1 Lake Pūkaki and key infrastructure associated with the WPS**.**

Water is taken from Lake Pūkaki for irrigation purposes by Glentanner Station Limited (Catherine Fields) adjacent to Gate 19 and within Meridian’s land. These facilities and operations, being the responsibility of Glentanner

Station Limited, are not the subject of this application. Meridian has a legal agreement with Glentanner Station Limited regarding the security of its water supply.

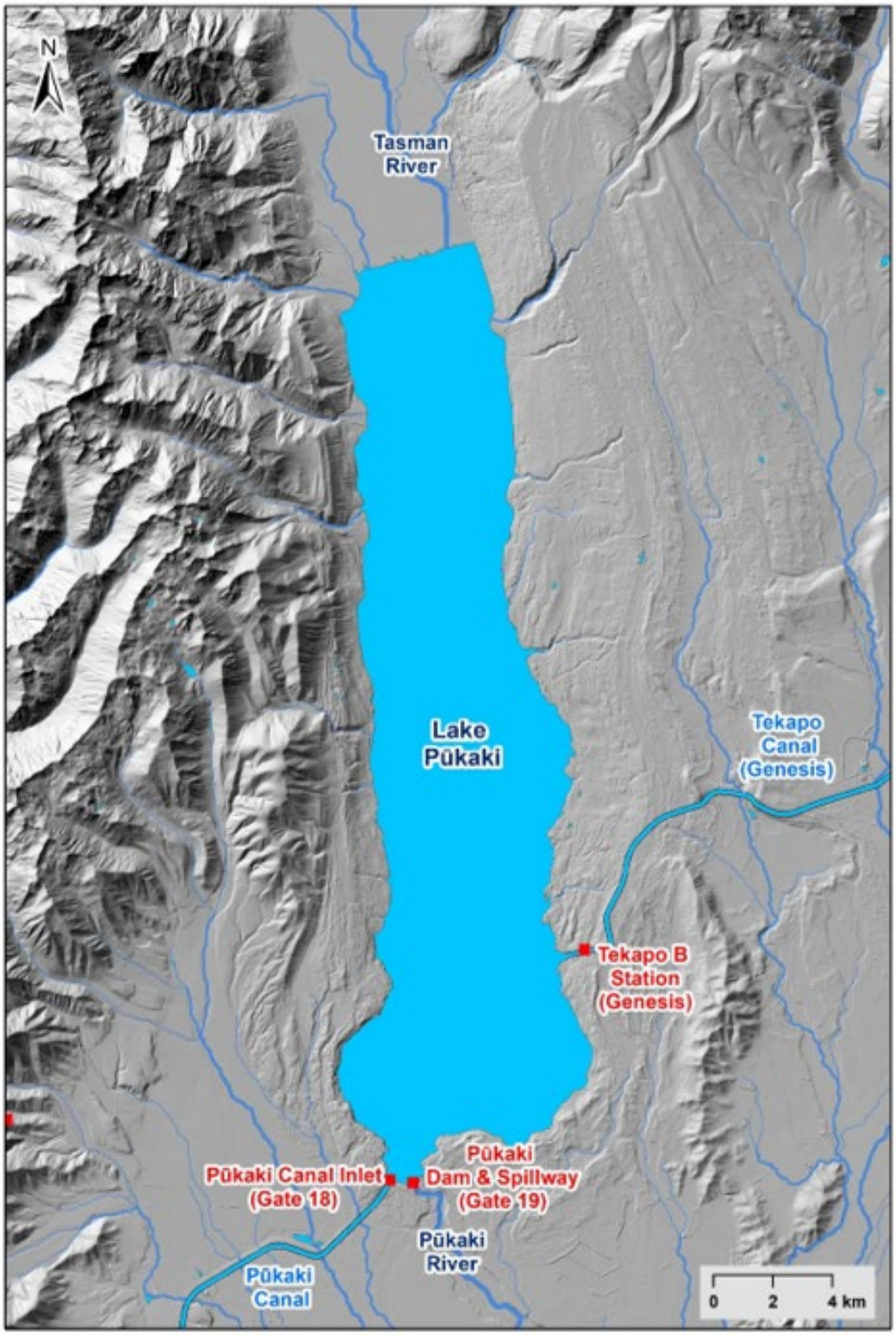


Figure 1 *Lake Pūkaki and key infrastructure associated with the WPS*

2.4.2 Pūkaki High Dam

The Pūkaki Dam is located at the southern end of the lake where the Pūkaki Canal begins. Constructed in 1977, the Pūkaki High Dam is made up of two dams separated by a rock ridge in the centre. Both dams are earth-fill structures with a maximum height of approximately 61 m and a total crest length of 1.7 km. The upstream face of

the dam is protected from wave damage by a layer of rip-rap sitting on bedding material. The downstream face is protected from erosion by a layer of coarse gravel. The rip-rap protection extends along the lake edge for approximately 1.8 km.

2.4.3 Pūkaki Canal and Associated Infrastructure

Water from Lake Pūkaki flows through the Pūkaki Canal inlet (Gate 18) into the Pūkaki Canal. The Pūkaki Canal conveys water from Lake Pūkaki to the confluence of the Ōhau Canal, and then via the Ōhau A Canal to Ōhau A Power Station.

The Pūkaki Canal is situated on land owned by Meridian and is presented in Figure 2 Lake Pūkaki Dam and location of existing stockpile areas.

Water is taken from the Pūkaki Canal for irrigation purposes by Bendrose Station Limited. This water take, being the responsibility of Bendrose Station Limited, is not the subject of this application. Meridian has a legal agreement with Bendrose Station Limited regarding the security of its water supply.

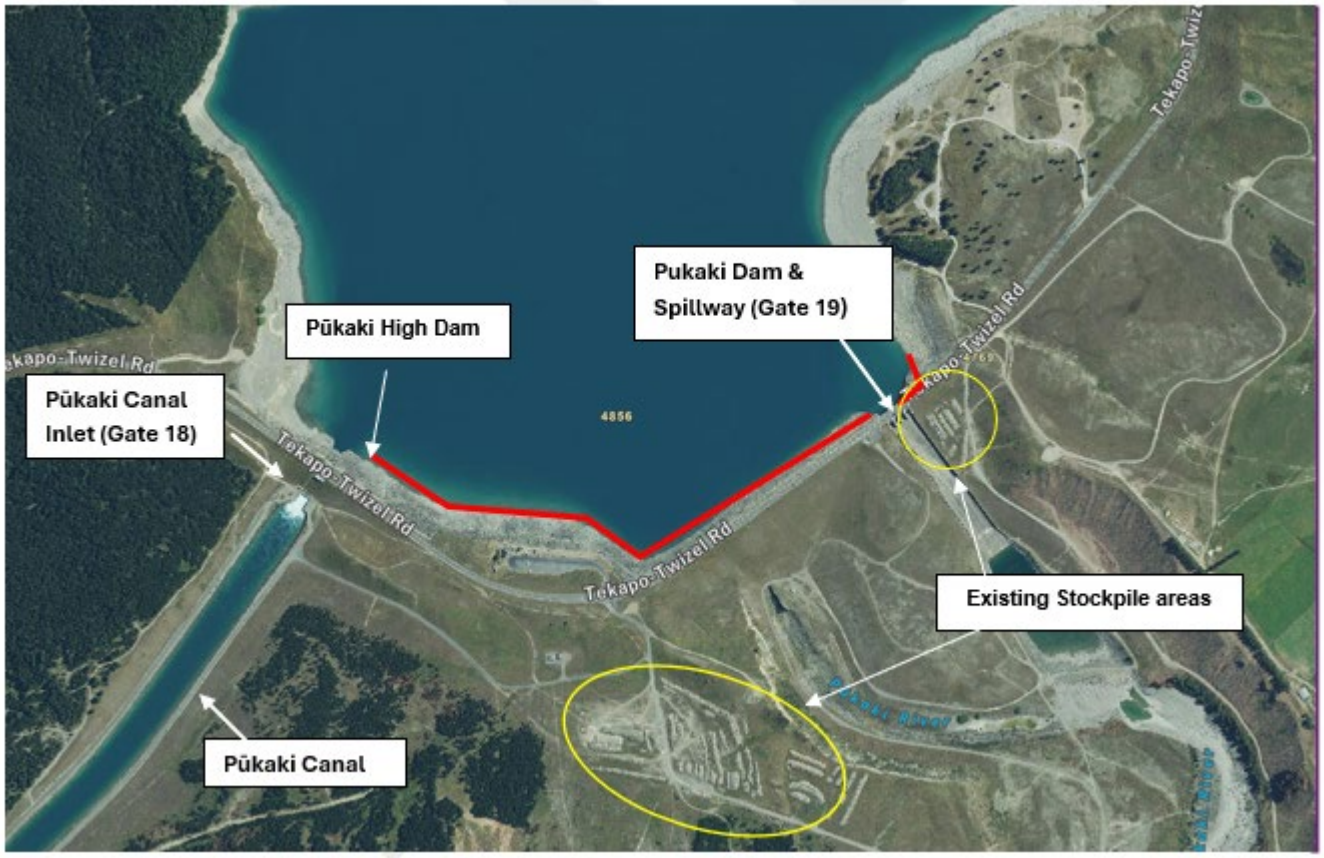


Figure 2 Lake Pūkaki Dam and location of existing stockpile areas

2.4.4 Existing environment

Lake Pūkaki is a significant feature in the open grassland and mountainous landscape of the Mackenzie Basin, recognised as an Outstanding Natural Landscape in the Canterbury Regional Policy Statement and Plan Change 13 to the Mackenzie District Plan.

North of Lake Pūkaki is the Tasman River, which is moderately covered by herbaceous and shrub vegetation. The river provides nesting habitat for braided river birds, including Black Stilts, Wrybill, and Black-fronted Terns, from September to January.

The aquatic ecology of Lake Pūkaki is characterised by a lack of macrophytes, low productivity in both littoral and pelagic zones, and a limited fish population. The lake shore vegetation is sparse due to topography, fluctuating

lake levels, and wave action, but diverse turfland communities, such as Isolepis basilaris, occur on the Tasman Delta (Tasman River).

Seventeen wetlands comprising a total of 645 ha are located around the shores of Lake Pūkaki and are likely to be hydrologically connected to the lake. Wetlands around the lake are partly lacustrine, but mostly palustrine areas of marsh and/or shallow water wetlands on shoreline features and within depressions; three contain areas of swamp. The importance of the lake to the hydrology of the wetlands varies and has been determined to be of high importance only for the Tasman River delta.

The Lake Pūkaki catchment is identified as a Rūnanga Sensitive Area, and the lake itself is a Statutory Acknowledgement Area due to its significant cultural, spiritual, historic, and traditional association with the Ngāi Tahu iwi.

2.4.5 Surrounding area

Lake Pukaki is located approximately 10km north of Twizel Township within the Mackenzie District.

Land uses surrounding the lake are typified by conservation activities and isolated tourism developments associated with Aoraki Mt Cook National Park; extensive agriculture, with patches of forestry, to the west, east, and south of the lake; and hydro electricity generation infrastructure around Tekapo B Power Station and the Pūkaki Dam. There are a number of tourist and recreation activities that occur within the wider area around Lake Pūkaki. However, active recreation on Lake Pūkaki itself is relatively low.

The nearest residential dwellings are located to the northeast of the dam wall, approximately 1.3km away. The Mt Cook Alpine Salmon shop (formerly known as the Lake Pūkaki Information Centre) is located between the dam wall and State Highway 8. The closest distance between the dam wall and shop is approximately 10 metres. This shop is situated on land owned by Meridian and will be closed during the construction works. The car park adjacent to this building is also on Meridian owned land and is used as a viewing area across Lake Pūkaki and on a clear day, also offers views of Aoraki/Mt Cook. This carpark will also be closed to the public during construction works.

Genesis owns and operates that part of the WPS generally above Lake Pūkaki and includes two power stations, Tekapo A and Tekapo B. Tekapo B is located on the east side of Lake Pūkaki and is accessed via Hayman Road.

2.5 Approvals required

2.5.1 Prohibited activities

The WAP outlines rules for water allocation in the Waitaki catchment, aligning with the Resource Management Act 1991. This plan manages water levels in Lake Pūkaki to support hydroelectric power generation, irrigation, and other uses.

Rule 3 of WAP states that no person can take, use, dam, or divert water from Lake Pūkaki if the lake level is below the minimum lake level of 518 m except in the follow circumstances:

- A minimum lake level of 513 mRL during an OCC (Part 9 of the Electricity Industry Participation Code 2010).
- A minimum lake level of 515 mRL during an SSA.

Rule 17 of WAP states that taking, using, damming, or diverting water for hydroelectric generation that complies with Rule 3 is a discretionary activity, except during an OCC, when it is a permitted activity. Therefore, a resource consent is required to manage Lake Pūkaki levels during an SSA.

Meridian obtained a resource consent (CRC185833) to operate the lake between 515 mRL and 518 mRL during an SSA. As discussed in Section 2.5.3 below, the use of this water during winter 2024 proved to be infeasible and uncertain. This adversely impacts the prudent management and utilisation of lake levels above and below 518 mRL, in response to serious market stress and security of supply challenges.

To increase electricity generation availability, Meridian seeks temporary resource consents to operate without being restricted by the infeasible SSA and OCC triggers. This activity does not comply with Rule 3 or CRC185833.

Rule 12 of the WAP specifies that any activity not complying with Rule 3 is a prohibited activity. Consequently, there is no consent approval pathway outside of the Fast-track process. The only alternative approval pathway would be via a further Private Plan Change which is not considered viable given the lengthy duration of a plan change process and the urgency of this work.

2.5.2 Consents required

The rock armouring erosion protection works will require resource consent under the Canterbury Regional Land and Water Plan and the Canterbury Air Regional Plan. Consent requirements are summarised below.

Canterbury Regional Land and Water Plan

- The discharge of water or contaminants into surface water cannot meet the permitted activity standards of Rules 5.98 and 5.99. Therefore, consent is required under Rule 5.100 as a **discretionary activity.**
- The extraction of gravel from the bed of a lake including the deposition of substances, excavation or other disturbance of the bed of a lake cannot comply with the permitted activity standards of Rule 5.148. Therefore, consent is required under Rule 5.150 as a **discretionary activity.**

Canterbury Air Regional Plan

- The discharge of dust into air cannot meet the permitted activity standards of Rule 7.3. Therefore, consent is required under Rule 7.5 as a **non complying activity.**

2.5.3 Existing consent

Meridian holds consent CRC185833, granted on 9 July 2018, which authorises the operation of Lake Pūkaki between the levels of 518 and 515 mRL, subject to conditions. This consent expires on 30 April 2025 but has been granted a section 124 continuance while the new replacement consent (CRC240441) is being processed. The replacement consent CRC240441 is for a controlled activity under Rule 15A of the WAP, meaning Environment Canterbury must grant it (albeit the application must be publicly notified). To be considered a controlled activity under Rule 15A, compliance with Rule 3, which regulates the minimum lake levels of Lake Pūkaki, is required.

The conditions of consent require Meridian to undertake a number of actions prior, during and following any lowering of lake levels below 518 mRL. In summary, these actions consist of:

- Before Lowering:
    - An SSA is required to be issued by the SO.
    - Meridian must notify Canterbury Regional Council (ECan) of the SSA before lowering levels below 518 mRL.
- Operating below 518 mRL:
    - When the SSA ends and an OCC is not in place, Meridian is to restore lake levels to 518 mRL as soon as practicable.
    - Whilst lake levels are being restored, Meridian must advise ECan on a weekly basis, the strategies adopted to restore lake levels to 518 m and the lake level at the end of each reporting week.
- Post recovery (above 518 mRL):
    - Provide a report to ECan within 8 weeks following the restoration of lake levels to 518 mRL which addresses specifics of the lowering event (dates, times, levels, duration, recovery period).
- There is a requirement for the consent holder to compare any lowering event to the original resource consent application and provide a detailed explanation of any differences and circumstances of the differences – but does not require an effects assessment.
- There is an opportunity for ECan to review the conditions of consent post recovery, including for the reasons of better managing adverse effects that are not otherwise authorised.

Currently, due to the experience and challenges of winter 2024, there is inadequate confidence regarding the process and predictability of a SSA being triggered for accessing additional storage in Lake Pūkaki under this consent. The ongoing uncertainty and the experience of winter 2024 when a one off and ad hoc change to the settings was required, means that the electricity market and planning has to assume that access is not available. This has serious adverse impacts for the operation of the electricity market leading to higher prices, greater thermal fuel use and emissions and reduces confidence in actual security of supply.

2.5.4 Compliance track record

Meridian produces an annual Waitaki Resource Consents Compliance Report to ensure they are compliant with the 34 consents required to operate the WPS. For Lake Pūkaki, the two relevant consents are:

- **RC905321.7:** To dam the Pūkaki River and operate Lake Pūkaki between 518.00 and 532.50 m above mean sea level (msl), at or about Map Reference NZMS 260 H38:820-649 (Lake Pūkaki Control Structure).
- **CRC185833:** To operate Lake Pūkaki below 518 ms AMSL at or about Map Reference NZMS 260 H38:820-649 (Lake Pūkaki Control Structure).

Compliance with these consents is achieved by maintaining the lake levels within the control range and by complying with the operating rules when the lake level is outside the control range (in a flood). A non-compliance would occur if the lake level went outside the control range and the operating rules are not followed.

In the most recent compliance report for the period 1/07/2023 - 30/06/2024, the maximum control level condition and operating rules were fully complied with.

2.6 Record of consultation

Meridian has initiated consultation with Canterbury Regional Council (ECan), MacKenzie District Council (MDC), Land Information New Zealand (LINZ) and Ngāi Tahu prior to lodging this application. The engagement aims to gather feedback on the proposal and to work directly with iwi and stakeholders to ensure their concerns are understood and considered. Details of the persons requiring consultation under Regulation 11 of the Fast-track Approvals Act, their roles, and a summary of the consultation undertaken to date are provided in **Appendix E.**

Meridian has committed to providing a copy of the final Referral Application to iwi, ECan and MDC for feedback.

2.6.1 Existing mitigation agreements

Rules regarding the ability to utilise the range of Lake Pūkaki below 518m mRL were inserted to the WAP via: Plan Change 1 in 2012, and Plan Change 3 in 2016. Furthermore, access and environmental impacts and suitable mitigation were addressed when Environment Canterbury granted resource consent for utilisation of Lake Pūkaki below 518 m, pursuant to a SSA, in 2018. As part of both the plan change and resource consent processes, Meridian was required to identify, assess and mitigate potential adverse effects associated with the utilisation of the lake range below 518m mRL. This involved entering into mitigation and monitoring agreements, which remain extant, with the parties who identified themselves and submitted in any of those three processes. For a summary of these existing agreements, please refer to **Appendix A.** Meridian will continue to engage with these stakeholders as per the agreements.

2.7 Persons affected by the proposal

The Fast Track Approvals Act does not include a definition of ‘affected parties’ therefore in this instance the definition contained in the Resource Management Act has informed the consideration of this issue and those parties with whom Meridian has Mitigation and Monitoring agreements are not considered affected in this instance. Therefore, we consider the persons potentially affected by the proposal to be:

Eased access to contingent Storage

- Iwi

Rock armouring works

- New Zealand Transport Agency (NZTA)
- Iwi

This list will be updated (if required) during the substantive application process, if this application to seek consent under the Fast Track Act is approved.

2.8 Statutory Considerations

2.8.1 Ngāi Tahu Claims Settlement Act 1998

The Ngāi Tahu Claims Settlement Act 1998 provides the legislative framework that furthers the agreements expressed in the Deed of Settlement between the Crown and Ngāi Tahu. This legislation recognises the special relationship of Ngāi Tahu with the land and resources, including those used and affected by the proposal.

The Crown acknowledges the cultural, spiritual, historic, and traditional association of Ngāi Tahu with the Waitaki catchment, and statutory acknowledgement areas which include Lake Pūkaki.

Pūkaki is one of the lakes mentioned in the tradition of “Ngā Puna Wai Karikari o Rakaihautu,” which tells how the principal lakes of Te Wai Pounamu were dug by the rangatira (chief) Rakaihautu. In Ngāi Tahu tradition, Pūkaki is referred to as the basin that captures the tears of Aoraki, a reference to the meltwaters that flow from Aoraki into the lake in the springtime.

The purpose of the statutory acknowledgement area is to:

- Require that consent authorities forward summaries of resource consent applications to Te Rūnanga o Ngāi Tahu.
- Require that consent authorities, Heritage New Zealand Pouhere Taonga or the Environment Court, as the case may be, have regard to this statutory acknowledgement in relation to Lake Pūkaki.
- Enable Te Rūnanga o Ngāi Tahu and any member of Ngāi Tahu Whānui to cite this statutory acknowledgement as evidence of the association of Ngāi Tahu to Lake Pūkaki.
- Consent authorities must have regard to the statutory acknowledgement when considering whether Te Rūnanga o Ngāi Tahu is an affected entity for a resource consent application within, adjacent to, or directly impacting the statutory acknowledgement area.

2.8.2 Waitaki Iwi Management Plan

The Waitaki Iwi Management Plan has been developed by Te Rūnanga o Arowhenua, Te Rūnanga o Waihao, and Te Rūnanga o Moeraki as an expression of rakatirataka (chieftainship) and in fulfillment of their kaitiaki (guardianship) responsibilities within the Waitaki Catchment.

The 2019 Plan's vision is: "To walk in the footsteps of our tupuna and in doing so, set a future pathway for our moko. Ka whakawharikitia e Tatou te huarahi mo ratou a muri ake nei, kia takahia ka tapuwae o ka tipuna."

The Plan is guided by two overarching strategic directions and eight high-level objectives. The strategic directions are:

- **Strategic Direction 1** - Ka Rūnaka can undertake their kaitiaki role in the Waitaki and this role is recognised and supported.
- **Strategic Direction 2** - Management of the Waitaki and its resources is undertaken ki uta ki tai - from the mountains to the sea.

The key strategic objectives relevant to this project address three key topics (Wai, Mahika kai and Wahi Tupuna) and are as follows:

- **Wai**
    - The mauri of water is protected, restored and enhanced throughout the Waitaki catchment.
- **Mahika kai**
    - Abundant mahika kai species are available and accessible for mana whenua to gather.
    - Mahika kai species and their habitats are protected, restored and enhanced.
    - Manawhenua can exercise rakatirataka and kaitiakitaka over significant mahika kai areas and species.
- **Wahi tupuna**
    - Wahi tupuna are protected and the relationship mana whenua have with these landscapes is enhanced.

Meridian is actively engaging with mana whenua to understand and address any concerns regarding the proposal. This engagement will guide the works and the substantive application, so that they have regard to mana whenua's relationship with wahi tupuna.

To date, Meridian has confirmed its commitment to honouring existing agreements made during PC1 and subsequent resource consents (**see Appendix A**). These agreements outline how Meridian and mana whenua will collaborate if lake levels between 518 – 513 mRL are utilised.

Overall, the proposal will be carried out in a manner that aligns with the vision and strategic direction of the Plan, respecting both environmental and cultural values.

2.9 Potential Environmental Effects

Meridian engaged technical experts to assess the potential environmental effects of the proposal. Refer **Appendix E** for an initial summary of the anticipated and known adverse effects of the activity on the environment. Key potential effects relate to:

- Landscape and Visual
- Water Quality
- Air Quality
- Ecology
- Cultural Values
- Existing water takes and infrastructure
- Groundwater

Within the technical assessments, the likely environmental effects associated with the proposed rock armouring works were identified as well as recommendations of mitigation strategies that could be implemented.

With regards to the eased access to Lake Pūkaki contingent storage, technical experts considered whether there were any material changes in the physical environment since PC1, and if such changes might potentially result in a new effect or a material change beyond the effects considered in PC1.

Overall, it has been determined that with appropriate mitigation measures in place, the anticipated potential adverse effects resulting from rock armouring and the removal of contingent storage triggers, can be managed to be minor. Additionally, for the removal of the contingent storage restrictions, the extent and scale of potential adverse effects will be consistent with those authorised by Plan Change 1.

3. Statutory Compliance

3.1 Alignment with national direction

The proposed activity subject to this application has been assessed against the relevant national policy statements and national environmental standards. This assessment is provided below.

3.1.1 National Policy Statement for Renewable Electricity Generation

The National Policy Statement for Renewable Electrical Generation (NPS-REG) provides guidance for local authorities on how renewable electricity generation should be dealt with in Resource Management Act 1991 planning documents. The NPS-REG applies to renewable electricity generation activities at any scale and covers the construction, operation and maintenance of structures associated with renewable electricity generation.

The objective in the NPS-REG is as follows:

'To recognise the national significance of renewable electricity generation activities by providing for the development, operation, maintenance and upgrading of new and existing renewable electricity generation activities, such that the proportion of New Zealand's electricity generated from renewable energy sources increases to a level that meets or exceeds the New Zealand Government's national target for renewable electricity generation'

The policies that implement the objective, and are of relevance to the proposed activities are:

- *Recognising the benefits of renewable electricity generation activities (Policy A).*
- *Acknowledging the practical implications of achieving New Zealand's target for electricity generation from renewable resources (Policy B).*
- *Acknowledging the practical constraints associated with the development, operation, maintenance and upgrading of new and existing renewable electricity generation activities (Policy C).*

New Zealand's gas supplies have been in steady decline for a number of years[1]. This situation has been independently described as a potential death spiral for domestic gas users[2]. In Winter 2024 following low hydro inflows and low wind generation, the unavailability of gas for electricity generation coupled with uncertainty regarding the calling of a SSA, resulted in considerable coal generation, operation of the diesel power Whiranaki power station and high electricity prices. As part of a response to improve electricity system security, reduce price spikes and utilise renewable generation ahead of increased thermal generation, Meridian seeks temporary consents to operate Lake Pūkaki below 518 m without SSA restrictions, and to place rock armouring at Pūkaki Dam to enhance the structure's resilience during low lake levels. These activities support the objective of the NPS-REG by enabling Meridian to better utilise hydro storage and in turn more effectively operate existing renewable electricity generation structures during periods of energy scarcity

The project acknowledges and promotes the benefits of renewable electricity generation, including reducing greenhouse gas emissions and contributing to sustainable development. Improving access to hydro storage will reduce greenhouse gas emissions from the electricity sector by decreasing reliance on gas and coal generation.

The proposal will improve the security of electricity supply at local, regional, and national levels, providing significant economic benefits to the country. It will support industries that are reliant on New Zealand's electricity prices remaining internationally competitive.

[1] See MBIE at https://www.mbie.govt.nz/about/news/gas-production-forecast-to-fall-below-demand

[2] See RNZ at **https://www.rnz.co.nz/news/business/536280/death-spiral-for-gas-frank-energy-turns-off-switch** Comments by Paul Fuge the head of Powerswitch, the Consumer NZ run organisation providing customers with independent assessments and comparisons of electricity supply options and prices

3.1.2 National Policy Statement for Freshwater Management

The revised National Policy Statement for Freshwater Management (NPSFM) came into effect on 3 September 2020. It outlines the objectives and policies for freshwater management, providing direction for local planning and decision-making under the Resource Management Act (RMA).

The government passed the Resource Management (Freshwater and Other Matters) Amendment Act which has introduced changes to the RMA and national directives, including the NPSFM. Under the Amendment Act, when considering an application and any submissions received, a consent authority must not have regard to the hierarchy of obligations outlined in clauses 1.3(5) and 2.1 of the NPSFM. Nevertheless, regard must still be given to the policies of the NPSFM in clause 2.2 noting that policy 1 stipulates that Freshwater is managed in a way that gives effect to Te Mana o te Wai. Therefore, while the hierarchy of obligations now carries less weight than it previously did, it has still been assessed below.

Policy 1 requires that freshwater is managed in a way that gives effect to Te Mana o Te Wai. Policy 2 mandates that tangata whenua are actively involved in freshwater management, including decision-making processes, and that Māori freshwater values are identified and provided for. The hierarchy of obligations has been followed as Meridian have engaged with mana whenua during the development of the referral application and will continue this engagement during the preparation of the substantive application. This process ensures that the proposed works are undertaken in a manner which has regard to the relationship between mana whenua and Lake Pūkaki. Meridian has also committed to honoring agreements made with mana whenua during PC1 and subsequent resource consents. These agreements outline how Meridian and mana whenua will collaborate if lake levels between 518 – 513 mRL are utilised. Lastly, Meridian has engaged technical experts to provide guidance on managing the works to minimise their potential impact on the lake.

Policy 4 requires that freshwater is managed as part of New Zealand's integrated response to climate change. This is of particular relevance to the proposal as renewable electricity generation is fundamental to the response to climate change. Improving access to hydro storage will reduce the greenhouse gas emissions emitted by the electricity sector under status quo settings, while improving security of supply and mitigating price spikes due to energy shortage.

Policy 5 aims to improve the health and well-being of degraded water bodies and freshwater ecosystems. Technical specialists have assessed the potential environmental effects and identified mitigations for the proposed works. Overall, these assessments have concluded that the extent and scale of potential adverse effects associated with the proposed activities, are no more significant than the effects authorised by PC1.

Policy 6 seeks to prevent any further loss of natural inland wetlands and protect their values. While there are seventeen wetlands, totaling 645 hectares around the shores of Lake Pūkaki, all but one wetland has a ‘low’ hydrological connectivity to the lake. The wetland with high hydrological connectivity to the lake is the Tasman Delta. Overall, the lowering of the Lake below 518 mRL will only be a very small and temporary change from the existing environment and is likely have a net ‘no change’ effect on wetland habitat quality/extent. This results in a negligible magnitude of effect and an overall low level of effects from changes to the existing environment water level of Lake Pūkaki.

Policies 8 and 9 require that the loss of waterbody values be avoided as much as practicable and that the habitats of indigenous freshwater species are protected. While the proposal involves operating Lake Pūkaki at a lower level and enhancing rock armoring, these works are not expected to result in the loss of waterbody values. During the works, effects on water quality due to sedimentation will be minimised through appropriate erosion and sediment controls and monitoring the discharge of dust to air. Potential adverse effects on ecological values of Lake Pūkaki can be adequately managed to a low or very low level for both terrestrial and freshwater values. It is also recognised that allowing access to stored water without triggers will not result in lake levels dropping below those considered and anticipated in the WAP, which permits Lake Pūkaki levels to be lowered to 513 mRL during an OCC. During an OCC it is anticipated that the lake levels may remain below 518 mRL for a period of four to seven months per year, this is considerably longer than the excursion period of 11 days modelled by Meridian

Overall, the impact on waterbody values and indigenous fauna habitats will be avoided and minimised as much as practicable.

Policy 15 relates to enabling communities to provide for their social, economic, and cultural well-being. The proposal will ensure communities continues to have access to a secure supply of electricity, with reliable and internationally competitive electricity prices.

Overall, the proposal is consistent with, and not contrary to, the objective and associated policies of the NPSFM.

3.1.3 National Environmental Standards for Freshwater

The Freshwater NES-F sets requirements for carrying out certain activities that pose risks to freshwater and freshwater ecosystems. Anyone carrying out these activities will need to comply with the standards.

The standards are designed to:

- protect natural inland wetlands
- protect urban and rural streams from in-filling
- ensure connectivity of fish habitat (fish passage)

The NES-F sets out regulations regarding the construction of specified infrastructure within or adjacent to natural inland wetlands. The regulations are designed to protect natural inland wetlands from activities such as vegetation clearance, earthworks, complete or partial drainage and discharge of contaminants.

The proposal will involve land disturbance, as well as the taking, use, and discharge of water. Rock armouring on the dam's high face will not occur within 100 m of a natural inland wetland. Regarding the taking, use, and discharge of water, it is noted that the water will be taken and discharged from Gate 18 at the Pūkaki dam, which is also not within 100 m of a natural inland wetland.

As no land disturbance, and the taking, use, and discharge of water will occur within 100 m of a natural inland wetland, the regulations contained in the NES-F are not applicable.

The National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NES-CS)

The National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NES-CS) sets out planning controls for activities occurring on contaminated or potentially contaminated land. This standard is designed to ensure that land affected by contaminants in soil is appropriately identified and assessed before being developed.

The Pūkaki dam is located within a property area that has been identified on Environment Canterbury's (ECan) Listed Land Use Register (LLUR) as having three HAIL activities occurring on it. These HAIL activities include:

- HAIL activity A17: Storage tanks for fuel, chemicals or liquid waste
- HAIL activity B4: Power stations, substations or switchyards
- HAIL activity G5: Waste disposal to land (excluding where biosolids have been used as soil conditioners)

A HAIL assessment (see **Appendix F**) completed by GHD contaminated land specialists determined that while several HAIL activities have been identified as present within the wider property within which the site is located, due to the nature of contaminants and the distance to the proposed works area, it is considered unlikely that contamination in soils are present at the site.

4. Conclusion

Meridian is seeking approval under the Fast-track Approvals Act to apply for a consent to operate temporarily without the restrictions that currently apply to Lake Pūkaki and which proved infeasible, as well as approval to install rock armouring at Pūkaki Dam. Overall, the works are considered eligible under Section 22 of the Fast-track Act as, the Act will facilitate the project, the project is unlikely to materially affect the efficient operation of the fast-track approvals process and the project will have significant regional and national benefits.

All information required as outlined in Section 13 of the act have been provided with enough detail that the referral application can be considered by the Minister.

Appendices

Appendix A

Existing Mitigation and Monitoring Agreements

Table 1 Lake Pūkaki Lower Lake Level Agreements

Party to Agreement	Address for service	Date of Agreement	Requirement
Te Rūnanga o Ngāi Tahu		5/3/2012 letter of support	
Te Rūnanga o Arowhenua		27/2/2012 letter of no objection	Meridian to advise Te Rūnanga o Arowhenua of the intention to manage Lake Pūkaki below 518m.
Te Rūnanga o Moeraki		6/3/2012 email	Meridian to advise Te Rūnanga o Moeraki of the intention to manage Lake Pūkaki below 518m. Meridian work collaboratively to understand any environmental effects of managing Lake Pūkaki below 518 m. Meridian to provide weekly updates of lake levels.
Te Rūnanga o Waihao		1/3/2012 email	Meridian to advise Te Rūnanga o Waihao of the intention to manage Lake Pūkaki below 518m. Meridian work collaboratively to understand any environmental effects of managing Lake Pūkaki below 518 m. Meridian to provide weekly updates of lake levels.
Department of Conservation	Director-General of Conservation C/- Twizel Te Manahuna Area Office Private Bag Twizel Attention: Area Manager (note: notification can be via email)	3/8/2012 executed	Meridian to advise DoC if Lake Pūkaki is about to, or is, being managed below 518 m. Meridian to fund DoC to undertake appropriate monitoring of Isolepis basilaris before (base line monitoring) and during (effects monitoring) Lake Pūkaki being managed below 518 m. Meridian to fund DoC to undertake monitoring of local populations of Kaki/Black Stilt. Meridian to ensure Ngāi Tahu is keep informed of the above.
Fish & Game Council	Central South Island Fish and Game Chief executive	8/8/2012 executed	Meridian to advise Fish and Game if Lake Pūkaki is at or below 519 m and Meridian is intending it be managed below 518 m.
Braemar Station	J Mackenzie Braemar Station Limited	30/8/2012 executed	Meridian is to ensure that the effects on Braemar Station's farming and tourism activities are appropriately mitigated or compensated for. At the time of, or before, Lake Pūkaki is managed below 518 m, Meridian is to agree with Braemar Station a management plan in relation to the above.
Guide Hill Station	Marion Gould David Gould	9/8/2012 executed	Meridian is to ensure that the effects on Guide Hill Station's farming and tourism activities are appropriately mitigated or compensated for.

Party to Agreement	Address for service	Date of Agreement	Requirement
			At the time of, or before, Lake Pūkaki is managed below 518 m, Meridian is to agree with Guide Hill Station a management plan in relation to the above.
The Wolds	John Murray Bronwen Murray	27/7/2012 executed	Meridian is to ensure that the specific effects on The Wolds farming activities are appropriately mitigated or compensated for. At the time of, or before, Lake Pūkaki is managed below 518 m, Meridian should agree with The Wolds an approach in relation to the above.
Maryburn Station	Martin & Penny Murray Maryburn s 9(2)(a) Fairlie	30/8/2012 executed	Meridian is to ensure that the effects on Maryburn Station's activities are appropriately mitigated or compensated for. At the time of, or before, Lake Pūkaki is managed below 518 m, Meridian is to agree with Maryburn Station a management plan in relation to the above.
Simons Pass Station	Murray Valentine Simons Pass Station	9/8/2012 executed	Meridian is to ensure that the effects on Simons Pass Station's farming activities are appropriately mitigated or compensated for. At the time of, or before, Lake Pūkaki is managed below 518 m, Meridian is to agree with Simons Pass Station a management plan in relation to the above.
Glentanner Station	Ross Ivey Glentanner Park Limited	10/8/2012 executed	Meridian is to ensure that the effects on Glentanner Station's farming activities relating to stock control on Glentanner Station and water take infrastructure from Lake Pūkaki, if any, for Catherine Fields are appropriately mitigated or compensated for At the time of, or before, Lake Pūkaki is managed below 518 m, Meridian is to agree with Simons Pass Station a management plan in relation to the above.

Appendix B

Pūkaki Lake Management Memo

MEMORANDUM

To	Fast Track Referral Application - Technical Discipline Leads
CC	
From	Meridian Energy Limited
Date	7 April 2025
Subject	**Lake Pūkaki hydro storage management: 2025 – 2027**

1 Introduction

Meridian is seeking approval under the Fast-track Approval Act to temporarily remove restrictions on Lake Pūkaki contingent storage, allowing it to operate between 518 above mean sea level (mRL) and 513 mRL over the next three years, without Security of Supply Alert (SSA) or Official Conservation Campaign (OCC) triggers.

Meridian has undertaken modelling to inform operational decisions regarding the management of water stored in Lake Pūkaki, comparing the current restricted operating regime to the proposed regime with the SSA and OCC triggers removed. The modelling will be used to help inform the legal and planning advice and provide a basis for the technical assessments to consider the material changes that have occurred in the Lake Pūkaki catchment since 2012.

In addition, the modelling looked at market outcomes, comparing eased and restricted access to discretionary storage.

Merdian's modelling approach and modelled outcomes are detailed below.

2 Background

The Waitaki Power Scheme (WPS) is a key component of the NZ power system. The power system today is highly renewable at around 85-90%, with hydro energy making up around 60% (25TWh) of total energy. Of this, the WPS generates around 8TWh per year, but with significant volatility in the scale and timing of the arrival of inflows into the catchment.

Lake Pūkaki is managed by Meridian as part of the WPS and is the largest hydro storage lake in New Zealand. The lake holds contingent storage between lake levels 518 mRL and 513 mRL which equates to approximately 550 GWh of realisable energy.

The New Zealand power system is becoming increasingly renewable reflecting economic trends as well as efforts to decarbonize the wider economy. Combined with this, we are seeing increased decommissioning of thermal plant and challenges in managing thermal fuel supplies that have traditionally been used for short and longer-term flexibility, particularly in response to extended periods of low inflows into hydro lakes.

The ability to access Lake Pūkaki contingent storage either, as per the current situation, or with less strict access to the lower ranges of the lake, as we are advocating for, will have significant beneficial impacts on the ease and cost of managing the entire New Zealand system over the next few years. This holds true until more generation is built and likely beyond that.

3 Modelling overview

The modelling was based on 91 years of catchment hydrological and meteorological data, using the current understanding of the New Zealand energy system (supply and demand analysis) and applying this to the forecast period between January 2025 and January 2028 (the period of interest for the Fast-track application).

The two scenarios presented below are (1) Restricted access to Lake Pūkaki storage below 518.0 mRL (status-quo) and (2) eased access to Lake Pūkaki storage below 518.0 mRL.

All power system assumptions are the same in these two scenarios except for the assumed attitude of operators to low storage levels. The restricted scenario reflects a risk-adverse attitude to using low lakes, in case external enabling rules do not line up with their own forecasts, and the eased scenario prudently uses the full lake range within the limits that engineering allows.

Meridian commissioned a peer review of the modelling, which has now been completed by Sapere Research Group (refer to Appendix A).

Sapere finds that while there may be factors not fully captured by the modelling, a benefit from enabling access to contingent storage can still be relied upon. They also state that:

"Conceptually the modelling of the two scenarios makes sense. The general conclusion is also logical from a mathematical modelling point of view: easing the constraint results in a more optimised/lower cost solution."

The modelling outcomes are summarised below.

4 Pūkaki contingent storage 2025-2027 - Restricted access (status-quo)

Figure 1 below shows modelled weekly outcomes ordered from highest to lowest, compared to history. Figure 2 shows modelled weekly outcomes arranged seasonally, showing the distribution of outcomes from the minimum through to the maximum observed across the year, and compared to recent historical seasonal average.

The continuation of restricted access to contingent storage means that there are few instances when contingent storage is used. There is one hydrological sequence which dips below 518 mRL for a short period. (i.e. when storage below 518 mRL is used, it is only just used and not for long). This reflects the risk-adverse attitudes of operators who are required to assume that contingent storage would not necessarily become available and therefore plan on the basis that the lake level would potentially have to remain at or above 518 m.

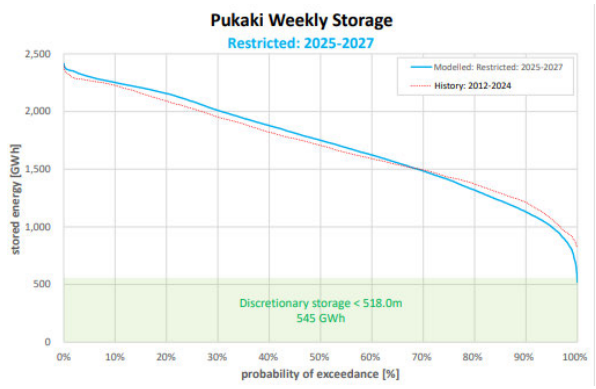


Figure 1

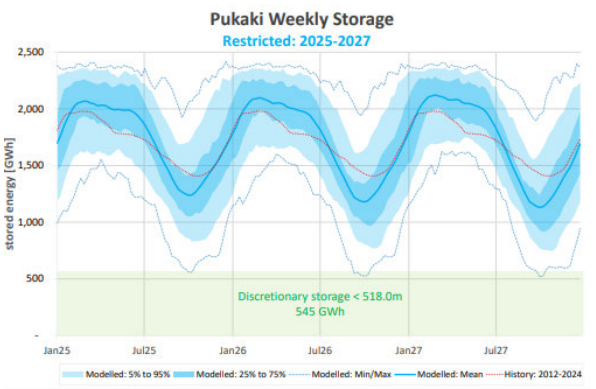


Figure 2

5 Pūkaki contingent storage 2025-2027 - Eased access

Figure 3 below illustrates the modelled weekly outcomes ordered from highest to lowest, compared to history. Figure 4 is the modelled weekly outcomes arranged seasonally, showing the distribution of outcomes from the minimum through to the maximum observed across the year, and compared to recent historical seasonal average.

Key outcomes from the modelling are:

- Lake levels will typically be held lower; however, the levels are modelled to still be within the permitted normal operational range of 518 mRL and 532.5 mRL for most of the time.
- Lake levels fall below 518 mRL for approximately 3% of the total days between January 2025 and January 2028. This equates to approximately 11 days per year or 33 days over 3 years.
- Approximately 1 in 5 (20%) of modelled hydrological sequences result in lake levels falling below 518 mRL. Where this occurs, the dips below 518 mRL are short in duration and are not deep.
- In total 18 hydrological sequences out of 91 fall below 518 mRL. Of these 18 sequences:
    - 2 sequences in 91 fall between 518.0 m - 517.0 m
    - 6 sequences in 91 fall between 517.0 m – 516.5 m
    - 6 sequences in 91 fall between 516.5 m – 516.0 m
    - 3 sequences in 91 fall between 516.0 m - 515.0 m
    - 1 sequence in 91 falls below 515.0 m

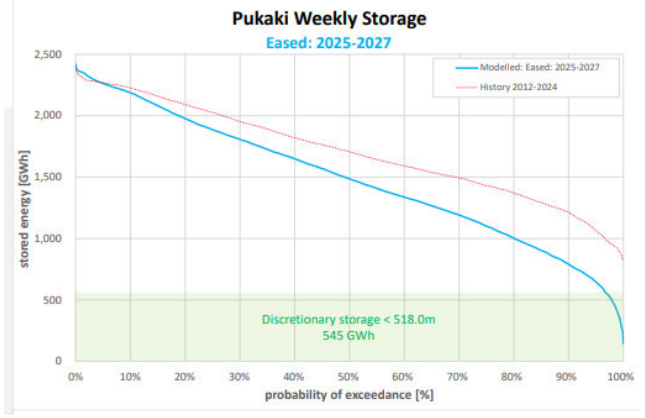


Figure 3

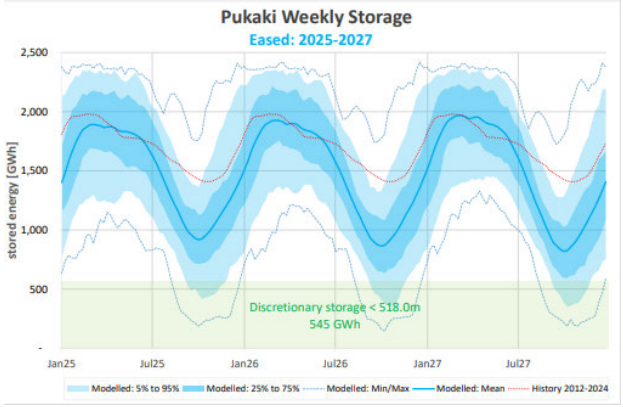


Figure 4

6 Market outcomes compared: 2025-2027

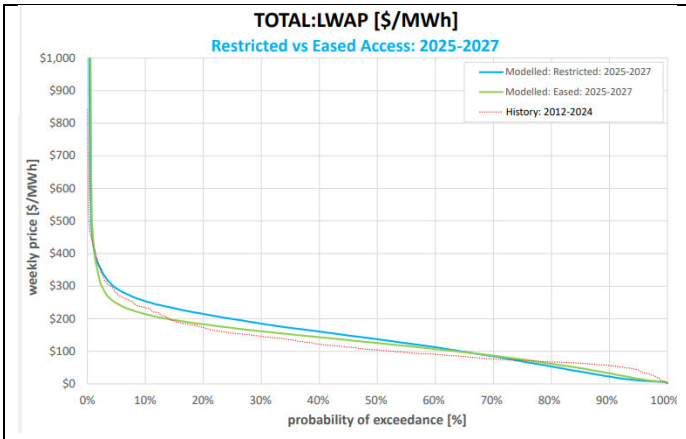


Figure 5

		Annualised History 2012-24 mean	Restricted vs Eased Lake Access Sustained results 2025-27; annualised Restricted p50	Eased p50	Restricted->Eased delta	%
LWAP	$/MWh	$ 127	$ 145	$ 134	-$ 11	-7%
Hydro	GWh	24,593	24,519	24,834	315	1%
Thermal	GWh	6,208	2,681	2,349	-331	-12%
Non-Hydro RE	GWh		15,480	15,569	89	1%
Hydro spill	GWh		1,404	1,083	-321	-23%
Dem Resp	GWh		240	108	-132	-55%
VoLL	GWh		-	-	0	-
CO2 Emissions	kT	4,500	2,593	2,369	-224	-9%
Load Cost	$M	$ 5,567	$ 6,528	$ 6,001	-$ 527	-8%

Figure 6

Comparing eased and restricted access to discretionary storage, differences across a range of market outcomes, both physical and pricing, is evident. This reflects risk adverse attitudes of operators who avoid low lakes in case external enabling rules do not line up with their own forecast expectations.

Figure 5 shows forecast probability distribution curves of weekly prices (LWAP[1]) for the three scenarios (historical, restricted and eased) for the next three years, repeating all historical hydrology seen from 1931-2022, ordered from highest to lowest.

Figure 6 compares typical (P50) results over 2025-2027. Key outcomes are:

- Hydro spill, renewable spill, thermal generation, CO2, LWAP, price volatility, demand response, and load costs are all higher if access is restricted.

[1] LWAP describes the load-weighted average price of electricity

- Sustained prices over 3 years are 7% ($11/MWh) lower because of eased access.
- Sustained load costs over 3 years are $527m pa lower with eased access.

On this basis, the current contingent storage restrictions can be seen as having a significant adverse impact on New Zealand electricity consumers. In the context of continued tight market conditions and other upwards pressures on electricity prices, enabling access to contingent storage is a simple step that can be taken now to support better consumer outcomes.

7 Summary

Eased access to Pūkaki contingent storage has physical benefits that reflect a larger operational lake able to absorb more inflow variation and power system and market uncertainty.

Meridian expects to see Lake Pūkaki held lower if access is eased, but with excursions below 518 mRL still not a common event, occurring approximately 3% of the time.

Lower lake levels mean an increased ability to capture high rainfall events that avoid wasteful spill i.e. energy that must otherwise be made up for elsewhere.

Low river flow management is unlikely to change, reflecting unchanged management of consents on the lower Waitaki river.

Eased access to Lake Pūkaki contingent storage has benefits for New Zealand that help partially offset the diminishing capabilities of thermal generation. Failure to allow the WPS scheme to fully contribute what the engineering allows will impose significant cost for electricity users.

APPRNDIX A: SAPERE RESEARCH GROUP - PEER REVIEW OF MODELLING

Modelling outcomes with and without access to contingent storage at Lake Pūkaki

Peer review

Toby Stevenson, Michael Young

31 March 2025

1. Brief

In making the case for more ready access to contingent storage at Lake Pūkaki Meridian has modelled two scenarios of future outcomes for a range of hydrological situations. The outcomes of these scenarios cover the immediate 36 months i.e. the next three winter periods including 2025. Both rely on the same available generation capacity (including assumptions of plant expected to be commissioned and plant expected to be retired in the period) and a distribution of historical lake levels.

The two scenarios are the same except for the price Meridian would put on generation available from releases of storage. In Meridian's words:

> "The price of water is the only lever we have available and is used to achieve these behavioural changes in lake management."

The logic is that the distribution of lake levels is a function of the available range, and that the price assigned to generation includes the potential to use the consented range. The inherent assumption is that the operator (Meridian) would have the same risk profile based on the proximity of lake levels to the top or bottom of the range. However, the range of possibilities is wider in one scenario compared with the other.

The two resulting scenarios are:

Restricted: operating to a range of Pūkaki storage between 532.50 a.m.s.l and 518 a.m.s.l with operating below 518 a.m.s.l restricted.

Eased: operating to a range of Pūkaki storage between 532.50 a.m.s.l and 513 a.m.s.l.

We have been asked to peer review the modelling. The questions we address are:

1. Do both modelled scenarios accurately represent their respective realities?
2. Are there material differences between the modelling and the decision-making tools the Meridian trading team and portfolio managers use?

2. Assumptions

Meridian applies an orthodox systematic approach to managing the storage in their hydro lakes, including for Lake Pūkaki. They offer it in a way that balances the value of generating today versus the opportunity cost of being able to use it in the future. The mechanism they use to recognise this trade-off is the water value.

The water value is the marginal value, or expected future value, of the future storable inflows. The water value is not expressed as the value of water *per se*, it is expressed as the value of generation made possible by that water being available i.e. $/MWh.

Of course, weighing the trade-off is dynamic. The water values have to account for the uncertainty over the timing and scale of future inflows combined with the uncertainty of how much generation will be dispatched at a given water value.

If the calculation of water value is consistent and largely dispassionate, the resulting generation, i.e. the rate at which the lake is drawn down, represents the same value for generating from the lake, at any given level, for any given time of the year to Meridian and the New Zealand system.

The issue of whether the management of the lake level is consistent and dispassionate arises at both ends of the range. Operators of storage lakes try and avoid spilling at the top and hitting the bottom. The water values reflect the market dynamics on the day, so a *dispassionate operator* is acting to its comfort levels taking the lakes lower and that is the same as reflecting how comfortable the *system* is taking the lake lower.

We know as a consequence of the evolution of the trading conduct rules in the Code and the scrutiny Meridian has been placed under from claims of undesirable trading situations that Meridian seeks to closely follow the modelled water values so their offer behaviour is auditable and defensible. If Meridian continues to follow modelled water values then it is more the case that Meridian interests and the New Zealand wide systems interests are aligned.

3. Approach

We have undertaken a high-level conceptual review of the modelling undertaken by Meridian based on interviews and discussions. We have not undertaken a technical review of the model and have not assessed whether the inputs/assumptions have been correctly entered, or whether the model itself is working correctly/as intended.

Our understanding is that current access to contingent storage at Pūkaki has been set up so as to be accessible when the system's risk of shortage reaches a certain level.

Direct summary of resource consent or regional plan	Interpretation
Meridian Energy has consent to use water from Lake Pūkaki for electricity generation. Additional 5 meters a.m.s.l (from 518 meters a.m.s.l) made available for generation if the System Operator (Transpower), its delegate, or any other statutory body exercising like powers and functions declares an Official Conservation Campaign. In November 2019, Meridian informed the System Operator that all of the 5 meters of additional hydro storage is physically accessible, and that sufficient analysis and preparation have been carried out to support lake armouring in the event that contingent storage at Lake Pūkaki is triggered.	A total of 545 GWh of additional hydro storage available for electricity generation; i) 331 GWh if reported storage falls below the New Zealand or South Island Alert Contingent Storage Release Boundary. ii) 214 GWh if the System Operator or an authority with equivalent powers and functions declares an Official Conservation Campaign.

Source: Transpower, Contingent Storage additional information.pdf

3.1 Our understanding of the model and scenarios

The base model used to produce the two scenarios is the same as the model that Meridian uses in their operations to help inform their target contract positions and day by day generation offers into the New Zealand electricity market. In this exercise, the model optimises for the lowest cost outcome for electricity generation to meet supply. It uses historic sun, wind and hydrological sequences to produce the potential distribution of the forecast outcomes.

The modelling produces two scenarios, restricted access and eased access to contingent storage. To represent these two different realities, the water values for a given lake level and a given time of year are adjusted to reflect the range of storage available. The restricted scenario has the water value increasing more rapidly as the lake approaches 518 a.m.s.l. The restricted scenario has been tailored to align with the current restrictions, with considerable risk aversion to accessing water below the 518 a.m.s.l. level. The Meridian trading team know that as they approach 518 a.m.s.l, the possibility of accessing the contingent storage increases, but is dependent on a range of other factors, many of which are outside their own control. They may scale their offers to delay that event but in some hydro sequences, lake levels still breach 518 a.m.s.l. The eased scenario moves this risk aversion ramp up of water values to the 513 a.m.s.l. level.

Critically any material variation to the modelled outcomes would arise from new information coming to hand that might change the water values calculated by the model in real time.

4. Review findings

For the purpose of this review our focus is mostly on the difference between the two modelled outcomes and the reliability of the differences.

4.1 Modelling outputs

Conceptually the modelling of the two scenarios makes sense. The general conclusion is also logical from a mathematical modelling point of view: easing the constraint results in a more optimised/lower cost solution. In this case, under normal circumstances, it gives more 'headroom' at both sides of the range.

More generation is able to be offered in the eased scenario in the knowledge that there is more accessible water (between 518m and 513m), and therefore less risk of 'running out'. In doing so, the mean lake level is lower. The converse is true, having a broader range of storage allows for greater scope to reduce the incidence of spill i.e. wasted energy resource.

In the restricted scenario, less generation is made available through the water value rationing mechanism, but the Meridian trading team will be acutely aware that a change in water values may arise where access to the contingent reserves is granted. Under current settings it is highly likely that the System Operator would need to use its discretion for access to contingent storage to be granted. If the lake level is approaching 518m, the SO is more incentivised to use this discretion, as we saw in 2024.

The first question we address is: do both modelled scenarios accurately represent their respective realities?

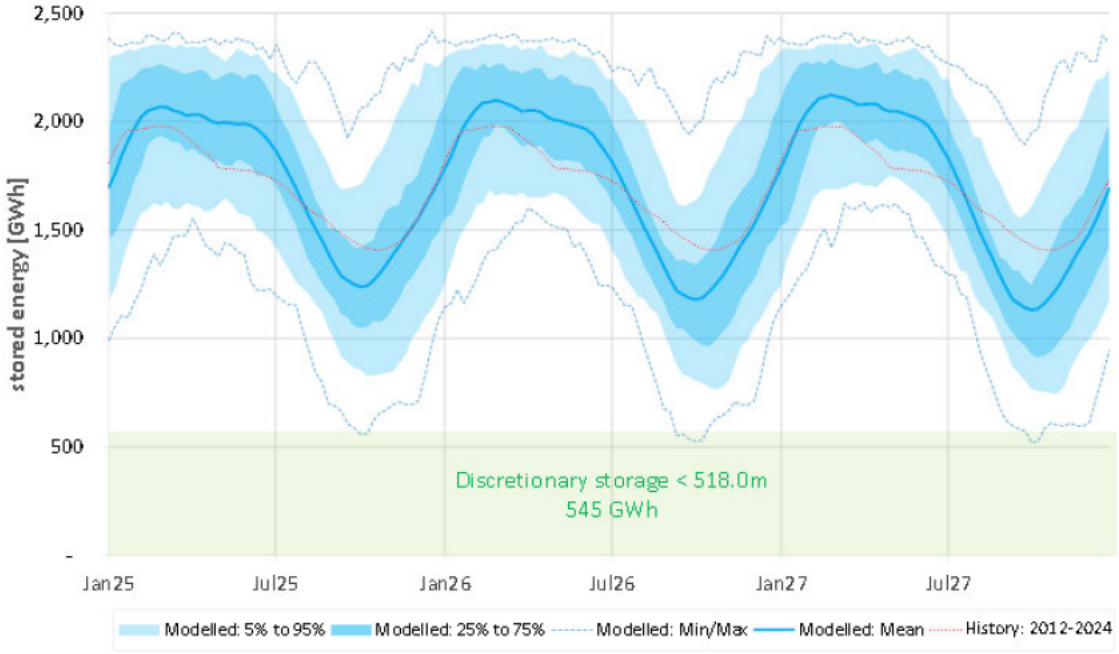
The range of the simulations somewhat accounts for the uncertainty regarding the future. However, it is possible that future scenarios of hydrology, demand, outages etc may fall outside the bounds of those tested in the model (for example the 2024 sequence is not included and there were some also unprecedented low inflows). Meridian also (understandably) makes operational decisions using up-to-date/live information. This enables Meridian to refresh their water values. Up to date information also feeds into the management of the hedge portfolio position where profit seeking and risk aversion are balanced.

The restrictions on access to contingent storage may create a distortion in the market. That is, with no certainty that access to the water below 518m will be available when needed, the operator must hedge their actions and positions on the probability that access will/will not be available. With a strong aversity to the risk that access is not available, the corresponding water values close to the 518m level will be relatively high. This may result in higher than efficient prices.

However, this does not mean that the findings of the modelling are not valid. It means that the actual path for storage on a given year between the two scenarios might be narrower or wider than modelled. The two charts below show the modelled differences in hydrological outcomes between the two scenarios. The spread of lake level outcomes is the same in each run but for the constrained range of operation in one compared to the other. All else being equal the difference between the two would be as modelled.

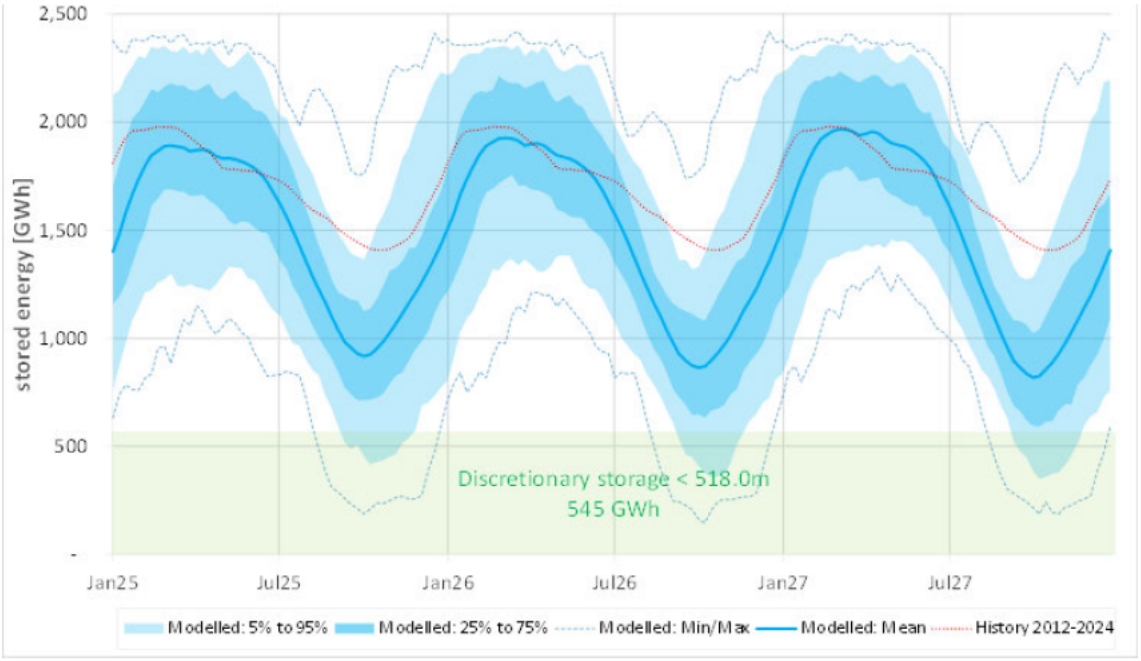
The snapshot for each week is a probability distribution for all the historical hydro sequences between 1931-2022. The model that generates these is also used to generate water values. The modelled minimum for the restricted scenario breaches the 518 m level a handful of times. This tells us that it would be infrequent and, as that became more likely, the SO will become more incentivised to exercise its discretion to enable contingent storage access.

Figure 1: Pūkaki weekly storage - restricted (2025-2027)



With access down to 513m, it makes sense that the optimised average lake level will be lower, as shown in the cart below. It also makes sense that the lake between 518m and 513m, is accessed considerably more often, with almost 25 per cent of sequences accessing this water.

Figure 2: Pūkaki weekly storage - eased (2025-2027)



Eased access reduces the risk of 'running out' as well as reduced spill. This enables more hydro generation to be offered and dispatched, generally resulting in lower prices by displacing higher cost fuels.

Figure 3: Total LWAP [$/MWh] - restricted vs eased access (2025-2027)

Figure 3 shows the modelled impact of the different hydro sequences on the distributions of the load-weighted average price (LWAP). We see that the eased scenario has a lower LWAP in the middle portion (approximately 65 per cent of the time) of the distributions.

The difference in LWAP is a representation of the difference in the market cost of electricity generation between the two scenarios. In answering our first question *"do both modelled scenarios accurately represent their respective realities?"* we stress the importance of assessing if the *difference* between these two modelled curves is likely representative of the differences in reality. In other words, even if these curves are not perfectly representative on their own, as long as there is no bias, the difference between them can still be relied on to assess the merits of easing restrictions.

4.2 Assessment

The modelling alters the only lever that a reservoir operator like Meridian has available to arrest storage decline, that is: the offer price, for any given storage level. If Meridian's operations are dispassionate, then its profile of risk aversion and New Zealand's profile of risk aversion are the same.

Apart from water values, no other changes to system assumptions have been made between the two scenarios. We know that the model is the basis for setting up the portfolio, for risk management assessment and establishing water values armed with real time information.

Factors that have not been modelled that may result in the difference between the two price curves being wider or narrowed include:

- The portfolios may be different between the two scenarios. This is unlikely to materially change the price curves, but could represent a transfer toward Meridian.
- Meridian may not strictly offer generation as per those produced by the model but their preference for an auditable, defensible offer strategy would mean variation is at the margin.
- There may be scenarios outside the distributions modelled. For instance, the 2024 hydrological sequence was not included in historic series – but this was the lowest lake level historically, with unprecedented low inflows, amongst other adverse conditions.
- The restricted scenario does not adjust for when access to contingent storage is granted. We can't account for when the SO exercises its discretion to lower the restrictions to access if deemed appropriate. At the point they do that the water values for the restricted scenario shift towards the water values for the eased scenario. As such, the difference between the LWAP curves may be overstated.

In our opinion, some of these factors could reduce the margin between the outcomes from the two scenarios, in terms of LWAP. Nonetheless, we still believe that a benefit can be relied on, just that the reality may be smaller than modelled. We also note that the more frequent parts (middle) of the distribution are less likely to be affected than at the extremes.

About Sapere

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For more information, please contact:

Toby Stevenson

Mobile: s 9(2)(a)

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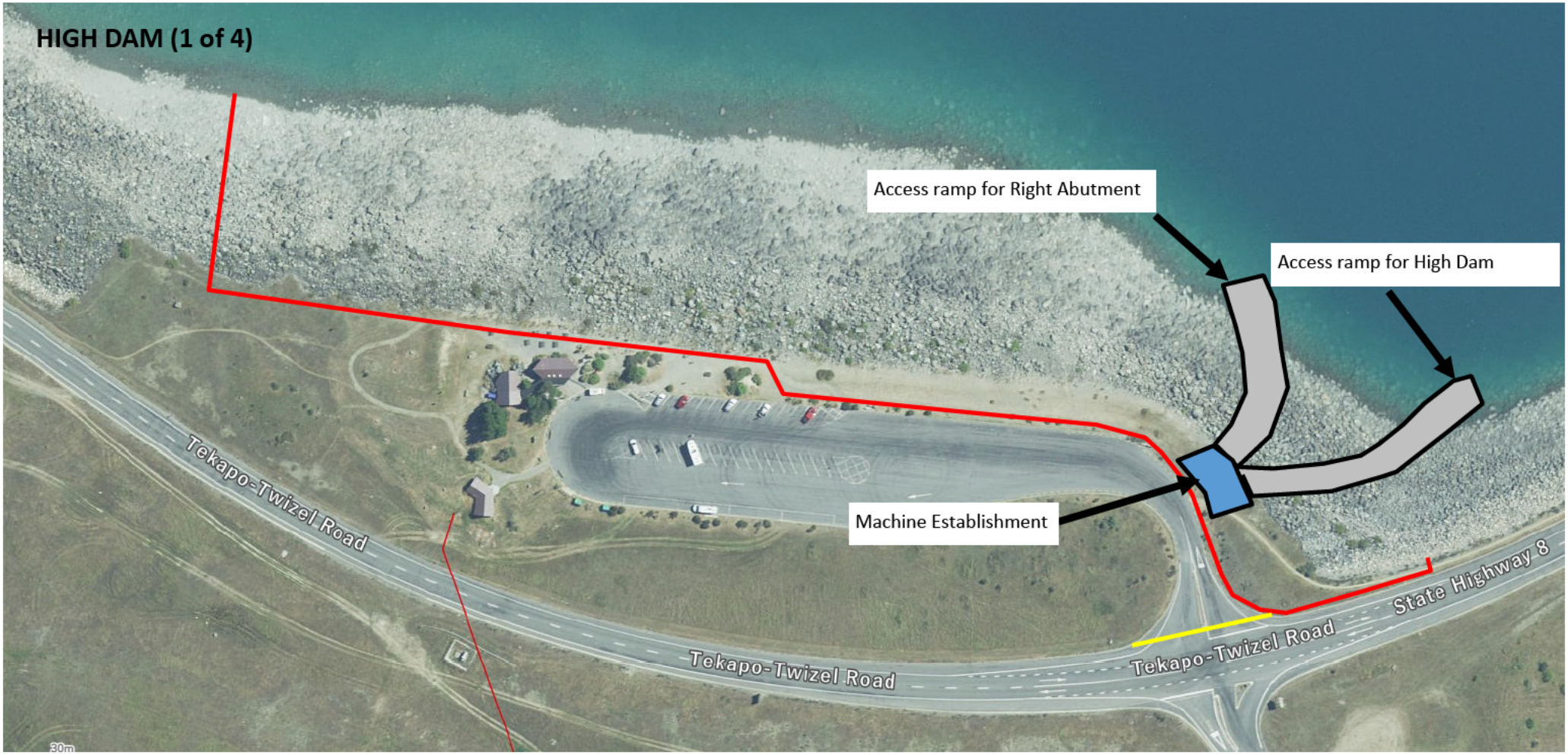
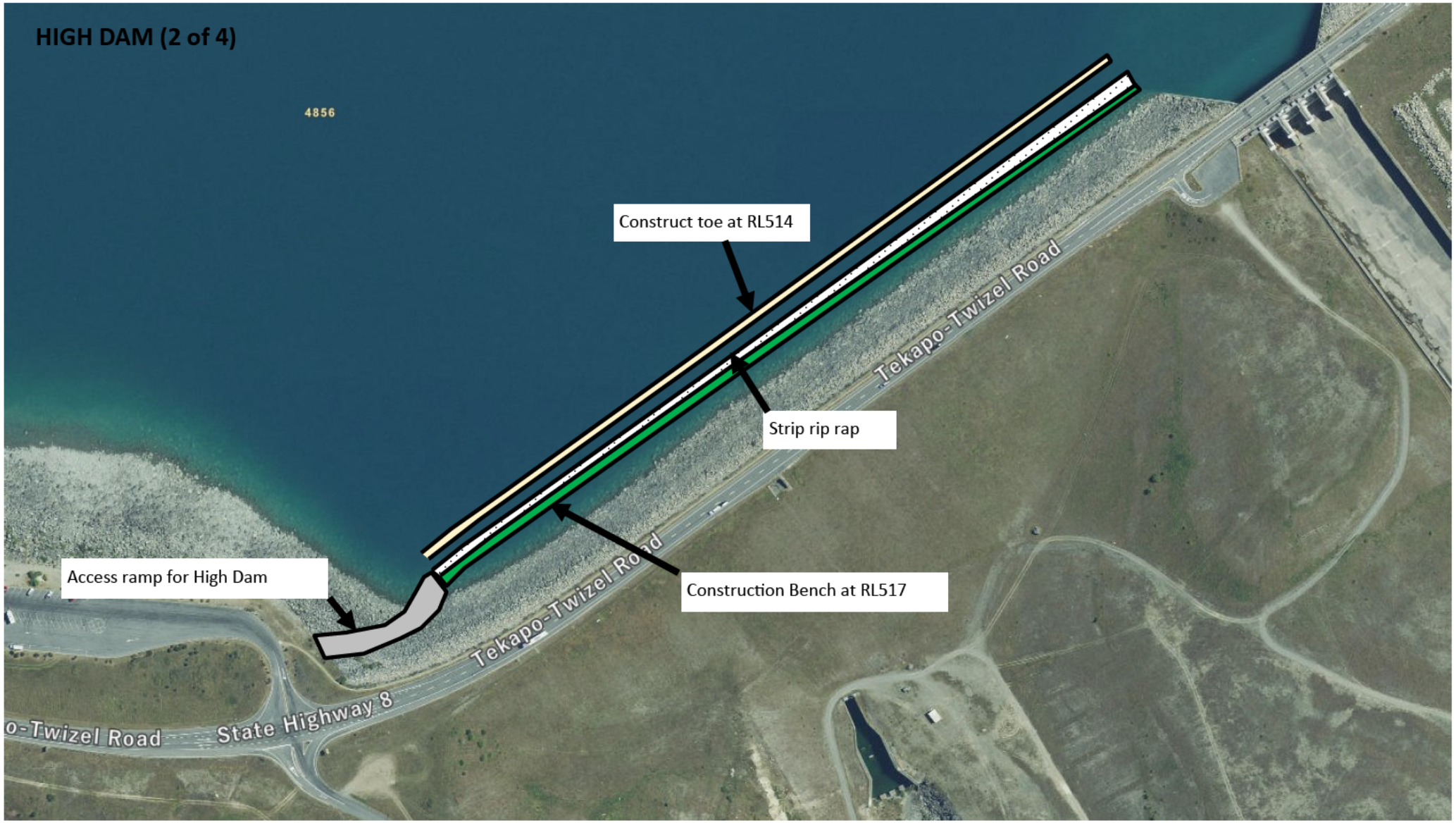
Appendix C

Rock Armouring Construction Sequencing Plans

- Install Temporary Fencing
- Close carpark.

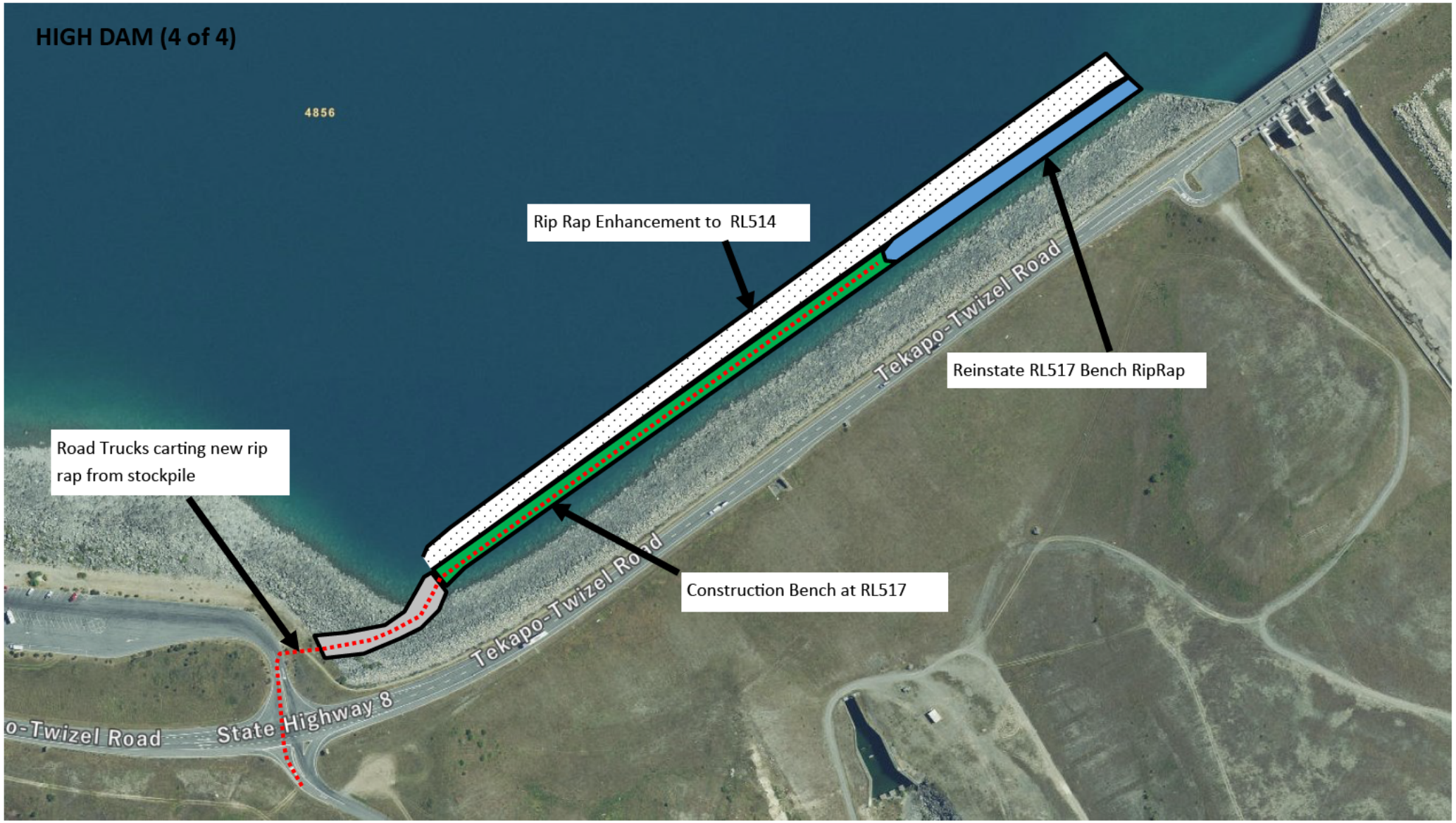


- Establish Excavator
- Construct High Dam access track to RL517 Bench
- Construct Right Abutment access track to RL517

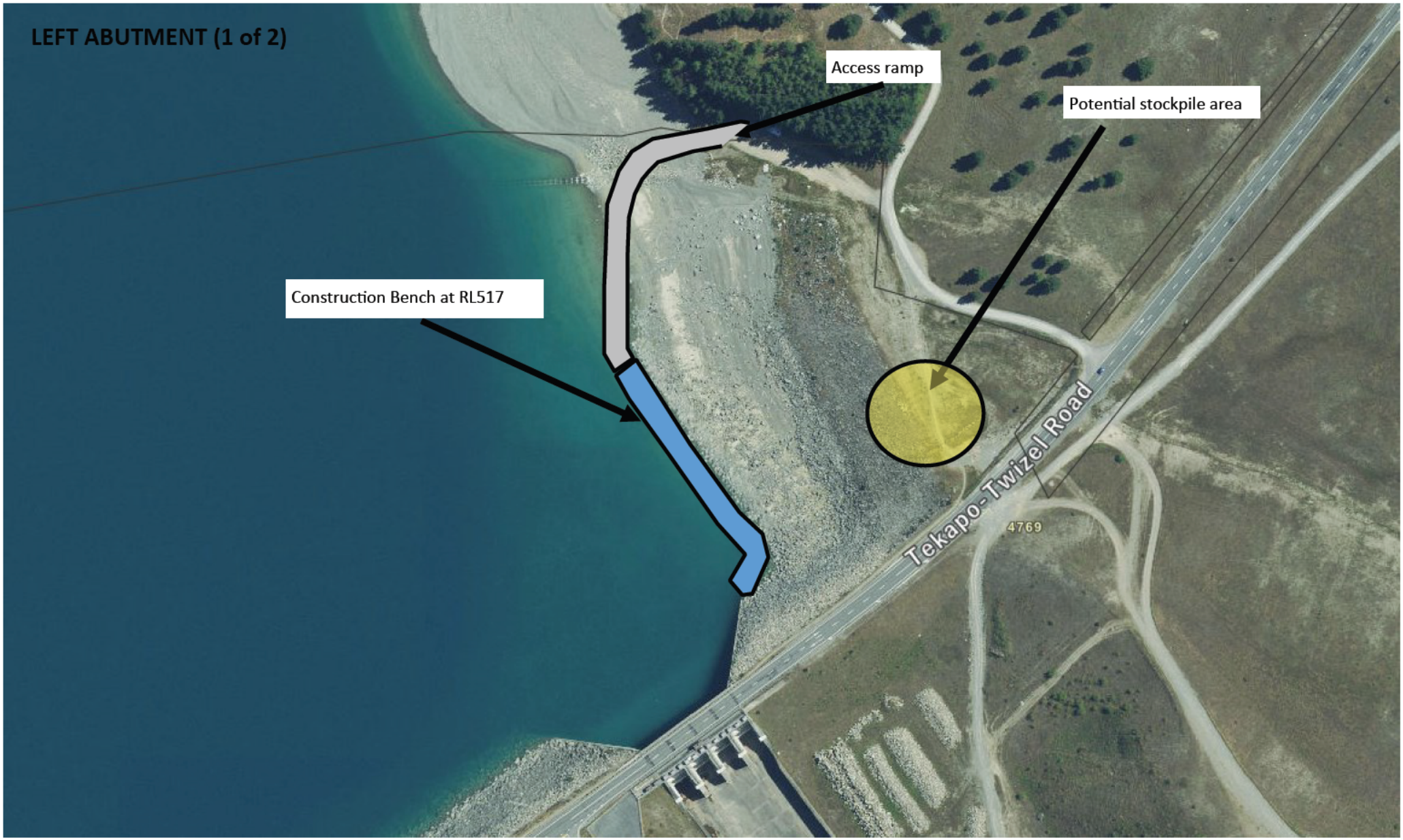


- 45t Excavator strip existing rip rap from 50% of 517 bench and stock-pile material on remainder of bench.
- Excavate RL514 toe.

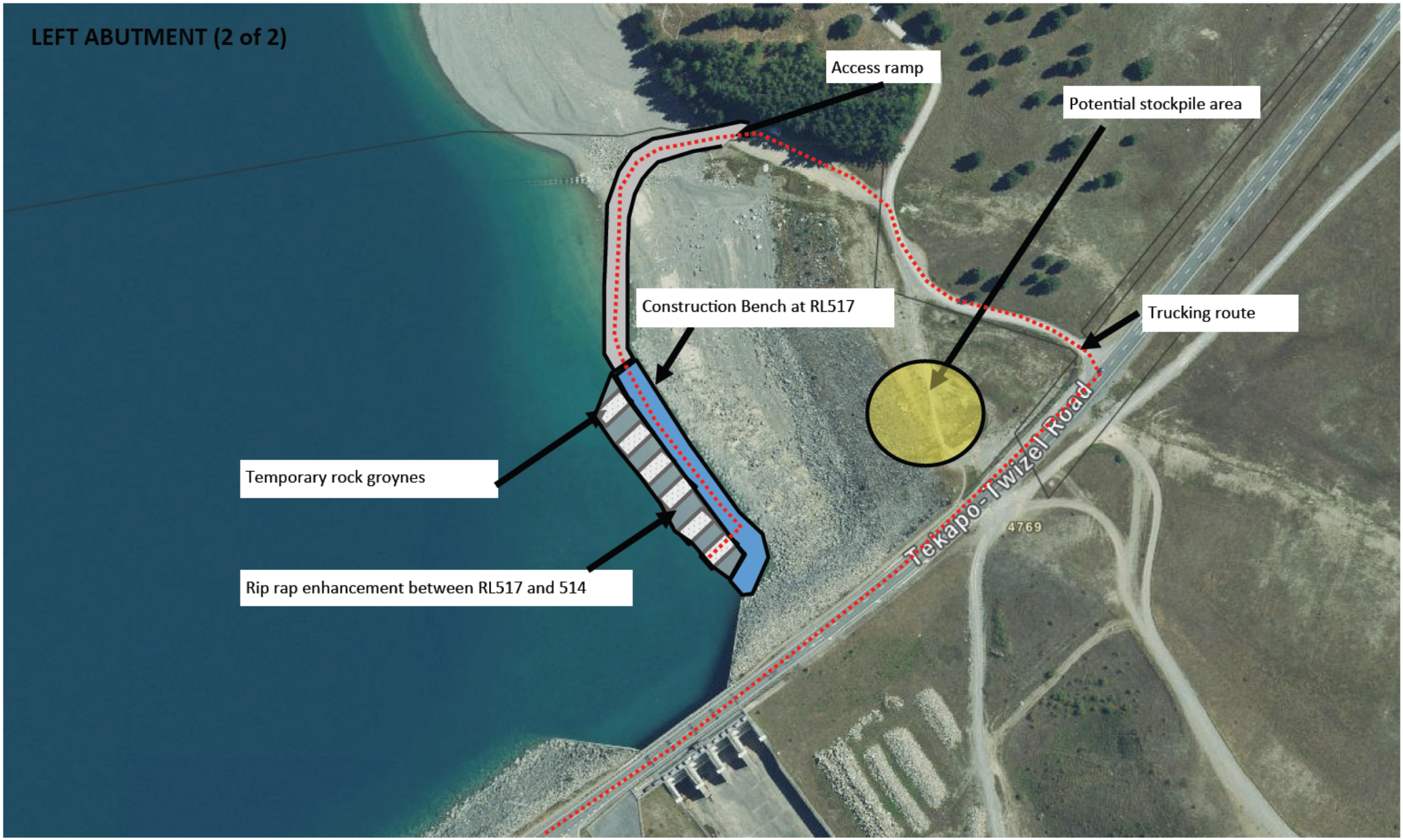
- Place rock from 517 bench in armour toe along length of dam.
- Utilise remainder of rock on 517 bench to armour dam face to RL514.



- Road trucks deliver new Rip Rap rock from stockpile area to reinstate borrowed rock on RL517 Bench
- Utilise remainder of rock on 517 bench to armour dam face to RL514.
-

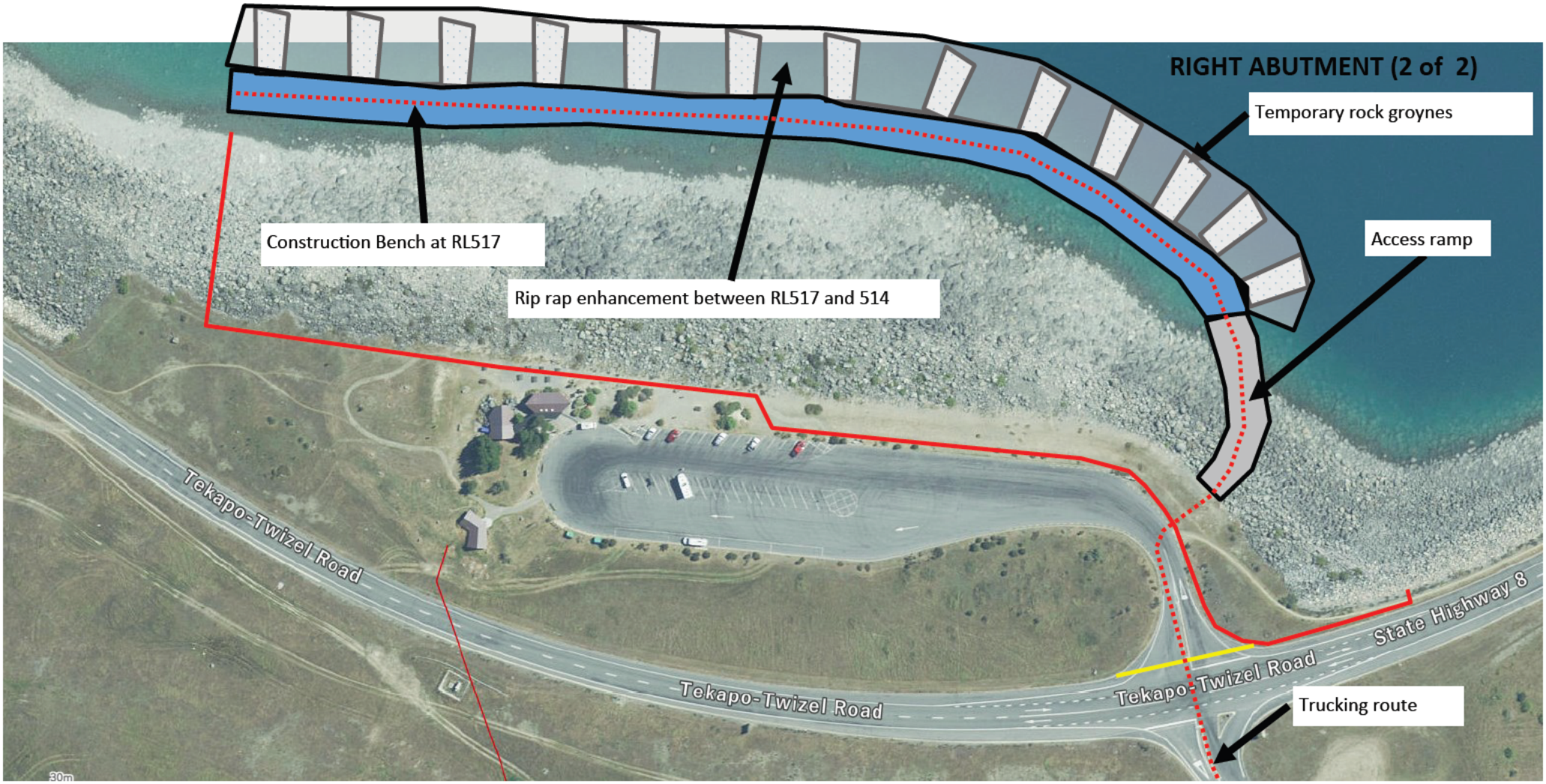


- Strip rip rap from RL517 and construct access bench.



- Construct new rock groynes as required to reach rip rap enhancement extents down to RL514.
- Deconstruct groynes as enhancement extents are completed and utilise rock for remaining areas.

- Strip rip rap from RL517 and construct access bench.



- Construct new rock groynes as required to reach rip rap enhancement extents down to RL514.
- Deconstruct groynes as enhancement extents are completed and utilise rock for remaining areas.

Appendix D

Certificate of Titles and the Operating Easement

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Search Copy

R.W. Muir
Registrar-General
of Land

Identifier **278224**

Land Registration District **Canterbury**

Date Issued 05 April 2007

Prior References

111124	178618	235594
263649	289995	58495
72622	72623	72890
7913	80415	GN169385.1
GN171402.1	GN211632.1	GN5778545.1
GN5831.1	GN857747	GN861568
GN919139	GN928015	GN939383

Estate Fee Simple

Area 666.9441 hectares more or less

Legal Description Lot 1-2 Deposited Plan 368484

Registered Owners

Meridian Energy Limited

Interests

Subject to a right of way over part Lot 1 herein marked I, J, K on DP 368484 created by Deed of Grant of Easement CB30F/682

7309519.3 Gazette Notice (2007 p.715) declaring the marginal strip requirements set out in Section 24 of the Conservation Act 1987 shall not apply to the disposition to Meridian Energy Limited of the land required in connection with electricity works for Pukaki High Dam, specified as Lots 1 and 2 DP 368484 - 5.4.2007 at 9:00 am

Subject to Section 11 Crown Minerals Act 1991

Appurtenant hereto is a right to convey water created by Deed of Easement 7309519.6 - 5.4.2007 at 9:00 am

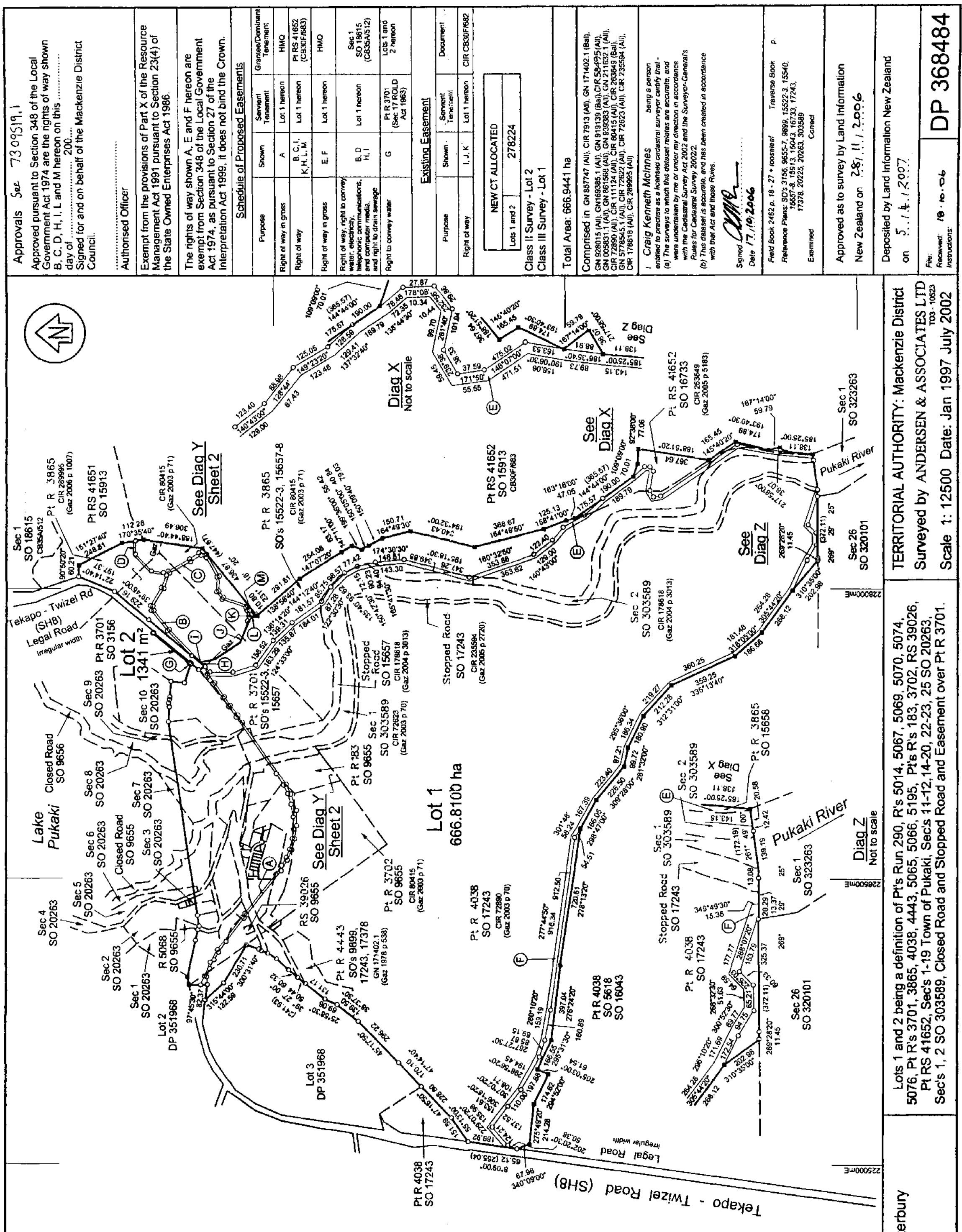
Subject to a right of way (in gross) over part Lot 1 herein marked E and F on DP 368484 in favour of Her Majesty the Queen created by Easement Instrument 7309519.7 - 5.4.2007 at 9:00 am

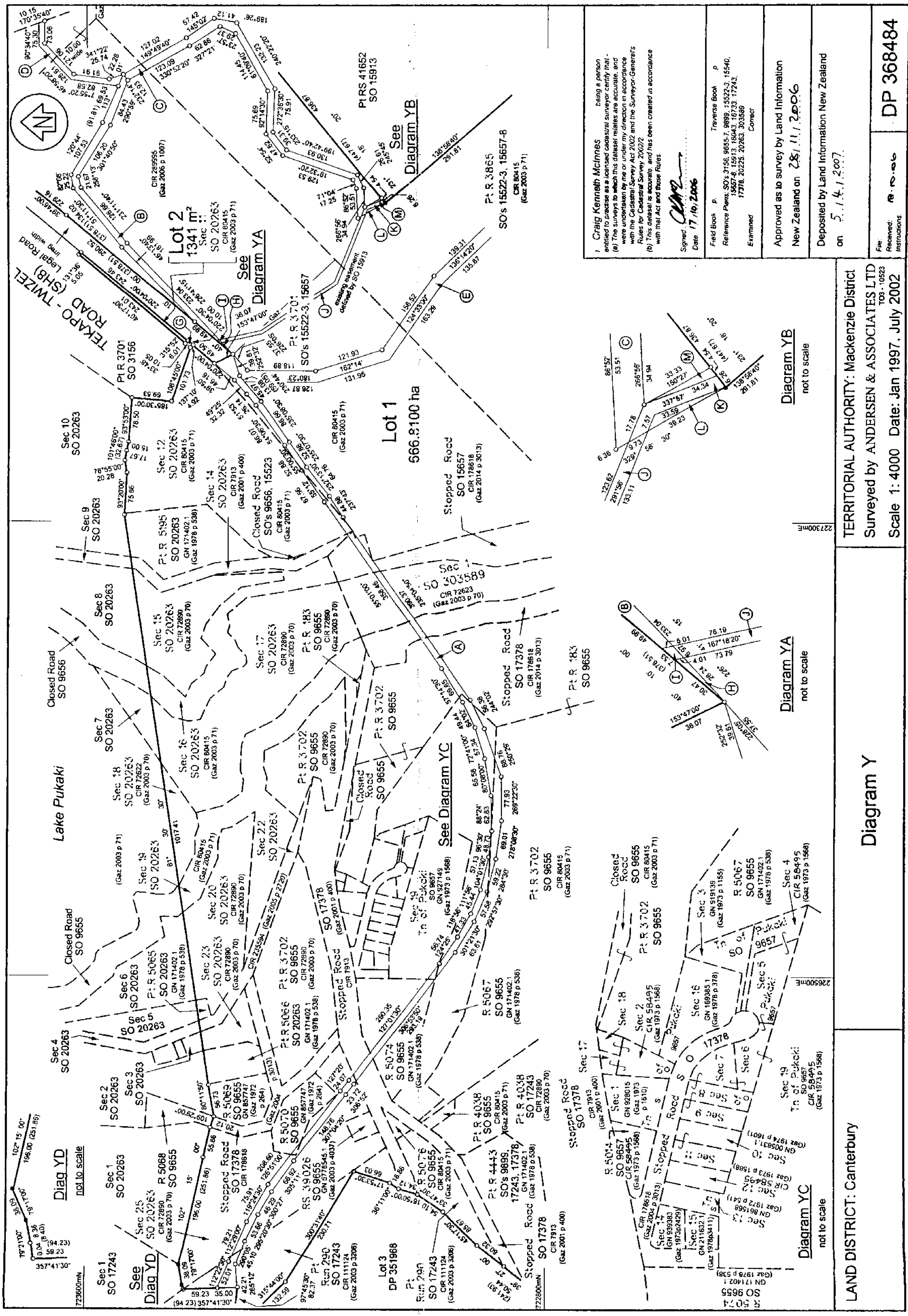
Subject to a right of way, right to convey water, electricity, telephonic communications and computer media and right to drain sewage over parts Lot 1 marked B, D, H and I on DP 368484 created by Easement Instrument 7442848.1 - 2.7.2007 at 9:00 am

Subject to a right of way over parts marked B, C, H, I, K, L and M on DP 368484 created by Easement Instrument 7570767.1 - 10.10.2007 at 9:00 am

Subject to a right of way over part Lot 1 Deposited Plan 368484 over part marked A on DP 524342 and over part marked D on DP 368484 created by Easement Instrument 12020461.2 - 7.4.2021 at 4:05 pm

12366664.1 Notice pursuant to Section 195(2) Climate Change Response Act 2002 - 1.2.2022 at 4:19 pm


LT 368484 (Title Plan)
Approvals See 7309519.1
Approved pursuant to Section 348 of the Local Government Act 1974 are the rights of way shown B, C, D, H, I, L and M hereon on this .... day of .... 200....
Signed for and on behalf of the Mackenzie District Council.
Authorised Officer
Exempt from the provisions of Part X of the Resource Management Act 1991 pursuant to Section 23(4) of the State Owned Enterprises Act 1986.
The rights of way shown A, E and F hereon are exempt from Section 348 of the Local Government Act 1974, as pursuant to Section 27 of the Interpretation Act 1999, it does not bind the Crown.
Schedule of Proposed Easements
Purpose | Shown | Servient Tenement | Grantee/Dominant Tenement
Right of way in gross | A | Lot 1 hereon | HMQ
Right of way | B, C, I, K, H, L, M | Lot 1 hereon | Pt RS 41652 (CB30F/683)
Right of way in gross | E, F | Lot 1 hereon | HMQ
Right of way, right to convey water, electricity, telephonic communications, and computer media, and right to drain sewage | B, D H, I | Lot 1 hereon | Sec 1 SO 18615 (CB35A/512)
Right to convey water | G | Pt R 3701 (Sec 17 ROLD Act 1963) | Lots 1 and 2 hereon
Existing Easement
Purpose | Shown | Servient Tenement | Document
Right of way | I, J, K | Lot 1 hereon | CIR CB30F/682
NEW CT ALLOCATED
Lots 1 and 2 | 278224
Class II Survey - Lot 2
Class III Survey - Lot 1
Total Area: 666.9441 ha
Lot 1
666.8100 ha
Lot 2
1341 m²
Lake Pukaki
Pukaki River
Tekapo - Twizel Road (SH8)
See Diag Y Sheet 2
Diag X Not to scale
Diag Z Not to scale
I Craig Kenneth McInnes being a person entitled to practise as a licensed cadastral surveyor certify that -
(a) The surveys to which this dataset relates are accurate, and were undertaken by me or under my direction in accordance with the Cadastral Survey Act 2002 and the Surveyor-General's Rules for Cadastral Survey 2002/2.
(b) This dataset is accurate, and has been created in accordance with that Act and those Rules.
Date 17/10/2006
Approved as to survey by Land Information New Zealand on 28/11/2006
Deposited by Land Information New Zealand on 5/4/2007
LAND DISTRICT: Canterbury
Lots 1 and 2 being a definition of Pt's Run 290, R's 5014, 5067, 5069, 5070, 5074, 5076, Pt R's 3701, 3865, 4038, 4443, 5065, 5066, 5195, Pt's R's 183, 3702, RS 39026, Pt RS 41652, Sec's 1-19 Town of Pukaki, Sec's 11-12,14-20, 22-23, 25 SO 20263, Sec's 1, 2 SO 303589, Closed Road and Stopped Road and Easement over Pt R 3701.
TERRITORIAL AUTHORITY: Mackenzie District
Surveyed by ANDERSEN & ASSOCIATES LTD
Scale 1: 12500 Date: Jan 1997 July 2002
DP 368484
T Sheet 1 of 2


Lake Pukaki
TEKAPO - TWIZEL ROAD (SHB)
Lot 1
566.8100 ha
Lot 2
1341 m²
See Diagram YA
See Diagram YB
See Diagram YC
See Diag YD
Diagram YA
not to scale
Diagram YB
not to scale
Diagram YC
not to scale
Diag YD
not to scale
Diagram Y
LAND DISTRICT: Canterbury
TERRITORIAL AUTHORITY: Mackenzie District
Surveyed by ANDERSEN & ASSOCIATES LTD
Scale 1: 4000 Date: Jan 1997, July 2002
DP 368484
T Sheet 2 of 2

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017

Search Copy

R.W. Muir
Registrar-General
of Land

Identifier **391603**

Land Registration District **Canterbury**

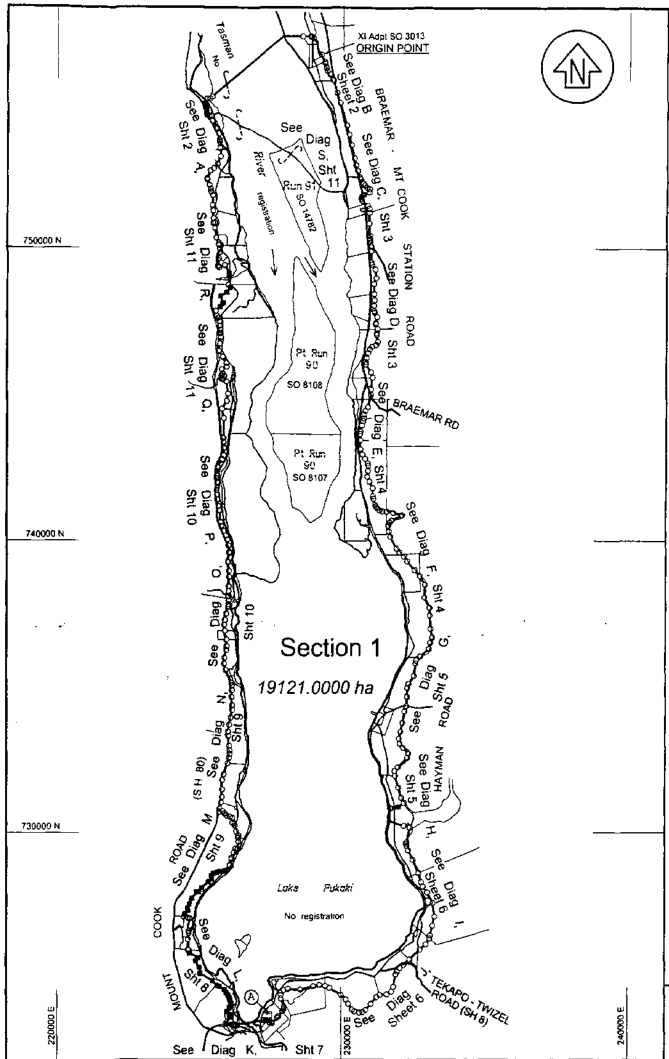
Date Registered 13 November 2007 09:00 am

Prior References
Crown Land

Type	Deed of easement under s60 Land Act 1948	**Instrument**	YEC 7611810.1
Area	19121.0000 hectares more or less		
Legal Description	Section 1 Survey Office Plan 380603		
Purpose	Right to store water and right to install and operate Hydro Electricity Water Works		

Registered Owners
Meridian Energy Limited (Grantee)

Interests



Existing Nohoanga Entitlement

Purpose	Shown	Grantee	Document
Nohoanga Entitlement	A	Te Runanga O Ngāi Tahu	Section 256 Ngāi Tahu Claims Settlement Act 1998

SO 380603 (Title Plan)

Area Schedule

Description	Former Description	Status
Section 1	Lake Pukaki, Tasman River, Boundary Stream, Whale Stream, Twin Stream, Jollie River, Parts Runs 85, 86, 207, 267, 290, 310, 341, 343, Run 91, Section 1 SO 20254, Section 10 SO 20262, Crown Land, Part Reserve 4676	Crown Land (no registration)
	Closed Road	Crown Land (Proclamation 482891) (Gaz 1958 p756)
	Part Reserve 3701, Reserve 5072, Reserve 5068	Crown Land (Section 17 Reserves and Other Lands Disposal Act 1963)
	Parts Reserve 3865	Crown Land (GN 607888) (Gazette 1963 p1206)
	Closed Road	Crown Land (GN 635265) (Gazette 1964 p1519)
	Closed Road	Crown Land (GN A073399.1) Gazette 1993 p2763)
	Reserves 2932, 4212, 5071, Part Reserves 2876, 2924, 2927, 2929, 2931, 4044, 4210, 4211, 4213, 4214, 4215, 4902, 4982, Rural Sections 1571, 38623, 38624, 38625, 38626, 38633, 38707, Part Rural Sections 33275, 33277, 33296, 33297, 33298, 33300, 33316, 33691, 33702, 33798, 33799, 34902, 35358, 35359, 35486, 36740, 36860, 36861, 36862, 36863, 38508, Part Runs 84, 85, 85a, 85b, 86, 89, 90, 264, Part Gravel Reserve, Part Boundary Creek Bed, Section 12 SO 20262, Sections 1, 2, 3, 5, 6, 7, 8, 10, 26 SO 20263, Closed Road, Crown Land, Part Lots 3 & 4 DP 38508	Crown Land (GN 5021657.2) Gazette 2001 p180)
	Stopped Road	Crown Land (GN 5026000.1) (Gazette 2001 p399)
	Stopped Road, Sec 9 SO 20263	Crown Land (GN 5039482.1) (Gazette 2001 p400)
	Part Reserve 2927	Crown Land (GN 5042618.1) (Gazette 2001 p833)
	Stopped Road, Sections 9 & 11 SO 20262, Section 4 SO 20263	Crown Land Gazette 2001 p4124
	Sections 7 & 8 SO 20262	Crown Land (GN 6621516.1) (Gazette 2005 p4412)
	Sections 2, 4 & 8 SO 20250	Crown Land (GN 6874584.1) (Gazette 2006 p1127)
	Parts Run 89, Sections 1, 5 & 9 SO 20250	Crown Land (GN 6786184.1) (Gazette 2006 p453)
	Parts Run 85a	Crown Land (GN 6846999.1) (Gazette 2006 p963)

Notes:

1. Section 1 is not intended to support the issue of a computer freehold register.
2. Refer to diagram sheets for details of boundary mark names, boundary dimensions and sources, and underlying and abutting appellations.
3. All of the land within Section 1 is Crown Land under the Land Act 1948. Unless otherwise shown, the alienated land was returned to this purpose by GN 5021657.2 (Gaz 2001 p180).
4. The leasehold estates formerly within Section 1 and held in GN 285285.1, GN 297770.1, GN 678185.1, GN 678185.2, GN 724035.1, GN 744867.1, GN 756633.1, GN 782736.1, GN 831299, Proc 358333 and Proc 358334 were extinguished by GN 5021657.1 (Gaz 2001 p178).
5. The leasehold estate formerly within Section 1 and held in CL CB529/45 (Part Run 85, 'Maryburn') was extinguished by GN 5512376.1 (Gaz 2003 p500).
6. The leasehold estate formerly within Section 1 and held in CL CB529/16 (Part Run 85A 'The Wolds') was extinguished by CIR 274759 (Gaz 2006 p201).
7. The leasehold estate formerly within Section 1 and held in CL CB30F/683 (Part Run 89 'Glentanner') was extinguished by GN 6692334.1 (Gaz 2005 p 4839) and CIR 263649 (Gaz 2005 p5183).

Bearing Datum: Geodetic
Coordinate Datum: Geodetic
Timaru Circuit Coordinates
Circuit Origin: Mt Horrible
700000 mN 300000 mE
Origin Point: XI Adpt SO 3103 from SO 20255
756628.39 mN 229223.65 mE

Class III Survey

Total Area: 19121.0000 ha

Comprised in - see Area Schedule

I Craig Kenneth McInnes
being a person entitled to practise as a registered surveyor certify that -
(a) The surveys to which this dataset relates are accurate, and were undertaken by me or under my direction in accordance with the Survey Act 1986 and the Survey Regulations 1998;
(b) This dataset is accurate, and has been created in accordance with that Act and those Regulations.

Signed [signature]
Date 23/11/2006

Field Book p. Traverse Book p.
Reference Plans: SO's 3013, 3156, 5623, 5692, 8103-13, 8950, 9575, 9655-6, 13607, 13703-4, 14156, 14485-7, 14511, 14552-60, 14610-13, 14677-81, 14766-70, 14780-2, 15073-4, 15520-3, 15879, 16043, 17163, 17271, 17788, 20250, 20254, 20255, 20262, 20263. DP's 38508, 42277, 81765
Examined Correct

COMPILED PLAN

LAND DISTRICT: Canterbury

Section 1

TERRITORIAL AUTHORITY: Mackenzie District
Surveyed by ANDERSEN & ASSOCIATES LTD 10428
Scale 1:100000 Date: October 2006

Approved as to survey by Land Information New Zealand 30/1/2007

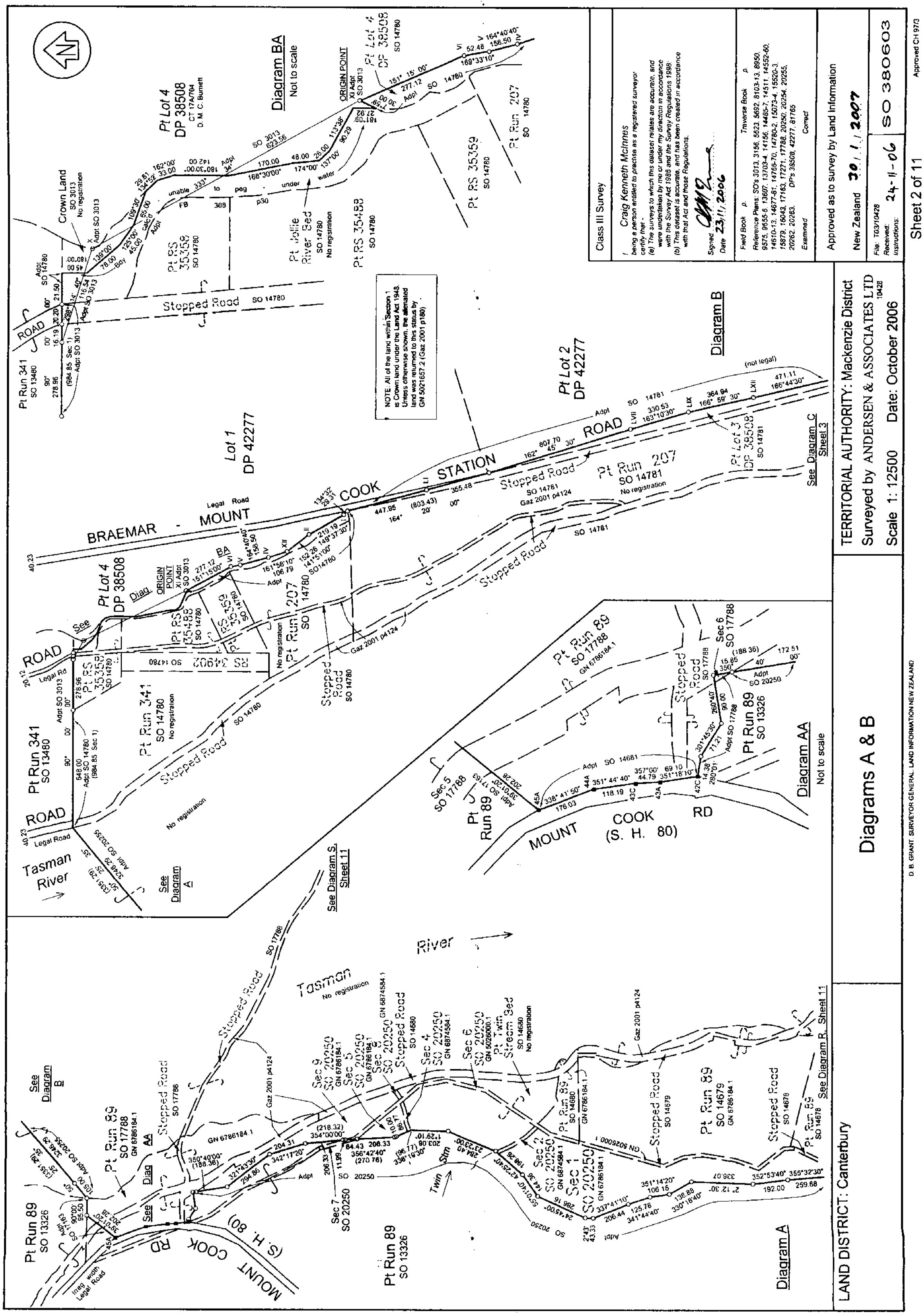
File: T03/10428
Received: 24-11-06
Instructions:

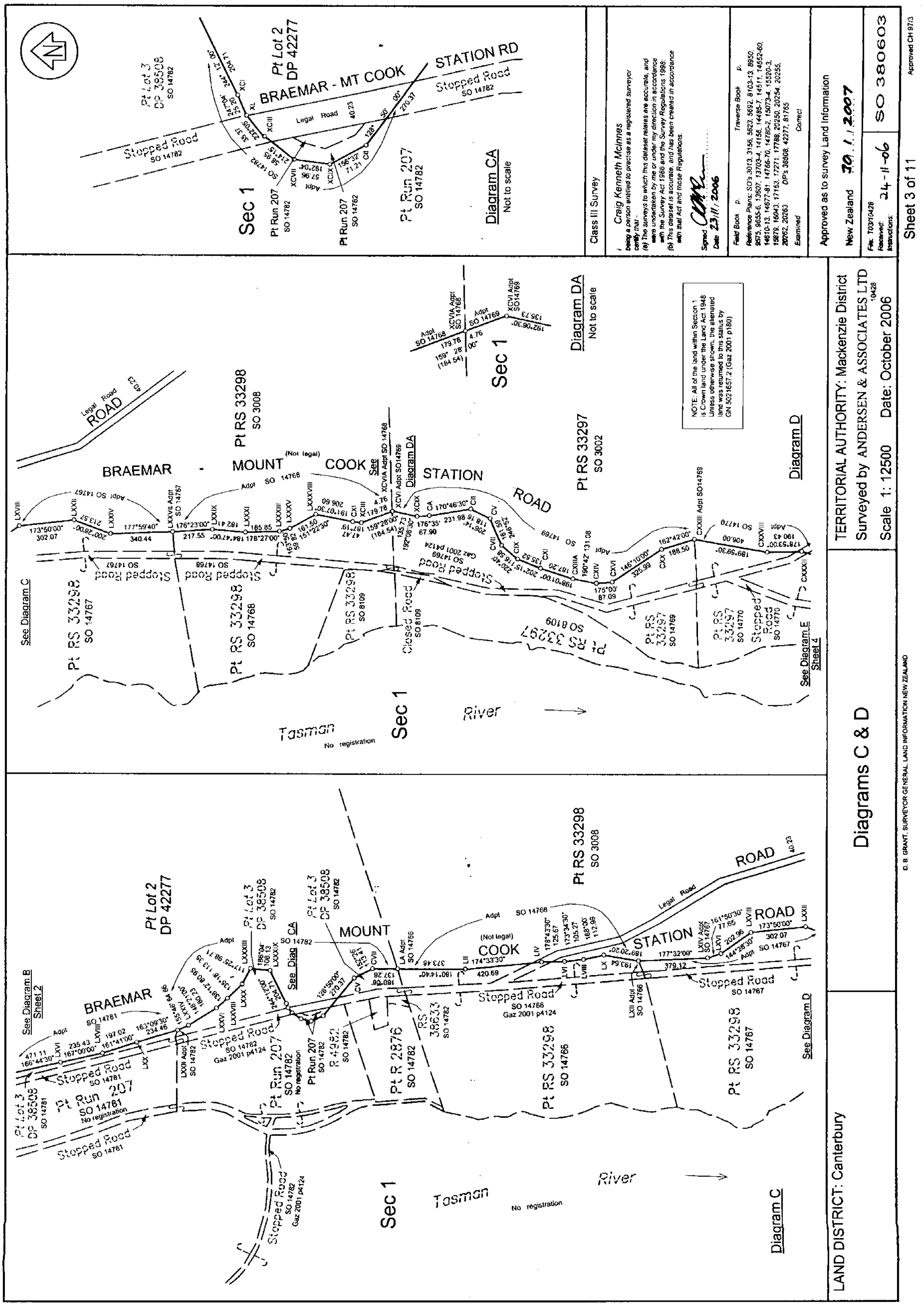
SO 380603

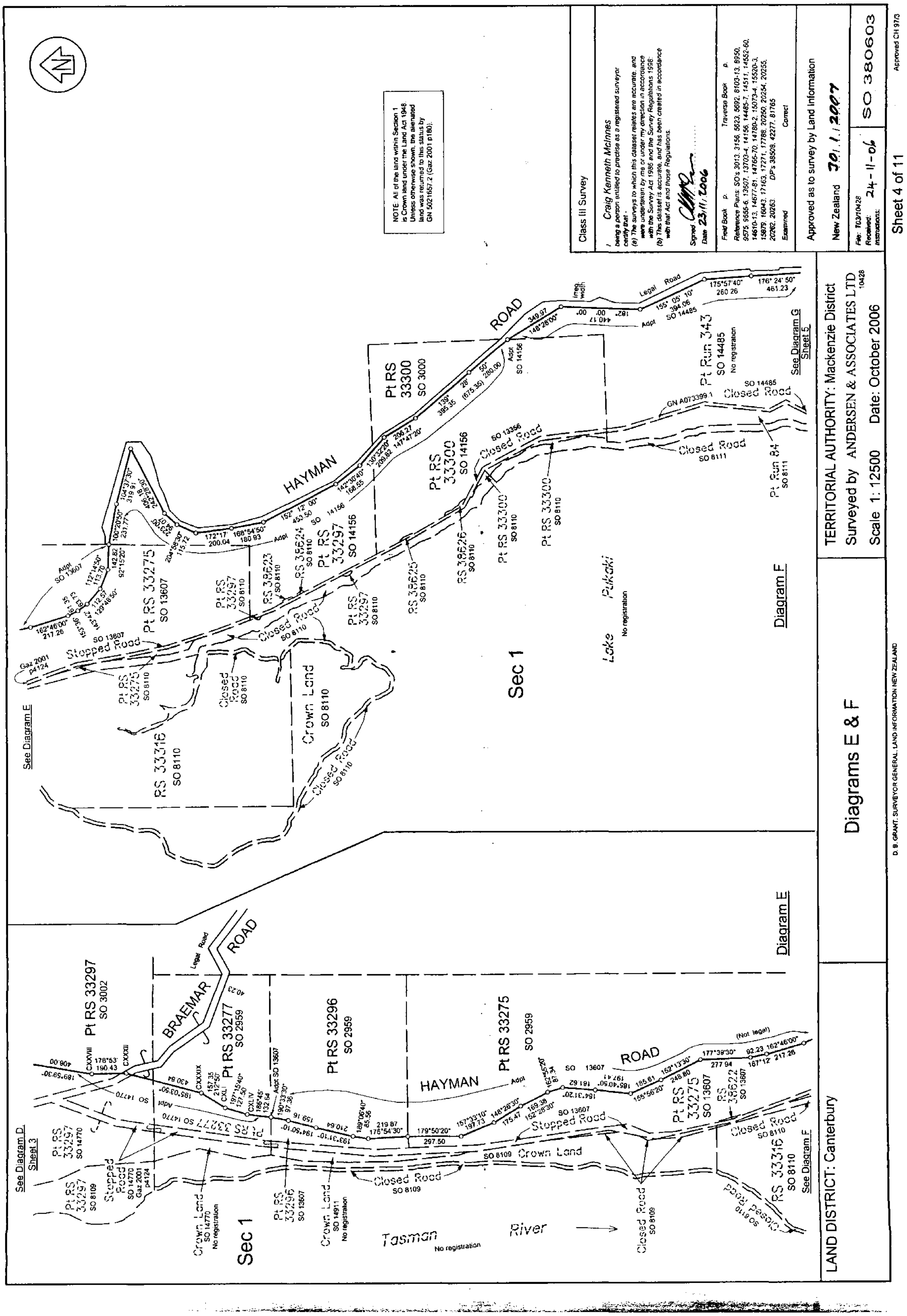
Sheet 1 of 11

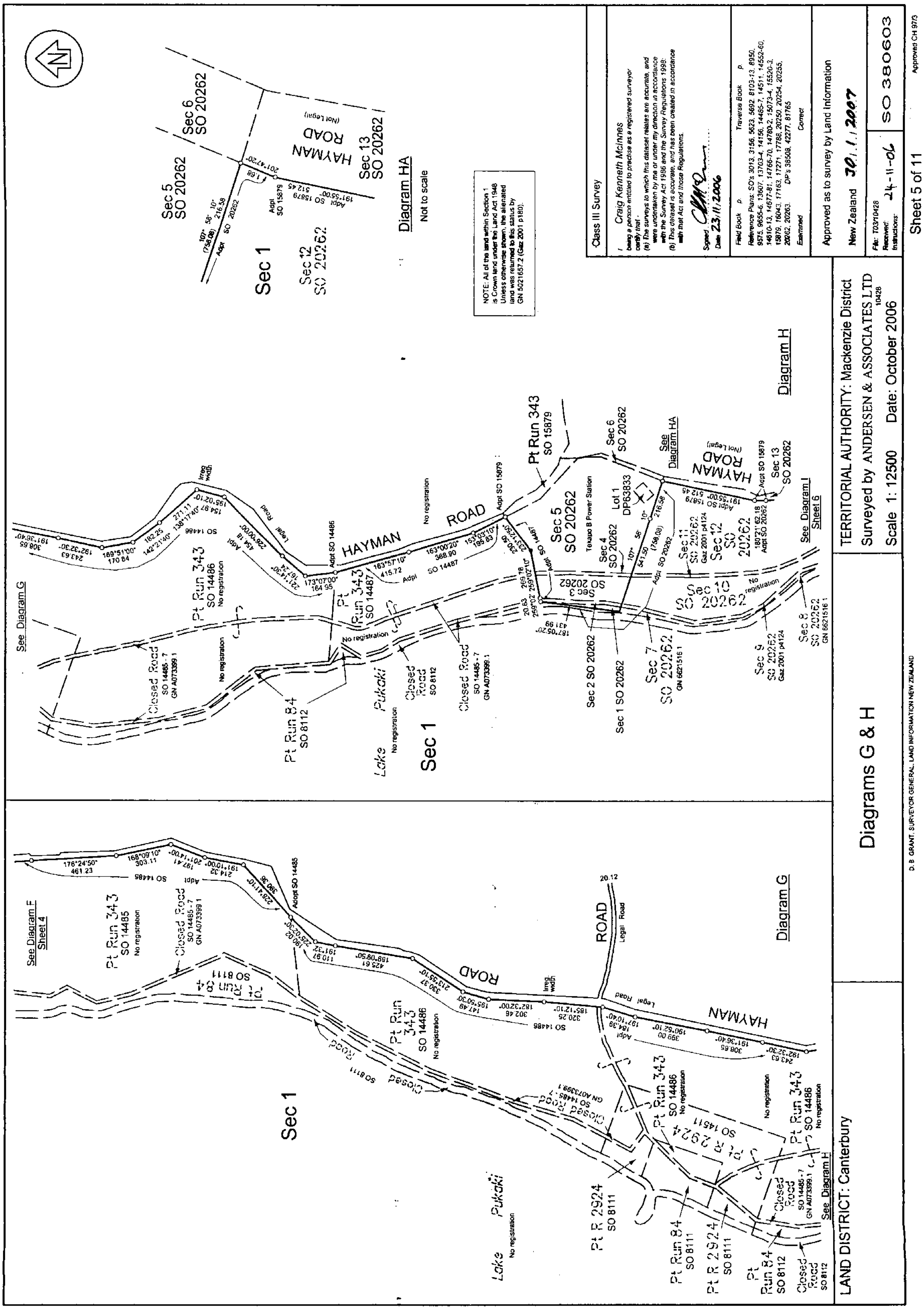
D G GRANT, SURVEYOR GENERAL, LAND INFORMATION NEW ZEALAND

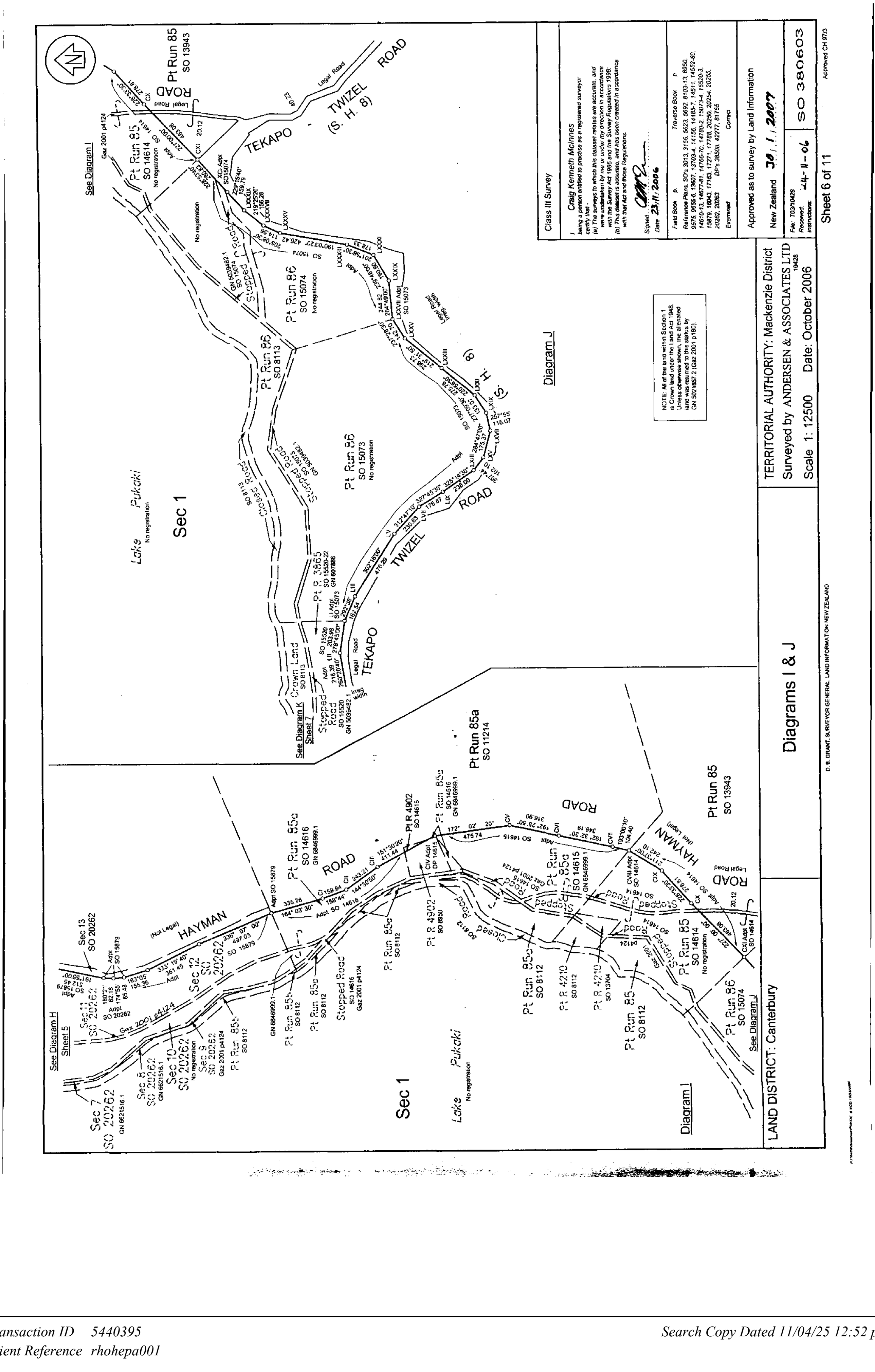
Approved CH 97/3


Diagrams A & B
TERRITORIAL AUTHORITY: Mackenzie District
Surveyed by ANDERSEN & ASSOCIATES LTD
Scale 1: 12500 Date: October 2006
LAND DISTRICT: Canterbury
SO 380603
Sheet 2 of 11
Class III Survey
Craig Kenneth McInnes
Approved as to survey by Land Information New Zealand
Diagram BA
Not to scale
Diagram B
Diagram AA
Diagram A
BRAEMAR - MOUNT COOK STATION ROAD
MOUNT COOK (S. H. 80)
Tasman River
Stopped Road
Lot 1 DP 42277
Pt Lot 2 DP 42277
Pt Lot 4 DP 38508
Pt Run 341 SO 13480
Pt Run 207
Pt Run 89 SO 13326
Pt Run 89 SO 17788
Pt Run 89 SO 14679
NOTE: All of the land within Section 1 is Crown land under the Land Act 1948. Unless otherwise shown, the alienated land was returned to this status by GN 5021657.2 (Gaz 2001 p180)


Diagrams C & D
LAND DISTRICT: Canterbury
TERRITORIAL AUTHORITY: Mackenzie District
Surveyed by ANDERSEN & ASSOCIATES LTD
Scale 1: 12500
Date: October 2006
Approved as to survey Land Information
New Zealand
SO 380603
Sheet 3 of 11
Class III Survey
Craig Kenneth McInnes
Diagram C
Diagram D
Diagram CA
Diagram DA
Not to scale
BRAEMAR - MT COOK
STATION RD
BRAEMAR - MOUNT COOK STATION ROAD
Tasman River
Sec 1
Pt RS 33298
Pt RS 33297
Pt Run 207
Pt Lot 2 DP 42277
Pt Lot 3 DP 38508
Stopped Road


Diagrams E & F
TERRITORIAL AUTHORITY: Mackenzie District
Surveyed by ANDERSEN & ASSOCIATES LTD
Scale 1: 12500 Date: October 2006
LAND DISTRICT: Canterbury
SO 380603
Sheet 4 of 11
Class III Survey
Approved as to survey by Land Information New Zealand
HAYMAN ROAD
BRAEMAR ROAD
Sec 1
Lake Pukaki
Tasman River
Diagram E
Diagram F


Diagrams G & H
LAND DISTRICT: Canterbury
TERRITORIAL AUTHORITY: Mackenzie District
Surveyed by ANDERSEN & ASSOCIATES LTD
Scale 1: 12500
Date: October 2006
Sheet 5 of 11
SO 380603
Class III Survey
Craig Kenneth McInnes
Approved as to survey by Land Information New Zealand
30.1.2007
Diagram G
Diagram H
Diagram HA
Not to scale
HAYMAN ROAD
Sec 1
Lake Pukaki
No registration
Closed Road
Pt Run 343
SO 14486
Pt Run 84
SO 8112
Sec 5 SO 20262
Lot 1 DP63833
Tekapo B Power Station
NOTE: All of the land within Section 1 is Crown land under the Land Act 1948. Unless otherwise shown, the alienated land was returned to this status by GN 5021657.2 (Gaz 2001 p180).


Diagrams I & J
TERRITORIAL AUTHORITY: Mackenzie District
Surveyed by ANDERSEN & ASSOCIATES LTD
Scale 1: 12500 Date: October 2006
LAND DISTRICT: Canterbury
Class III Survey
Craig Kenneth McInnes
Approved as to survey by Land Information
New Zealand
SO 380603
Sheet 6 of 11
Diagram I
Diagram J
Sec 1
Lake Pukaki
No registration
TEKAPO - TWIZEL ROAD (S. H. 8)
HAYMAN ROAD
Pt Run 85
SO 13943
Pt Run 85a
SO 11214
Pt Run 86
SO 15073
Pt Run 86
SO 15074
Pt Run 86
SO 8113

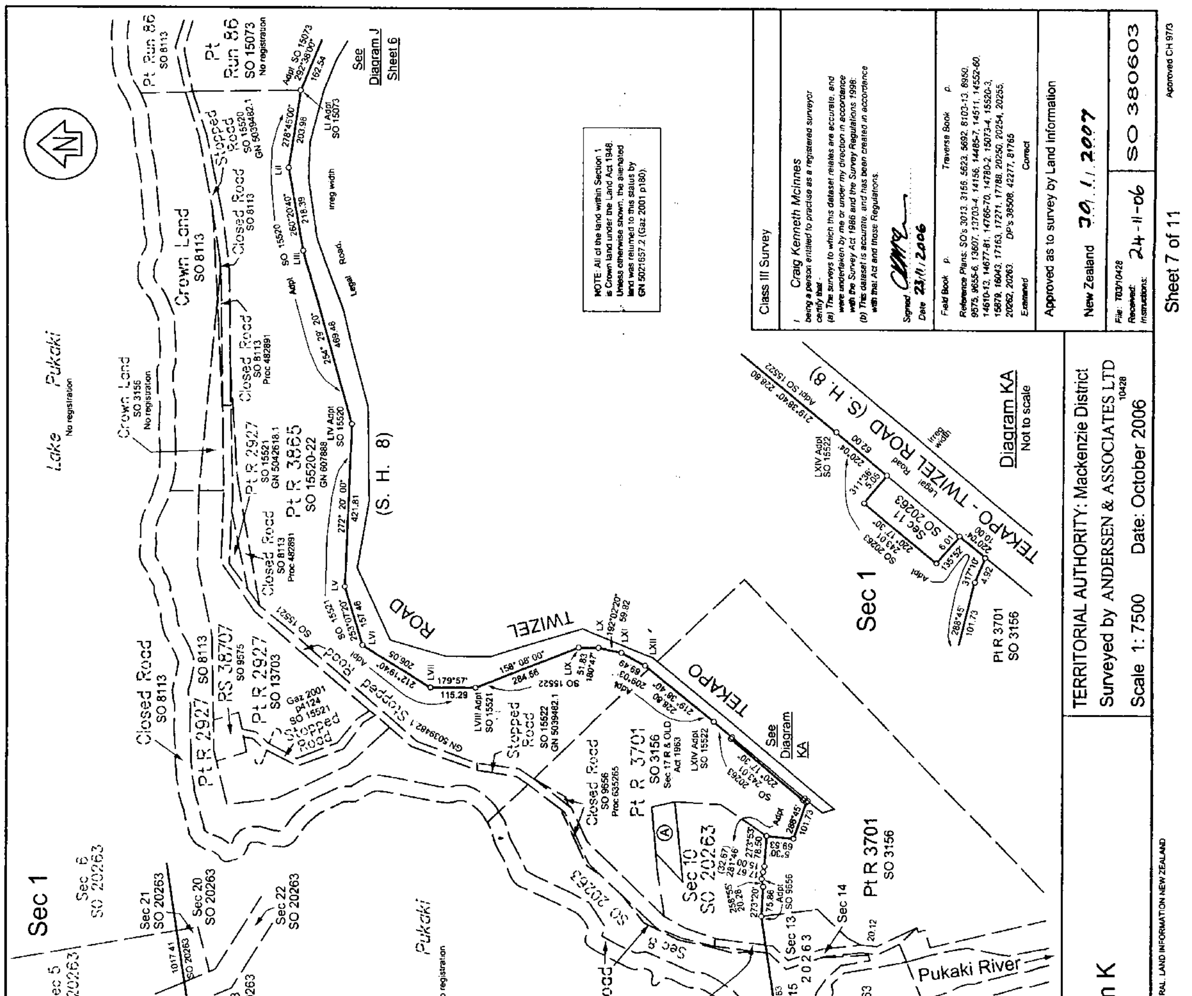


Diagram K
Lake Pukaki
Pukaki River
Sec 1
TEKAPO - TWIZEL ROAD (S. H. 8)
Diagram KA
Not to scale
Diagram KB
Not to scale
Diagram KC
Not to scale
Class III Survey
Craig Kenneth McInnes
Approved as to survey by Land Information
New Zealand
Sheet 7 of 11
SO 380603
TERRITORIAL AUTHORITY: Mackenzie District
Surveyed by ANDERSEN & ASSOCIATES LTD
Scale 1: 7500
Date: October 2006
LAND DISTRICT: Canterbury

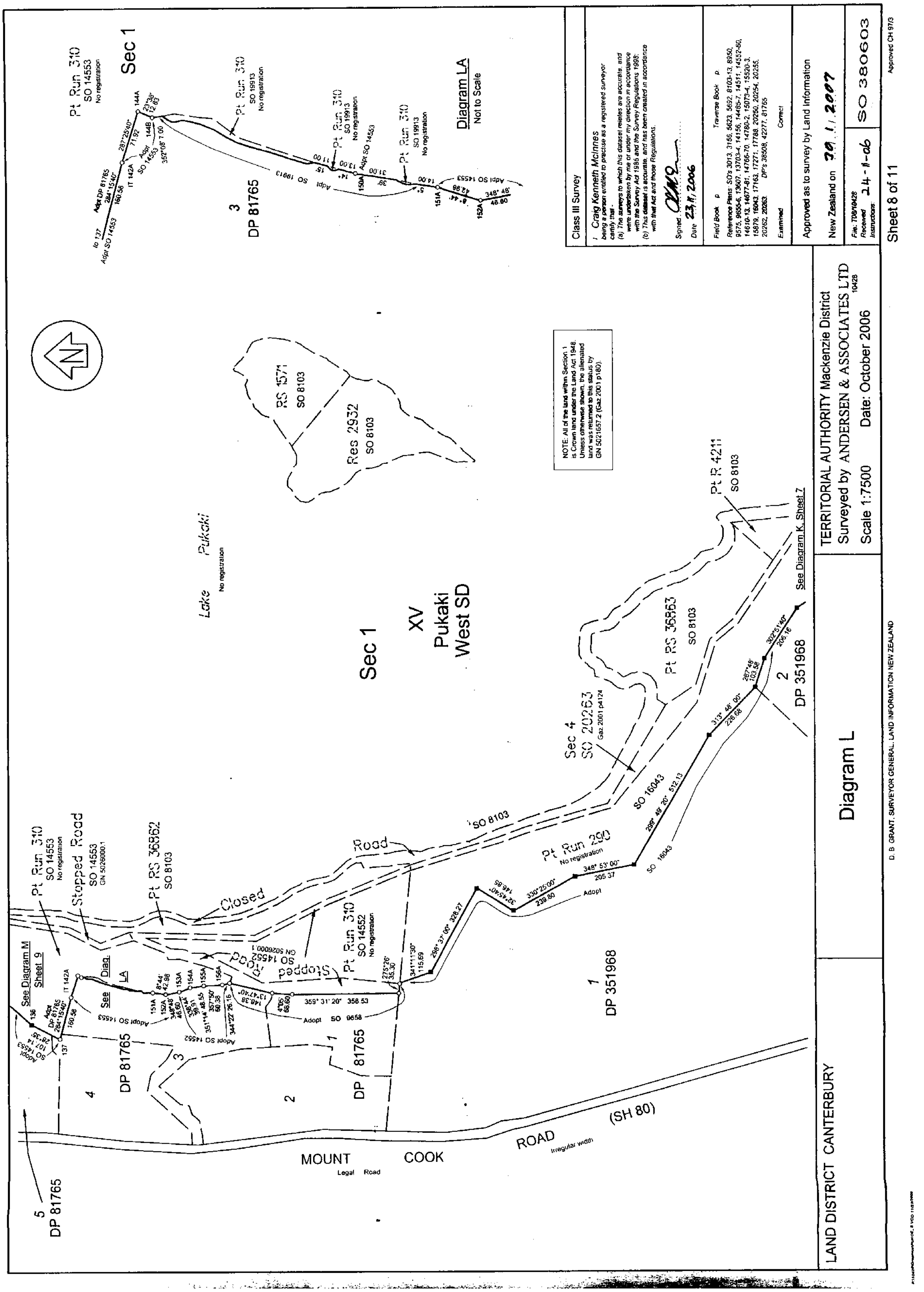
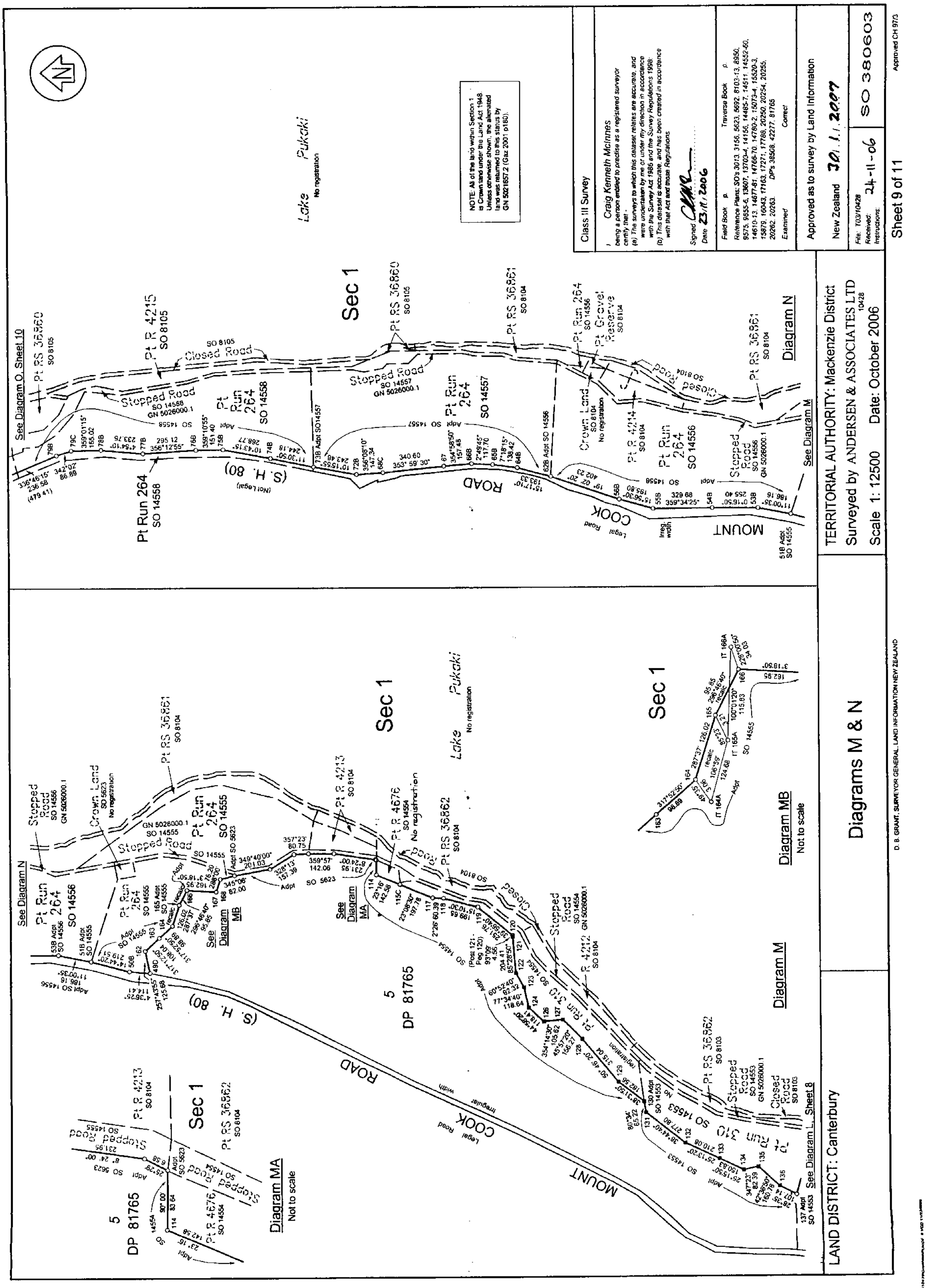
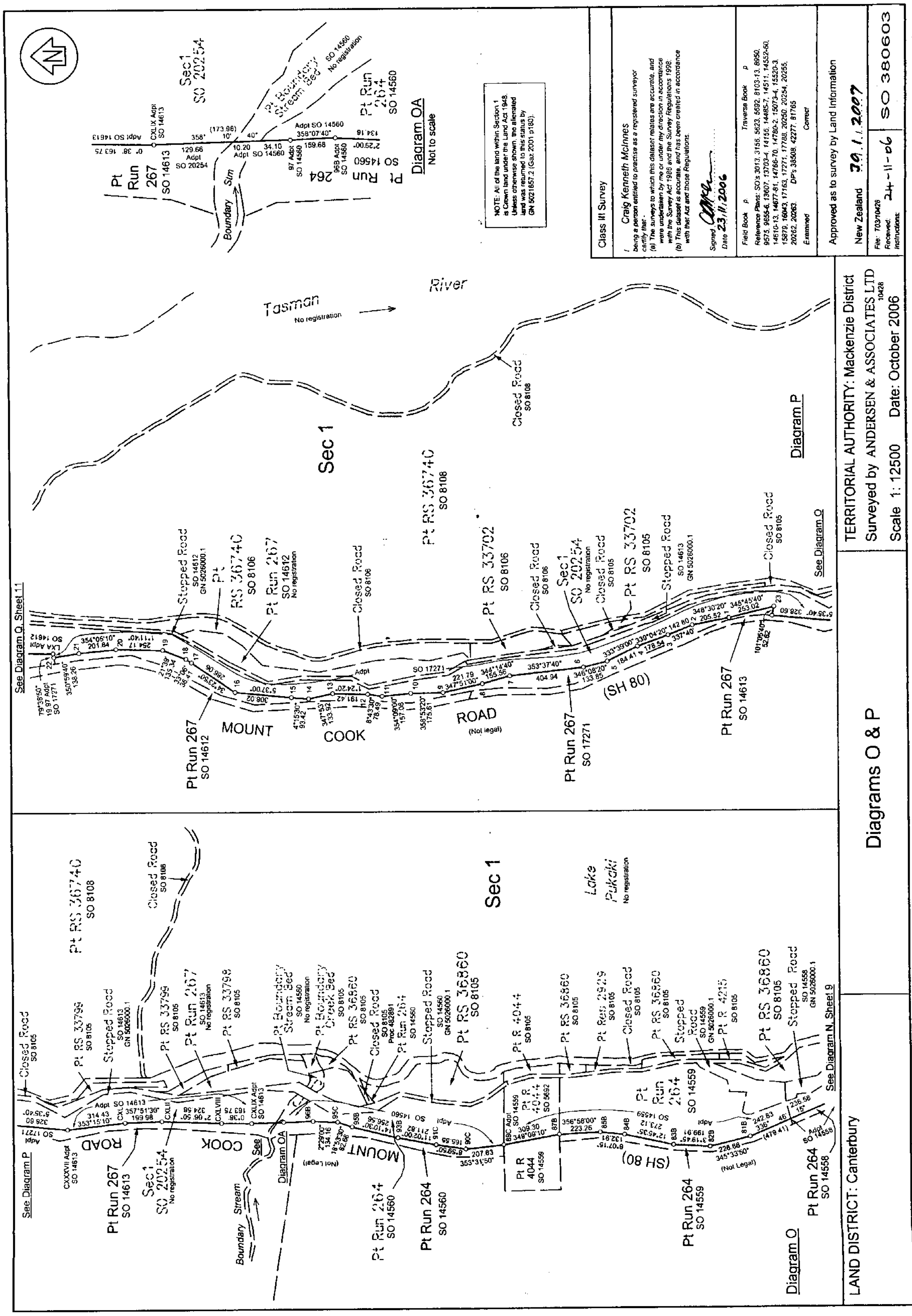


Diagram L
Diagram LA
Not to Scale
Sec 1
XV
Pukaki
West SD
Lake Pukaki
No registration
MOUNT COOK ROAD (SH 80)
Legal Road
Irregular width
DP 81765
DP 351968
Pt Run 310
SO 14553
Pt Run 290
Pt RS 36863
SO 8103
Sec 4
SO 20263
RS 1571
Res 2932
Pt R 4211
Stopped Road
Closed Road
Class III Survey
Craig Kenneth McInnes
Approved as to survey by Land Information New Zealand on 30.1.2007
SO 380603
TERRITORIAL AUTHORITY Mackenzie District
Surveyed by ANDERSEN & ASSOCIATES LTD
Scale 1:7500
Date: October 2006
LAND DISTRICT CANTERBURY
Sheet 8 of 11


Diagrams M & N
Diagram M
Diagram MA
Not to scale
Diagram MB
Not to scale
Diagram N
NOTE: All of the land within Section 1 is Crown land under the Land Act 1948. Unless otherwise shown, the alienated land was returned to this status by GN 5021657.2 (Gaz 2001 p180).
Lake Pukaki
No registration
Sec 1
Pt Run 264
SO 14558
SO 14557
SO 14556
SO 14555
Pt Run 310
SO 14553
5
DP 81765
MOUNT COOK ROAD (S. H. 80)
Stopped Road
Closed Road
Crown Land
Pt Gravel Reserve
See Diagram O, Sheet 10
See Diagram L, Sheet 8
Class III Survey
I, Craig Kenneth McInnes
being a person entitled to practise as a registered surveyor certify that -
(a) The surveys to which this dataset relates are accurate, and were undertaken by me or under my direction in accordance with the Survey Act 1986 and the Survey Regulations 1998:
(b) This dataset is accurate, and has been created in accordance with that Act and those Regulations
Date 23/11/2006
Field Book p. Traverse Book p.
Reference Plans: SO's 3013, 3156, 5623, 5692, 8103-13, 8950, 9575, 9655-6, 13607, 13703-4, 14156, 14485-7, 14511, 14552-60, 14610-13, 14677-81, 14766-70, 14780-2, 15073-4, 15520-3, 15879, 16043, 17163, 17271, 17788, 20250, 20254, 20255, 20262, 20263. DP's 38508, 42277, 81765
Examined Correct
Approved as to survey by Land Information New Zealand 30.1.2007
File: T03/10428
Received: 24-11-06
Instructions:
SO 380603
Sheet 9 of 11
Approved CH 97/3
TERRITORIAL AUTHORITY: Mackenzie District
Surveyed by ANDERSEN & ASSOCIATES LTD 10428
Scale 1: 12500 Date: October 2006
LAND DISTRICT: Canterbury
D. B. GRANT, SURVEYOR GENERAL, LAND INFORMATION NEW ZEALAND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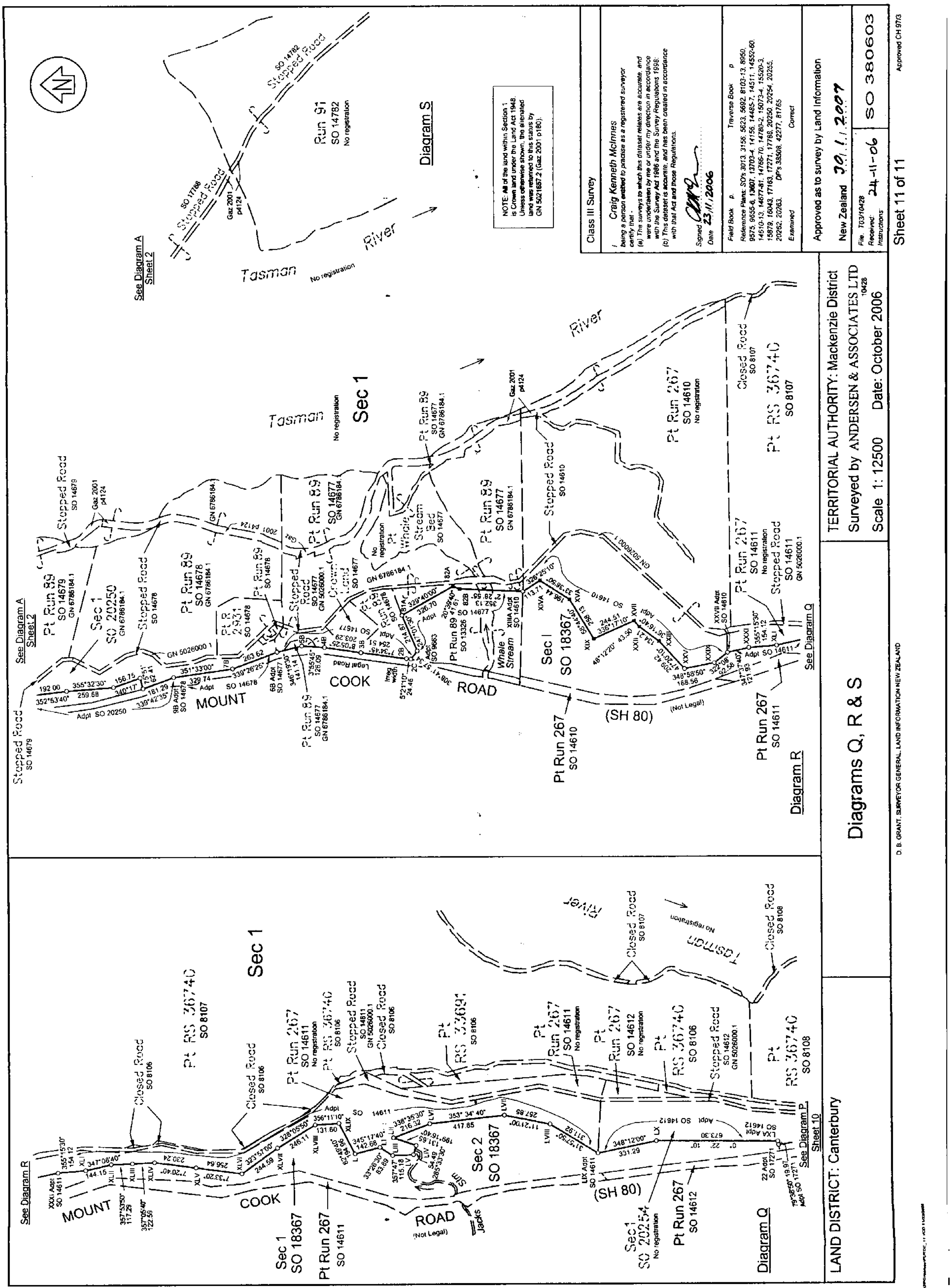
Surveyed by ANDERSEN & ASSOCIATES LTD
Scale 1: 12500 Date: October 2006
LAND DISTRICT: Canterbury
Class III Survey
Approved as to survey by Land Information
New Zealand
SO 380603
Sheet 10 of 11
Diagram OA
Not to scale
Diagram O
Diagram P
Sec 1
Tasman River
Lake Pukaki
MOUNT COOK ROAD
(SH 80)


Diagrams Q, R & S
LAND DISTRICT: Canterbury
TERRITORIAL AUTHORITY: Mackenzie District
Surveyed by ANDERSEN & ASSOCIATES LTD
Scale 1: 12500 Date: October 2006
Approved as to survey by Land Information New Zealand
SO 380603
Sheet 11 of 11
Class III Survey
Craig Kenneth McInnes
MOUNT COOK ROAD
(SH 80)
Tasman River
Sec 1
SO 18367
Pt Run 267
SO 14611
Diagram S
Run 91
SO 14782

Deed of grant of easement for Lake Pukaki

Her Majesty the Queen

Meridian Energy Limited

Certified correct for the purposes of the Land Transfer Act 1952

Solicitor for the Grantee

Canterbury Land Registration District

GreenwoodRocheChisnall
PROJECT LAWYERS

TRE2065.19.01

TABLE OF CONTENTS

Date: 21/8/07

PARTIES

1 **Her Majesty the Queen** acting by and through the Commissioner of Crown Lands appointed under section 12A(1) of the Survey Act 1986 (*Grantor*)

2 **Meridian Energy Limited** (*Grantee*)

BACKGROUND

A The Grantor is the owner pursuant to the Land Act 1948 of all that land described in the First Schedule (*Easement Land*).

B By deed dated 31 March 1988 (*Crown Sale Deed*) the Crown acting by and through the Ministers of Finance and State Owned Enterprises sold to the Electricity Corporation of New Zealand Limited (*ECNZ*) certain assets owned by the Crown and used for the generation and supply of electricity (*Specified Assets*).

C The Specified Assets include certain land assets of the Crown as at 31 March 1988 held for the purposes of present and future electricity generation or supply (whether formally set apart under the Public Works Act 1981 or not) and include land related rights as are reasonably required to operate the relevant business sold, to give full force and effect to the Crown Sale Deed.

D By a Deed of Operating Easement dated 16 April 1993 the Ministers of Finance and State Owned Enterprises and ECNZ agreed, inter alia, that the beds of lakes and rivers (which remain under the control and jurisdiction of the Commissioner of Crown Lands) would not be transferred to the Grantee but that certain operating easements would be granted to enable the Grantee to carry out the electricity generation business operated by it.

E Pursuant to an agreement for sale and purchase dated 22 December 1998 ECNZ sold some of the Specified Assets to the Grantee.

F Pursuant to a Deed of Assumption and Release entered into between the Crown, ECNZ and the Grantee dated 22 December 1998, the Crown and ECNZ agreed that the Grantee is entitled under the Crown Sale Deed "to the benefit of, and to exercise, all of the rights, powers and privileges of ECNZ under the Crown Sale Deed to the extent that those rights, powers and privileges relate or apply to the Specified Assets as if the Grantee was ECNZ and a party to the Crown Sale Deed".

G The Grantee is desirous of an easement to store and release water and to take and discharge water and to convey and drain water together with ancillary rights attaching to such use on or about the Easement Land.

H The Commissioner of Crown Lands has agreed pursuant to Section 60 of the Land Act 1948 to the grant of a right to store and release water and the right to take and discharge water and the right to convey and drain water from time to time on or about the Easement Land together with the ancillary rights to such rights upon the terms and conditions contained in this Deed.

GRANT OF EASEMENT

IT IS AGREED that pursuant to the premises contained in this Deed, the Grantor pursuant to Section 60 of the Land Act 1948 transfers, conveys and grants to the Grantee as an easement in gross in perpetuity:

Right to store water

1 The full and free right and liberty to store water (in whatever quantities and whatever times the Grantee thinks fit) from time to time on or about the Easement Land, the right to carry out works and/or maintain the Easement Land in such a manner to store water, and when required by the Grantee to release from time to time that water in such quantities as it shall determine.

Right to install and operate Hydro Electricity Water Works

2 The full and free right and liberty to install and operate Hydro Electricity Water Works from time to time upon, over, under or about the Easement Land and via those Hydro Electricity Water Works to take in such quantities as the Grantee shall determine any water from time to time situated upon, under or about the Easement Land and also via any of those Hydro Electricity Water Works to convey, take and discharge water, in such quantities as the Grantee shall determine, either from, through or to the Easement Land or other lands.

TERMS AND CONDITIONS

The rights shall be subject to the terms and conditions in this Deed as follows:

1 **INTERPRETATION**

For the purpose of the interpretation or construction of this Deed unless the context provides otherwise:

(a) Words importing any gender shall include all other genders.

(b) Words importing the singular shall include the plural and vice versa.

(c) Headings shall be ignored.

(d) References to clauses are references to clauses in this Deed and references to parties and Schedules are references to the parties and the Schedules to this Deed unless expressly stated otherwise.

(e) Any reference in this Deed to any statute or rules is deemed to include all amendments, revisions, substitutions or consolidations made from time to time to that statute or rules.

(f) A *person* shall include any individual person, a corporation, a company or other body corporate, an unincorporated body of persons, a public body, firm, partnership, joint venture, association, organisation, trust or Crown agency, in each case whether or not having separate legal personality.

(g) *writing* shall include words visibly represented or reproduced.

(h) A reference to *the Grantor* or *the Grantee* includes their respective successors and assignees and where the context permits extends to include all persons under their respective control.

(i) *Dams or Structures* means all dams and structures and associated structures whether on the Easement Land or elsewhere in respect of which the Grantee is for the time being entitled to exercise the Grantee's rights under this Deed.

(j) *Deed* means this Deed of Grant of Easement and includes any schedule and any annexure to this Deed.

(k) *Easement Land* means the land described in the First Schedule.

(l) *Hydro Electricity Water Works* includes without limitation all or any pipe, pipeline, conduit tunnel, bore, pump, pumphouse, bridge, heat exchanger, separation plant, cooling tower, holding pond, utility and services connections, channel, canals, dams or structures, equipment (including monitoring and measuring equipment and structures, safety devices and similar equipment), booms, floating equipment, weirs, improvements, and appurtenances or works used or associated with all such improvements for the taking, conveyance, containment, monitoring, use, and/or discharge or disposal of water.

(m) *improvements* means all improvements associated with the business of the Grantee under this Deed whether constructed or

existing at the time of entering into this Deed or at anytime constructed or installed by the Grantee in the future.

2 **WATER STORAGE**

2.1 The Grantee shall have the right to store and retain water within the operating levels established from time to time under the terms of resource consents or other statutory or regulatory consents or approvals imposed on the Grantee on or about the Easement Land subject to matters beyond the reasonable control of the Grantee.

2.2 In the event of unusually heavy rainfall or unusually heavy inflow of water which impacts on the water levels on or about the Easement Land the Grantee shall subject to matters beyond its reasonable control take whatever measures are required to discharge an appropriate level of excess water agreed upon with the Regional Council and otherwise in compliance with any lawful direction of a civil defence authority.

3 **DISCHARGE OF WATER**

3.1 The Grantee shall have the right to discharge drain and convey water into and along any waterway, water course or water catchment which forms part of the Easement Land.

3.2 If lawfully directed or requested to do so by a civil defence authority or if required in any other case beyond the reasonable control of the Grantee then the discharge of water to that waterway, water course, water catchment or to the Easement Land may exceed the levels authorised by the relevant resource consents, or other statutory or regulatory consents or approvals held by the Grantee from time to time.

4 **RIGHT TO CARRY OUT WORKS**

4.1 The Grantee's right to install and operate Hydro Electricity Water Works shall include, without limitation, the right to inspect, monitor, test, drill, investigate, install, construct, lay, use, maintain, renovate, renew, repair, replace, upgrade, alter, demolish or remove Hydro Electricity Water Works and to do any related works.

4.2 All transmission lines, Hydro Electricity Water Works, tunnels (if any), dams or structures existing at the date of this Easement on or about the Easement Land shall be deemed installed with the Grantor's consent. Any repair, maintenance, replacement or upgrade works to such existing works shall not require the consent of the Grantor.

4.3 The Grantee shall not undertake the installation of any new Hydro Electricity Water Works, upon, over, under or about the Easement Land, without first having obtained the consent of the Grantor.

5 **RIGHT OF ACCESS**

5.1 The Grantee shall at all times have the right of access with or without vehicles, plant and equipment over, upon and through the Easement Land, either to and from any land of the Grantee or to and from other land, for the purpose of carrying on its electricity generation business and shall at all times have the right of access to and from any part of the Easement Land for the purpose of exercising any of the powers granted under this Deed at any time provided that:

(a) except in the case of emergency or in accordance with *clause 12* no such rights shall be exercised without the consent of the Grantor; and

(b) in exercising such access rights the Grantee shall use reasonable endeavours to so far as practicable minimise and avoid any unnecessary damage to the Easement Land and disturbance to any occupier.

5.2 The Grantee may with the prior consent of the Grantor construct such accessways, roads, tracks and fences as are necessary for the exercise of the rights granted by this clause.

6 **INSTALLATION OF EQUIPMENT**

6.1 The Grantee may from time to time if it sees fit install and maintain booms and other floating equipment on any lake or reservoir used for storage of water on the Easement Land and shall have the right to anchor such equipment on the Easement Land. The Grantee may if it sees fit from time to time install and maintain monitoring and measuring equipment and structures, safety devices and similar equipment on, over, under or about the Easement Land.

6.2 All the abovementioned devices, equipment and structures existing at the date of this Deed shall be deemed to be installed with the Grantor's consent.

6.3 Except in the case of emergency, or due compliance with statutory, regulatory, or resource consent requirement(s) the installation of such devices and equipment shall not be undertaken without the Grantee first having obtained the consent of the Grantor.

7 **EROSION WORKS**

7.1 The Grantee may from time to time undertake works and/or carry out planting of vegetation on or about the Easement Land with a view to limiting or minimising erosion, land slippage or landslides. The Grantee shall use reasonable endeavours when carrying out such works and

plantings to so far as practicable carry out the same in keeping with the character of the Easement Land.

7.2 The Grantee shall use reasonable endeavours to reduce erosion, land slippage and landslides on the Easement Land by available practical and economic means as determined by the Grantee in its reasonable opinion provided that nothing in this *clause 7* shall be taken to restrict or hinder the Grantee from raising or lowering the level of the water situated from time to time on or about the Easement Land during the course of carrying on the Grantee's electricity generation business.

7.3 The Grantee may from time to time remove from any water on or about the Easement Land or remove from any part of the Easement Land and/or redistribute or relocate, whether on the Easement Land or elsewhere, any sediment or other material or any vegetation which in the opinion of the Grantee is impeding or likely to impede the efficient generation of electricity or the efficiency of the Hydro Electricity Water Works or to cause danger, injury or damage to persons or property. Before carrying out such work the Grantee shall (except in the case of an emergency or due compliance with statutory, regulatory or resource consent requirements) first obtain the consent of the Grantor.

8 **WORKS SUBJECT TO GRANTOR'S CONSENT**

8.1 The Grantee may from time to time erect structures and do works on the Easement Land for the purpose of the exercise of any of the Grantee's rights under this Deed but no structures shall be erected or work done without first having obtained the consent of the Grantor.

9 **DEPOSIT AND REMOVAL OF SEDIMENT**

9.1 The Grantee may from time to time remove sediment, rock or other material or any vegetation from, on or about the Easement Land which in the reasonable opinion of the Grantee is impeding or likely to impede the efficient generation of electricity by the Grantee or cause danger, injury or damage to persons or property and the Grantee may deposit sediment, or other material, on or about the Easement Land.

9.2 Where the appearance or use of the Easement Land is or may be adversely affected by any work undertaken under *clause 9.1* then as agreed by both parties after consultation with each other, the Grantee shall carry out reasonable landscaping of the affected area in a manner approved by the Grantor.

10 **STORAGE OF GOODS OR MATERIAL**

10.1 The Grantee may from time to time store goods and materials of all kinds on or about the Easement Land but no such goods and materials shall be stored without first having obtained the consent of the Grantor.

10.2 Where a permanent right to store goods or materials on the Easement Land has been granted the Grantee may apply to purchase the land concerned at its then current market value to be determined in accordance with *clause 26* together with the reasonable costs of raising title and transferring the land and the Grantee and Grantor shall use their best endeavours to give effect to any such arrangement with all due expedition.

10.3 All goods and materials stored on or about the Easement Land at the date of this Deed shall be deemed to have been stored and continue to be stored with the Grantor's consent.

11 **ON WATER OPERATIONS**

11.1 The Grantee shall for the purpose of exercising any of the rights granted under this Deed have the right to operate any vessel, plant or equipment upon any area of water on the Easement Land, and to establish and maintain jetties, wharves, landing places and slipways but no such jetties, wharves, landing places and slipways shall be established after the date of this Deed without the consent of the Grantor.

11.2 All jetties, wharves, landing places and slipways existing at the date of this Deed shall be deemed to have been established with the Grantor's consent.

12 **EMERGENCY AND PUBLIC SAFETY**

12.1 If, at any time, the Grantee considers that there is an emergency situation involving public safety or the security of electricity generation business, the Grantee may temporarily exclude entry by any persons to all or any parts of the Easement Land.

12.2 In any other case where there is no emergency the Grantee may also with the Grantor's prior approval temporarily or permanently and/or from time to time exclude persons from all or any parts of the Easement Land.

12.3 Where entry is excluded, the Grantor will not authorise or permit entry except for the purpose of inspecting the condition of the Easement Land or doing any act required to be done by it under this Deed, and in such cases after having given reasonable prior notice to the Grantee.

12.4 Where permanent exclusion of third parties is warranted, the Grantee may purchase the Easement land or any part or parts of it at its then current market value to be determined in accordance with *clause 26* together with the reasonable costs of raising title and transferring the land concerned and the Grantee and Grantor shall use their best endeavours to give effect to any such arrangement with all due expedition.

13 **RIGHT TO ERECT WARNING NOTICES**

13.1 The Grantee may take such measures as it reasonably thinks necessary for the safety of persons or property on or about the Easement Land including without limitation the right to erect signs and notices warning of any danger.

14 **INCIDENTAL RIGHTS**

14.1 The Grantee shall have the right to do all such acts and things as are reasonably necessary for the better enjoyment of the rights expressly and impliedly granted by this Deed.

15 **GRANTOR CONSENT**

15.1 In all cases where the consent or approval of the Grantor is required under this Deed such consent or approval shall be deemed granted for the day to day or other activities of the Grantee properly and reasonably required for the carrying on of its electricity generation business or interests and in the event that the consent or approval is not deemed granted, such consent or approval shall not be unreasonably withheld or delayed or granted upon unreasonable conditions, or granted subject to the payment of money or other consideration.

16 **STATUTORY COMPLIANCE**

16.1 The Grantee shall obtain and comply with all statutory and regulatory consents required from time to time to exercise its rights under this Deed.

16.2 The Grantee shall be entitled to apply for any resource consents and any other statutory or regulatory consents required for the purpose of the exercise of any of the Grantee's rights under this Deed in the same manner as if it were the registered proprietor of the Easement Land. The Grantee shall at or before the time of making the relevant application forward a copy to the Grantor.

16.3 The Grantor shall in order to in good faith give full and proper effect to the Grantee's easement rights granted in this Deed provide upon written request from the Grantee, at the reasonable cost of the Grantee, a reasonable degree of support, co-operation and/or assistance (including written submissions in support) in respect of such application(s) and shall

not do anything whereby the ability for the Grantee to obtain and comply with any such required consents shall be frustrated, hindered or interfered with.

17 **REMOVAL OF STRUCTURES**

17.1 All structures, plant and equipment made or installed by the Grantee on the Easement Land may at any time be removed by it provided that any substantial damage caused by such removal shall immediately be remedied by the Grantee at its cost.

18 **GRANTEE NOT TO DISRUPT GRANTOR'S BUSINESS**

18.1 The Grantee shall use all reasonable endeavours to cause as little disturbance and disruption to the carrying of the normal business operations (if any) of the Grantor although the Grantor accepts that this provision shall not prevent, restrict or hinder the carrying out the Grantee's electricity generation business or interests in an normal manner consistent with the rights granted to it in this Deed.

19 **FENCING**

19.1 The Grantee shall not be required to fence any of the Easement Land, unless it is required as a condition of the Grantor's consent when granting any consent under this Deed provided that condition is reasonable in the circumstances.

20 **IMPROVEMENTS**

20.1 The parties accept and acknowledge that all improvements connected with the use rights contained in this Deed shall remain in the ownership of the Grantee.

20.2 Upon this Deed ceasing or being surrendered, the Grantee shall have the right, but not an obligation, within a period of 12 months from such date (or such other period as agreed by the parties) to remove its improvements and otherwise take all appropriate measures to ensure that any of its improvements remaining are left in a secure state and where applicable areas sealed off or closed off and otherwise protected from members of the public provided any measures adopted are practical and not unduly uneconomic to the Grantee. Any improvements remaining on the Easement Land at the end of the period referred to in this *clause 20.2* shall vest in the Grantor.

20.3 The Grantee shall not be entitled to any compensation or damages for any improvements to the Easement Land effected by the Grantee.

21 APPLICATION TO GRANTOR TO PURCHASE EASEMENT LAND

21.1 The Grantor shall consider any application made by the Grantee to purchase the Easement Land (or any part or parts of it) pursuant to *clauses 10* and *12* in an expeditious manner and in accordance with any established Protocols agreed with the Grantee from time to time.

21.2 The Grantee acknowledges that the Grantor may take into account (but without limitation) the following matters when considering any such application made by the Grantee:

(a) The requirements of any settlement of a claim under the Treaty of Waitangi Act 1975;

(b) Statutory requirements relating to the disposal of land;

(c) Government policy in existence at the time of such application; and

(d) Whether special legislation is required to implement any purchase.

21.3 Any purchase of the Easement Land (or any part or parts of it) approved by the Grantor shall be at the current market value determined under *clause 26*.

21.4 Notwithstanding *clauses 21.1* to *21.3* (inclusive) this Deed has the effect as an easement pursuant to section 60 of the Land Act 1948 and remains subject to the provisions of the Land Act 1948 which remain binding on the parties at all times in the same manner as if such provisions had been fully set out in this Deed.

22 DISPOSITION OF EASEMENT LAND

22.1 The Grantor undertakes to give the Grantee not less than 6 months prior notice of any intention to sell, lease or otherwise dispose of any estate or interest in the Easement Land or any intention to vest or change the legal status pursuant to which the Crown holds the Easement Land.

22.2 The Grantor shall not enter into or give effect to or permit registration of any sale, transfer, lease, or other disposal or grant of estate or interest in the Easement Land or any vesting of change of the legal status pursuant to which the Crown holds the Easement Land without:

(a) first consulting with the Grantee;

(b) procuring that any third party or the Crown, as the Grantee reasonably requires, enters into a Deed of Covenant with the Grantee or enters into such other appropriate lawful arrangement in such form as the Grantee may reasonably require, either binding that third party to observe and perform all or any relevant parts of

the Grantor's covenants in this Deed including this *clause 22*, and/or binding the Crown separately so that the Grantee's rights under this Deed are not frustrated, hindered or interfered with.

23 **CHANGE OF USE OF EASEMENT LAND**

23.1 The Grantor covenants not to permit or consent to any development or change of use or change of zoning of any of the Easement Land without consulting with and obtaining the consent of the Grantee which consent may be withheld if in the reasonable opinion of the Grantor the rights granted to the Grantee under this Deed are likely to be materially prejudiced.

23.2 Where the Grantee can demonstrate upon a reasonable basis that any such development, change of use or change of zoning is likely to materially frustrate, hinder or interfere with the ability for the Grantee to properly exercise its rights under this Deed, then the Grantor shall decline and/or take reasonable steps to object to the proposed development, change of use or change of zoning.

24 **FURTHER ASSURANCES**

24.1 The Grantor shall, whenever called upon by the Grantee and at the cost of the Grantee, execute such further deeds and assurances such as registrable easements and/or encumbrances at a nominal rent charge in perpetuity and arrange for any titles to be produced if required by the Grantee as may be necessary to give full and proper effect to the rights granted in favour of the Grantee arising out of and from this Deed and to enable those rights to be registered pursuant to any gazette notice or against any relevant title which issues in respect of the Easement Land.

25 **SURRENDER OF EASEMENT**

25.1 The Grantee shall be entitled at any time to surrender at its own cost all or any part of the interest granted pursuant to this Deed.

25.2 The Grantor shall execute any deed of surrender upon request by the Grantee.

25.3 Any such surrender shall be without prejudice to the rights of either party in respect of any antecedent breach of this Deed.

26 **VALUATION OF RELEVANT LAND**

26.1 For the purpose of *clauses 10* and *12* of this Deed the current market value of the relevant land shall be determined by a registered valuer appointed by each party and if they cannot agree to be determined by a

umpire to be appointed by those valuers prior to their entering in to the determination of the matter.

27 **TRANSFERABILITY OF EASEMENT RIGHTS**

27.1 The Grantee shall be entitled to transfer or assign its rights and obligations under this Deed as to the whole or any parts of the Easement Land.

27.2 Upon the assignee or transferee becoming liable under this Deed or notifying the Grantor that it has assumed the relevant obligations of the Grantee under this Deed, the provisions of this Deed shall cease to be binding upon the assignor or transferor in respect of the relevant parts of the Easement Land (or if applicable, the whole of the Easement Land) but without prejudice to the assignor's or transferor's liability for any antecedent breach of covenant under this Deed.

28 **DISPUTE RESOLUTION**

28.1 In the event of any dispute arising between the parties in respect of or in connection with this Deed, the Grantee shall first exercise any right or entitlement to seek a rehearing by the Grantor pursuant to section 17 of the Land Act 1948 and once such review has taken place or is lawfully waived the parties shall, without prejudice to any other right or entitlement they may have under this Deed or otherwise, explore whether the dispute can be resolved by use of the alternative dispute resolution technique of mediation. The rules governing such techniques shall be agreed between the parties or as recommended by the Chairperson of the New Zealand chapter of LEADR (Lawyers Engaged in Alternative Dispute Resolution).

28.2 In the event the dispute is not resolved within twenty eight days of written notice by one party to the other of the dispute (or such further period agreed in writing between the parties), either party may refer the dispute to arbitration by a sole arbitrator under the provisions of the Arbitration Act 1996. The arbitrator shall be agreed between the parties within 10 days of written notice of the referral by the referring party to the other or failing agreement appointed by the President or his or her nominee of the New Zealand Law Society or any successor body. In either case, the arbitrator shall not be a person who has participated in any informal dispute resolution procedure in respect of the dispute.

29 **NOTICE AND CONSENTS**

29.1 All notices and communications under this Deed shall be deemed to have been received when delivered personally, sent by prepaid post or by facsimile to such address as either party shall notify to the other from time to time.

29.2 All consent approvals or matters of whatsoever kind or nature to be given or received by the Grantor shall be given or received by the Commissioner of Crown Lands and shall be given or received by him on behalf of the Grantor and shall be binding and effectual upon the parties to the Deed.

30 **GRANTOR NOT TO INTERFERE WITH GRANTEE'S RIGHTS**

30.1 The Grantor shall not at any time do permit or suffer to be done any act whereby the rights, powers, licences and liberties granted to the Grantee may be interfered with or affected in any way.

EXECUTED AS A DEED

Signed for and on behalf of **Her Majesty the Queen** by **Paul Alexander Jackson** pursuant to a delegation from the Commissioner of Crown Lands in the presence of:

.....
Paul Alexander Jackson

J R Furlong-Baiston
Witness signature

Joanne R. Furlong-Baiston
Full name (please print)

Management Support Officer
Occupation (please print)

LINZ, PO Box 5501, Wellington
Address (please print)

Signed for and on behalf of **Meridian Energy Limited** by its attorneys:

Keith Turner 21/8/09
Attorney

Keith Turner
Full name (please print)

.....
Attorney

James Malcolm Greig Neary
Full name (please print)

TRE2065.19.01

SCHEDULE – EASEMENT LAND

Section 1 on Survey Office Plan 380603 (Canterbury Land Registration District) comprising an area of 19121 hectares

CERTIFICATE OF NON-REVOCATION OF POWER OF ATTORNEY

I, Keith Sharman Turner, Chief Executive, of Wellington, certify that:

1 By power of attorney dated 9 June 2004 (*Power of Attorney*), Meridian Energy Limited appointed the Chief Executive, General Counsel, Senior Legal Counsel (Christchurch), Enterprise Services Director and Growth and Development Director (each being an *Attorney*) to be its attorneys to act jointly with one other attorney of Meridian Energy Limited (whether or not appointed under the Power of Attorney) on the terms and subject to the conditions set out in the Power of Attorney.

2 The Power of Attorney has been deposited at the Land Registry Office at Wellington under number 6050311.1.

3 I am the Chief Executive of Meridian Energy Limited.

4 At the date of this certificate I have not received any notice or information of the revocation of the appointment by the dissolution (however occurring) of Meridian Energy Limited or otherwise.

5 The annexed document complies with all conditions and restrictions set out in the Power of Attorney and I am authorised by the Power of Attorney to execute the annexed document.

Keith Sharman Turner

Date: 11/8/07

3891344

CERTIFICATE OF NON-REVOCATION OF POWER OF ATTORNEY

I, James Malcolm Gill Hay, General Counsel, of Wellington, certify that:

1 By power of attorney dated 9 June 2004 (*Power of Attorney*), Meridian Energy Limited appointed the Chief Executive, General Counsel, Senior Legal Counsel (Christchurch), Enterprise Services Director and Growth and Development Director (each being an *Attorney*) to be its attorneys to act jointly with one other attorney of Meridian Energy Limited (whether or not appointed under the Power of Attorney) on the terms and subject to the conditions set out in the Power of Attorney.

2 The Power of Attorney has been deposited at the Land Registry Office at Wellington under number 6050311.1.

3 I am the General Counsel of Meridian Energy Limited.

4 At the date of this certificate I have not received any notice or information of the revocation of the appointment by the dissolution (however occurring) of Meridian Energy Limited or otherwise.

5 The annexed document complies with all conditions and restrictions set out in the Power of Attorney and I am authorised by the Power of Attorney to execute the annexed document.

James Malcolm Gill Hay

Date: 23/8/07

3891345

Appendix E

Record of Consultation

Table 2 Record of Consultation

Stakeholder	Person/organisation	Interest	Summary of consultation
Iwi/hapu - Ngāi Tahu	Te Rūnanga o Moeraki	Lake Pūkaki catchment is identified as a Rūnanga Sensitive Area, and a Statutory Acknowledgement Area. Potential interests include: • Impacts to Taoka species (especially relating to Tasman delta). • Mahika kai / cultural use. • Natural character of the catchment.	A letter was sent to the Rūnaka chairs providing background information and an overview of the project. The letter also included an invitation to discuss the project and provide feedback to be incorporated into this referral application. Currently no response has been received, however, going forward, Meridian will continue to engage with iwi through the referral application phase as well as the substantive phase, should the application be accepted into the Fast-track process.
	Te Rūnanga o Arowhenua		
	Te Rūnanga o Waihao		
Local Government	Canterbury Regional Council	Regulatory bodies tasked with monitoring existing consents held by Meridian and managing effects on the environment. Potential interests include: **Canterbury Regional Council** • Dust • Lake shore erosion • Wading birds • Connectivity of lake tributaries **Mackenzie District Council** • Dust - landowners • Asset protection / erosion management / Civil integrity of local roads • Economic impacts i.e. tourism (A2O) and impacts to local businesses	There has been ongoing correspondence with Environment Canterbury, including a letter providing background information and an overview of the project, as well as an online meeting. During the meeting, Environment Canterbury highlighted the need to log the project using their pre-application form/portal. They expressed an interest in continuing to engage and assist Meridian throughout the process. Additionally, they mentioned that they are still determining what 'consultation' entails for Environment Canterbury under the Fast-track legislation.
	Mackenzie District Council		A letter was sent to the Mackenzie District Council providing background information and an overview of the Project. The letter also included an invitation to discuss the project and provide feedback to be incorporated into this referral application. At time of RA lodgement, the MDC has not responded to Meridian's initial letter however, going forward, Meridian will continue to engage with MDC through the referral application phase as well as the substantive phase, should the application be accepted into the Fast-track process.
Government	Department of Conservation (DoC)	Manages surrounding public conservation land and protects biodiversity and historic heritage:	The proposed activities do not require any approvals or permissions from the DoC. Consequently, DoC is not an

Stakeholder	Person/organisation	Interest	Summary of consultation
		Potential interests may include: • Indigenous biodiversity - birds, native fish, wetlands. • Pockets of public conservation land adjacent to the lake.	administering agency under the Fast-track Approvals Act. Regardless, Meridian sent an email to the Operations Manager - Te Manahuna, Twizel, to inform them about the project and offer the opportunity to discuss the proposal further.
	Transpower (System Operator)	Responsible for managing the real-time power system and operating the wholesale electricity market. Potential interests include: • Management of the flow of electricity across the high-voltage national transmission grid. • Operation of the wholesale electricity market. • Ensuring that electricity supply and demand are in balance at all times and monitoring and reporting on security of supply.	Meridian approached Transpower in July 2024 regarding issues with infeasible access to contingent storage at certain times of year under their Security of Supply Forecasting and Information Policy (SOSFIP). This was through a series of meetings, data sharing and correspondence. Transpower subsequently consulted on a change to the contingent storage release boundaries and buffers in the SOSFIP. Meridian made a submission and on 22 August 2024 Transpower decided to provide certainty of access to contingent storage for September and October 2024. Since then, Meridian has raised with Transpower on multiple occasions the need to resolve the ongoing uncertainty regarding contingent storage access on a permanent basis. This includes a letter sent to Transpower in November 2024. Transpower is now working together with the Electricity Authority on a review of the SOSFIP. Meridian submitted on a Transpower Issues Paper on 24 March 2025 and again on 31 March 2025. Further consultation on a draft SOSFIP amendment proposal is planned for later in 2025. We hope that Transpower will make urgent changes to provide certainty of access to contingent storage ahead of Winter 2025. Meridian has been open with Transpower that we are also contemplating resource consent solutions to deliver certainty of access to contingent storage.
	Electricity Authority	Responsible for the governance and regulation of New Zealand's electricity industry. Potential interest includes compliance with the Electricity Industry Act 2010, its Regulations and the Electricity Industry Participation Code 2010 to promote competition, reliability and security for the long-term benefit of consumers.	Meridian approached the Electricity Authority in July 2024 regarding issues with access to contingent storage under Transpower's SOSFIP. This was through a series of meetings and correspondence. Meridian has been open with the Electricity Authority that we are also contemplating resource consent solutions to deliver certainty of access to contingent storage

Stakeholder	Person/organisation	Interest	Summary of consultation
	Land Information NZ	Administrator of crown land. Interested in what is proposed on crown land though it is noted that Meridians interests are covered by operating easements.	An email was sent to Land Information NZ (LINZ) to inform them about the project and offer the opportunity for further discussion with Meridian. The proposed activities do not require any approvals or permissions from the LINZ. Consequently, LINZ is not an administering agency under the Fast-track Approvals Act. In a subsequent phone call and follow-up email, LINZ indicated that the proposal would undergo an internal review process. Their initial impression was that there were no concerns with the proposal. They assured Meridian that they would follow up if any questions or concerns arose during the internal review.
Other	Fish and Game	Manages, maintains and enhances sports fish and game birds and their habitats. Particular interest in the passage of fish between the lake and tributaries of the lake.	An email was sent to Fish and Game to inform them about the project and offer the opportunity for further discussion with Meridian. Fish and Game responded, highlighting the biggest risk is the potential loss of both upstream and downstream migration for sockeye in several tributaries, including the spring-fed creek at Glentanner, the Tasman, and the Jollie Rivers. They also noted that the proposed changes could exacerbate impacts on the already affected littoral zone in the lake. Meridian responded, noting that they have an existing agreement (from PC1) addressing the tributary connection issue. They expressed willingness to explore this further and meet to discuss. Additionally, Meridian provided a memo outlining their current understanding of macrophytes in the littoral zone of Lake Pūkaki, noting that it is sparse due to glacial flour and lake range. A follow-up meeting with Fish and Game has been scheduled for late April.

Appendix F

Assessment of Effects

Table 3 Assessment of effects – Rock armouring

Key Effect	Potential effect	2025 Initial Assessment
Positive effects	Promoting economic growth, environmental sustainability, and energy security.	The project will deliver significant regional and national economic benefits by enhancing electricity supply security and lowering wholesale electricity prices and volatility. These improvements are essential for economic growth. Providing a consistent and dependable power source to businesses and industries reduces the risk of outages and price spikes, preventing operational disruptions, financial losses, and productivity difficulties. Furthermore, the proposal supports a secure electricity supply and supports the development of new businesses and industries, attracting investment and creating jobs. In addition to economic benefits, the project will support climate change mitigation by reducing greenhouse gas emissions. By increasing the availability of hydroelectric power, the project will reduce New Zealand's reliance on coal generation, diesel power, and thermal generation during energy shortage periods. The temporary removal of Lake Pūkaki storage restrictions will further enhance the operability of the largest hydro storage reservoir in New Zealand, which is nationally significant electricity infrastructure. This will provide the necessary flexibility to manage hydro storage effectively, supporting the establishment of other renewable electricity generation sources. This aligns with New Zealand's goals for reducing emissions and transitioning to renewable energy sources.
Air Quality	Dust emissions from earthworks, including the placement of rock armour and the tracking of material from vehicle movements across the site and onto the State Highway	An initial air quality assessment has been completed to inform this application. The emission of dust is considered to have a potential effect on sensitive receptors which include but are not limited to Lake Pūkaki itself. To minimise dust emissions, it is recommended that a dust management plan be implemented during the works. This Plan may include but will not be limited to: • Limit works to as small an area as is practicable. • Limit the drop height of soil/rock into and out of trucks as much as is practicable. • Where practicable, appropriate, and as required, use a water truck/cart to apply regular water spraying to site haul roads. • Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. • Limit vehicle speeds to 10 km/hr onsite. • Undertake regular (weekly) on-site and off-site inspections, where receptors are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and flat surfaces within 100 m of the site boundary, with cleaning to be provided if necessary.

		Overall, it is considered that dust emissions can be appropriately managed and are considered to be minor.
Water quality	Discharge and migration of sediment from land disturbance, the potential plume created by placing rock armouring on the dam face, and the operation of machinery within the lake waterbody.	An initial hydrology assessment has been completed to inform this application. Meridian proposes to develop and implement an Erosion and Sediment Control Plan (ESCP) to manage the works and ensure water quality is maintained. This plan aims to limit the spatial effects of elevated total suspended solid (TSS) levels from the proposed rock armouring works. It will also cover other work areas including the stockpiles and transport routes. The ESCP will promote site stability and ensure effective monitoring and maintenance of the implemented controls. The controls within this plan may include, but are not limited to, the following: 1. Installing sediment fences and sandbags to limit sediment movement beyond the work area. This may include floating sediment fencing. 2. Dust control during excavation and material movement. 3. Reinstating the site to an erosion-resistant state as soon as practicable. 4. Removing any excess material off site. 5. Maintenance and monitoring of the proposed controls and water quality beyond the 50-m buffer will be conducted to ensure controls implemented perform to an acceptable standard and water quality measured beyond the mixing zone for Lake Pūkaki does not exceed a 20% change in visual clarity. While it will be avoided as much as possible, machinery may need to operate within flowing water. To prevent the spread of pest species, including didymo, works will follow Biosecurity New Zealand's hygiene procedures. Machinery will be inspected to ensure they are free of plants and seeds before use in the lake's flowing water. Additionally, construction vehicles will be maintained and checked for fluid leaks. An Emergency Spill Management and Response Plan (ESRP) will be implemented, and a spill kit capable of absorbing the quantity of oil and petroleum products that may be spilled on site will be kept on site at all times. No fuels will be stored or refueling will occur within 20 m of the lake. Overall, the potential effects on water quality are considered to be minor.
Effects on ecology	Potential effects of sediment entering or resuspending within Lake Pūkaki may impact wetlands and the littoral zone.	Meridian engaged Tonkin and Taylor to conduct a desktop and high-level field assessment of the potential ecological effects of the works. The assessment determined that during the armoring works, potential adverse effects can be adequately managed to a low or very low level for both terrestrial and freshwater values. Proposed measures include:

	The proposed access track footprint contains sparsely distributed native vegetation, ranging in value from low to high, which may be lost during the armouring works. Impacts to native birds could occur if the works take place during the peak breeding season (September to December). However, native lizards and At Risk or Threatened invertebrates are not expected to be impacted by the proposed armouring works.	• Mitigation through erosion and sediment control measures. • Managing effects on native vegetation through remediation planting. • Undertaking works outside of bird breeding season if practicable or conducting bird nest checks. Overall, the potential effects on ecology are considered to be minor.
Effects on cultural values	Disruption of spiritual and cultural value, in particular, kaitiakitanga and mauri values.	The Lake Pūkaki catchment is identified as a Rūnanga Sensitive Area, and the lake itself is a Statutory Acknowledgement Area due to its significant cultural, spiritual, historic, and traditional association with the Ngāi Tahu iwi. To provide for the values of the site, all works will be limited to only that which is required. Additionally appropriate erosion and sediment control measures will be in place during the works. As detailed in **Attachment 3**, Meridian have contacted the Rūnaka chairs of Waitaki Rūnaka: Te Rūnanga o Moeraki, Te Rūnanga o Arowhenua and Te Rūnanga o Waihao to provide them with Project background, and overview of proposal, key dates and an invitation to engage / provide feedback. Currently no response has been received. During the works, a standard accidental discovery protocol will be adhered to. This will include: • Ceasing all work on site immediately in the event of an accidental discovery. • Securing the site to ensure the site remains undisturbed. • Notifying the archaeologist of the Historic Places Trust, tangata whenua, and any other required statutory agencies. • If the material is confirmed as being archaeological, under the terms of the Historic Places Act, an archaeological assessment will be carried out by a qualified archaeologist, and if appropriate, an archaeological authority will be obtained from the Trust before work resumes. • Works at the site area will not recommence until an archaeological assessment has been made archaeological material has been dealt with appropriately, and statutory requirements met. Overall, it is concluded that the adverse effects on cultural values will be less than minor.

Visual and landscape effects	Reduction in amenity and character values.	A landscape and visual assessment by The Goodfellows Group found that the dam slopes below SH8 are a minor element in the overall landscape. While these embankments are visible from various viewpoints, such as the Visitor Information Centre and along the A2O trail, they are generally seen as an acceptable part of the road and hydroelectric infrastructure, including SH8, Gate 19, the Pūkaki Spillway, and Gate 18/Pūkaki Outlet. These embankments do not obstruct scenic views of the surrounding landscape. The proposed rock armouring will use the same materials as the existing rip-rap, ensuring visual consistency. Although construction activities along the lake edge will be visible to road users and visitors, this will be temporary, lasting approximately 10 to 12 weeks. Temporary construction benches and groynes will be built as working platforms for a 45-t excavator and removed upon completion, with no permanent landscape effects expected. Overall, the assessment concludes that the proposed armouring works will have a negligible effect on the landscape. This change is considered appropriate and acceptable for the existing artificial dam structure and the broader lake as part of the extensive WPS. The lower-level armouring will be visibly indiscernible from the upper sections (i.e. same rock material) and will be visible at certain periods only (e.g. winter into spring when the structure becomes exposed following low lake levels) and therefore likely to be seen for intermittent periods only. The position of a smaller stockpile area proposed on the north side of SH8 and adjacent to the Left Abutment is in conflict with the existing A2O cycle trail route The A2O is a popular walking and cycling route (also used by walkers on the national Te Araroa Trail). Further consideration to resolve this conflict will be undertaken.
Dam integrity	Erosion reducing the dam's integrity	A geotechnical assessment determined that lowering the lake levels would impact the dam's integrity. This is because the upstream blanket and shoulder materials would be exposed and vulnerable to erosion, especially from wave action. Consequently, rock armouring was identified as a necessary mitigation measure.
Groundwater	Unlikely to affect the groundwater system.	A hydrogeological assessment was undertaken to support this application. In the assessment it was concluded that the works are for a short duration and within an area where groundwater is unlikely to be intercepted, on this basis any effects of the rock armouring on underlying groundwater will be negligible and no further consideration is necessary.

Table 4 Assessment of effects – eased access to contingent storage (SSA and OCC triggers removed)

Effect	Existing environment detailed in PC1 (2012)	Effects Assessment in PC1	Changes to the environment since (PC1)	2025 updated initial effects assessment and further works required
Positive effects	See Table 1 Above			
Air Quality	Dust storms occur naturally on exposed lake and riverbeds as a result of strong northwest winds (usually in spring) passing across dry sediment (i.e. there has been little rainfall and high temperatures). With respect to Lake Pūkaki the potential for dust storms relates to high winds passing across the Tasman Delta and exposed lake shoreline when it is dry. Material from the delta and lake shoreline can be mobilised from above and below the maximum lake level. Currently up to 24 km^2 of the delta and lake shoreline is exposed between the routine consented lake levels range of 14.5m (532.5 m to 518 m).	Dust storms are a common natural feature of all exposed river and lake beds on the South Island, where their intensity depends on the type of exposed soil (substrate), duration of exposure, moisture content, and wind strength and direction. With increasing exposed lakebed, the likelihood and severity of a dust storm is increased, especially near the Tasman River delta. However, the impact is considered to be localised to affecting only properties around the lake shoreline and unlikely to affect any major populated areas such as Twizel. Overall, while the exposed area contributing to dust storms will be increased during lowering, the resulting dust nuisance effect is unlikely to be materially different to that resulting from the existing environment.	No information has been provided, reviewed or found in the publicly available literature that indicates the potential environmental impact of lowering the lake level to 513 m RL has changed between now and 2012. Within the 2025 air quality assessment completed to support this application, 66 sensitive receptors around Lake Pūkaki, including the lake itself were identified. These receptors are classified into three main categories: "tourist, cultural, and conservation," "commercial, retail, and business," and "residential." Due to prevailing northwest winds, receptors on the western shore are less likely to be exposed to windborne dust. However, the complex wind patterns caused by the nearby mountains may affect dust exposure unpredictably. Regardless of wind direction, some parts of the lake will always be exposed to dust, with the highest dust loads occurring with east or west winds due to the lake's alignment.	The air quality assessment concluded that operating the lake down to 513 mRL will expose an additional 9.5 km^2 of lake surface area, consisting of glacial till and fine sediments, to wind erosion. This could spread dust across the basin and affect sensitive areas. Controlling dust from wind erosion on the newly exposed shoreline is challenging due to the extensive area involved. While targeted water management may be effective in specific locations, it is generally impractical. Within the 2025 air quality assessment, it was concluded that the dust assessment conducted in 2012 for the PC1 application remains valid. Within PC1 It was concluded that resulting dust nuisance effects are unlikely to differ significantly from the current environment. While it has been determined that dust nuisance effects are unlikely to differ significantly from the current environment, Meridian has mitigation and monitoring agreements in place with some surrounding landowners and stakeholders. These agreements ensure that any potential effects of the activity, including dust impacts on

Effect	Existing environment detailed in PC1 (2012)	Effects Assessment in PC1	Changes to the environment since (PC1)	2025 updated initial effects assessment and further works required
				farming and tourism activities, are appropriately mitigated or compensated for. The potential impact of climate change was also assessed for potential impact on air quality effects. Overall, the annual impact of climate change appears minimal, especially in the short term. Seasonal trends due to climate patterns like El Nino and the Southern Annular Mode show that decreases in one season are offset by increases in another, resulting in little net annual impact. Given the short duration of the proposed activity (3 years), the impact of climate change is expected to be negligible.
Water quality (turbidity)	Lake Pūkaki has naturally high but variable turbidity, being the highest in summer (following snow melt) and lowest in autumn and winter. Turbidity is largely a result of inputs of glacial flour derived from melt waters. Shoreline erosion processes also add sediment to the lake.	There is unlikely to be significant increases in turbidity as most of the sediment will be trapped within the lake, meaning there is unlikely to be an increased turbidity in Lake Pūkaki outflows. Overall, No significant change or effects of lake or downstream turbidity.	No material changes to the environment have been identified.	The reduction in lake levels below 518 m RL is expected to have an effect on wave action at lower depths and influence on sediment deposits and hence TSS levels in the lake. Nevertheless, the operation of Lake Pūkaki with eased contingent storage restrictions will not result in any material change in extent of effects since PC1.
Erosion around the shoreline	The shoreline is eroding towards a new natural equilibrium following filling of the lake in the1970's as a result of the construction of the Pūkaki High Dam, with some sections in a continuous state of erosion.	Lowering the lake level will increase wave action on the nearshore shelf, causing more erosion and sediment movement, potentially leading to a steeper shelf and accelerated backshore/cliff erosion. The impact depends on the time of year, duration below 518 m, and hydrological/climate conditions.	The proposed 2025 – 2027 operating regime is within the approved PC1 operating range conditions.	The geomorphology and lake processes assessment determined that the operation of lake Pūkaki with eased contingent storage restrictions, falls within the approved PC1 operating regime. Easing restrictions is not expected to significantly alter geomorphological processes or key variables like wave, climate and sediment characteristics. Thus, previous assessments

Effect	Existing environment detailed in PC1 (2012)	Effects Assessment in PC1	Changes to the environment since (PC1)	2025 updated initial effects assessment and further works required
		Events requiring lowering however do not happen frequently or for long periods. Consequently, effects are likely to be temporary with shoreline development processes readjusting when the lake level returns to the consented range.		for the PC1 application remain valid for the new operating regime. Within the lake processes and geomorphology assessment, it was noted that there were indications that Lake Pūkaki has an erodible shoreline and dynamic landforms. Previous assessments reviewed identified vulnerable areas. It is therefore recommended that a site-specific assessment to further understand erosional and depositional landforms, be undertaken.
Effects on ecology	Lake Pūkaki has high turbidity due to glacial flour from the Tasman Glacier, resulting in low aquatic productivity. It lacks macrophytes, has low productivity in both littoral and pelagic zones, and a limited fish population. Shore vegetation is sparse due to topography, fluctuating lake levels, and wave action, diverse turfland communities exist on the Tasman Delta. The lake and Tasman Delta are important bird habitats, supporting breeding and overwintering of the critically endangered black stilt, banded dotterel, wrybill, and black-fronted terns.	An ecological assessment for PC1 examined the effects of lowering Lake Pūkaki on various ecological components. The findings were: • Low aquatic turf communities around seeps are unlikely to be impacted. • Effects on periphyton and macroinvertebrates will be temporary and not ecologically significant. • Increased turbidity will have an insignificant impact on plankton communities. • Effects on native fish will be short-term and localized around the shore. • Sport fish densities are low and of limited recreational value; effects will be short-term and localized.	The identified ecological values of the site align with those historically recognised for the PC1 and WPS reconsenting projects.	The ecological assessment noted the following: **Freshwater Habitats**: The braided, alpine, and hill-fed tributary river habitats are highly valuable. Temporary exposure of new river channels may occur but will have a negligible effect on the Tasman River Delta's freshwater habitat. **Tributary Habitats**: No impact on alpine and hill-fed tributary habitats as they are not directly affected by Lake Pūkaki's water level changes. **Littoral Zone**: The littoral zone in Lake Pūkaki, of moderate to high ecological value, will experience negligible effects, resulting in a very low overall impact. **Fish Community**: Lake Pūkaki and its tributary rivers supports a low diversity of fish species, although several species are of high ecological, conservation or recreational value. The limited high-value fish community

Effect	Existing environment detailed in PC1 (2012)	Effects Assessment in PC1	Changes to the environment since (PC1)	2025 updated initial effects assessment and further works required
		• Terrestrial turf communities, including the threatened sedge Isolepis, may be temporarily impacted but are expected to recover once the lake returns to its normal levels. • Nest inundation will affect only a small percentage of the bird population and already occurs under the current level regime. Extensive bird feeding habitat will remain.		will see negligible effects, with no significant change in species composition or range. **Wetland Habitat**: The Tasman River Delta wetland, connected to Lake Pūkaki, will experience minimal and temporary changes, resulting in a negligible impact on habitat quality and extent. **Freshwater birds**: Freshwater birds are unlikely to be affected by the proposed water level changes, as the impact will be minimal and temporary, resulting in a negligible effect on bird habitat quality and extent, especially in the Tasman River Delta wetland. **Lizards and invertebrates:** Lizards and invertebrates are also not expected to be impacted, with effects predicted to be negligible. Overall, the effects on ecology of operating the lake with eased contingent storage restrictions is considered to be minor. It is recommended that monitoring of fish migratory access into tributary streams be undertaken if the lake levels are drawdown lower than modeling predicts. No further management measures in response to the modelled water level change are required for freshwater environments.
Effects on cultural values	Statutory acknowledgement in the Ngāi Tahu Claims Settlement Act 1998	Written Statements were provided identifying that the proposed change was acceptable to Te Runanga o Ngai Tahu, Te Runanga o	No change	To provide for the relationship between mana whenua and Lake Pūkaki, as detailed in **Attachment 3**, Meridian have contacted the Rūnaka chairs of Waitaki Rūnaka: Te

Effect	Existing environment detailed in PC1 (2012)	Effects Assessment in PC1	Changes to the environment since (PC1)	2025 updated initial effects assessment and further works required
		Arowhenua, Te Runanga o Moeraki, Te Runanga o Waihao.		Rūnanga o Moeraki, Te Rūnanga o Arowhenua and Te Rūnanga o Waihao. In this engagement Meridian provided project background, an overview of the proposal, key dates, and an invitation to engage and provide feedback. Meridian also expressed their intention to honour existing agreements from the consultation of PC1 and subsequent resource consents. These agreements outline collaboration with mana whenua if lake levels between 518 – 513 mRL are utilised. Overall, the change in adverse effects on cultural values is expected to be minimal.
Visual and landscape effects	Lake Pūkaki significantly contributes to the landscape and amenity values of the Mackenzie Basin. The Mackenzie Basin has been included as an outstanding Natural Landscape in the Proposed Canterbury Regional Policy Statement (2011), which is underpinned by the Canterbury Regional landscape Study (1993) and the Mackenzie Landscape Study (2007). The Environment Court's interim decision on Plan Change 13 to the Mackenzie District Plan confirmed the view that the entire Mackenzie Basin is an Outstanding Natural Landscape. The immediate environment surrounding Lake Pūkaki is characterised by an open, expansive, predominately rural	Lowering the lake levels fully will reduce the lake surface area from approximately 154.5 km² to 145 km² and increase the lakeshore by about 9.5 km², mainly exposing the Tasman Delta. Around Pūkaki High Dam, more engineering structures and defenses will be visible. The landscape's massive scale and existing modifications allow it to accommodate these changes without adverse effects on its character. The drawdown will appear as a minor change to the Waitaki Power Scheme's operation, consistent with the lake's working character. The temporary and small-scale nature of the drawdown will be barely noticeable, leaving the landscape character and values unaffected. The Basin's status as an	• New and upgraded visitor parking and public amenities on SH8, including Hayman's Carpark, completed in 2023/2024. • Installation of Peter's Lookout on SH80 with parking, toilet facilities, seating, and signage, completed in 2020. • Opening of the Lake Pūkaki Visitor Centre (Punatahu) by Meridian and Ngāi Tahu in 2019, with a redeveloped toilet block and adjoining carpark completed in 2024. • Installation of the A2O (Alps to Ocean) cycle track section next to SH8/Lake Pūkaki in 2018. • Removal of pine trees along the western lake side and near Hayman's Carpark. • Normal vegetation changes around the lake margins due	The landscape assessment notes that since PC1 the physical shoreline will have changed slightly through natural erosional processes such as wave action during storms, high winds and deposition of material from streams and rivers. Changes to the vegetation patterns around the lake since 2012 are insubstantial and have had negligible effects on the landscape values of Lake Pūkaki's lakeside margin within the Mackenzie Basin ONL. On this basis it is considered that adverse effects on landscape and visual amenity arising from the temporary operation of the lake with eased contingent storage restrictions will be minor and consistent with that assessed under PC1.

Effect	Existing environment detailed in PC1 (2012)	Effects Assessment in PC1	Changes to the environment since (PC1)	2025 updated initial effects assessment and further works required
	landscape with a working character afforded by the Waitaki Power Scheme infrastructure, high country farming and areas of forest plantations.	Outstanding Natural Feature will remain unchanged. Excluding the Tasman Delta, the exposed lakeshore will increase by an average of 36 m, ranging from 8 to 137 m. Lowering the lake will make engineering structures around Pūkaki High Dam more prominent, but the overall visual amenity of Lake Pūkaki will remain unchanged. While the increased bed exposure may be locally unsightly, the lake margin's visual coherence and general character will stay relatively unchanged. Effects on visual amenity will likely be minimal unless viewers are very familiar with the minimum consented lake levels. Any impact will be temporary and will not adversely affect the overall visual amenity values of the lake and surrounding landscape.	to growth, decay, fluctuating water levels, and land management activities. • Physical shoreline will have changed slightly through natural erosional process.	
Dam integrity	Not applicable	Not applicable	Not applicable	Within the geotechnical assessment, an effect associated with operating the lake below 518 mRL is that it would jeopardise the integrity of the dam structure as it will be vulnerable to erosion, especially from wave action. Consequently, rock armouring is proposed to mitigate this.
Surrounding structures integrity	**Tekapo B Power Station was considered in PC1.**		Catherine Fields irrigation intake was established following 2012.	An assessment was conducted to identify structures around Lake Pūkaki and the additional effects on these structures due to

Effect	Existing environment detailed in PC1 (2012)	Effects Assessment in PC1	Changes to the environment since (PC1)	2025 updated initial effects assessment and further works required
				the proposed lake lowering. Key findings are summarised below: **Gabion Retaining Wall on the western shoreline of Lake Pūkaki:** Erosion at lower levels due to wave action is expected but will not affect the wall due to its distance from the shoreline. **Boundary Stream Bridge 170**: Access to contingent storage will not increase scour on the bridge structure. **Catherine Fields Irrigation Intake**: Access to contingent storage below 518 mRL will expose the intake screen foundation to wave action, potentially leading to erosion and making the intake screen susceptible to vandalism or theft. Meridian has consulted with the landowner to understand and explore potential mitigation measures. These discussions will resume prior to water levels reaching 518 mRL. **Tekapo B Power Station:** The Tekapo B Power Station is a 46 m high structure within the lake's current operating water levels. At lower lake levels, the station footings are visible. No detailed information is available about the power station's design or operational capabilities at various lake levels, so the effects of lowering the lake level cannot be fully assessed. However, in PC1 it was noted that the power station was designed to operate at lower lake levels than those proposed, making it very unlikely that lowered lake levels would impact its operations. Nevertheless, this conclusion will

Effect	Existing environment detailed in PC1 (2012)	Effects Assessment in PC1	Changes to the environment since (PC1)	2025 updated initial effects assessment and further works required
				be confirmed as a part of a further assessment to be undertaken should the application be accepted into the Fast-track process. Further to this mitigation and monitoring measures will be considered.
Ground water	There are four active or proposed groundwater bores for domestic or stock water takes around the lake. There are two active observations wells in the area of Irishman Creek and Haymans Road. There are two groundwater quality wells (owned by Meridian) near the lake outlet.	One of the groundwater quality bores may run dry during lower lake levels. However, this bore is owned by Meridian. Therefore, there are no material effect on users other than Meridian	No material difference identified	No material change in extent effects since Plan Change 1.
Surface water takes	Not applicable	Not applicable	Not applicable	When contingent storage below 518 mRL is accessed, the existing Catherine Fields irrigation intake can no longer operate. In winter 2024, Meridian consulted with the landowner to understand the impact on farm operations and explore potential mitigation measures. These discussions will resume prior to water levels reaching 518 mRL.

Appendix G

HAIL assessment

Memorandum

Internal use only

26 August 2024

To	Amy Callaghan		
Copy to	Stephen Douglass		
From	Wendy Whitley	**Tel**	03 363 0802
Subject	Lake Pukaki HAIL areas	**Project no.**	12647815

1. Introduction

Meridian Energy propose to undertake some erosion protection measures along the southern shoreline of Lake Pukaki (the 'site'). The indicative works boundary is shown on Figure 1 below. The proposed rock armouring involves excavations of rock and insitu soils for the construction of the armour toe and benching for access (see Figure 2[1]). Insitu soils identified as 'dam shoulder material' is proposed to be cut to waste and assumed to be retained within the wider property boundary and not disposed offsite.

The site is located within a property area that has been identified on Environment Canterbury's (ECan) Listed Land Use Register (LLUR) has having three HAIL[2] activities occurring on it. The presence of potentially contaminated land will impact on the consenting requirements for discharges for the proposed works.

Figure 1: Site location (image source: Environment Canterbury GIS)

[1] Draft construction methodology provided by Meridian Energy, 7 August 2024
[2] Hazardous Activities and Industries List, October 2011, Ministry for the Environment

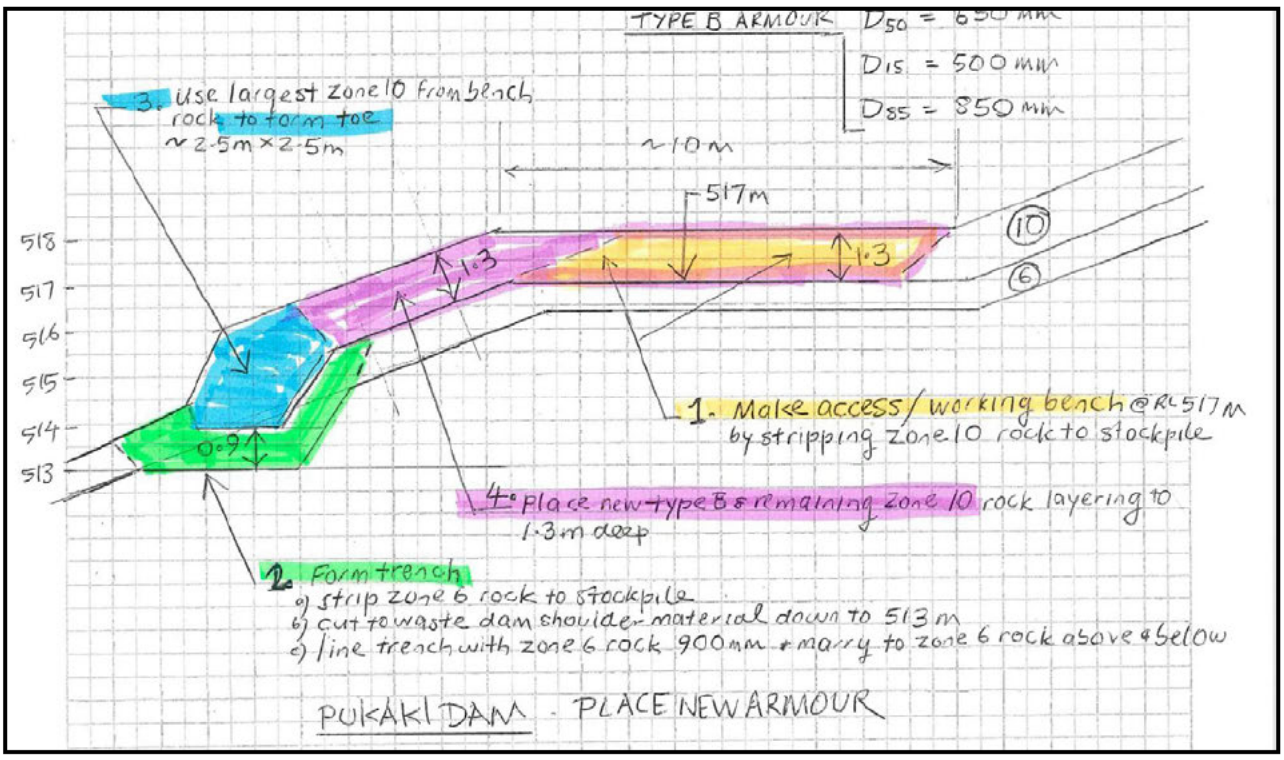


Figure 2: Draft proposed excavations and benching for placing new armour

1.1 Scope and objectives

This memo provides a high-level assessment of whether a HAIL activity is occurring or has occurred at the site and determine if there is a risk of soil contamination impacting the proposed project works, and includes:

- Review of the following information:
  - Environmental setting details including geology and groundwater from publicly available resources;
  - LLUR statement for the Property;
  - Publicly available historical aerial photographs on the ECan online GIS portal; and
  - Client provided information.
- Preparation of a preliminary Conceptual Site Model to understand the potential risks for contamination.

2. Site setting

2.1.1 Site description

The site is located in the northern portion of Lot 1 DP 368484 (the Property) and is located on the Tekapo-Twizel Road, Twizel, on the southern banks of Lake Pukaki.

Adjacent to the lake are the engineering infrastructure associated with the hydro dam and control of lake levels, and the Lake Pukaki lookout carpark with small commercial facilities and public toilets. This lookout area is a popular tourist attraction with hundreds of people visiting every day.

2.1.2 Environmental setting

The geology of the area is described as *generally unweathered bouldery till; mixtures of gravel / sand / silt / clay; in well-defined valley moraines* and *engineered fill associated with hydro-electric canals and dams; alluvial gold dredge tailings* by GNS[3].

Details for two test pits which were excavated adjacent to the lookout carpark were found on the New Zealand Geotechnical Database (NZGD). Relevant details from these testpits include:

– The soils encountered comprised a silty topsoil underlain by a fine sand with gravels and silt increasing with depth down to 1.7 m and 2 m depth.
– Groundwater was not encountered in the test pits.
– It appears the investigations were undertaken to support changes for the discharge from the public toilets. Based on the test pit logs and accompanying location plan reviewed from NZGD, there is a former dispersal bund adjacent to the carpark area and the current dispersal field is located approximately 250 m to the south of the car park (shown on Figure 3).

Based on ECan's online GIS, piezometric contours indicate that groundwater flows towards the lake and canal (north and north east). A nearby monitoring well (H38/0005) (shown on Figure 3) was installed in 1998 and the initial water level was recorded to be approximately 13.45 m below ground level (noting that ground levels and water levels are likely to vary significantly due to the engineered nature of the area).

3. Information review

3.1 LLUR

The LLUR statement for the site is attached to this memo as Attachment 1. The identified HAIL areas are shown on Figure 3 and an overview of these HAIL activities is provided in Table 1 overleaf.

Figure 3: HAIL areas (image source: Environment Canterbury GIS)

[3] **Geology 2.0.0 (gns.cri.nz)**

Table 1: HAIL activities overview

LLUR ID	HAIL activity	Comments
1540	HAIL activity A17 – storage tanks or drums for fuels, chemicals or liquid waste	It is stated on the LLUR report that a 2,000 L diesel underground storage tank (UST) is present within the outlined HAIL area. The HAIL area outlined on the LLUR statement is large and extends into the lake and the exact location of the UST is not provided. However, it is likely that the UST is located close to the lookout carpark adjacent to the commercial premises. The HAIL area is categorised as 'not investigated' on the LLUR.
367217	HAIL activity B4 – power stations, substations or switch yards	This HAIL area is located approximately 90 m to the south of the site and comprises an electrical transformer contained within a concrete bund (visible from Google Street View). It is unclear from the historical aerial photos whether this structure was always bunded. It is unlikely that contaminants, if present, from this source would migrate in surface / near surface soils as far as the site.
367219	HAIL activity B4 – power stations, substations or switch yards	This HAIL area is located approximately 200 m to the south of the site and comprises a small electricity substation. It is unlikely that contaminants, if present, from this source would migrate in surface / near surface soils as far as the site.

3.2 Historical aerial photographs

Historical aerial photographs available on ECan's online GIS for the area were reviewed. A summary of the historical aerial photographs is provided in Table 2 below and the images are attached to this memo in Attachment 2.

Table 2: Historical aerial photographs

Year	Description
1960-1964	Lake Pukaki and a dam has been constructed, however the shoreline, discharge to the river, road layout and engineering infrastructure varies significantly to the current layout. Worker's huts and structures are present approximately 120 m from the lake edge. These are located within the current lake boundary.
1965-1969	There are no significant changes along the lake edge. There are an increasing number of worker's huts further to the south.
1980-1984	The shoreline, surrounding waterways and canal, road layout and engineering infrastructure are as the current layout. The lookout carpark is present, with no adjacent structures.
2004-2010	Notable changes are visible for the structures adjacent to the lookout carpark only.

3.3 Client provided information

Information regarding the UST was requested from Meridian Energy, however they do not have records for the UST at the site. It is considered most likely that the UST is associated with the facilities at the lookout carpark.

Meridian Energy did note that a 22,000 L septic tank is located adjacent to the carpark, and two additional tanks are currently proposed.

4. Identified HAIL activities

HAIL activities within 200 m of the site are shown on Figure 3 and include:

– HAIL activity A17: Storage tanks for fuel, chemicals or liquid waste
  - The location of the fuel UST is not confirmed, however is assumed to be adjacent to the lookout carpark not within the proposed works area.

– HAIL activity B4: Power stations, substations or switchyards
  - Due to the distance from the site of these structures and that bunding is present around the transformer, it is unlikely these activities would result in shallow soil contamination at the site and therefore are discounted as a potential risk for the proposed works.

– HAIL activity G5: Waste disposal to land (excluding where biosolids have been used as soil conditioners)
  - The septic tank dispersal areas could potentially fall under this HAIL activity. The key contaminants of concern include biological hazards, which normally degrade rapidly over a short period of time, and heavy metals, that will likely have limited leachability in this environment. Due to the distance to the proposed works area of the currently in-use dispersal field and the former dispersal mound not being in-use, there is likely limited risk of soil contamination in the proposed works area from these sources.

5. Preliminary Conceptual Site Model

A preliminary conceptual site model (CSM) for the site has been developed to assess the likelihood of a complete linkage between a contaminant source(s) and potential receptors via a given pathway. This is presented in Table 3.

While several HAIL activities have been identified present within the wider Property within which the site is located, only one of these, the UST – HAIL activity A17, has been identified as a potential risk of being a source of contamination at the site.

It is considered unlikely that the UST would have been installed within the site area and is likely located adjacent to the lookout carpark / commercial premises. The potential for soil contamination to be present at the site would require migration, via soil and groundwater, of contaminants from the UST following a leak in the tank or fuel lines. There is no indication that a leak has occurred from this UST.

However, contamination, resulting from a leak, from a source such as a UST would be limited in extent both vertically and horizontally. Should this have occurred, then this activity would fall under HAIL *Activity H - Any land that has been subject to the migration of hazardous substances from adjacent land in sufficient quantity that it could be a risk to human health or the environment*.

Table 3: Preliminary conceptual site model of potential contamination at the proposed works area

Source	Pathway	Receptor	Potential linkages
UST containing fuel (Hydrocarbons, potentially lead)	Vertical migration of contaminants through soil to groundwater, and Horizontal migration of contaminants through soil.	Shallow soil (should leak have occurred in fuel lines) Groundwater Lake Pukaki Human health (site workers)	**Incomplete** Surface soils only are proposed to be disturbed for access tracks, and unlikely to intersect potentially contaminated groundwater or soils.

6. Summary

While several HAIL activities have been identified present within the wider Property within which the site is located, only one of these, the UST – HAIL activity A17, has been identified as a potential risk of being a source of soil contamination at the site.

However, due to the nature of contaminants and the distance to the proposed works area, it is considered unlikely that contamination in soils is present at the site resulting from potential discharges from the UST which is likely located adjacent to the lookout carpark.

Regards

Wendy Whitley
Senior Environmental Scientist

Cecilia Gately
Technical Director

Limitations

This memorandum has been prepared by GHD for Meridian Energy. It is not prepared as, and is not represented to be, a deliverable suitable for reliance by any person for any purpose. It is not intended for circulation or incorporation into other documents. The matters discussed in this memorandum are limited to those specifically detailed in the memorandum and are subject to any limitations or assumptions specially set out.

This HAIL assessment has been based on the review of limited information and is not considered to be a Preliminary Site Investigation in accordance with Ministry for the Environment (2021) Contaminated Land Management Guidelines No. 1 – Reporting on contaminated sites in New Zealand.

GHD has prepared this memorandum on the basis of information provided by the Client and others who provided information to GHD (which may also include Government authorities), which GHD has not independently verified or checked for the purpose of this memorandum. GHD does not accept liability in connection with such unverified information, including errors and omissions in the memorandum which were caused by errors or omissions in that information.

Attachments

Attachment 1

ECan Listed Land Use Register Report

Environment Canterbury
Regional Council
Kaunihera Taiao ki Waitaha

Customer Services
P. 03 353 9007 or 0800 324 636

PO Box 345
Christchurch 8140

P. 03 365 3828
F. 03 365 3194
E. ecinfo@ecan.govt.nz

www.ecan.govt.nz

Dear Sir/Madam

Thank you for submitting your property enquiry from our Listed Land Use Register (LLUR). The LLUR holds information about sites that have been used or are currently used for activities which have the potential to cause contamination.

The LLUR statement shows the land parcel(s) you enquired about and provides information regarding any potential LLUR sites within a specified radius.

Please note that if a property is not currently registered on the LLUR, it does not mean that an activity with the potential to cause contamination has never occurred, or is not currently occurring there. The LLUR database is not complete, and new sites are regularly being added as we receive information and conduct our own investigations into current and historic land uses.

The LLUR only contains information held by Environment Canterbury in relation to contaminated or potentially contaminated land; additional relevant information may be held in other files (for example consent and enforcement files).

Please contact Environment Canterbury if you wish to discuss the contents of this property statement.

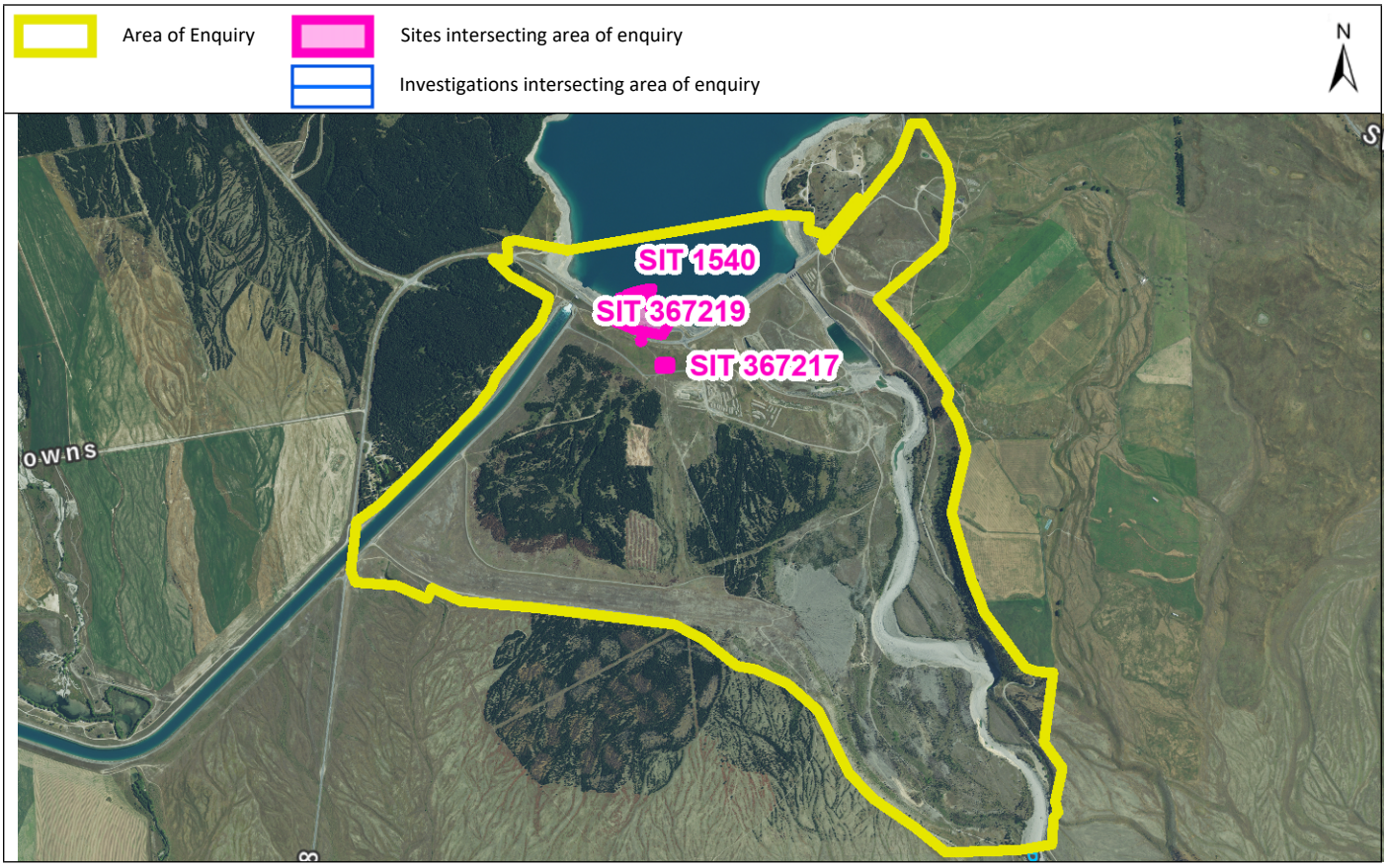
Yours sincerely

Contaminated Sites Team

Property Statement
from the Listed Land Use Register

Visit ecan.govt.nz/HAIL for more information or
contact Customer Services at ecan.govt.nz/contact/ and quote ENQ386857

Date generated: 08 August 2024
Land parcels: Lot 2 DP 368484
Lot 1 DP 368484



The information presented in this map is specific to the property you have selected. Information on nearby properties may not be shown on this map, even if the property is visible.

Sites at a glance

Sites within enquiry area

Site number	Name	Location	HAIL activity(s)	Category
1540	Pukaki Canal Inlet	Glen Lyon Road, Lake Pukaki	A17 - Storage tanks or drums for fuel, chemicals or liquid waste;	Not Investigated
367217	Power station		B4 - Power stations, substations or switchyards;	Verified HAIL
367219	Substation infrastructure		B4 - Power stations, substations or switchyards;	Verified HAIL

More detail about the sites

Site 1540: Pukaki Canal Inlet (Intersects enquiry area.)

Category: Not Investigated
Definition: Verified HAIL has not been investigated.

Location: Glen Lyon Road, Lake Pukaki
Legal description(s): Lot 1 DP 368484

HAIL activity(s):

Period from	Period to	HAIL activity
?	Current	Storage tanks or drums for fuel, chemicals or liquid waste

Notes:

20 May 1999 1993: One 2000 L underground storage tank (UST), 3(c) product.

Investigations:

There are no investigations associated with this site.

Site 367217: Power station (Intersects enquiry area.)

Category: Verified HAIL
Definition: The land-use / HAIL history has been confirmed.

Location:
Legal description(s): Lot 1 DP 368484

HAIL activity(s):

Period from	Period to	HAIL activity
	Present	Power stations, substations or switchyards.

Notes:

Investigations:

There are no investigations associated with this site.

Site 367219: Substation infrastructure (Intersects enquiry area.)

Category: Verified HAIL
Definition: The land-use / HAIL history has been confirmed.

Location:
Legal description(s): Lot 1 DP 368484

HAIL activity(s):

Period from	Period to	HAIL activity
	Present	Power stations, substations or switchyards.

Notes:

Investigations:

There are no investigations associated with this site.

Disclaimer

The enclosed information is derived from Environment Canterbury’s Listed Land Use Register and is made available to you under the Local Government Official Information and Meetings Act 1987.

The information contained in this report reflects the current records held by Environment Canterbury regarding the activities undertaken on the site, its possible contamination and based on that information, the categorisation of the site. Environment Canterbury has not verified the accuracy or completeness of this information. It is released only as a copy of Environment Canterbury's records and is not intended to provide a full, complete or totally accurate assessment of the site. It is provided on the basis that Environment Canterbury makes no warranty or representation regarding the reliability, accuracy or completeness of the information provided or the level of contamination (if any) at the relevant site or that the site is suitable or otherwise for any particular purpose. Environment Canterbury accepts no responsibility for any loss, cost, damage or expense any person may incur as a result of the use, reference to or reliance on the information contained in this report.

Any person receiving and using this information is bound by the provisions of the Privacy Act 1993.

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

Listed Land Use Register

What you need to know

Everything is connected

What is the Listed Land Use Register (LLUR)?

The LLUR is a database that Environment Canterbury uses to manage information about land that is, or has been, associated with the use, storage or disposal of hazardous substances.

Why do we need the LLUR?

Some activities and industries are hazardous and can potentially contaminate land or water. We need the LLUR to help us manage information about land which could pose a risk to your health and the environment because of its current or former land use.

Section 30 of the Resource Management Act (RMA, 1991) requires Environment Canterbury to investigate, identify and monitor contaminated land. To do this we follow national guidelines and use the LLUR to help us manage the information.

The information we collect also helps your local district or city council to fulfil its functions under the RMA. One of these is implementing the National Environmental Standard (NES) for Assessing and Managing Contaminants in Soil, which came into effect on 1 January 2012.

For information on the NES, contact your city or district council.

How does Environment Canterbury identify sites to be included on the LLUR?

We identify sites to be included on the LLUR based on a list of land uses produced by the Ministry for the Environment (MfE). This is called the Hazardous Activities and Industries List (HAIL)[1]. The HAIL has 53 different activities, and includes land uses such as fuel storage sites, orchards, timber treatment yards, landfills, sheep dips and any other activities where hazardous substances could cause land and water contamination.

We have two main ways of identifying HAIL sites:

- We are actively identifying sites in each district using historic records and aerial photographs. This project started in 2008 and is ongoing.
- We also receive information from other sources, such as environmental site investigation reports submitted to us as a requirement of the Regional Plan, and in resource consent applications.

[1] The Hazardous Activities and Industries List (HAIL) can be downloaded from MfE's website www.mfe.govt.nz, keyword search HAIL

How does Environment Canterbury classify sites on the LLUR?

Where we have identified a HAIL land use, we review all the available information, which may include investigation reports if we have them. We then assign the site a category on the LLUR. The category is intended to best describe what we know about the land use and potential contamination at the site and is signed off by a senior staff member.

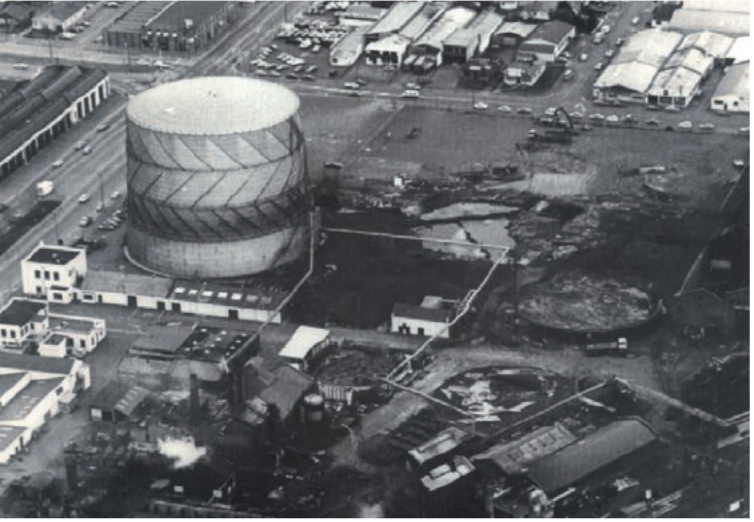
Please refer to the Site Categories and Definitions factsheet for further information.

What does Environment Canterbury do with the information on the LLUR?

The LLUR is available online at www.llur.ecan.govt.nz. We mainly receive enquiries from potential property buyers and environmental consultants or engineers working on sites. An inquirer would typically receive a summary of any information we hold, including the category assigned to the site and a list of any investigation reports.

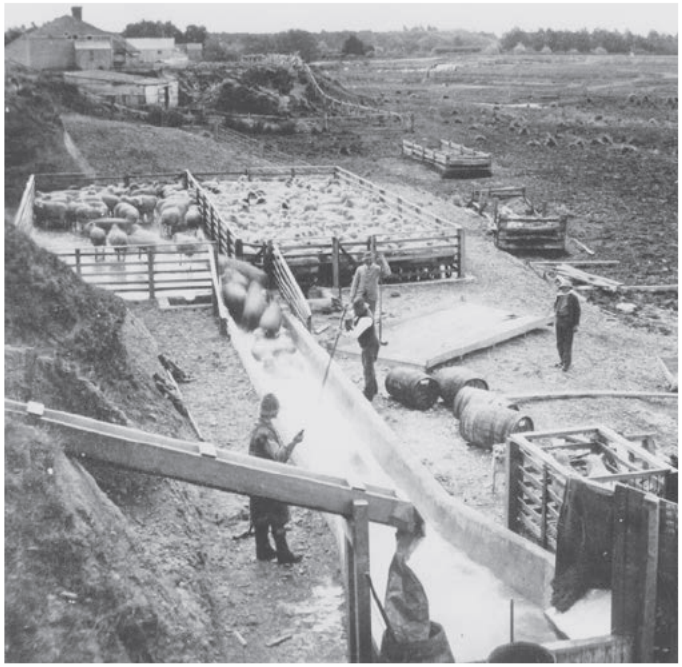
We may also use the information to prioritise sites for further investigation, remediation and management, to aid with planning, and to help assess resource consent applications. These are some of our other responsibilities under the RMA.

If you are conducting an environmental investigation or removing an underground storage tank at your property, you will need to comply with the rules in the Regional Plan and send us a copy of the report. This means we can keep our records accurate and up-to-date, and we can assign your property an appropriate category on the LLUR. To find out more, visit www.ecan.govt.nz/HAIL.



IMPORTANT!

The LLUR is an online database which we are continually updating. A property may not currently be registered on the LLUR, but this does not necessarily mean that it hasn't had a HAIL use in the past.



Sheep dipping (ABOVE) and gas works (TOP) are among the former land uses that have been identified as potentially hazardous. (Photo above by Wheeler & Son in 1987, courtesy of Canterbury Museum.)

My land is on the LLUR – what should I do now?

IMPORTANT! Just because your property has a land use that is deemed hazardous or is on the LLUR, it doesn't necessarily mean it's contaminated. The only way to know if land is contaminated is by carrying out a detailed site investigation, which involves collecting and testing soil samples.

You do not need to do anything if your land is on the LLUR and you have no plans to alter it in any way. It is important that you let a tenant or buyer know your land is on the Listed Land Use Register if you intend to rent or sell your property. If you are not sure what you need to tell the other party, you should seek legal advice.

You may choose to have your property further investigated for your own peace of mind, or because you want to do one of the activities covered by the National Environmental Standard for Assessing and Managing Contaminants in Soil. Your district or city council will provide further information.

If you wish to engage a suitably qualified experienced practitioner to undertake a detailed site investigation, there are criteria for choosing a practitioner on www.ecan.govt.nz/HAIL.

I think my site category is incorrect – how can I change it?

If you have an environmental investigation undertaken at your site, you must send us the report and we will review the LLUR category based on the information you provide. Similarly, if you have information that clearly shows your site has not been associated with HAIL activities (eg. a preliminary site investigation), or if other HAIL activities have occurred which we have not listed, we need to know about it so that our records are accurate.

If we have incorrectly identified that a HAIL activity has occurred at a site, it will be not be removed from the LLUR but categorised as Verified Non-HAIL. This helps us to ensure that the same site is not re-identified in the future.

Contact us

Property owners have the right to look at all the information Environment Canterbury holds about their properties.

It is free to check the information on the LLUR, online at www.llur.ecan.govt.nz.

If you don't have access to the internet, you can enquire about a specific site by phoning us on (03) 353 9007 or toll free on 0800 EC INFO (32 4636) during business hours.

Contact Environment Canterbury:

Email: ecinfo@ecan.govt.nz

Phone:
Calling from Christchurch: (03) 353 9007
Calling from any other area: 0800 EC INFO (32 4636)

Environment Canterbury Regional Council
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www.ecan.govt.nz E13/101

Listed Land Use Register

Site categories and definitions

When Environment Canterbury identifies a Hazardous Activities and Industries List (HAIL) land use, we review the available information and assign the site a category on the Listed Land Use Register. The category is intended to best describe what we know about the land use.

If a site is categorised as **Unverified** it means it has been reported or identified as one that appears on the HAIL, but the land use has not been confirmed with the property owner.

If the land use has been confirmed but analytical information from the collection of samples is not available, and the presence or absence of contamination has therefore not been determined, the site is registered as:

Not investigated:

- A site whose past or present use has been reported and verified as one that appears on the HAIL.
- The site has not been investigated, which might typically include sampling and analysis of site soil, water and/or ambient air, and assessment of the associated analytical data.
- There is insufficient information to characterise any risks to human health or the environment from those activities undertaken on the site. Contamination may have occurred, but should not be assumed to have occurred.

If analytical information from the collection of samples is available, the site can be registered in one of six ways:

At or below background concentrations:

The site has been investigated or remediated. The investigation or post remediation validation results confirm there are no hazardous substances above local background concentrations other than those that occur naturally in the area. The investigation or validation sampling has been sufficiently detailed to characterise the site.

Below guideline values for:

The site has been investigated. Results show that there are hazardous substances present at the site but indicate that any adverse effects or risks to people and/or the environment are considered to be so low as to be acceptable. The site may have been remediated to reduce contamination to this level, and samples taken after remediation confirm this.

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Managed for:

The site has been investigated. Results show that there are hazardous substances present at the site in concentrations that have the potential to cause adverse effects or risks to people and/or the environment. However, those risks are considered managed because:

- the nature of the use of the site prevents human and/or ecological exposure to the risks; and/or
- the land has been altered in some way and/or restrictions have been placed on the way it is used which prevent human and/or ecological exposure to the risks.

Partially investigated:

The site has been partially investigated. Results:

- demonstrate there are hazardous substances present at the site; however, there is insufficient information to quantify any adverse effects or risks to people or the environment; or
- do not adequately verify the presence or absence of contamination associated with all HAIL activities that are and/or have been undertaken on the site.

Significant adverse environmental effects:

The site has been investigated. Results show that sediment, groundwater or surface water contains hazardous substances that:

- have significant adverse effects on the environment; or
- are reasonably likely to have significant adverse effects on the environment.

Contaminated:

The site has been investigated. Results show that the land has a hazardous substance in or on it that:

- has significant adverse effects on human health and/or the environment; and/or
- is reasonably likely to have significant adverse effects on human health and/or the environment.

If a site has been included incorrectly on the Listed Land Use Register as having a HAIL, it will not be removed but will be registered as:

Verified non-HAIL:

Information shows that this site has never been associated with any of the specific activities or industries on the HAIL.

Please contact Environment Canterbury for further information:

(03) 353 9007 or toll free
on 0800 EC INFO (32 4636)
email ecinfo@ecan.govt.nz

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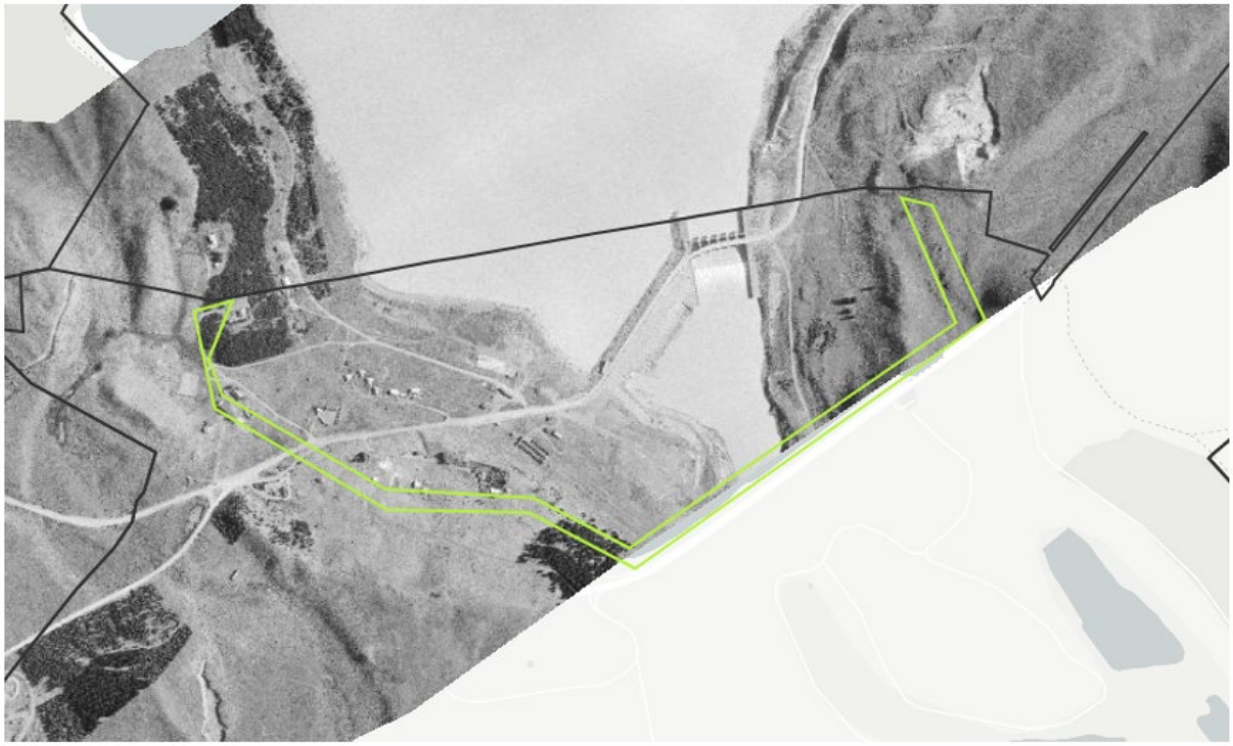
E13/102

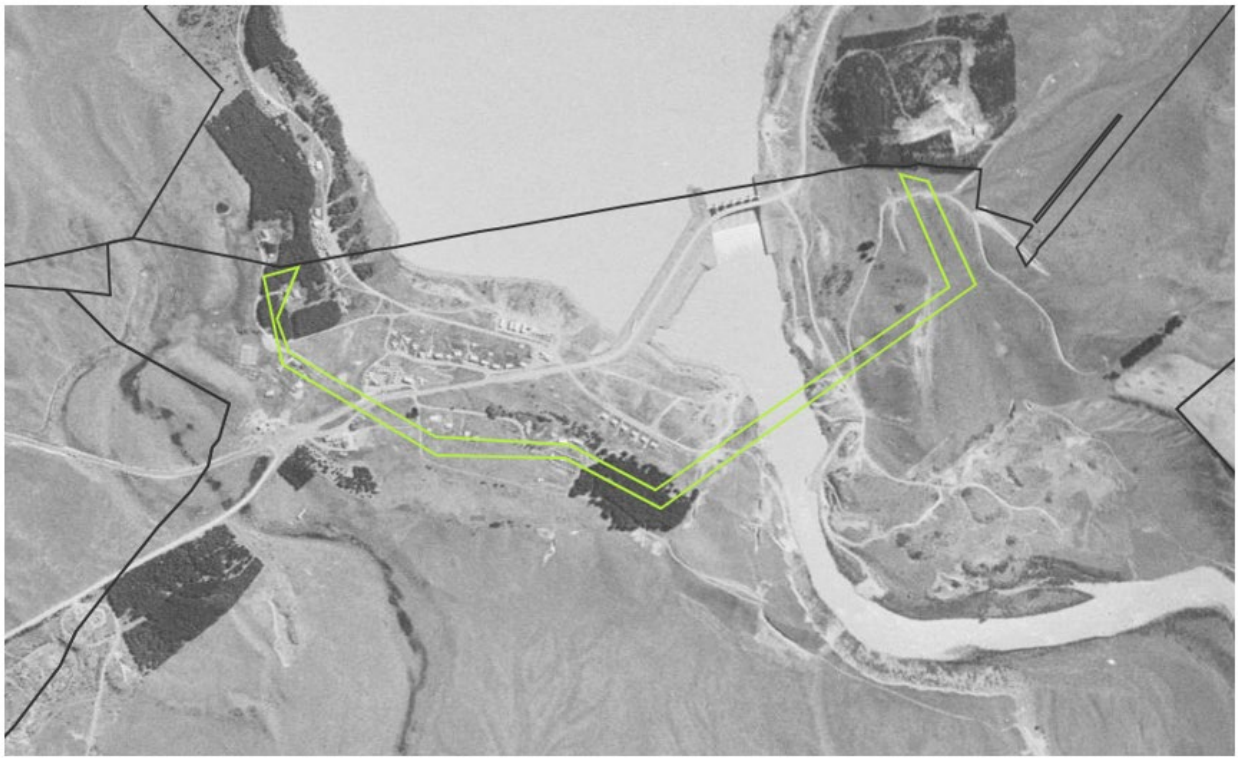
Attachment 2

Historical aerial photographs

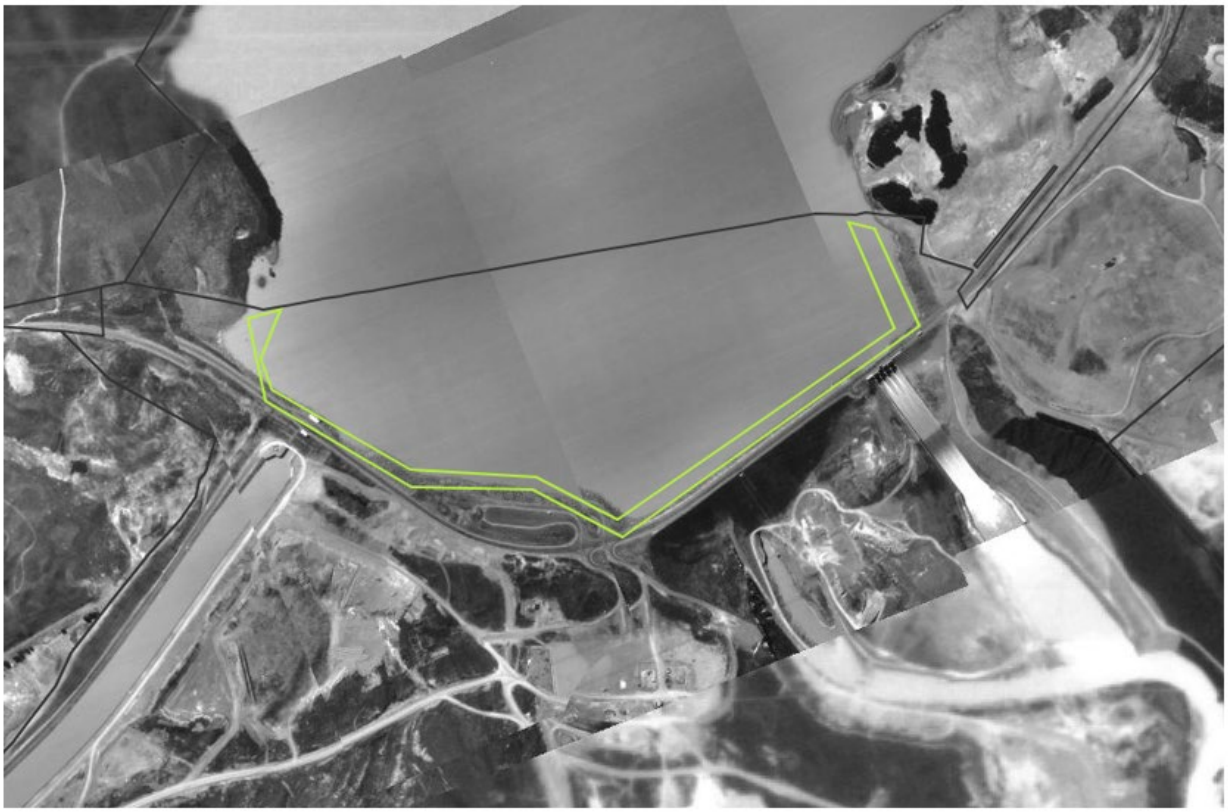
1960-1964, Source Environment Canterbury GIS



1965-1969, Source Environment Canterbury GIS



1980-1984, Source Environment Canterbury GIS



2004-2010, Source Environment Canterbury GIS