

10. MANAGEMENT AND MONITORING OF ACTUAL AND POTENTIAL EFFECTS

10.1 APPROACH TAKEN

Part A.09 of this report provides an assessment of the actual and potential effects of MP4, which is based on:

- > Engagement with iwi;
- > The various technical assessments commissioned by OGNZL;
- > Engagement with the relevant local authorities (ORC, WDC, and DCC) and administering agencies (DOC and HNZPT) and other parties as identified in **Part A.08** of this report; and
- > Feedback received on the application for resource consents for the MP4 (RMA) Project.

The technical assessments have recommended the implementation of measures to avoid, remedy or mitigate actual and / or potential adverse effects where necessary. These recommendations have shaped the development of the proposed consent conditions which are written to provide certainty, to be enforceable, and to meet the requirements of the FTAA. The proposed consent conditions are provided in **Part D** of this substantive application.

As required by the proposed consent conditions, OGNZL will operate MP4 in accordance with a comprehensive suite of management plans (provided in **Part G** of this substantive application) to ensure that measures to manage effects and minimise potential adverse effects are appropriately employed. The key elements relevant to each consented activity captured by the management plans, along with the objectives and required contents of each plan are detailed in the proposed conditions. The requirement to comply with these specific conditions and management plans is provided for under the various resource consents.

As set out in **Part A.09** of this report, as part of MP4, OGNZL has committed to a more stringent future water quality regime at the Macraes Operation than required by the existing consent conditions. Compliance criteria have been developed that align more closely with contemporary aquatic ecosystem protection objectives and drinking water protection requirements. This will ensure that improved outcomes would be progressively achieved over the remaining life of mine and into closure. These improvements will be achieved through a combination of ecological enhancements, engineering controls, operational practices, monitoring programmes and treatment systems, all of which are specified in the proposed consent conditions.



OGNZL recognises that it is not possible to completely avoid all potential environmental effects associated with MP4. In particular, the fixed location of the targeted mineral resource, and the functional constraints around the ways the resource is able to be economically recovered, mean that, even though MP4 is a brownfields development, the various landforms that will be created or expanded will overlap with areas that presently contain terrestrial biodiversity values.

The design of MP4 has, to the extent practical, followed an approach of avoidance, minimisation / mitigation and remediation of terrestrial biodiversity values, consistent with the effects management hierarchy approach under the RMA national policy statutory documents. There will, however, still be residual ecological effects which require further management. As discussed in **Part A.09** of this report, this includes residual effects on some higher terrestrial and wetland ecological values including two vegetation system/ ecosystems, several small ephemeral wetlands, nine TAR plant species, two invertebrate species, two lizard species and three bird species.

These residual adverse effects have been responded to through a comprehensive biodiversity compensation package which, when considered as a complete package, proposes biodiversity actions that will contribute positively to the Macraes ED, providing ecological, cultural and landscape benefits that would otherwise not be realised within the Macraes Operation.

While some effects cannot be practically offset on a like for like basis, the proposed package has been developed to add real value to the Macraes ED, delivering substantial and enduring biodiversity gains to higher value aspects of biodiversity than would be delivered by addressing residual biodiversity impacts on a stricter like for like basis. Examples of these gains are:

- > Inclusion of an important population of the large Otago skink within the MEEA when this species are not predicted to be impacted by MP4;
- > Plantings of the original Macraes ED forest cover which is now functionally extinct; and
- > Removal of exotic pine plantation seedlings at Mt Highlay Station and replacement with tussock plantings.

Overall, OGNZL and its technical advisers consider that MP4 can be undertaken in a manner that will appropriately address any unavoidable adverse effects. Where residual adverse impacts remain, measures have been proposed to address effects to the extent possible whilst also achieving improved outcomes for the Macraes ED. Residual adverse impacts are not sufficiently significant to outweigh MP4's benefits which are set out in Section 9.3 in **Part A.09** of this report, including the benefits offered by the alternative biodiversity actions.



10.2 MEASURES PROPOSED

The key measures proposed by OGNZL to manage identified effects are set out in Table 10-1 below, all of which have been explicitly provided for in the proposed consent conditions provide in **Part D** of this substantive application. These key measures include:

- > Active involvement by Kā Rūnaka in relevant site activities during operating and closure phases of MP4, with post-closure governance responsibilities. OGNZL and Kā Rūnaka intend to work in partnership in relation to these matters to deliver outcomes that recognise and address cultural and environmental effects of mining, including the relationship between Kā Rūnaka and their ancestral whenua and wai, providing for Kā Rūnaka rakatirataka and exercise of kaitiakitaka;
- > Terrestrial biodiversity measures to mitigate and compensate for residual effects where practical. A comprehensive, landscape-scale biodiversity compensation package has been developed to address residual effects and provide improved outcomes for the Macraes ED, which focuses on actions within three key areas: MEEA; Cranky Jims Link; and the Mt Highlay Restoration Area;
- > Compensation for loss of natural inland wetland areas and reclaimed stream beds through restoration and enhancement of wetland and streams within the Macraes Operation landholdings;
- > Water quality and flow mitigation and management measures aimed at improving environmental outcomes for the receiving environment and receptors through mine water capture, augmentation of low flows, and treatment during closure;
- > Limits on the generation of noise and vibration and management protocols for protecting amenity and heritage values;
- > Limits on discharges to air and management protocols for protecting amenity and human health from the effects of dust and discharges associated with the processing of ore;
- > Design and eventual rehabilitation of visible project elements to avoid, remedy or mitigate any adverse landscape and visual effects;
- > Appropriate geotechnical design and construction of the pits, WRSs and TSFs and use of Ground Control Management Plans to manage potential stability effects;
- > Implementation of a subsidence standoff zone from Deepdell Creek;
- > Realignment of Macraes Road prior to impact by mining operations;



- > Protection of certain identified heritage / archaeological sites and archival recording of sites proposed to be impacted;
- > Erosion and sediment control measures and management of contaminated soils;
- > Preparing and adhering to detailed environmental management plans; and
- > A rehabilitation and closure plan secured by rehabilitation and capitalisation bonds.

In addition, OGNZL will provide further compensation to potentially affected landowners by:

- > Construction of a noise bund on OGNZL land for additional noise mitigation at 1668 Macraes Road; and
- > Potential partnership to upgrade and/or replace the Stoneburn drinking water supply (subject to discussions and agreement with WDC).



Table 10-1: Summary of Key Management and Monitoring Measures for MP4.

Actual or Potential Effect	Recommended Mitigation / Management	Recommended Monitoring / Future Action	Proposed Consent Condition No.
Cultural Matters			
Potential effects on matters of importance to Ka Runaka and their relationship with ancestral lands and water.	Kā Rūnaka is preparing an updated Treaty Settlement Impact Assessment in relation to the current application and has indicated this will be provided following OGNZL's lodgement of the application. Kā Rūnaka to be invited to update the Integrated Health Assessment for Deepdell Creek.	Acknowledging the Treaty Settlement Impact Assessment is to be provided, Table 9-2 of Section 9.4, Part A.09 of this report.	Schedule 1, Conditions 121 and 122
Water			
Effects on nearby groundwater users associated with dewatering of pits	Adherence with the Water Quality Management Plan. Additional groundwater detection bores to be constructed and monitored in accordance with the Water Monitoring Plan.	Continuous monitoring of groundwater levels in accordance with the Water Quality Management Plan and Water Monitoring Plan. Preparation of a Quarterly Water Monitoring Report.	Schedule 3, Conditions EM1-EM7, EM16-24, WM1-WM2 Schedule 3, RMFT26.[006], [007], [011], [013], [014], [017], [022], [023], [026], [030], [048], [062], [063], [066]



Actual or Potential Effect	Recommended Mitigation / Management	Recommended Monitoring / Future Action	Proposed Consent Condition No.
Discharge of contaminated groundwater into the environment	Adherence with the Water Quality Management Plan. Additional groundwater detection bores to be constructed and monitored in accordance with the Water Monitoring Plan. Preparation and implementation of a Brine Disposal Management Plan.	Continuous monitoring of EC, and temperature and quarterly groundwater quality sampling in accordance with the Water Monitoring Plan. Preparation of a Quarterly Water Monitoring Report. Preparation of an Annual Brine Management Report during any year in which brine is discharged to FRUG.	Schedule 3, Conditions MWM4-MWM10, EM1-EM7, EM16-24 Schedule 3, RMFT26.[022], [054]-[056]
Effects on receiving surface water environment from runoff capture, pit lakes discharges and seepages from WRSs and TSFs	Adherence with the Water Quality Management Plan which includes the planned implementation of the following mitigation measures: > Source control measures including WRS construction methodology, progressive capping and rehabilitation of completed WRS surfaces, mine design and water diversion constructions; > Discharge controls including return pumping of silt pond water and capture of seepage; > Water treatment including active and passive methodologies and dosing of pit lakes with ferric-chloride; > Flow augmentation and flushing from Camp Creek and Coal Creek Dams and flushing flows from the WTP;	Monitoring in accordance with the Water Quality Management Plan and Water Monitoring Plan. Preparation of a Quarterly Water Monitoring Report. Review, update and recalibration of the Water Balance Model at the points specified in the conditions. Development of a WTP Discharge Management Plan.	Schedule 3, Conditions MWM1-MWM3, MWM11-18, WTP1-WTP7, WQ1-WQ18, EM1-15, EM20-24, WM1-WM2 Schedule 3, RMFT26.[001], [002], [004], [005], [008]-[010], [012], [015], [016], [018]-[021], [024], [025],



Actual or Potential Effect	Recommended Mitigation / Management	Recommended Monitoring / Future Action	Proposed Consent Condition No.
	> Following the implementation of the suite of water management and mitigation measures, and no later than 7 yrs following consent granting, compliance with improved water quality limits in the receiving water environment as set out in the conditions; and > Monitoring of surface water and groundwater. Preparation and implementation of a Mine Water Management Plan.		[027]-[034], [036]-[039], [041]-[046], [049]-[053], [057], [058], [060], [061], [064], [065], [067], [068], [074], [075] Schedule 3, RM10.351.12 Schedule 3, RM16.138.08
Terrestrial Ecology and Wetland			
Effects on terrestrial vegetation during vegetation clearance associated with land disturbance associated with MP4	Adherence to the Vegetation and TAR Flora Management Plan which provides measures to minimise effects on indigenous vegetation in accordance with consent requirements, including pre-clearance surveys to identify TAR species, micro-siting to avoid key individuals (where practicable), salvage of TAR plants and highest value tussock, propagation of TAR species that occur beyond direct loss areas and inclusion in restoration planting plans, monitoring and reporting of outcomes. The plan also includes weed management to prevent invasion and degradation of retained and rehabilitating habitats. Adherence to the Residual Effects Terrestrial Restoration Plan. Residual adverse effects on terrestrial ecological values will be addressed through a package of compensation actions which comprise:	Monitoring and adaptive management, implemented through the Residual Effects Terrestrial Restoration Plan.	Schedule 1, Conditions 40-74



Actual or Potential Effect	Recommended Mitigation / Management	Recommended Monitoring / Future Action	Proposed Consent Condition No.
	> Large-scale habitat protection and enhancement, including the establishment of a 252 ha predator-proof fence at the MEEA and pest control across a wider landscape; > Extensive restoration planting, particularly of 175 ha tussock grassland at Mt Highlay and 50 ha of shrubland at Cranky Jims; > Habitat connectivity and covenant integration, including linking existing protected areas such as MEEA, Cranky Jims Link, and Redbank; > Targeted fauna management, including intensive pest control and habitat enhancement for lizards and avifauna; > Restoration of rare and functionally extinct ecosystems, such as podocarp forest elements within Cranky Jims Link; > Removal of degrading land uses and weed control, including the removal of pine forestry and ongoing control of invasive species.		
Effects on lizards during vegetation clearance associated with land disturbance associated with MP4	Adherence with the Lizard Management and Monitoring Plan which includes protocols for pre-clearance surveys, capture, salvage, and relocation of lizards from impact areas to minimise direct mortality and reduce impacts on local populations. Residual effects will be addressed through a package of compensation actions which comprise: > The establishment of the MEEA, a 252 ha predator-free sanctuary for indigenous lizards including Otago skinks;	Monitoring and adaptive management in accordance with the Lizard Management and Monitoring Plan.	Schedule 1, Conditions 84-85



Actual or Potential Effect	Recommended Mitigation / Management	Recommended Monitoring / Future Action	Proposed Consent Condition No.
	> Landscape-scale pest control across an approximately 1,170 ha buffer area surrounding the fenced area; > The stock-fencing of approximately 355 ha of existing tussock grassland which will be protected in perpetuity; > The stock-fencing of approximately 48 ha of existing dry shrubland which will be protected in perpetuity; > Habitat protection, pest control and stock exclusion of 32 ha rock outcrop/tor habitat at MEEA, Mt Highlay and Cranky Jims Link; and > The protection of lizards through pest control and improvement of habitat connectivity towards the high value Redback Covenant.		
Effects on avifauna during vegetation clearance associated with land disturbance associated with MP4	Adherence with the Avifauna Monitoring and Management Plan which includes timing controls and pre-works checks where vegetation clearance or earthworks could affect nesting birds. If active nests are identified, appropriate exclusion zones or management responses will be implemented. Residual effects will be addressed through a package of compensation actions which include protection of avifauna through pest control and habitat restoration and connectivity improvements as described above.	Monitoring and adaptive management in accordance with the Avifauna Monitoring and Management Plan.	Schedule 1, Condition 86-96
Effects on invertebrates during vegetation clearance associated with land	Adherence with the Invertebrate Management and Monitoring Plan which includes a salvage and relocation program, habitat protection measures, and operational controls.	Monitoring and adaptive management in accordance with the Invertebrate Management and Monitoring Plan.	Schedule 1, Conditions 75-83



Actual or Potential Effect	Recommended Mitigation / Management	Recommended Monitoring / Future Action	Proposed Consent Condition No.
disturbance associated with MP4	Residual effects will be addressed through a package of compensation actions which include protection of invertebrates through pest control and habitat restoration and connectivity improvements as described above.		
Effects of mammalian pests on terrestrial biodiversity	Pest management approach as part of the compensation package for terrestrial vegetation, invertebrates, avifauna and lizards with detailed measures included in the PCEP.	Monitoring and adaptive management in accordance with the PCEP.	Schedule 1, Condition 97-114
Loss of natural inland wetlands associated land disturbance associated with MP4	Effects on wetlands and TAR wetland plants will be managed through the Water Quality Management Plan, Vegetation and TAR Flora Management Plan, Wetland Management and Monitoring Plan, and Residual Effects Wetland Restoration Plan. Residual adverse effects on wetland ecology will be addressed through a package of compensation actions comprising: > Restoration and enhancement of approximately 2.78 ha of degraded ephemeral wetlands; > Restoration and enhancement of approximately 5.48 ha of sedgeland wetland; > Establishment and enhancement of approximately 5.06 ha of copper tussock wetland; > Restoration and protection of approximately 0.12 ha of shrubland wetland; > Enhancement and establishment of TAR wetland plants;	Monitoring and adaptive management in accordance with the Wetland Management and Monitoring Plan. Preparation of Annual Wetland Monitoring Report. Experimental creation of ephemeral wetlands and creation of a Wetland Research Fund.	Schedule 3, Conditions WLD1-WLD33 Schedule 3 RM25.366.06



Actual or Potential Effect	Recommended Mitigation / Management	Recommended Monitoring / Future Action	Proposed Consent Condition No.
	> Protection and stock exclusion of approximately 0.22 ha of headwater seep wetland; and > Protection and stock exclusion of approximately 0.96 ha of wetland, and 2.48 ha of riparian habitats. The proposed Camp Creek and Coal Creek wetland compensation package also includes restoration, enhancement and protection actions across multiple locations within OGL landholdings. The key components include: > Restoration and enhancement of approximately 1.47 ha of sedgeland wetland; > Restoration, establishment and enhancement of approximately 0.54 ha of copper tussock; > Enhancement and establishment of TAR wetland plants; and > Protection and stock exclusion of 9 ha of wetland.		
Aquatic Ecology and Freshwater			
Effects of discharges on aquatic ecology	> Discharge design that includes outlet configuration, energy dissipation and erosion protection (such as a riprap) where appropriate; > Applying the site-specific approaches including ground infiltration instead of direct discharge (where appropriate); and > Continuous flow monitoring systems at Deepdell Creek, Tipperary Creek and key water sources.	Surface water flow and quality monitoring in accordance with the Water Monitoring Plan. Aquatic biological monitoring and reporting.	Schedule 3, Condition EM5-EM16, EM25



Actual or Potential Effect	Recommended Mitigation / Management	Recommended Monitoring / Future Action	Proposed Consent Condition No.
Effects of physical works on aquatic ecology	Adherence with the Fish Management Plan including: > The installation and maintenance of fish exclusion devices in the permanent reach of Trimbells Gully and Murphys Creek to prevent fish moving up and downstream through the area of works; > Fish salvage with electric fishing and netting/trapping and relocation to Trimbells Gully and Murphys Creek; > Biosecurity measures; > Monitoring and reporting requirements on aquatic flora, benthic macroinvertebrates and fish; and > Adaptive management during works. Stream compensation works as detailed below. All earthworks to be undertaken in accordance with the Erosion and Sediment Control Management Plan.	Following completion of fish salvage and relocation works, a short report will be prepared detailing the fish captured (species and number of fish) during the salvage, as well as details on the relocation site. Aquatic biological monitoring and reporting.	Schedule 3, Condition EM25, ESC1-ESC12, AEC9-AEC13 Schedule 3, RMFT26.[069]-[071]
Loss of stream within Trimbells Gully and Clydesdale Creek tributary	The Project will result in the loss of 180 m of permanent stream and 670 m of intermittent stream in Trimbells Gully, 140 m of intermittent stream in Trimbells Gully tributary, and 22 m of permanent stream in the Clydesdale Creek tributary. As per the Stream Compensation Plan these losses are to be compensated through: > Realignment of a portion of Trimbells Gully of 745 m and its tributary of 60 m;	An annual report will be prepared providing information on the stream enhancement activities and maintenance that have occurred during the preceding 12 months.	Schedule 3, Conditions AEC1-AEC8 Schedule 3 RMFT26.[003], [059]



Actual or Potential Effect	Recommended Mitigation / Management	Recommended Monitoring / Future Action	Proposed Consent Condition No.
	> 640 m of enhancement within Murphys Creek with 20 m riparian planting from the stream edge where practicable; and > 950 m of enhancement within the Waikouaiti River North Branch with 10 m riparian planting from the stream edge and instream boulder placement. Enhancement to involve direct transfer of riparian vegetation from present stream alignments, riparian plantings from within Macraes ED, and creation of instream habitat variability. Enhancement will be supported by ongoing maintenance, pest control, stock exclusion fencing, and weed control.		
Effects of predator proof fence on Murphys Creek	Effects will be managed through the design of culvert gates that allow fish passage during elevated flow conditions, and in accordance with the Fish Management Plan.	Aquatic biological monitoring.	Schedule 3, Condition EM25
Landscape, Natural Character and Visual Amenity			
Alteration of existing landform within Coronation Mining Area resulting in landscape character and visual effects.	Final landform to be in accordance with the Coronation Closure Plan which aims to reduce visual contrast and enhance long-term landscape coherence. Measures include: > The proposed final landform will be designed to integrate with the existing and surrounding landforms; > Coronation and Coronation North pits would be rehabilitated to form pit lakes;	Monitoring of rehabilitation works in accordance with the Landscape Rehabilitation Strategy and Management Plan.	Schedule 2, Conditions 46-79



Actual or Potential Effect	Recommended Mitigation / Management	Recommended Monitoring / Future Action	Proposed Consent Condition No.
	> WRSs and backfilled areas will be contoured to achieve stable, naturalised landforms, with slopes softened and contours aligned with adjacent topography; > Rehabilitation of WRSs would focus on reinstating pasture interspersed with pockets of tussock grassland; > The lower benches within the pits will become submerged by future pit lakes. Where these remain above the future pit lake water level, these will be stabilised and remain in perpetuity. Where safe, pit margins to be softened and planted where intersecting with backfill; > Clean water will continue to be diverted to the north-east of Trimbells WRS and two spillways will be established, one to the west of Coronation North Pit and one to south of Coronation Pit. These spillways will be planted to enhance ecological outcomes; and > Disturbance areas outside of the pit will be re-established with pasture and areas of tussockland to integrate with the surrounding rural landscape. Preparation and implementation of a Landscape Rehabilitation Strategy and Management Plan.		
Alteration of existing landform within Central Mining Area resulting in landscape character and visual effects.	Final landform to be in accordance with the Central Mining Area Closure Plan which aims to reduce visual contrast and enhance long-term landscape coherence. Measures include: > At closure, the TSF will be dry capped and rehabilitated. Waste rock from the Innes Mills extension would be placed within a network of	Monitoring of rehabilitation works in accordance with the Landscape Rehabilitation Strategy and Management Plan.	Schedule 2, Conditions 46-79



Actual or Potential Effect	Recommended Mitigation / Management	Recommended Monitoring / Future Action	Proposed Consent Condition No.
	existing and expanded disposal locations and will be integrated with the adjacent landform; > The Innes Mills open pit (Stages 11–13) will be partially backfilled and remain at closure as a pit lake. Exposed benches above the lake will be stabilised to remain in perpetuity; > Backfill areas (IM-BF1 and IM-BF2) will be regraded to remove haul roads and benching, creating smoothed and stable landforms. Surfaces above the final water level will be capped with brown rock and rehabilitated predominantly with pasture interspersed with tussock grassland, and areas of grey scrubland to provide visual texture and habitat diversity; > The MTI will be lowered to approximately +512 masl, with a perimeter dam wall retained at approximately +515 masl and rehabilitated to pasture. The Frasers TSF will be dry-capped and rehabilitated to support mixed grassland and defined overland flow paths; and > Watercourses will be reinstated in a naturalised form, including redirection of the upper catchment of the North Branch Waikouaiti River across the TSF capping and embankment with riparian planting. Roads and mine access tracks will be rationalised, with redundant haul roads rehabilitated and opportunities provided for post-closure recreation and public access. Preparation and implementation of a Landscape Rehabilitation Strategy and Management Plan.		



Actual or Potential Effect	Recommended Mitigation / Management	Recommended Monitoring / Future Action	Proposed Consent Condition No.
Alteration of existing landform by Golden Bar Mining Area resulting in landscape character and visual effects.	Final landform aims to reduce visual contrast and enhance long-term landscape coherence. Measures include: > All waste rock generated by the Golden Bar Pit extension will be placed within an expanded Golden Bar WRS located to the northwest of the pit. This approach consolidates waste rock within an established mining landform, avoiding the creation of dispersed new features across the surrounding catchment; > Following completion of mining, the Golden Bar Pit will be rehabilitated to form a permanent pit lake, with a spillway and riparian planting established around the lake margins where practical; > Pit benches will be completed to maintain long-term landform stability; and > The WRS will be progressively rehabilitated throughout operations, contoured to form a gently sloping landform and revegetated primarily with pasture interspersed with tussock, consistent with the wider rural context. Preparation and implementation of a Landscape Rehabilitation Strategy and Management Plan.	Monitoring of rehabilitation works in accordance with the Landscape Rehabilitation Strategy and Management Plan.	Schedule 2, Conditions 46-79
Geotechnical			
Underground mine subsidence effects on Deepdell Creek	Adoption of the Deepdell Creek Standoff Line (DCSL) with an angle of draw 24° and 25 m additional offset to exclude subsidence causing activities such as stoping.	Subsidence monitoring as per the Deepdell Creek Subsidence TARP	Schedule 3, RMFT26.[047]



Actual or Potential Effect	Recommended Mitigation / Management	Recommended Monitoring / Future Action	Proposed Consent Condition No.
	Mining (stopping) within the DCSL may occur following satisfactory results of detailed site investigation and geotechnical assessment – particularly where the overburden thickness increases and more information on the ground behaviour associated with stopping is understood. The Deepdell Creek subsidence Trigger Action Response Plan (TARP) has been developed by OGNZL to manage the risks associated with subsidence at Deepdell Creek and provides guidance on monitoring requirements, trigger levels, and response actions. Adherence to the Subsidence and Ground Control Management Plan.	and Subsidence and Ground Control Management Plan. Preparation of an Annual Subsidence and Ground Control Management Compliance Report.	
Instability of open pit walls	The conditions require adherence to a defined pit rim footprint. Detailed design of the pit will be undertaken such that the pit is safe and stable within that footprint. Stability of pit walls will continue to be closely monitored and managed during mining through highwall mapping and slope performance monitoring. Ground control across the site is managed under the site-wide Surface Ground Control Management Plan and the Ground Control Management Plan - Public Roads Adjacent to Macraes Operations in Part C of this substantive application provides for the ground control system for roads subject to resource consent conditions.	Active slope monitoring in accordance with the Ground Control Management Plans. Installation of Vibrating Wire Piezometers around the pit crest.	Schedule 2, Conditions 80-85 Schedule 3, RMFT26.[021]
Instability of WRS	Detailed design of WRS in accordance with recommended slope stability design acceptance criteria and to withstand a 1-in-2500 annual-exceedance-probability earthquake without catastrophic failure.	A design report shall be prepared for each new WRS by a suitably qualified geotechnical engineer or engineering geologist.	Schedule 3, Conditions WRS1-WRS17



Actual or Potential Effect	Recommended Mitigation / Management	Recommended Monitoring / Future Action	Proposed Consent Condition No.
	Preparation and implementation of a Waste Rock Stack Management Plan.		
Instability of Frasers TSF	Established management controls that may be applied during the filling of the Frasers TSF include: > Rigorous slope monitoring procedures using both radar and GPS to capture real time slope movements > Development, review and implementation of TARP's with regular risk assessments.	Active slope monitoring in accordance with the Ground Control Management Plan.	
Instability and settlement effects on Macraes Road Realignment Stage 2	Implementation of the following measures to be developed during detailed design with relevant requirements to be incorporated into the Frasers TSF Stage 3 Operation, Maintenance and Surveillance (OMS) Manual and mine closure arrangements: > Final road alignment, formation and drainage will be designed with reference to the estimated longitudinal settlement profile presented in EGL (2026c), development of specific transition treatments, and to allow routine resurfacing and regrading as settlement develops; > Baseline survey of the completed road and Frasers Backfill Embankment crest will be undertaken once road construction is complete; and > Post seismic inspection of the Frasers Backfill Embankment and repairs of any material deformations.	Geotechnical monitoring of Macraes Road where it traverses Frasers Backfill Embankment during operations and post-closure.	Schedule 2, Conditions 119 - 123



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Noise			
Excessive noise causing nuisance impacts	Compliance with the following operational noise limits at neighbouring properties not owned by OGNZL apart from 1668 Macraes Road and 406 Horse Flat Road which have specific noise limits: > Monday to Friday 7am – 10pm: 50 dB L_{Aeq} (15 min) > Saturday 8am – 7pm: 50 dB L_{Aeq} (15 min) > At all other times and any public holiday: 40 dB L_{Aeq} (15 min) > Daily 10pm to 7am the following day: 75 dB L_{AFmax} Noise mitigation at 1668 Macraes Road via construction of a noise bund on adjoining land owned by OGNZL. Surface level earthmoving activities in the northern part of the Frasers West WRS area, and the western part of Innes Mills BF1 to be restricted to the daytime period only, unless haulage in the surrounding area stops, at which point earthmoving activities could commence. Noise management measures are captured in the Noise, Airblast and Vibration Management Plan which conditions require adherence to.	Monthly, day and nighttime, noise monitoring in accordance with the Noise, Airblast and Vibration Management Plan.	Schedule 2, Conditions 4-8, 17-19
Blasting and Vibration			
Effects of vibration on amenity values	Blasting shall be restricted to Monday-Friday 9am to 5.30pm and Saturday and Sunday 10am to 4.30pm. Existing consent conditions that set limits for vibration and airblast levels for residences to be continued.	Blast and vibration monitoring at 1668 Macraes Road and 406 Horse Flat Road in accordance	Schedule 2, Conditions 9-29



Actual or Potential Effect	Recommended Mitigation / Management	Recommended Monitoring / Future Action	Proposed Consent Condition No.
	Blasting to be managed in accordance with the requirements of the Noise, Airblast and Vibration Management Plan, Site Management Plans, Principal Hazard Management Plan and the Open Pit Explosives Management Plan.	with the Noise, Airblast and Vibration Management Plan.	
Effects of vibration on heritage values	Vibration will continue to be managed in accordance with the requirements of the Noise, Airblast and Vibration Management Plan. Baseline condition surveys of heritage sites within the Golden Point Historic Reserve and Gay Tan's Cottage to be carried out by a suitably qualified and experienced professional prior to the commencement of blasting and a follow up inspection carried out should blasting result in levels of vibration exceeding the applicable limit. Any damage attributed to blasting to be remedied by OGNZL in consultation with DoC.	Blast and vibration monitoring at Gay Tan's Cottage and Building 2 in the Golden Point Historic Reserve in accordance with the Noise, Airblast and Vibration Management Plan.	Schedule 2, Conditions 9-29
Roading and Traffic			
Effects on road safety caused by realignments of Macraes Road and unformed roads	Detailed design of Macraes Road realignments in accordance with industry standards (Austroads standards as well as NZTA Traffic Control Devices Manual and MOTSAM) to ensure no adverse road safety and/or efficiency effects on future Macraes Road users. It is intended that sightlines in accordance with SISD standards, including allowance for grade corrections, will be provided at all intersections and access points on the realigned Macraes Road, with this able to be confirmed through the detailed design process. Replacements for effected sections of unformed roads Matheson Road, Link Road, and Golden Point Road as set out in the conditions.	Post-construction safety audit	Schedule 2, Conditions 86-91, 93-123, 125-131, 133-138



Actual or Potential Effect	Recommended Mitigation / Management	Recommended Monitoring / Future Action	Proposed Consent Condition No.
Effects of road construction works on users of Macraes Road	Short-term construction activity impacting public road users will have temporary traffic management in place through a standard Temporary Traffic Management Plan process, led by the contractor. Public access along existing roads will be maintained, with part of the road always remaining usable.	Construction Traffic Management Plan(s) to be prepared for construction works on public roads.	Schedule 2, Condition 92
Effects on road safety associated with new vehicle access points	New internal vehicle crossings to be constructed in accordance with Austroads and SISD standards. Public access via Golden Point Road, between Deepdell Creek and Horse Flat Road will be maintained with a managed haul road crossing at Horse Flat.	None.	Schedule 2, Condition 124, 132
Lighting			
Lighting impacts on neighbouring residences and public road users	Mobile lighting towers shall be no taller than 12m and, unless the MLT lighting will not be visible due to topography, not be aimed directly towards any residence or public road nearby. Where new fixed lighting (i.e. lighting mounted on buildings, static structures, lighting columns or the like) is visible from any residential property or public road, it shall: > Be the minimum output required for safe access and operation; > Have a nominal colour temperature no greater than 2700K; and > Either be: • directed down, with no upward tilt and selected to ensure no more than 1% direct upward light is emitted; or	None.	Schedule 2, Conditions 30-31



Actual or Potential Effect	Recommended Mitigation / Management	Recommended Monitoring / Future Action	Proposed Consent Condition No.
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- selected to ensure that the maximum luminous intensity from any luminaire, in any direction, does not exceed 1,000 candelas.

Archaeological and Heritage			
Accidental impacts on the archaeological remains / features associated with the: > Gay Tan's Cottage (I42/50) > early alluvial workings (I42/64) and associated sod structure (I42/51) > Site I42/33 (prospecting pit) > Harry's Hut (I42/153) > Golden Bar Mine and Battery (I43/86 and I43/88)	Implementation of an Archaeological Management Plan(s) to manage potential archaeological / heritage effects. This will include: > Proposed seepage sump locations must be assessed by an archaeologist for their potential to affect archaeological sites, including a site visit to the proposed location(s). If there is the potential that a sump will affect an archaeological site, designs should be altered to avoid this; > An area around the known Chinese Camp building locations, as well as the early alluvial workings (I42/64) and sod structure (I42/51), to be demarcated and protected on the ground using physical barriers (plastic mesh safety fencing, or similar) to avoid any accidental disturbance during Stage 2 road realignment works and seepage drain/sump construction; > Areas where archaeological investigations must be undertaken prior to project earthworks proceeding at: • The Upper Township; • Innes Farm; • The drainage feature/wire and post remains (IM2);	Vibration monitoring of Gay Tan's Cottage as per the Archaeological Management Plan.	Archaeological Authority conditions



Actual or Potential Effect	Recommended Mitigation / Management	Recommended Monitoring / Future Action	Proposed Consent Condition No.
	> An on call-protocol for managing the discovery of any archaeological material beyond the investigation areas/sites; > The vibration limits established for Gay Tan’s Cottage and heritage buildings within the Golden Point Historic Reserve and the monitoring regime and parties responsible to ensure that limits are complied with; > Site I42/33 (prospecting pit) is flanked by two branches of the proposed haul road; a post and wire fence should be erected around this site – at least while the haul road is in use – to make its location apparent and protect it from any accidental damage; > Areas around the archaeological features making up the Golden Bar Mine and Battery (I43/86 and I43/88) should be demarcated and protected on the ground using physical barriers (plastic mesh safety fencing, or similar) to avoid any accidental disturbance during project works; > Gay Tan’s Cottage (I42/49) to be assessed by a suitably qualified structural or blasting/vibration engineer, with experience in understanding the structural performance of historic buildings, to establish vibration limits sufficient to prevent threshold damage to the building. This advice is to be provided in consultation with a suitably qualified stone mason or other tradesperson with expertise in earth structures; > Remedial work by a suitably qualified stonemason is to be undertaken to stabilise the ruins of Harry’s Hut (I42/153);		



Actual or Potential Effect	Recommended Mitigation / Management	Recommended Monitoring / Future Action	Proposed Consent Condition No.
	> Areas around the archaeological features making up the core of the New Zealand Gold and Tungsten Battery site (I42/98) to be demarcated and protected on the ground using physical barriers (plastic mesh safety fencing, or similar) to avoid any accidental disturbance during project works; > Areas around the archaeological features making up the Golden Bar Mine and Battery (I43/86 and I43/88) to be demarcated and protected on the ground using physical barriers (plastic mesh safety fencing, or similar) to avoid any accidental disturbance during project works; > Ensure contractors undertaking MEEA works avoid historic heritage; and > A regular maintenance regime for the physical barriers at the sites, to ensure they remain visible and effective throughout the project duration.		
Destruction of the Innes Farm (I42/215).	An Archaeological Authority under the HNZPT Act 2014 is required for the proposed works.		Archaeological Authority conditions
Destruction of Griffin House (I42/214).	Implementation of an Archaeological Management Plan to manage potential archaeological / heritage effects. This will include:		Schedule 1, Conditions 124-125
Potential modification of the Chinese Camp (I42/49).	> Archaeological recording of the stone outbuilding (Building D) at the Innes Farm site to a Level II standard according to AGS 1;		
Destruction of the fence line (I42/253).	> Archaeological recording of the other probable 19th century buildings (Buildings C, E, and F) to a Level III standard according to AGS 1;		
Destruction of the Coal Creek workings (I42/221).			



Actual or Potential Effect	Recommended Mitigation / Management	Recommended Monitoring / Future Action	Proposed Consent Condition No.
Destruction of the various sites that make up the alluvial workings within the reservoir footprint (I42/148, I42/149, I42/150, I42/151, I42/152, I42/155, and I42/156). Destruction of the 19th century sluicing site (I43/190). Destruction of other possible subsurface sites that may be present within the project area.	> Archaeological recording of the 20th century buildings (A, B, and H), as a dimension of the earlier site's archaeological context, to a Level III standard according to AGS 1; > Archaeological recording of the fence line to a Level III standard according to AGS 1; > Areas to be targeted for vegetation clearance with scrub cutters to facilitate the relocation and archaeological recording of I42/155 and I42/149 prior to works proceeding. The detailed mapping of all sites/features within the project area, and targeted excavation of some features, prior to works proceeding; > The detailed mapping and recording of the features relating to I42/221 within the project area prior to works proceeding; > The detailed mapping and recording of the features relating to I42/97 and I42/98, and other post-1900 features in the project area; and > Archaeological recording of the sluicing site prior to project earthworks proceeding; and > An on call-protocol for managing the discovery of any archaeological material as part of the proposed work that was not accounted for during the specified archaeological recording.		
Accidental discovery of koiwi tangata (human remains).	In the event of koiwi tangata (human remains) being uncovered, Heritage New Zealand Archaeologist, NZ Police, and the appropriate mana whenua groups or kaitiaki representative are to be advised, work will cease	None.	Schedule 1, Conditions 124-125



Actual or Potential Effect	Recommended Mitigation / Management	Recommended Monitoring / Future Action	Proposed Consent Condition No.
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immediately in the vicinity of the remains and not resume until written approval for work to continue is received from Heritage New Zealand.

Contaminated Land Management

Disturbance of contaminated land	Contaminated soils to be remediated/managed by either: > Offsite disposal; > Processing contaminated materials through Processing Plant; or > Excavation and disposal within the TSFs. Soil contaminated with hydrocarbons may be treated on dedicated treatment pads in addition to, or in combination with, the above. Excavation or ground disturbance to be limited around the Main Workshop, and in areas affected by runoff from it, and any other areas where PFAS containing AFFF use and/or discharge may have occurred regularly or at high volumes / concentrations, until these areas have been appropriately investigated.	Dedicated Site Management Plan (Ground Contamination) that complies with the NES-CS. Any additional consent requirements as a result of any investigations or mitigation requirements will be sought prior to undertaking any such activities.	Schedule 2, Conditions 40-45 Schedule 3, RMFT26.[035], [040]
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Storage and Handling of Hazardous Substances

Effects on ecosystems, people and property from spills of hazardous substances.	OGNZL operates with strict hazardous substance management procedures in place, which are detailed in the: > Principal Hazard Management Plan – Hazardous Substances; > Hydrocarbon Management Plan; > Waste Management Plan;	None.	Schedule 1, Condition 123 Schedule 2, Conditions 32-39
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Actual or Potential Effect	Recommended Mitigation / Management	Recommended Monitoring / Future Action	Proposed Consent Condition No.
	> Emergency Management Principal Control Plan; > Standard operating procedure for Hazardous Waste, Destruction and Removal from Site and further specific waste disposal procedures. Any hazardous substance emergency that has the potential to adversely affect people off-site or the environment, or any above-ground hazardous substance spill greater than 20 L, must be remediated by and reported by OGNZL to Councils in the event of spills.		
Effects on ecosystems, people and property from the development and operation of Class 1 Explosives Storage facility at Golden Bar Underground	Storage of explosives is managed in accordance with the: > Principal Hazard Management Plan for Explosives; > Principal Hazard Management Plan for Fire & Explosion.	None.	Schedule 1, Condition 123 Schedule 2, Conditions 32-39
Dust and Air Quality			
Dust discharge impacting the amenity of surrounding neighbours.	Dust to be managed in accordance with the Air Quality Management Plan. Existing TSP monitoring to be replaced with PM₁₀ monitoring at DG15. New TSP monitoring site close to 1668 Macraes Road.	Air quality monitoring in accordance with the Air Quality Management Plan.	Schedule 3, Conditions Air1-Air18, Air22-Air24
Emissions of metals to air from the processing plant	Processing Plant incorporates a number of emission control measures to minimise air discharges including:	Stack emission testing of POX plant stack be carried out once every three years for particulate	Schedule 3, Conditions Air1-Air8, Air19-24



Actual or Potential Effect	Recommended Mitigation / Management	Recommended Monitoring / Future Action	Proposed Consent Condition No.
	> POX plant vent scrubber, a wet scrubbing system that removes SO₂, acid mist, and particulate-phase contaminants, routine monitoring of scrubbing liquor flow rates and composition, and system pressure drop, and maintenance; > Measures within the crushing circuit including water spray systems, minimisation of drop heights, wetting of ROM pad surface, routine inspection and maintenance; > Routine inspection of the retort oven to ensure the mercury condenser associated with the retort oven is operating correctly and that the mercury collection system is functioning as intended. Maintenance on the retort oven is undertaken on an annual basis; and Barring furnace baghouse which removes fine particulate matter, manual monitoring of pressure and routine inspection and maintenance.	matter, sulphur dioxide and metals.	
Public Access and Recreation			
Effects on access to Murphys Flat Historic Reserve and Golden Point Historic Reserve.	Managed haul road crossing to enable continued public entry to Murphys Flat Historic Reserve and Golden Point Historic Reserve.	None.	Schedule 2, Condition 124
Social			
Effects of mine closure on community and businesses	OGNZL's procurement approach to continue to facilitate the spread of local supplier benefits across local businesses to reduce mine dependency.	OZNGL to commission a Closure SEIA two years prior to closure.	Schedule 2, Conditions 139-142



Actual or Potential Effect	Recommended Mitigation / Management	Recommended Monitoring / Future Action	Proposed Consent Condition No.
	Preparation and implantation of a Community Communication and Engagement Plan to provide information about project activities, environmental monitoring, rehabilitation, complaints management, and closure planning.		
Amenity effects during mining operations	Preparation and implantation of a Community Communication and Engagement Plan to provide information about project activities, environmental monitoring, rehabilitation, complaints management, and closure planning.	Environmental monitoring and reporting as mentioned above.	Schedule 2, Conditions 139-142
Effects on water resources	Preparation and implantation of a Community Communication and Engagement Plan to provide information about project activities, environmental monitoring, rehabilitation, complaints management, and closure planning. Engage with landowners near areas impacted by MP4 who rely on springs, bores, or surface water for stock supply to discuss property-specific risks, monitoring results, and contingency measures if water availability or quality is affected.	Water monitoring and reporting as mentioned above.	Schedule 2, Conditions 139-142
Closure and Aftercare			
Risk of OGNZL defaulting on its rehabilitation obligations.	The combination of the Site Decommissioning and Closure Plan and the bond ensure that rehabilitation and closure of the site will occur under all circumstances, and that the costs associated with both the rehabilitation of the land and its long-term management will be met.	None.	Schedule 1, Conditions 115-120, 129-153

