6. ASSESSMENT OF ENVIRONMENTAL EFFECTS

6.1 OVERVIEW

In accordance with Schedule 5 (clause 5 (4), clause 6 and clause 7), Schedule 6 (clause 3 (1)(g)(i)), Schedule 7 (clause 2 (1)(j)), Schedule 8 (clause 2 (1)(g)), Schedule 9 (clause 2) and Schedule 11 (clause 3 (e)(iv)) of the Act this section provides an assessment of the actual and potential environmental effects associated with the proposed WNP.

This section of the report addresses the actual and potential effects associated with the proposed construction, operation, maintenance, and closure of the WNP.

OGNZL has commissioned a number of independent experts to provide specialist reports on the actual and potential effects on the environment. Copies of those reports are included in **Part B** of these application documents.

The relevant actual and potential environmental effects, as summarised in the following sub-sections of this report, are considered to be:

- Cultural effects;
- Positive effects;
- Effects on surface and groundwater;
- Ground settlement and subsidence effects;
- Effects on terrestrial and aquatic ecology;
- Landscape, visual amenity and natural character effects;
- Geotechnical effects;
- Geochemistry and acid rock drainage effects;
- Noise effects;
- Blasting and vibration effects;
- Effects relating to tourism and recreation;
- Air quality effects;
- Lighting effects;
- Archaeological and historic heritage effects;
- Effects relating to the storage and handling of hazardous substances;

- Contaminated land management;
- Transportation effects;
- Social impacts; and
- Closure and aftercare.

OGNZL proposes implementing the effects management and mitigation measures referenced in the sub-sections below by way of the proposed conditions provided in **Part D** of these application documents.

The proposed conditions for the WNP have been drafted to address the environmental effects associated with the project in a robust way. As set out below, the conditions have been drafted according to best practice principles such that they are enforceable and avoid any subsequent delegation of decision making functions. Where management plans are relied on to give vent to conditions, the relevant conditions include a clear statement of the objectives that are required to be met by those plans, and if they are required to be certified post issuance of consent, there is clear guidance about the process that must be followed to facilitate the certification process. In some cases, final versions of management plans have been submitted as part of this application. For these management plans it is intended that the decision making panel that is charged with delivering a decision on this application will have sufficient information to accept those plans and impose conditions that require the Consent Holder to adhere to their requirements without the need for subsequent certification. Of course, it is acknowledged that throughout the panel's consideration of the application and as part of its deliberations there will likely be a need to revisit these conditions to address new matters that arise or to deal with new perspectives that might be brought to bear on a particular issue. OGNZL is committed to a collaborative process whereby further amendments and refinements can be made to the conditions if and when the need arises at the panel's behest.

The proposed conditions have been reviewed by an experienced commissioner (Dr Philip Mitchell) who until he was commissioned to undertake that review had no previous involvement in the preparation of the application. This review has sought to:

- Ensure the proposed conditions are robust and fit for purpose based on the nature and extent of the environmental effects that will result from the project;
- Ensure the performance standards set out in the proposed conditions provide effective mitigation, offsetting and / or environmental compensation where this is required;
- Ensure that the proposed conditions are enforceable and readily able to be administered by the consent authorities;

- Where appropriate, ensure that any conditions that require adaptive management are effective and aligned with relevant jurisprudence relevant to conditions of this type; and
- Ensure that monitoring and review obligations imposed by the proposed conditions are comprehensive and effective.

6.2 CULTURAL EFFECTS

Cultural effects have been identified via direct engagement with iwi as OGNZL acknowledges and recognises that only iwi have the ability to determine how the project affects them.

OGNZL commenced engagement with iwi in 2019 at the outset of the WNP and has endeavoured to build and maintain relationships as the project has been developed. Consultation with iwi is summarised in Section 5.

From this engagement it is clear that for iwi the WNP does not take place in isolation – there is a legacy of past mining activity, which sets a context in which the proposed activities and their effects are viewed. OGNZL is very much aware that it needs to be cognisant of this legacy.

OGNZL is engaged with ongoing discussions with iwi to determine how the project may be used to achieve some degree of amelioration relating to these legacy issues and the current project.

Nonetheless, for the purposes of this substantive application, it is important to make a distinction between actual effects of the WNP, which need to be addressed and managed (including via conditions of consent); and other opportunities for cultural engagement, which may be addressed outside the statutory framework.

With this in mind, cultural effects of the WNP have been identified in the following areas:

- Relationships (governance, rangatiratanga);
- Tribal / whānau development;
- Cultural expression / practices (including community education and awareness raising); and
- Environmental Protection

6.2.1 Relationships

Iwi have emphasised the fundamental importance of relationships in addressing cultural matters. For the WNP, there are two key dimensions:

- The relationship between tangata whenua and the land; and
- The relationships between tangata whenua and other parties (public and private) who are working with the resources of that land.

Based on iwi feedback OGNZL considers that the most effective way to foster and maintain good iwi relationships is to establish a dedicated forum for the WNP, with the purpose being to:

- Facilitate engagement and long-term working relationships between OGNZL and iwi
- Identify and create opportunities for social, economic and environmental enhancement
- Provide a mechanism for iwi to have input into draft management plans (including closure plans)
- Provide an avenue to for the company to seek other cultural advice as may be required

Provision for this forum is included in the proposed conditions of consent set out in Part D.

It is important to emphasise that the forum is not intended to be the sole means of engagement – rather, it is an opportunity to share ideas and help to arrive at solutions. OGNZL remains committed to engagement with individual iwi as appropriate.

6.2.2 Tribal / Whānau Development

As set out in the Social Impact Assessment (WSP2025b), the WNP has positive effects in terms of increased employment and business activity in the Waihi area. Based on the voluntary employee survey undertaken in 2022, OGNZL's existing workforce, the proportion of OGNZL employees who identify as being of Māori descent was 27%, which is higher than the average of 17.9% within the local area, and also higher than the proportion in New Zealand as a whole (16.5%).

Iwi wish to see their people benefit from employment, education and training opportunities that the proposed project may present, and it is important to ensure that this is managed so that these effects accrue equitably.

To this end, specific provisions are included in the proposed conditions of consent relating to the Social Impact Management Plan and Waihi Skill and Development Training Action Plan to ensure that tangata whenua concerns are duly taken into account.

Iwi have also communicated a desire to see OGNZL contribute to their goals and aspirations more broadly (for example by supporting iwi development, capacity building and sponsorship opportunities). These matters are not directly related to effects of the WNP, and OGNZL intends to work with iwi outside the statutory framework in this regard.

6.2.3 Cultural Expression

The WNP needs to make appropriate provision for cultural expression in order to avoid adverse effects. In this regard Iwi have emphasised the importance of accommodating traditional practices in relation to the project. Specific requests include:

> Karakia: To be conducted at appropriate project stages.

  A condition of consent is proposed to this effect (See Part D);

> Cultural Monitoring: Whilst a wide range of "technical" monitoring activities are already taking place or proposed for the WNP, iwi also wish to develop and apply monitoring indicators drawn from their own mātauranga in order to monitor the well-being of the environment.

  It is proposed that the development of cultural monitoring indicators be included in a Cultural Practices Plan. Provision for this plan is included in the proposed conditions of consent set out in **Part D**.

> Cultural Awareness Raising: Sharing kōrero (place names, stories, history), to instil an appreciation of the cultural landscape and the relationship of iwi with the environment.

> A condition of consent is proposed to require a cultural awareness programme to be provided for all WNP staff and contractors. OGNZL is also willing to work with iwi to identify opportunities to develop mātauranga and raise public and community awareness of the cultural context and history of the area in addition to managing effects of the project itself.

> Protection of taonga: Iwi request that an accidental discovery protocol be applied when undertaking ground disturbance.

  A standard accidental discovery protocol is included in the proposed conditions of consent included within Part D.

> It should be noted that Iwi have asked that OGNZL consider a number of activities, related to the research and development of mātauranga and cultural awareness raising in the community more generally. These are not directly related to the management of WNP effects and will be considered by OGNZL outside the statutory framework.

6.2.4 Environmental Protection

At its heart, iwi involvement with environmental management of the WNP is about their relationship with the land and the exercise of kaitikaitanga. The WNP needs to facilitate the exercise of kaitikaitanga to avoid adverse effects.

A primary mechanism proposed is to enable iwi input to the suite of management plans which relate to the various environmental aspects of the project. Conditions are proposed to this effect within **Part D**.

Iwi are also to be engaged (to the extent that they desire) in development and Implementation of the Waihi North Biodiversity Project. The intention is that the Waihi North Biodiversity Project will be developed and implemented in partnership with tangata whenua, allowing integration of cultural perspectives and knowledge, as well as exercise of kaitiakitanga in both establishing the Waihi North Biodiversity Project's objectives and in implementing the programme.

6.3 POSITIVE EFFECTS

As noted in Section 1 of this report, the WNP will deliver significant benefits to both the Waikato Region and New Zealand more broadly.

In that regard, the WNP will increase the scale and duration of the economic and social benefits that OGNZL's Waihi operations already provide to the regional and national economy, by:

- Generating substantial foreign investment, making it one of the largest funded projects in New Zealand's infrastructure pipeline;
- Delivering a considerable boost to New Zealand's exports;
- Supporting a wide range of highly paid jobs, bringing with them job security, sustained livelihoods, reduced local unemployment, increased business activity, and indirect employment opportunities; and
- Delivering significant contributions to the regional economy.

In addition to the substantial economic benefits offered by the project, as part of the proposed approach to managing the actual and potential effects of the WNP, ecological improvements will be generated within the Waikato Region as a result of terrestrial and riparian restoration and enhancement planting, ensuring that a net gain in ecological values is achieved.

Furthermore, in addition to the measures necessary to mitigate, offset or compensate for the environmental effects associated with the WNP's proposed mining activities, OGNZL is proposing to fund and facilitate the Waihi North Biodiversity Project.

At a global scale, the gold and silver produced by OGNZL contributes to powering the global economy and is essential to the renewable energy and transport sections, life-saving medical devices, and technology that connects communities around the world.

6.3.1 Economic Benefits of the Waihi North Project

The economic benefits of the WNP have been assessed and quantified further in an economic assessment by Eaqub (2025), provided in **Part B** of these application documents.

6.3.1.1 Existing Economic Contributions

OGNZL's existing mining activities at Waihi make a substantial contribution to the local and national economy, with the company's Waihi operations contributing over $170 million to the local, regional, and national economy in 2023.

The mining activities directly and indirectly employed approximately 1,000 people in the local community in 2024, with over 300 further jobs induced via consumption of these employees. It is estimated that an average mining job is equivalent to 3.5 jobs elsewhere in New Zealand. Reliance on indirect employment / suppliers is high at Waihi, with it considered that the local mining operations result in the spending of $3.4 on local suppliers / services for every $1 of wages earnt by mining staff. Figure 6-1 illustrates OGNZL's increasing contribution to employment in the local setting.

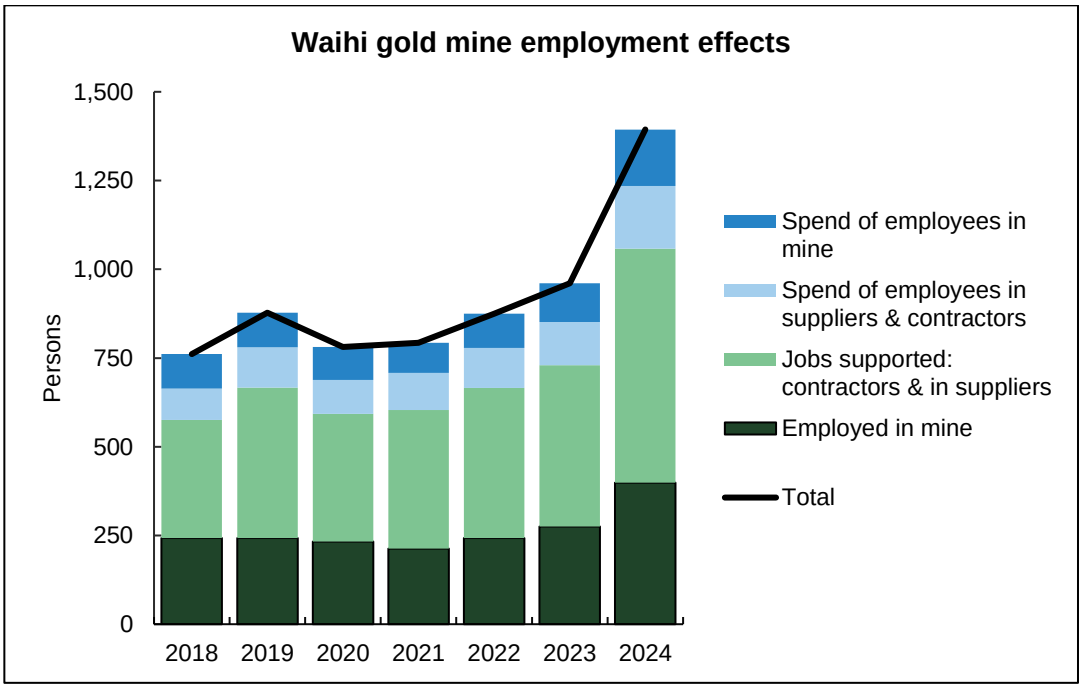

Figure 6-1: OGNZL's Contribution to Employment at Waihi

The average income for OGNZL employees is over $100,000 per year, compared to the national average of $67,000 and $55,000 in the Hauraki District.

In 2023, the GDP contribution from the Hauraki District was $940 million. Whilst this does not entirely relate to OGNZL's mining operations, they are a significant contributor to this figure.

Eaqub (2025) has identified that spending associated with OGNZL's Waihi employment is not confined to the local region, with Figure 6-2 illustrating a split of spending in the Hauraki District, the rest of the Waikato Region, and the rest of New Zealand. This further demonstrates that economic benefits of the mining activities are both local and national.

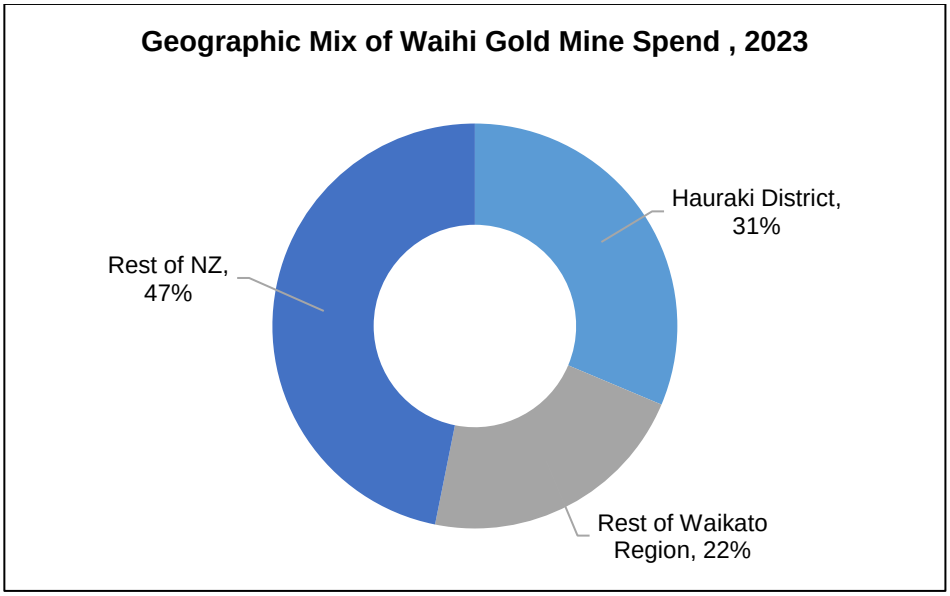

Figure 6-2: Geographic Spread of Waihi Mining Income Spend

Economic diversity has occurred in Waihi and the surrounding local areas in recent years. This has included expansion of the tourism and hospitality industries, and other primary industries such as farming, agriculture, and manufacturing. These expansions support a diverse and resilient local economy and protect businesses and the community from future economic change and dependence on mining, including the eventual mine closure.

6.3.1.2 Economic Impacts of the Waihi North Project

The WNP will substantially transform the future of the region with the project increasing the scale and duration of the economic benefits associated with current Waihi mining activities locally, regionally and nationally.

The project requires, and will inject over $1 billion into the country, via Foreign Direct Investment ("**FDI**"). The WNP will be a nationally significant investment project, considering that the total FDI for New Zealand in the year to September 2024 was $4.1 billion.

Of note, there are only 11 funded $1 billion + projects in the New Zealand infrastructure pipeline today, with another five not yet funded.

The WNP will create additional employment opportunities directly, indirectly, and via induced consumption, contributing to job growth within the region and across the country. This will materialise in a total of 859 jobs, comprising:

> 197 jobs directly in the mine;

> 223 jobs indirectly in contractors (192 excluding tunnelling construction contractors);

> 243 indirect jobs via suppliers throughout New Zealand; and

> 195 jobs via induced demand through the spending of supported jobs.

The jobs associated with the WNP will be equivalent to 6% of all jobs within the Hauraki District.

The WNP will generate export revenue of $5,151 million over the life of the project, or an average of $286 million per year (based on conservative gold price assumptions). In comparison, this will be equivalent to 64% of New Zealand's wool exports, 14% of wine exports, and it will be larger than live animal exports.

Expenditure associated with the WNP over the life of the project will benefit not only the local and regional economies, but it will also have a positive impact on New Zealand as a whole. The average spend / economic contribution is estimated to be $110 million annually; contributing $60 million to the Hauraki District's economy, $14 million to the Waikato Region; and $36m to be dispersed across the remainder of New Zealand.

6.3.2 Positive Social Impacts of the Waihi North Project

An assessment of the social effects of the WNP is has been undertaken by WSP (2025b), a copy of which is provided in **Part B** to these application documents and is considered further in Section 6.19 of this report. However, of note, WSP (2025b) identifies the following social benefits associated with the WNP:

> Job security and sustained livelihoods;

> Social uplift from reduced local unemployment; and

> Social uplift from increased business activity and indirect employment opportunities.

6.3.3 Ecological Improvements Associated with the Waihi North Project

As part of the proposed approach to managing the actual and potential effects of the WNP, OGNZL seeks to undertake and implement ecological improvements within the Hauraki and

Thames Coromandel Districts. This will include terrestrial and riparian restoration and enhancement planting that will generate a net gain in ecological values for the area.

A wide range of technical experts have been engaged to assist with formulating the proposed ecological improvements, and these are detailed further in Section 6.6 of this report. In summary, the improvements will include:

> The establishment of the Wharekirauponga Pest Management Area, which involves broad scale intensive pest control over an area of 632ha to compensate for potential effects of vibration on native frogs (which will benefit other native fauna);

> The provision of research funding to undertake investigative work above WUG and within the wider Wharekirauponga Animal Pest Management Area to assess the efficacy of pest control regimes for frog recovery;

> Offsetting the loss of the warm spring in the Wharekirauponga area, by fencing and planting of 85 m of headwater springs and seepage gullies of Tributary 3 at Willows SFA (amounting to 180 m length of watercourse);

> Enhancing the Mataura wetland (0.28 ha) by establishing a fenced buffer, removing stock, undertaking weed and pest management, and planting programme;

> Offsetting the loss of Tributary 2 (Willows Site), by restoring and protecting 1,995 m of stream in the adjoining Tributary 3 and Tributary 1 catchments. Tributary 2 will be remediated fully (and margins planted) following the removal of the rock stack;

> Completion of 17.5 ha of offset planting, 20 ha of enhancement planting adjoining or within SNA 166, and 20 ha of offset restoration plantings along the Ohinemuri River and around the GOP. All native plantings will be subject to 20 years of pest control (rats, possums, mustelids);

> To address copper skink habitat loss (6.5 ha), compensation proposed includes 11.2 ha of revegetation with pest control and 4.45 ha of pest control in the existing habitat; and

> To address 47 m of stream reclamation, and the residual 644 m of stream not replaced by diversions, and to address time lags in functional restoration of diversions, OGNZL is proposing to restore 7,646 m of stream margins along the Mataura Stream and Ohinemuri River catchment.

6.3.4 The Waihi North Biodiversity Project

The proposed Waihi North Biodiversity Project is a betterment initiative which seeks to facilitate long term environmental gains and benefit with the Coromandel Forest Park, and

to maintain and enhance habitats and indigenous biodiversity in the vicinity of WNP for at least the foreseeable future and ideally in perpetuity.

The Waihi North Biodiversity Project is to be designed and implemented in collaboration with tangata whenua and the Department of Conservation, and to maximise beneficial cultural and social outcomes (including employment) alongside the ecological benefits. While the design of the Waihi North Biodiversity Project is ongoing, as a starting point for discussion OGNZL (2025b) has produced an assessment of the potential opportunities for the project. A copy of this report is provided in **Part B** of these application documents.

The Waihi North Biodiversity Project is large enough that a variety of biodiversity benefits will accumulate for a range of species typical of the Hauraki District and southern Coromandel, including:

- Archey's frog (*Leiopelma archeyi*): At Risk - Declining;
- Hochstetter's frog (*L. hochstetteri*): At Risk - Declining
- Elegant gecko (*Naultinus elegans*): At Risk – Declining;
- Pacific gecko (Dactylocnemis pacificus): At Risk – Relict;
- Forest gecko (*Mokopirirakau granulatus):* At Risk – Declining *;*
- Northern striped gecko (*Toropuku inexpectatus*): Threatened – Naturally Vulnerable;
- Copper skink (*Oligosoma aeneum*): At Risk – Declining;
- Ornate skink (*O. ornatum*): At Risk – Declining;
- Moko skink (*O. moco*) – At Risk – Relict;
- Several native (and introduced) bird species including the "Declining" Kākāriki / Yellow-crowned parakeet and "Recovering" Kākā;
- Several native invertebrates, including paua slug (*Schizoglossa worthyae, S. novoseelandica novoseelandica*) and a flightless stag beetle (possibly Te Aroha stag beetle - *Geodorcus auriculatus* sp.).
- A variety of native freshwater species, including longfin eel (*Anguilla dieffenbachii*), kōaro (*Galaxias brevipinnis*), torrentfish (*Cheimarrichthys fosteri*), redfin bully (*Gobiomorphus huttoni*), common smelt (*Retropinna retropinna*) and banded kokopu (*Galaxias fasciatus).*

It is noted that no long-tailed bats (*Chalinolobus tuberculatus*) were observed in the Coromandel Forest Park surveys undertaken to support the assessment of the effects of the project. Previous records suggest that long-tailed bats were once widespread across the

Coromandel Peninsula. The cause of the apparent decline is unknown. However, as documented in Boffa Miskell (2025a), population decline across New Zealand has been attributed to predation and competition from introduced mammals and wasps, as well as habitat loss, degradation and fragmentation. Pest animal density within the Wharekirauponga catchment area is very high, and this may partially explain the absence of bats there. The significant pest control proposed as part of the Waihi North Biodiversity Project could assist with long-tailed bats returning to the Coromandel Forest Park.

OGNZL has committed to finance the work involved in establishing and designing the Waihi North Biodiversity Project including providing $2,400,000 prior to commencing scoping within the Coromandel Forest Park to get the Waihi North Biodiversity Project underway, and then $600,000 annually thereafter for ten years or until mine closure, whichever is greater.

The dollar value offered for each year is proposed in the expectation that it will be sufficient to fund two years of predator control (one during operation and one following closure). In effect, ten years of mining should fund the implementation of 20 years of predator control work.

There are no anticipated adverse effects associated with the Waihi North Biodiversity Project, and the anticipated positive effects are not relied upon in any way for mitigation for the effects of mining activities, which are managed in their own right.

6.4 EFFECTS ON SURFACE AND GROUNDWATER

OGNZL's Waihi operations are contained within the broader Waihou-Piako Catchment. Discharges from the WNP will enter various catchments within this broader catchment area, including the Mataura Stream, Ruahorehore Stream or Ohinemuri River, before joining the Waihou River and eventually flowing to the sea at the Firth of Thames.

There are several different sources of water generated on site that will require management, including water generated from:

- The dewatering of tunnels and mines;
- Rainfall runoff from areas subject to mine related works and activities at the surface;
- Seepage from disturbed areas of the proposed work sites; and
- Surplus processing water (decant from tailings).

Water quality management and treatment is currently undertaken via a range of measures at source, and within a purpose-built treatment plant at OGNZL's existing Waihi facilities. This treatment plant facility will be upgraded to cater for the additional water treatment demands

that will accrue from the new sources of water identified above. Figure 6-3 demonstrates what this will look like.

At a high level, the water management and treatment undertaken at Waihi comprises:

> The diversion of natural and clean water away from areas disturbed by mining activities wherever practicable in order to reduce the volumes of water affected by the activities; and

> The diversion of water from disturbed areas (both runoff and seepage) to appropriate collection facilities. From there if it is not of suitable quality to direct to a surface waterbody it is transferred to the WTP for treatment before being discharged to the Ohinemuri River.

Various holding ponds are designed to withstand flood events such that stored water intended for the WTP will not enter any surface waterbodies except during extreme rainfall events when overflow of the ponds could occur.

A number of technical assessments have been prepared for the WNP to assess the effects of individual elements of the WNP on ground and surface water. These are provided in **Part B** to these application documents and discussed in the sub-sections below which consider:

> Dewatering effects associated with the proposed mining activities;

> Ground settlement effects associated with the proposed mining activities; and

> Operational water management effects associated with the proposed mining activities.

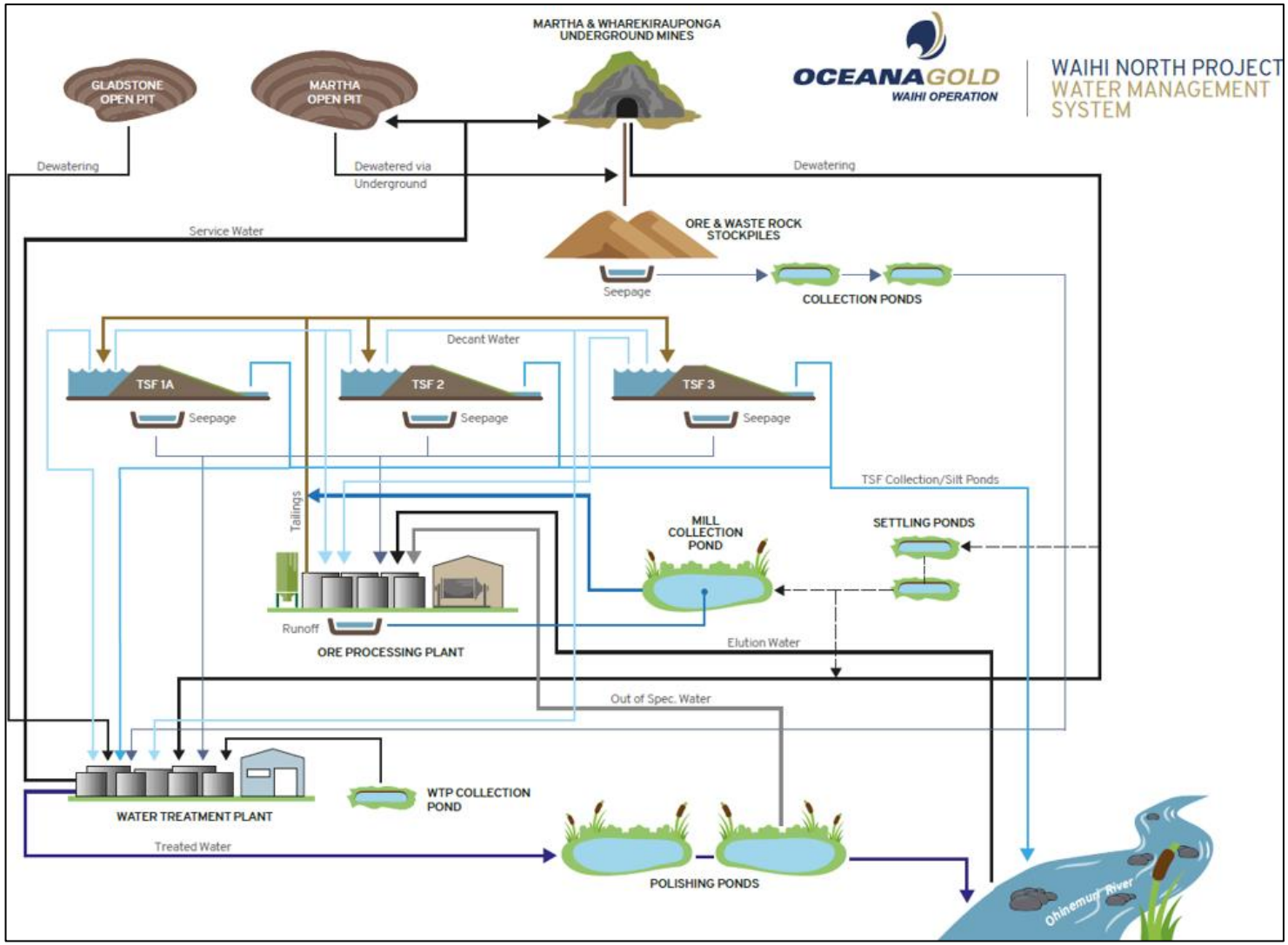

Figure 6-3: WNP Water Management Schematic

A suite of eight management plans with water related coverage are proposed for the WNP activities. These are applicable to differing areas of the WNP, and each seek to provide differing water management objectives. These management plans, their area of applicability, and objectives are as follows:

- **Water Management Plan** – This plan is applicable to all areas of works associated with the WNP. The objective of the plan is to set out how OGNZL will manage water to ensure that discharges do not have significant adverse effects on the receiving water, water users, or aquatic biota;
- **WUG Water Management Plan** – This plan is applicable to those mining activities that occur beneath the Wharekirauponga catchment which necessitate lowering the deep groundwater level to provide appropriate working conditions. In this instance, 'mining activities' comprises ore drive development along the EG Vein system, and stoping activities used to extract pre from the EG Vein system employing drill and blast methods of no less than 15 m sub-level spacing. The objective of the plan is to ensure that monitoring and mitigation procedures are implemented to provide protection of the Natural State Water Bodies above the WUG from potential dewatering effects during mining activities;
- **Dewatering and Settlement Monitoring and Management Plan** – This plan is applicable to tunnelling or mining activities in Area 2, Area 3, and / or Area 5. The objective of this plan is to monitor and assess the effects of the activities on land settlement and the groundwater hydraulic regime, and to detail the contingency measures that will be actioned should groundwater or surface settlement triggers be exceeded;
- **WRS Monitoring and Management Plan** – This plan is applicable to the WRS activities in Area 2. The objective of the plan is to monitor the proposed works to ensure that the WRS does not adversely affect land, ground, and surface water resources; whilst also identifying any necessary contingency measures;
- **GOPTSF Monitoring and Management Plan** – This plan is applicable to the GOPTSF activities in Area 5. The objective of the plan is to monitor the proposed works to ensure they do not adversely affect land, ground, and groundwater; whilst also identifying any necessary contingency measures;
- **Area 5 Rock Storage Monitoring and Management Plan** – This plan is applicable to the Area 5 rock storage activities. The objective of the plan is to monitor the proposed works to ensure they do not adversely affect land, ground, and groundwater; whilst also identifying any necessary contingency measures;

- **NRS Monitoring and Management Plan** – This plan is applicable to the NRS activities in Area 6. The objective of the plan is to monitor the proposed works to ensure they do not adversely affect land, ground, and groundwater; whilst also identifying any necessary contingency measures;
- **Area 6 Stockpile Monitoring and Management Plan** – This plan is appliable to the Area 6 stockpiling activities. The objective of the plan is to monitor the proposed works to ensure they do not adversely affect land, ground, and groundwater; whilst also identifying any necessary contingency measures; and
- **TSF3 Monitoring and Management Plan** – This plan is applicable to the TSF3 activities in Area 7. The objective of the plan is to monitor the proposed works to ensure they do not adversely affect land, ground, and groundwater; whilst also identifying any necessary contingency measures.

6.4.1 Dewatering Effects

6.4.1.1 Area 1

Within Area 1, the WUG and the WUG Dual Tunnel are located beneath the Department of Conservation administered Coromandel Forest Park, and beneath or near a number of surface water features that are identified in the Regional Plan's "Natural State Water Class" as being "*...outstanding waterbodies and important habitats because they are unmodified or substantially unmodified by human intervention*". These water features include:

- Within the Wharekirauponga sub-catchment:
  - Thompson Stream;
  - Edmonds Stream;
  - Teawaotemutu Stream;
  - Adams Stream; and
  - Wharekirauponga Stream;
- Within the Waiharakeke sub-catchment:
  - Waiharakeke Stream;
- Within the Ohinemuri sub-catchment:
- Mataura Stream.

As a result of this, groundwater-surface water interaction within the vicinity of the Wharekirauponga orebody and potential effects resulting from the WNP have been carefully and comprehensively assessed throughout the preparation of this application.

A key consideration of the proposed underground mining of the Wharekirauponga orebody is how the dewatering of the ore drive development and mining stopes of the WUG may impact surface waterbodies located above, or within the surrounding area of the underground mining activities.

A collective of both New Zealand and international experts has been engaged to provide advice on the potential dewatering effects of the proposed WNP activities, and how to appropriately manage these in a way that ensures the natural state waterbodies listed above, as well as natural inland wetlands located within the Wharekirauponga Sub-Catchment, retain their natural flow regimes, their natural habitat qualities, and their natural character for the duration of the proposed WNP. These reports are provided in **Part B** to these application documents and are referenced as relevant in the sub-sections below.

Dewatering Effects Associated with the WUG Dual Tunnel

An assessment of the likely dewatering effects associated with development of the WUG Dual Tunnel is provided in WWLA (2025c), a copy of which is provided in **Part B** of these application documents.

Key conclusions of the WWLA (2025c) report are:

- There are limited connections between groundwater and surface water along the length of the tunnel alignment;
- The potential for associated effects from dewatering that occurs as part of tunnel construction on streams and springs is considered to be less than minor;
- Any effects associated with the dewatering of the tunnel will be indiscernible at the closest bores (6+ km away). Potential effects on existing groundwater users will be less than minor;
- The take of water from the deep aquifers is not expected to affect water levels in the overlying aquifers, with the potential for associated effects on shallow aquifers considered to be less than minor;
- There will be no consequential change in groundwater quality resulting from the tunnel dewatering;
- Groundwater that flows into the tunnel will be pumped to the WTP for treatment prior to its discharge to the Ohinemuri River;

- No adverse effects on groundwater quality are expected from the tunnel. Given the limited connection between groundwater and surface water along the tunnel length, and the lack of expected effects on groundwater quality, effects on surface water quality are similarly expected to be negligible;
- The potential for saline intrusion to occur during tunnel construction is less than minor;
- It is expected that the materials encountered during the construction of the tunnel will be of low permeability and will have a comensurately low likelihood of dewatering, particularly in the timeframe within which mitigation within the tunnel will be put in place. It is considered that there will not be long term drainage occurring that could result in settlement; and
- Soil moisture conditions in the regolith soils or terrace deposits in the near surface from which plants draw water are not expected to change as a consequence of dewatering. Effects of the tunnel dewatering on plant growth are considered to be less than minor.

Taking the matters above into consideration, it is considered that dewatering effects associated with the WUG Dual Tunnel are low risk with respect for potential effects on groundwater. As such, no specific associated monitoring is proposed with respect to this phase of the work.

Dewatering Effects Associated with the WUG

Technical assessments of the potential dewatering effects associated with development of the WUG that have been commissioned by OGNZL include:

- WWLA (2025a) – which provides an overarching assessment of the potential groundwater effects associated with the proposed underground dewatering activities of the WUG. This assessment provides a summary of all the reports listed below;
- Flo Solutions (2024a) – which provides a hydrogeological conceptual site model for the setting of the proposed WUG;
- Flo Solutions (2024b) – which provides a groundwater model of the groundwater setting at the proposed WUG;
- Intera (2024) – which details the modelling calibration undertaken, and provides a summary of the findings of model inputs post-calibration;
- EGL (2025f) – which provides an assessment of potential ground settlement effects resulting from the proposed underground dewatering activities of the WUG;
- GHD (2025c) – which provides an assessment of the anticipated Water Balance Model of the WUG. The Water Balance Model seeks to identify the various water inputs and

outputs of the proposed WNP mining activities, including (but not refined to) factors such as dewatering, water required for processing activities, and water required for tailings storage;

- GHD (2025d) – which provides an assessment of the hydrogeological, discharge quality, and receiving environment discharge quality parameters of water relating to the WRS, the GOP, the NRS, and TSF3;
- GHD (2025e) – which provides an overview of OGNZL's current approach to water management for their existing Waihi mining operations;
- WWLA (2025e) – which identifies potential natural inland wetlands within, and in close proximity to, the setting of the proposed WUG, and assesses them against the applicable delineation and hydrological classification systems;
- Bioresearches (2025c) – which provides an assessment of potential ecological impacts of the proposed WUG on wetlands within, and in close proximity to, the setting of the proposed WUG;
- AECOM (2024) – which provides an assessment of potential geochemical effects associated with the warm spring at the time of the WUG's closure;
- NIWA (2024) – which provides an assessment of modelled reductions in flow on the amount of instream physical habitat available in the Wharekirauponga Stream and its tributaries;
- Boffa Miskell (2025c) – which provides an assessment of potential effects of the WNP on wetland and freshwater ecological values; and
- Boffa Miskell (2025e) – which provides an assessment of potential effects of the WNP on both individual and cumulative landscape contexts.

Copies of which are provided in **Part B** of these application documents. Key observations and conclusions of these assessments are summarised below.

These reports were commissioned with the purpose of gaining a better understanding as to if the proposed underground mining activities and associated dewatering will result in a measurable effect / change to the overlying surface water bodies (i.e. rivers, streams, and wetlands).

WWLA (2025a) confirms that there is sufficient groundwater available in the Otahu Catchment for the proposed take of groundwater / dewatering of the WUG. The proposed dewatering activities will lower the deep groundwater level. Available geological and hydrogeological data has demonstrated that there is a limited link between deeper groundwater, shallow groundwater, and surface water. The presence of such a link raises

the potential for the proposed dewatering of the deep groundwater system to affect the shallow groundwater system.

Until dewatering activities commence, it will not be known if this link between the deep, shallow, and surface waters is small-negligible (which will see dewatering effects constrained to the deep groundwater system), or more substantial (resulting in measurable surface water effects).

The reports however, which cover a wide range of dewatering related considerations, including geological, hydrogeological, ecological, and amenity aspects, as summarised in the sections below, predict that the effects associated with the tunnel and mine dewatering activities will be minor or less.

With regard to potential drawdown effects resulting from the dewatering of the ore drive development and mining stopes of the WUG:

> Numerical modelling undertaken by Flo Solutions (2024b) has predicted the spatial extent of potential drawdown within the Wharekirauponga Sub-Catchment, as shown in Figure 6-4 with the amount of drawdown contoured in meters. Figure 6-5 shows a long section through the central area of potential drawdown;

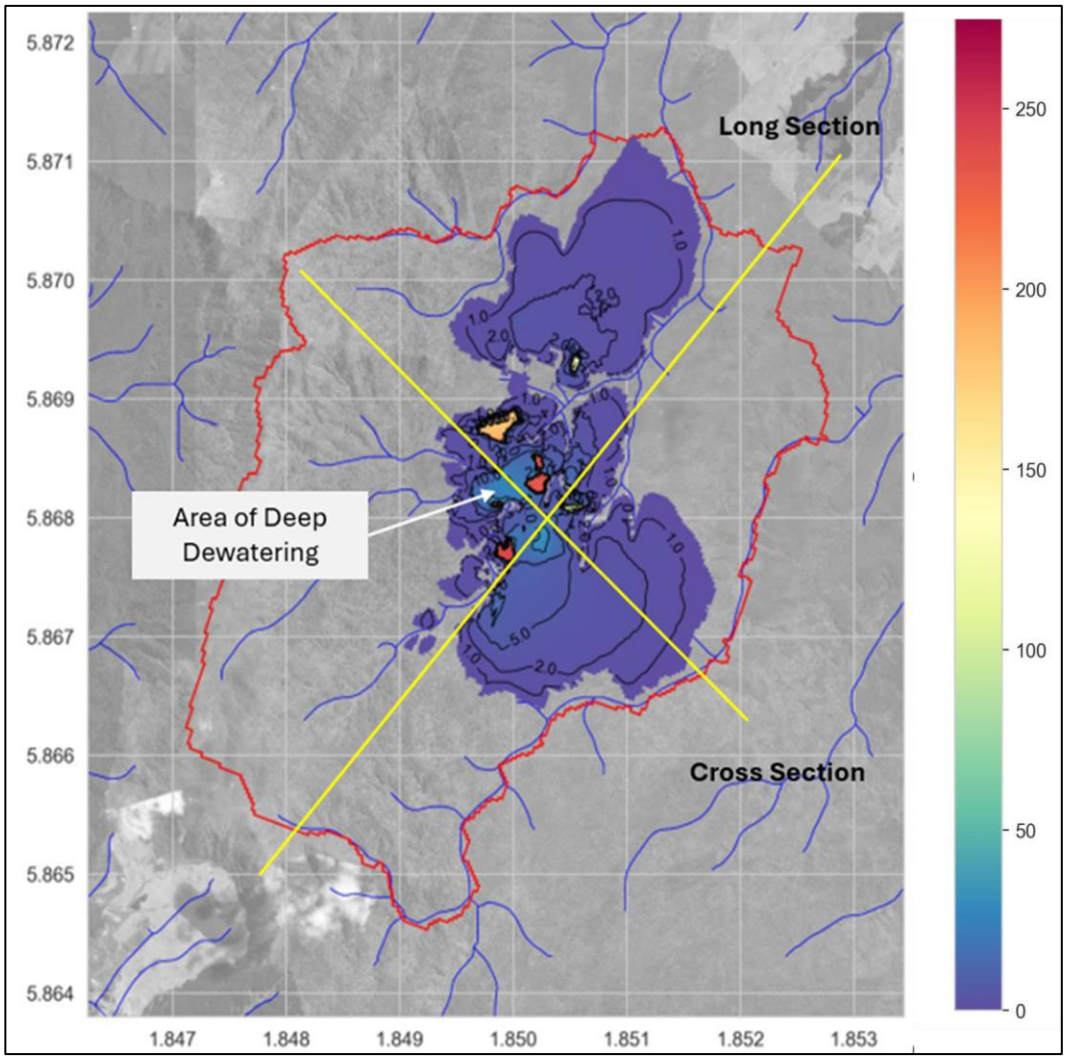

Figure 6-4: WUG Potential Drawdown Contours in the Near Surface (WWLA (2025a))

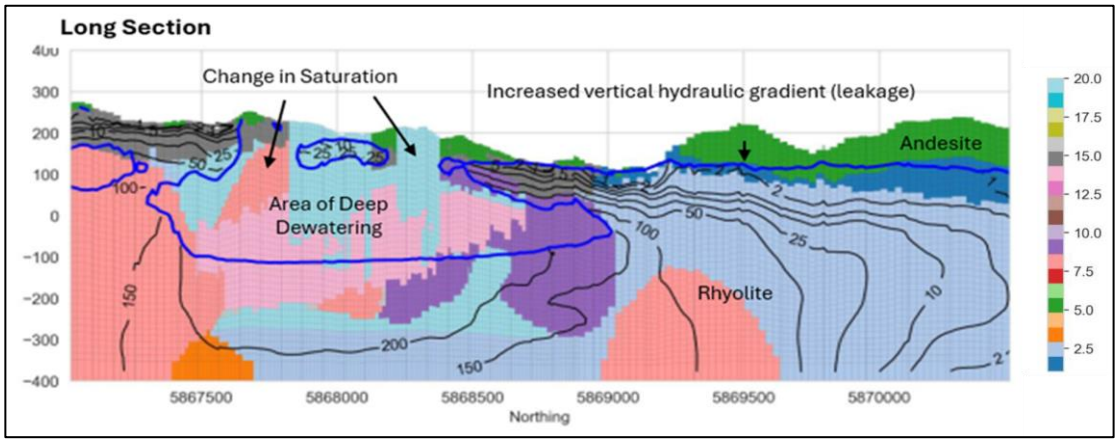

Figure 6-5: Extent of Potential Drawdown Effects in Section (WWLA (2025a))

- WWLA (2025a) has found that the potential drawdown effects are likely to be entirely constrained to within the Wharekirauponga Sub-Catchment;
- Where post mineralisation andesite is present at the surface, a water table remains, but an increase in the vertical hydraulic gradient is expected that may result in a minor under-drainage effect;
- The areas of potential deep dewatering are localised and relate to geological structure, the presences of the vein system, and the higher permeability of the rock mass that is silicified and fractured. Conductivity between the shallow and deep groundwater systems can potentially develop at those locations;
- While connection could develop between the shallow and deep groundwater systems, this effect will likely be limited in extent and constrained to the area where the Rhyolite host rocks are exposed at the surface. This is around 1.5 km^2 or 2% of the catchment surface, as illustrated in Figure 6-6;

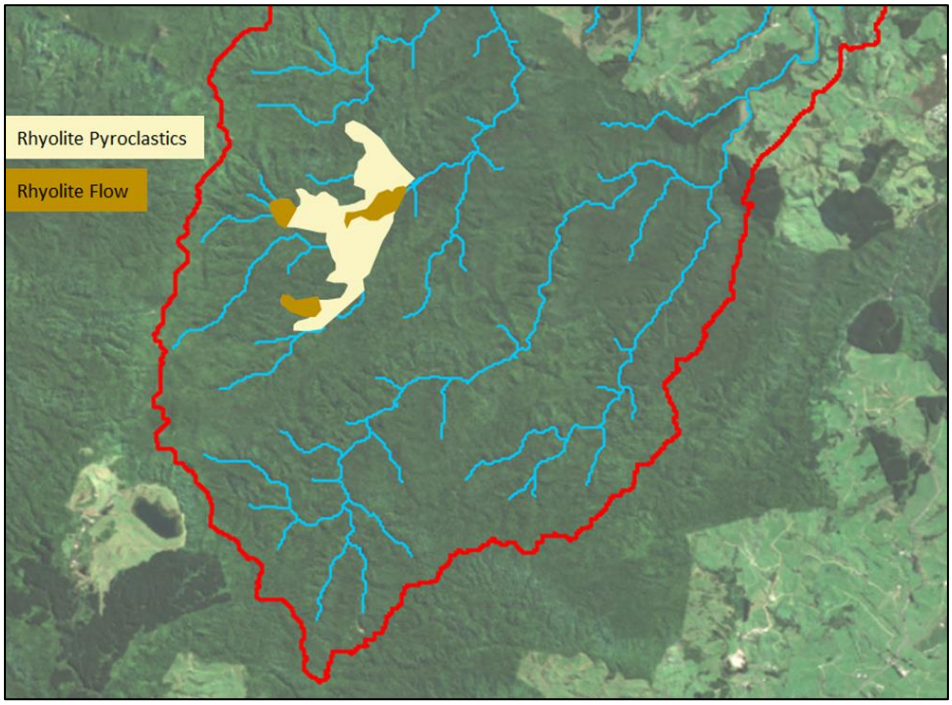

Figure 6-6: Surface Exposure of Rhyolite Rocks

- The remainder of surface exposures within the catchment are Andesite rocks which are not expected to drain as a result of dewatering the Rhyolite rockmass. This is primarily due to these geologic units being of lower permeability generally, and a low-permeability weathered layer between the units that acts as an aquitard and limits the amount of vertical drainage, as shown in Figure 6-7; and
- Connections to the surface from mine related dewatering at depth are likely to be localised, and effects on surface water could differ depending on the hydrogeologic setting.

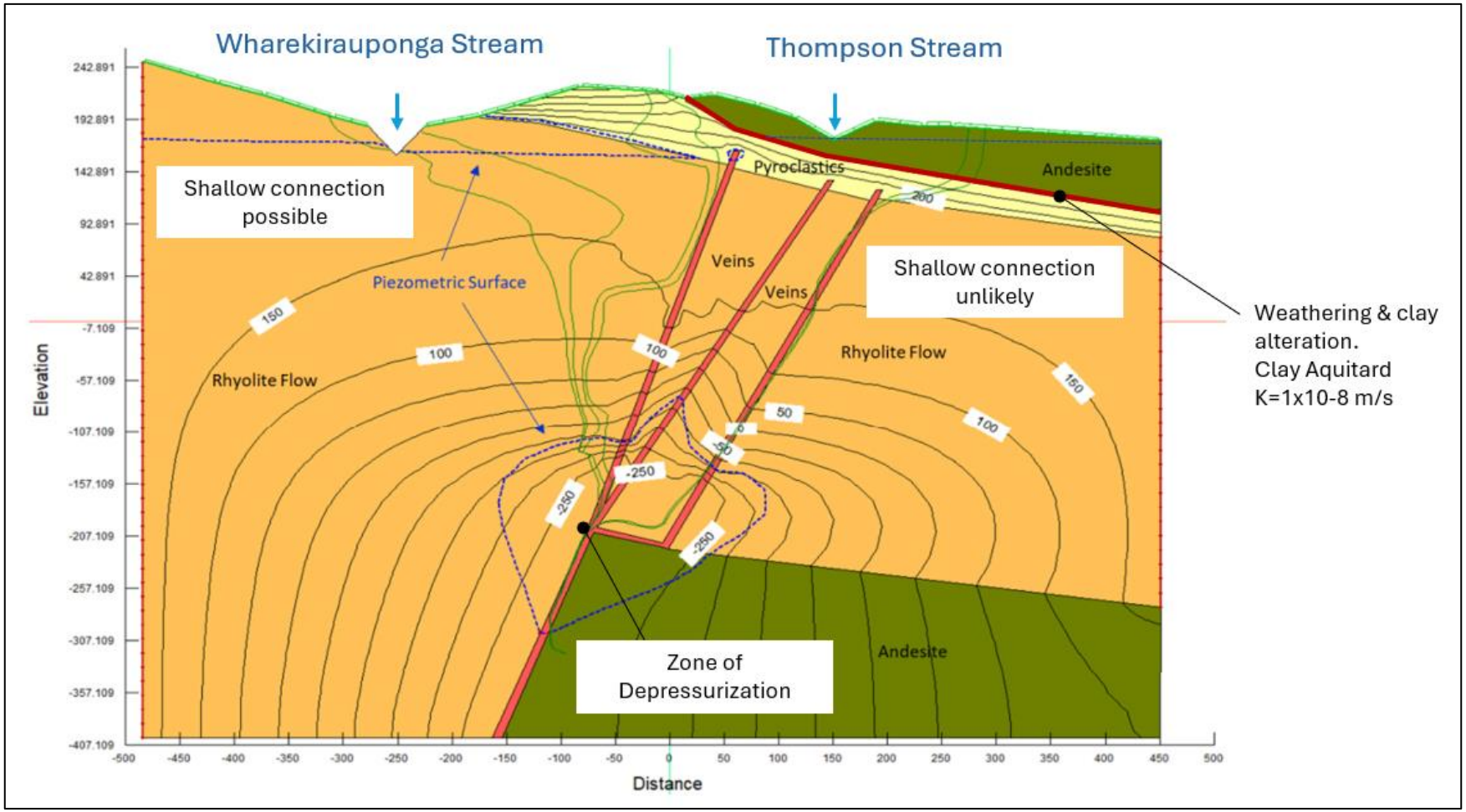

Figure 6-7: Model Section Showing Potential for Shallow – Deep Groundwater Connectivity (WWLA, 2025a)

With regard to potential effects on aquifers resulting from the dewatering of the ore drive development and mining stopes of the WUG;

- The primary aquifer that is likely to be dewatered is the Rhyolite rockmass which intercepts deep groundwater that flows from the upper reaches of the catchment down to well below sea level where it discharges in a submarine environment. At a catchment scale this is not expected to result in adverse effects, as coastal outflow will be maintained;
- While some extent of dewatering of the rockmass is likely to occur, it will be localised and will not affect water levels in any overlying aquifers in the post mineralisation Andesite units;
- It is not expected that the overlying aquifers will dewater as a result of mining activities, but there may be some adjustment of pressure heads in the aquifers due to steeper vertical hydraulic gradients created by increased drainage;
- Ventilation Shafts 2 – 5 may require mitigation such as lining or grouting to prevent excessive ingress of groundwater. There is likely to be some localised drawdown around Ventilation Shafts 2 – 5 during construction, however following construction it is predicted that this will return to its previous state; and
- The construction of Ventilation Shafts 2 – 5 will not result in the mixing of previously isolated aquifers.

With regard to potential effects on surface waters resulting from the dewatering of the ore drive development and mining stopes of the WUG:

- GHD (2025e) undertook modelling and assessment of the Water Balance Model for the WNP utilising input data from the Wharekirauponga Sub-Catchment which included rainfall evaporation data, flow data, groundwater 3D model inputs, catchment area, and other parameters utilised in standard water balance modelling;
- The model results are conservative in that baseflow loss is assumed to be constant, the modelled predictions during mining utilise peak baseflow loss estimates, and the 5th percentile predictions assume that peak mining is associated with low annual rainfall and the upper end of the baseflow estimates;
- The modelling and assessment predict that a small decrease in flow (relative to baseflow) is expected at T Stream West, T Stream East, WKP03, WKP02, and WKP01, with larger decreases in flow (relative to existing and predicted low flow events) unlikely;
- The 7-day mean annual low flow ("**MALF**") could be reduced within the Wharekirauponga Sub-Catchment between 2 to 13% because of baseflow reduction as

a result of mining (based on current monitoring locations). Summarised results for the catchment are illustrated in Figure 6-8;

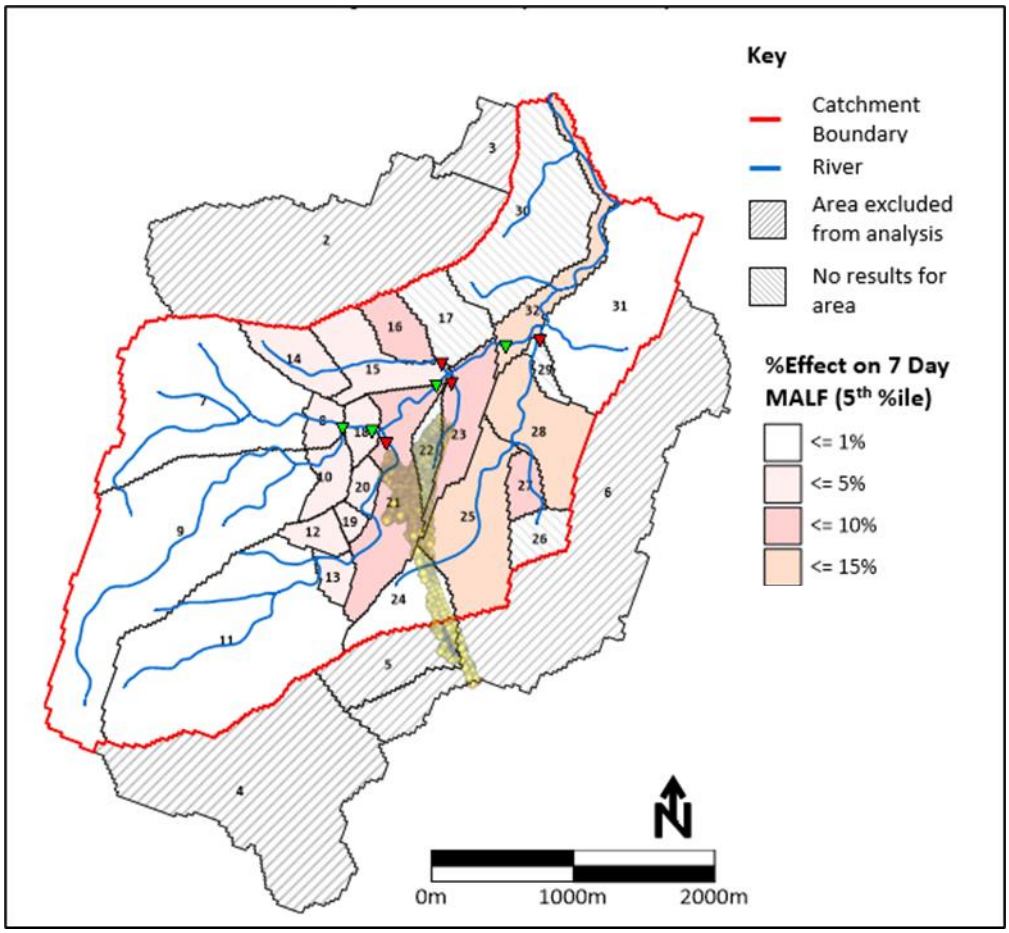

Figure 6-8: Heat Map Showing % Effect on MALF (5th Percentile Model Result (GHD (2025e))

- Larger modelled reductions have been calculated in the Edmonds and Thompsons Catchments (being smaller tributary catchments above the WUG);
- The modelled low flow statistics are within the current natural variation observed, however the modelled reductions in 7 Day MALF approach the lower end of the current estimated Annual Low Flow variability within the Edmonds and Thompson Catchments;
- As noted previously, there is one location where deep dewatering could create connectivity to the shallow aquifer system (where the Wharekirauponga Stream bed passes over the mining area) and therefore affect surface waters. Figure 6-9 illustrates the area of potential effect and represents a stream length of approximately 1,200 m of second and third order stream; and

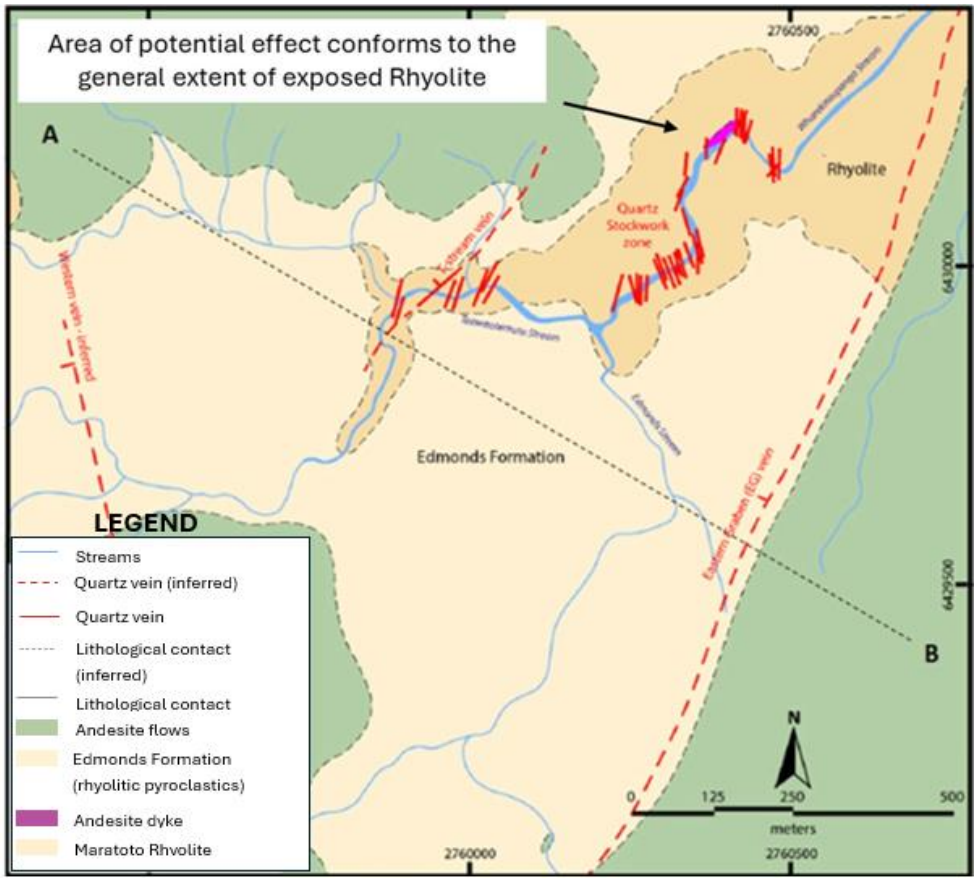

Figure 6-9: Location of Area of Potential Effect

> The area of potential effect conforms to the extent of the Rhyolite host rocks exposed at the surface where the most intense veining, silicification and fracturing is observed. Due to the higher risk of effects developing at that location, the area will be subject to more intensive monitoring (discussed further below in this section of the report).

With regard to potential effects on spring flows:

> Fracture and fault related springs within the Wharekirauponga Sub-Catchment could potentially be affected by deep dewatering;

> There are two locations where groundwater discharge is noted to occur in relation to the deep geologic structure and rock fracturing: the warm spring and the Wharekirauponga downstream discharge area;

> On a conservative assessment, the warm spring's approximately 3.5 L/s discharge is expected to cease for the duration of the WUG dewatering. This is due to it being likely that the existing pathway to the surface from up flowing deep groundwater will be disturbed during mining activities. As the quality of water discharging from the warm

spring is poor, the cessation of flow will likely result in a small improvement in the quality of surface waters downstream during the life of mining;

- It is expected that a cold spring will discharge at the same location once rewatering of the mine has taken place and that trace element concentrations will not be measurably different from the existing discharge, however sulphate is predicted to be elevated (discussed further below in this section of the report);
- A fracture-controlled discharge of 5 L/s at an area along a downstream reach of the Wharekirauponga Stream where deep groundwater is discharging is expected to reduce, or possibly cease, for the duration of WUG dewatering. The discharge is expected to commence again as the mine rewaters and groundwater levels revert back to their natural state, with the water quality not expected to be measurably different;
- The stream flows in the lower part of the catchment are high being circa >200 L/s average flow and the expected loss of discharge is minor in a relative sense.

With regard to potential effects on wetlands:

- 50 natural inland wetlands have been identified within the Wharekirauponga Sub-Catchment based on vegetation type (Bioresearches (2025c)) and delineation in extent and characteristics using the hydric soils and hydrology tools (WWLA (2025e)). The wetlands are largely located within the Adams, T-Stream, and South Edmonds Sub-Catchments;
- Soil Moisture Water Balance Modelling has been undertaken by WWLA (2025e) with results showing that all wetlands in the Wharekirauponga Sub-Catchment can be supported by climate alone, mainly due to high rainfall coupled with low permeability subsoils. The wetlands are also typically located in depressions with marked banks and often have some form of additional hydrological input. As the modelling and assessment undertaken does not consider this hydrological input, and as such the results should be viewed as being conservative;
- The wetland extents are not anticipated to change, even if a lowering of shallow groundwater levels were to occur. The soil saturation is expected to remain high enough for the wetlands to still be considered wetlands under the wetland criteria;
- Even if dewatering was to occur at the same time as drought conditions (worst case scenario), the wetlands will still meet the criteria of being a functional wetland;
- Of the 50 wetlands, eight have been identified as having a higher susceptibility of being affected (relative to others) if a linkage between the deep and shallow groundwater systems develops due to mine dewatering. These locations have been identified due to their position relative to the catchment geology, the modelled depth to groundwater, the

water chemical signature, and the field based observations. Those sites are listed below and identified on Figure 6-10:

- Edmonds 16;
- Edmonds 17;
- Edmonds 18;
- Edmonds 20;
- Edmonds 22;
- Adams 3;
- Adams 4;
- Adams 9; and
- Adams 10;

Figure 6-10: Locations of Wetlands with Groundwater Inputs

- Given there may be shallow groundwater inputs into the wetlands identified above, and that those inputs could potentially reduce if the groundwater levels were to lower because of deep dewatering associated with mining activity, WWLA recommends monitoring of the wetland hydrology. Assessing seasonal variation of the wetlands is important both in terms of the observations made and the ability to use that information to calibrate the water balance modelling undertaken; and
- WWLA concludes that the potential effects on the inland wetlands in the Wharekirauponga Sub-Catchment due to the proposed mine dewatering are less than minor because no measurable change in the extent of the wetlands is expected beyond that which occurs naturally due to seasonal variation.

With regard to potential effects on existing groundwater users:

- Dewatering associated with mining activity is 5 km from the closest groundwater users, and WWLA (2025a) considers this to be too distant to affect existing water bores.

With regard to potential ground settlement effects:

- EGL (2025f) has noted that ground settlement effects can occur from dewatering where the geological medium being dewatered is compressible in nature. The primary rockmass being dewatered is Rhyolite volcanic rock, which is hard, incompressible media and is not expected to consolidate significantly because of dewatering. However, ground settlement effects are considered further in Section 6.5 of this report.

With regard to saline intrusion risk:

- Dewatering associated with mining will occur 7 km from the coastline and at that distance WWLA has concluded that it is not possible for saline intrusion to occur.

With regard to post-closure effects:

- The numerical groundwater model undertaken by Flo Solutions (2024b) has indicated it will take approximately 10 years after the cessation of pumping for the groundwater levels to recover to 90% of the pre-existing levels, with full recovery expected within 20 – 30 years;
- AECOM (2024) advises that limestone amendment is necessary to prevent high concentrations of trace elements developing in the back-filled mine after dewatering;
- In the warm spring trace elements are unlikely to be measurably different after mining;
- Concentrations in deep groundwater are unlikely to be measurably different than currently observed;

- AECOM (2024) notes that elevated sulphate concentrations are predicted for re-established (warm) spring discharge suggesting an increased potential for precipitate deposition in the discharge / mixing zone of the warm spring. These effects will be localised in the oxidising surface water environment immediately downstream of the spring; and
- Surface water trace elements at WKP1 are unlikely to be measurably different.

Monitoring Associated with Dewatering Effects of the WUG

For the reasons set out above, the effects associated with the abstraction of groundwater / dewatering of the WUG within the Wharekirauponga Sub-Catchment are predicted to be minor or less.

To ensure this outcome, OGNZL proposes to adopt the following management and mitigation measures in association with the potential dewatering effects of the WUG:

- Undertake four years of baseline data collection prior to the commencement of stoping activities at the WUG to confirm key statistics (including seasonal variations where appropriate) of the hydrological and hydrogeological systems in the Wharekirauponga Sub-Catchment. This will provide for identification of any material changes to those systems as a result of dewatering activities;
- Set Alert Trigger Levels which represent / signify when Natural State Water Bodies have been in a state of low flow for a 7-day period (noting that a state of low flow is not necessarily due to effects associated with dewatering activities). The proposed Alert Trigger Levels are included in the WUG Water Management Plan provided in **Part H** to these application documents;
- If flows in a Natural State Water Body are less than an Alert Trigger Level, OGNZL must undertake daily reviews of the flow until such time that the flows are no longer less than the Alert Trigger Level;
- Set Respond Trigger Levels, below which the natural flows of the identified Natural State Water Bodies (with the exception of the warm spring) and natural water levels of the identified nine natural inland wetlands shall not fall below (noting that a state of low flow below a Respond Trigger Level may signify that the dewatering activities are having an effect on the flow rates);
- If flows in a Natural State Water Body are less than a Respond Trigger Level, OGNZL must commission a suitably qualified expert to implement appropriate mitigation measures;

- Monitor surface water flows in Natural State Water Bodies at appropriately representative locations, as well as suitable control sites in accordance with the Alert and Respond Trigger Levels;
- If a Respond Trigger Level has been reached at any of the Natural State Water Bodies, OGNZL must assess the water levels within and adjacent to appropriately representative natural inland wetlands, as well as suitable control sites, to determining whether any changes, or differences, of water level indicate a potential dewatering effect. If any changes are considered to be beyond expected natural variation, OGNZL must commission a suitably qualified expert to implement appropriate mitigation measures.
- Appropriate mitigation measures may comprise:
  - The supplementation of water to maintain stream flows and / or wetlands via local borehole pumping or deep groundwater pumping;
  - The grouting of any cracks or fissures; and / or
  - Reinjecting groundwater inflow to the WUG into selected locations of an affected overlying aquifer.

The management and mitigation measures are to be undertaken in accordance with the WUG Water Management Plan (provided in **Part H** to these application documents), which also provides further detail / information on these measures.

6.4.1.2 Area 2

Dewatering Effects Associated with the Willows Access Tunnel

An assessment of the likely dewatering effects associated with development of the Willows Access Tunnel is provided in WWLA (2025c), a copy of which is provided in **Part B** of these application documents.

Key conclusions of the WWLA (2025c) report are:

- Any baseflow loss to Mataura Stream will be of such a small scale that it will not have discernible effects within the surface water body;
- There will be no discernible effects on any neighbouring bores;
- Any effects on other aquifers resulting from the take of groundwater from the upper aquifer located along the length of the tunnel alignment will be less than minor;
- There will be some localised drawdown around Ventilation Shaft 1 during construction, however following construction this will return to its previous state;

- The construction of Ventilation Shaft 1 will not result in the mixing of previously isolated aquifers;
- There will be no consequential change in groundwater quality resulting from the tunnel dewatering;
- Groundwater that flows into the tunnel will be pumped to the WTP for treatment prior to its discharge to the Ohinemuri River;
- No adverse effects on groundwater quality are expected from the tunnel;
- The potential for saline intrusion to occur during tunnel construction is less than minor;
- Only a limited amount of ground settlement is possible, and this will mostly be directly over the tunnel alignment; and
- Soil moisture conditions in the regolith soils or terrace deposits in the near surface from which plants draw water are not expected to change as a consequence of dewatering the deeper rocks. Effects of the tunnel dewatering on plant growth are considered to be less than minor.

Taking the matters above into consideration, OGNZL proposes to adopt the following management and mitigation measure:

- Utilise the existing monitoring system in place, with some additional piezometers, to monitor shallow groundwater levels to ensure no long-term lowering effects are observed.

This measure has been integrated into the proposed conditions provided in **Part D** to these application documents.

6.4.1.3 Area 3

Dewatering Effects Associated with the Wharekirauponga Access Tunnel

An assessment of the likely dewatering effects associated with development of the Wharekirauponga Access Tunnel is provided in WWLA (2025c), a copy of which is provided in **Part B** of these application documents.

Key conclusions of the WWLA (2025c) report are:

> The potential for associated effects on streams and springs is considered to be negligible;

> It is unlikely that existing groundwater users will be adversely affected by the tunnel as lateral effects of depressurisation around the tunnel will be limited due to the permeability of surrounding rockmass;

> The take of water from the deep aquifers is not expected to affect water levels in the overlying aquifers, with the potential for associated effects to occur to be highly unlikely. If however they were to occur, they will be less than minor;

> There will be no consequential change in groundwater quality resulting from the tunnel dewatering;

> Groundwater that flows into the tunnel will be pumped to the WTP for treatment prior to its discharge to the Ohinemuri River;

> No adverse effects on groundwater quality are expected from the tunnel;

> The potential for saline intrusion to occur during tunnel construction is assessed to be less than minor;

> Where driven through deep andesite rockmass, ground depressurisation is likely to occur immediately around the tunnel, however the effects will not be laterally extensive, and no significant settlement risk is considered likely; and

> Soil moisture conditions in the regolith soils or terrace deposits in the near surface from which plants draw water are not expected to change as a consequence of dewatering the deeper rocks. The effects of the tunnel dewatering on plant growth are considered to be less than minor.

Taking the matters above into consideration, OGNZL proposes to adopt the following management and mitigation measures:

> Monitor groundwater levels using an existing network of monitoring piezometers located near the southern end of the Wharekirauponga Access Tunnel (Piezometers P62, P63, P64, and P78) to ensure no significant changes develop to what is expected of the shallow groundwater system;

> Monitor groundwater levels in locations where existing bores take groundwater close to the tunnel alignment from a similar depth to the Wharekirauponga Access Tunnel. WWLA (2025c) consider it is unlikely these will be affected by the tunnel, but

recommend monitoring to ensure there are no significant changes to what is expected of the groundwater levels; and

> Implement measures that ensure that if any existing stock, domestic or other water supplies are adversely affected, that OGNZL will be responsible for providing an alternative equivalent water supply within 12 hours where the WRC considers the proposed activities are having a negative effect (refer to Condition G31 provided in **Part D** of these application documents).

These measures have been integrated into the proposed conditions provided in **Part D** to these application documents.

6.4.1.4 Area 4

Area 4 comprises the Services Trench, which does not form part of this application.

6.4.1.5 Area 5

Dewatering Effects Associated with the Gladstone Open Pit and the Gladstone Open Pit Tailings Storage Facility

An assessment of the potential dewatering effects of the development of the GOP and the supplementary GOP TSF is provided in GHD (2025d), a copy of which is provided in **Part B** of these application documents.

GHD (2025d) describes the key potential dewatering effects of the development of the GOP and the GOP TSF as being:

> The lowering of shallow groundwater levels locally;

> A reduction in groundwater flows to surface water; and

> The discharge of dewatered groundwater to the receiving environment via the WTP.

Gladstone Open Pit

Shallow Groundwater Effects

GHD (2025d) anticipates that shallow groundwater table will be intercepted during the excavation of the GOP. However, total inflows of this groundwater into the pit are estimated to be low due to the low permeability of the rock material that will be encountered during excavation. The complexity of the geology and topography adjacent to the pit means that the predicted dewatering zone of influence ("**ZOI**") is not likely to be radially extensive.

Deep Groundwater

Existing mine dewatering activities at Waihi have largely dewatered the vein system and andesite north-east of the proposed GOP. Further dewatering during mining is predicted to result in this vein desaturation extending to the south-west and potentially a small distance beyond the Ohinemuri River. Desaturation of the host andesite outside of the veins is expected to be limited, which is the experience elsewhere in Waihi where similar conditions are encountered. The effects on the deeper groundwater system are therefore considered to be limited.

Effects on Surface Water

The small reduction in shallow groundwater levels resulting from the excavation of the proposed GOP is predicted to result in locally reduced groundwater flow to nearby surface water receiving environments including the Gladstone Wetland.

Despite these predicted reductions in discharge to surface water receptors, all dewatered groundwater and rainfall runoff captured within the GOP during excavation will be directed towards the WTP for treatment and subsequently discharged back into the Ohinemuri River. This is expected to result in a net neutral or gain to the Ohinemuri River flow.

With respect to Gladstone Wetland a reduction in groundwater discharge to the wetland of approximately 30%, and a reduction in groundwater level of approximately 0.5 m adjacent to the wetland is predicted. However, as the waterflow of the Gladstone Wetland is dominated by stormwater and interflow, the anticipated reduction in groundwater baseflow will be minimal and unmeasurable in typical weather conditions, with the groundwater reduction only expected to result in a minor change to the wetland's water balance in drought conditions. The diversion of water to the Gladstone Wetland to support flow will mitigate any reduction in wetland levels and flow.

Groundwater Users

Within the shallow groundwater system, drawdown from the GOP dewatering is predicted to produce a ZOI that extends up to 290 m south of the pit boundary, and 210 m west. There are no registered groundwater users located within these areas nor in the alignment of the veins extending to the south-west of GOP. The extent of dewatering influence on the deep groundwater system is expected to be constrained to within close proximity of the Gladstone vein system by the low permeability rock. Therefore, any potential to affect other groundwater users as a result of mining at the GOP is assessed to be negligible.

Gladstone Open Pit Tailings Storage Facility

Effects on Groundwater

During development of the GOP TSF the deep groundwater system is anticipated to continue to under-drain the shallow groundwater system at a reducing rate following the cessation of the legacy dewatering of the Favona Underground Mine, which would allow groundwater levels to recover. Predicted groundwater drawdown and groundwater levels in this scenario are similar to those in the GOP excavation scenario as the tailings pond and recharge to the tailings is not expected to influence the adjacent shallow groundwater system. Instead, tailings pore water not recovered at surface as decant is expected to percolate downwards, ultimately discharging to the deep groundwater system where it will contribute to flow being captured, but at a reducing rate, by Favona Underground Mine dewatering.

Deep groundwater levels will recover following capping of the GOP TSF and cessation of underground mining.

Post-mining water treatment is proposed to remove metals from all water sources. GHD (2025d) has concluded that the GOP TSF will likely require treatment for up to 2.5 years following final tailings deposition (as included in the Water Balance Modelling undertaken and assessed in GHD (2025c)).

Effects on Surface Water

Flow to surface water during the operation of the GOP TSF operation is expected to be consistent with that for GOP.

However, changes in groundwater levels and hydraulic gradients are expected after mine rewatering resulting in the development of flow paths from the GOP TSF to shallow groundwater to the west and the Ohinemuri River, with this also increasing net groundwater flow to the river.

Closure of the GOP TSF will also include installation of a capping layer, which will provide separation of stormwater from the tailings and be contoured to direct flows toward the Gladstone Wetland and Eastern Stream, both discharging to the Ohinemuri River. This will effectively reinstate and expand the wetland catchment from that which existed prior to mining. On closure of the GOP TSF, assuming cessation of all mine dewatering, deep groundwater levels will return to those similar to pre-mining conditions.

Changes to the Ohinemuri River water quality as a function of the GOP TSF discharge, even when excluding potential attenuation of contaminants during migration to the river, is predicted to be negligible and within the existing receiving water quality criteria.

Groundwater Users

No groundwater or surface water users are predicted to be impacted by discharges from the GOP TSF.

Monitoring

Taking the matters above into consideration, OGNZL proposes to adopt the following management and mitigation measures in association with the potential dewatering effects of the GOP and the GOP TSF:

- Monitor inflows to the GOP and groundwater levels in both shallow and deep groundwater systems around the perimeter to validate the predicted extent of dewatering effects; and
- Intercept groundwater during the construction and operation of the GOP and GOP TSF and divert it to the WTP for treatment prior to discharge to the Ohinemuri River.

These measures have been integrated into the proposed conditions provided in **Part D** to these application documents.

6.4.1.6 Area 6

Dewatering Effects Associated with the Northern Rock Stack

An assessment of the potential dewatering effects associated with the construction of the NRS is provided in GHD (2025d), a copy of which is provided in **Part B** of these application documents.

GHD (2025c) acknowledges that placement of material within the NRS is predominantly anticipated to be above the existing range of groundwater level fluctuations at the site. The exception to this is in the south-eastern boundary, where excavation into the elevated rhyolite dome is proposed to allow installation of the clean water Northern Uphill Diversion Drain.

The dewatering required for installation, and the ongoing influence of the Northern Uphill Diversion Drain throughout operation and closure, is predicted to have a ZOI of up to approximately 10 m and is therefore not likely to have a significant impact on groundwater gradients and flow across the remainder of the NRS site.

Whilst localised changes may occur in the immediate vicinity of the dewatering, the minor volume is not expected to significantly influence the wider groundwater and surface water flow regimes. Abstraction of groundwater during construction dewatering is also not expected to adversely impact groundwater quality. While there may be some localised

changes in soil moisture in close proximity to areas of earthworks and dewatering, no impacts are expected beyond the immediate vicinity of the works.

6.4.1.7 Area 7

Dewatering Effects Associated with the Tailings Storage Facility 3

An assessment of the potential dewatering effects associated with the development of TSF3 is provided in GHD (2025d), a copy of which is provided in **Part B** of these application documents.

Initial foundation works for TSF3 will require removal of topsoil and excavation of compressible soils up to 20 m deep near the toe of the proposed embankment. The excavation will be infilled with structural backfill prior to TSF3 construction. Dewatering is proposed to enable the excavation works to occur.

With respect to effects on groundwater, the construction dewatering will result in temporary local decreases in groundwater levels, with the ZOI of dewatering relatively limited. No existing groundwater users have been identified within the affected area.

With respect to the effects on surface water, the potential impacts to the Ruahorehore Stream and Ohinemuri River flow during construction dewatering will be mitigated by diverting the abstracted groundwater to appropriately sized sediment treatment basins or devices prior to its discharge to the waterbodies.

6.4.2 Construction and Operational Water Management Effects

Construction and operational water management effects have been assessed in relation to the following key features of the WNP:

- The WTP;
- The Willows SFA, the WRS, and the Willows Portal;
- The GOP;
- The NRS; and
- TSF3.

6.4.2.1 Water Treatment Plant

The WTP, located in Area 5, treats all mine water associated with OGNZL's Waihi mining operations which is not of suitable quality to be discharged directly to the environment (via silt ponds), before it is discharged to the Ohinemuri River.

It is a critical and integral component of OGNZL's overall water management infrastructure at Waihi and will be relied upon for the proposed WNP activities.

It has been determined that in order for the WTP to be able to deal with the additional volume of water required for treatment with the WNP, an upgrade to the WTP is required.

The existing water quality standards that are implemented at the WTP are essential for maintaining water quality, and in turn the ecological health of the Ohinemuri River.

The proposed WTP upgrades have been designed to enable OGNZL to continue to adhere to the water quality standards that currently apply to the exiting WTP approvals.

Discharge Parameters of the Water Treatment Plant

An assessment of the effects of the WTP discharge on water quality and aquatic ecology in the Ohinemuri River is provided in Boffa Miskell (2025c). A copy of this is provided in **Part B** of these application documents.

The Boffa Miskell assessment concludes that the ecological values of the Ohinemuri River have remained stable and persistent since operations at Martha Mine commenced. There is no evidence that the OGNZL activities have caused any detrimental effects to the ecological values of the Ohinemuri River, and the ecological values have been maintained as anticipated by the criteria as set out in the proposed conditions. Accordingly, Boffa Miskell concludes that re-consenting the WTP with the same receiving water quality standards will not result in detrimental effects on the ecological values of the Ohinemuri River.

Since the existing consent limits have proven effective in protecting water quality and aquatic ecology in the Ohinemuri River, OGNZL proposes to carry the existing WTP discharge limits forward as part of this application.

Water Treatment Plant Operation

GHD (2025c) used a Water Balance Model ("**WBM**") to assess how water inputs and outputs change over the life of the mine to check that the proposed infrastructure for conveyance, storage, and treatment will be adequate and to inform the design of the water treatment facilities necessary as part of the WNP. The full description of how the WBM represents the WNP is provided in GHD (2025c) Appendix C of that report.

Based on the WBM, GHD (2025c) determined that all mine impacted water generated from the WNP can be directed and managed within the existing water management and treatment facilities established as part of the existing Waihi mines subject to the proposed WTP upgrades described in Section 2.10.4 of this report. Modelling also confirms that water quality predictions for the WNP can readily comply with existing discharge and receiving

environment conditions for the WTP, which are considered appropriate on ecological grounds for the reasons set out above.

Under the current circumstances, the best practicable option for managing discharges from mining activities (including the WNP) remains the discharge of treated water to the Ohinemuri River.

6.4.2.2 Willows Surface Facilities Area

Construction of the Willows SFA

During the construction of the Willows SFA (located in Area 2) erosion and sediment control measures will be required in relation to bulk earthworks. These measures are described in Southern Skies (2025), provided in **Part B** to these application documents, and the required measures are incorporated in the proposed conditions, provided in **Part D** to these application documents.

The proposed erosion and sediment control measures include:

- All sediment laden runoff from an area containing soil disturbance activities being treated by sediment retention structures prior to discharge;
- With sediment retention devices to be designed, operated, and maintained to achieve a:
  - Discharge turbidity of no greater than 110 NTU; and
  - Discharge pH of not less than 6.0 and not greater than 9.0 pH units.
- Sediment retention devices will discharge to surface water during rainfall events when the receiving water body contains high flows and elevated suspended sediment levels. During those events a discharge of the quality specified above will suitably protect instream values.

Operation of the Willows SFA

Throughout the operation of the Willows SFA, natural and clean water will be diverted away from areas disturbed by mining activities in order to reduce the volumes of water entering disturbed areas.

With respect to the disturbed areas, for the WRS and haul road which may contain PAF rock, surface runoff and seepage will be collected and diverted to the Willows Collection Pond before being pumped back to the WTP (Area 5) for appropriate treatment. The Willows Collection Pond is designed to withstand flood events such that except during extreme rainfall events it will not discharge to the Mataura Stream. This aligns with OGNZL's existing approach to water management at the existing Waihi operations. The technical

assessments describe why this is an acceptable solution due to the high ambient flows which are present in the receiving water bodies during these events.

Runoff from other disturbed areas (i.e. those which will not contain PAF rock) will be collected and managed in accordance with WRC Technical Report No. 2020/07 *Waikato Stormwater Management Guideline*, updated May 2020 ("**TR2020/07**"). This will include diversion of stormwater from within the site to a silt pond for treatment prior to discharge during high flow events.

Some seepage from the WRS may over time enter Mataura Stream, however, it will have a very minor effect on water quality and will not cause an exceedance of the ambient water quality standards which are included in the proposed conditions to protect aquatic ecology. Further details of the expected seepage load are provided in the (GHD, 2025d), a copy of which is provided in **Part B** of these application documents.

The flow from Tributary 2 will be captured as part of the WRS drainage system, which is temporarily expected to reduce the flow of the Mataura Stream a minor amount (up to 2%). Such reductions in stream flow are considered unlikely to be discernible from the background variability in flow.

On remediation of the site, it is expected that the natural flow pathways will be restored. The effects on the surrounding groundwater and surface water network are therefore anticipated to be minimal.

GHD (2025c) recommends monitoring of groundwater and surface water quality and quantity in and around the Willows SFA and WRS. This is provided for in the proposed conditions, which include requirements for additional baseline monitoring (for future effects to be assessed against), trigger levels, and a precautionary requirement to implement mitigation / contingency measures in the unlikely event they are required.

6.4.2.3 Gladstone Open Pit

As with the Willows SFA, during the development of the GOP and the relocation of the powerline, located in Area 5, erosion and sediment control will be required in relation to bulk earthworks. The proposed erosion and sediment control measures are described in Southern Skies (2025), provided in **Part B** to these application documents, and incorporated in the proposed conditions, provided in **Part D** to these application documents.

The proposed measures align with those summarised in relation to the Willows SFA in Section 6.4.2.2 above.

6.4.2.4 Northern Rock Stack

Construction of the NRS

As with the Willows SFA and the GOP, during the development of the NRS, located in Area 6, erosion and sediment control will be required in relation to bulk earthworks. The proposed erosion and sediment control measures are described in Southern Skies (2025), provided in **Part B** to these application documents, and incorporated in the proposed conditions, provided in **Part D** to these application documents.

The proposed measures align with those summarised in relation to the Willows SFA in Section 6.4.2.2 above.

Operation of the NRS

GHD (2025c) assesses the potential effects on water due to operational activities associated with the NRS, a copy of which is provided in **Part B** to these application documents.

Key conclusions of the GHD (2025c) report are:

- Current groundwater flow from the NRS area to the Ohinemuri River has been estimated at approximately 1,170 m^3/day. This represents only a small proportion (< 1%) of Ohinemuri River flow as it passes the NRS site (averaging 63,200 m_3/day). Meaningful changes in groundwater and river levels are not anticipated as a result of the proposed NRS;
- Monitoring of groundwater influences occurring at existing rock storage facilities at Waihi indicates that water levels remain similar to pre-existing conditions, and this is expected to be the case at the NRS site. Any change to groundwater flows arising from the NRS on flow in the Ohinemuri River are likely to be very minor
- Groundwater quality is expected to be affected by seepage through the base of the NRS, however, the sub-soil drains are predicted to capture the majority of impacted water. The un-captured seepage is predicted to have a very minor influence on downgradient groundwater quality;
- Monitoring of existing storage facilities indicates that following closure, longer term impacts to water quality should reduce;
- A reduction in direct groundwater discharge to the Ohinemuri River is likely to occur, however this is expected to be offset by discharge to the river from uphill diversion drains, treated water from the perimeter drains, and treated leachate and groundwater

from the WTP. Changes to surface water flow and levels in the Ohinemuri River during operation and after closure of the NRS are expected to be very minor;

> Minimal change in trace element concentrations and only a small increase in sulphate concentration in the Ohinemuri River is conservatively predicted as a result of NRS discharges, and for all parameters instream water quality is expected to meet the instream water quality criteria included in the proposed conditions to protect instream values;

> No groundwater or surface water users are predicted to be impacted by the development of the NRS.

GHD (2025c) recommends that monitoring of groundwater and surface water resources occurs as part of the construction and operation of the NRS. Specific requirements are to be detailed in the NRS Monitoring and Management Plan which is proposed as a condition of consent, as provided in **Part D** to these application documents.

6.4.2.5 Tailings Storage Facility 3

Construction of TSF3

As with the Willows SFA, the GOP, and the NRS, during the development of TSF3, located in Area 7, erosion and sediment control will be required in relation to bulk earthworks. The proposed erosion and sediment control measures are described in Southern Skies (2025), provided in **Part B** to these application documents, and incorporated in the proposed conditions, provided in **Part D** to these application documents.

The proposed measures align with those summarised in relation to the Willows SFA in Section 6.4.2.2 above.

Operation of TSF3

GHD (2025c) assesses the potential effects on water due to operational activities associated with TSF3, a copy of which is provided in **Part B** to these application documents.

GHD (2025c) notes that OGNZL is experienced in establishing and operating TSFs, and similar methodologies to those used in the past will be employed as part of TSF3 to ensure the activity is undertaken such that it is protective of ground and surface water resources. Conditions proposed in this regard seek to:

> Stipulate the design requirements for lining TSF3 to provide for secure long-term containment of the tailings;

- Stipulate the design requirements for underdrains and require OGNZL to divert leachate and drainage to the WTP for treatment or for use in the Processing Plant;
- Specify minimum freeboard requirements for the tailings pond within TSF3;
- Specify which areas / zones can and cannot contain PAF material;
- Specify requirements for the pH of exposed PAF rock until capping is complete;
- Require temporary storage of any PAF material on properly constructed pads;
- Specify requirements for the design of TSF3, for the qualifications for the person(s) who design TSF3, for the submission of design documents, for independent peer review of those documents, for supervision of construction, and for post construction inspections and further independent peer review over the life of TSF3;
- Specify requirements to monitor and assess the effects of TSF3 on the land, ground and groundwater resources;
- Specify requirements for the rehabilitation and closure of TSF3; and
- Require provision of a suitable bond and trust fund to ensure those rehabilitation and closure outcomes are realised.

With these measures in place GHD (2025c) has assessed that:

- Any change in groundwater quality will be minor and localised;
- Flows in the Ruahorehore Stream are expected to be maintained and potentially increase due to a small increase in groundwater levels;
- The activities will not cause water quality in the Ruahorehore Stream to exceed the receiving water quality standards identified as being protective of aquatic ecology, and it is unlikely that any change in the Ohinemuri River water quality will be measurable; and
- The changes to groundwater and surface water quality, where predicted to occur, are not expected to measurably impact any groundwater or surface water users.

The monitoring conditions referred to above require the effects of the activity on groundwater and surface water quality to be monitored by assessing the chemistry of the underdrainage system, shallow groundwater and springs, the Ruahorehore Stream and the Ohinemuri River. They require analysis and interpretation of any changes in groundwater chemistry as well as predictions of any future changes in chemistry that may arise as a result of these trends. Contingency actions are also required to be identified, that may be implemented in response to deviations to these predictions.

The monitoring and treatment of TSF3 decant water and seepage water will continue until such time that water quality is acceptable for discharge.

6.4.3 Conclusion

OGNZL has committed to managing its mining activities so that potential effects on surface and groundwater are minimised as far as practicable. Management of tunnel and mine dewatering, the control and treatment of rainfall runoff from areas subject to mine related activities at the surface and from seepage from proposed work sites, and the treatment of surplus processing water are proposed to support the protection, maintenance, and enhancement of water related values. Various expert reports have been commissioned which demonstrate how that will be achieved using relatively conventional management techniques for mining activities. This includes the proffering of a selection of area / site specific water related management plans (refer to Section 6.4) and associated conditions that support the implementation of those management plans.

The proposed conditions provide a detailed roadmap for how the principles described in those reports will be applied to ensure an acceptable outcome is achieved in respect of effects of the proposed activities on surface and groundwater.

6.5 GROUND SETTLEMENT AND SUBSIDENCE EFFECTS

An assessment of the potential for ground settlement to occur as a result of underground works being undertaken in relation to the WNP is included in EGL (2025f), a copy of which is included in **Part B** of these application documents.

EGL (2025f) considers potential ground settlement effects associated with:

- The Willows Access Tunnel;
- The WUG Dual Tunnel;
- Ven Shafts 1 – 5;
- The WUG;
- The Wharekirauponga Access Tunnel; and
- The GOP.

6.5.1 Areas 1 and 2

The total settlement from the Willows Access Tunnel (Area 2) and the WUG Dual Tunnel (Area 1) is expected to be in the order of 10 to 100 mm with any tilt likely to be very small. There are no buildings near the tunnel alignments which could be affected by settlement.

EGL (2025f) recommends that the town settlement monitoring network is extended up Willows Road and Highland Road to the privately-owned dwellings located at the end; however, no settlement monitoring is required above the Willows Access Tunnel or the WUG Dual Tunnel alignments as any settlement is not expected to have any effects at the surface for overlying farmland and forest land uses.

Total settlement around all ventilation shafts is expected to be in the order of 50 to 300 mm. This degree of settlement will have no adverse effect on the forest area in which they will be located.

Total settlement of up to 300 mm to 1000 mm could be expected in the area of the WUG, however, due to hilly terrain, ground settlement of this magnitude is not expected to have any material effect on the environment, including stream flows. The flattest stream grade is approximately 1 in 30 over a 500 m length at the north end of the EG Vein. For a maximum settlement of 1000 mm, occurring over a distance in the order of 200 m (i.e. estimated minimum distance from maximum to no settlement, based on the dewatering depths), this will result in a shallowing or steepening of grade in the order of 1 in 200. For a stream at 1 in 30, a 1 in 200 grade change is very minor and unnoticeable in a forest environment.

EGL (2025f) considers that ongoing settlement monitoring is not required at the WUG, with base surveys of reference points at the ventilation shafts and drill sites being sufficient. Furthermore, visual observation of the stream and forest environment as part of monitoring of other environmental effects will be sufficient to check for any unforeseen effects due to settlement within Area 1.

6.5.2 Area 3

For the most part, EGL (2025f) identifies that in locations north of Waihi East settlement is expected to be in the order of 10 to 100 mm. Depending on the length of the Wharekirauponga Access Tunnel and the geological structures it passes through, and provided the shallow water table is not affected, additional tilts will be very small.

EGL (2025f) has identified the potential for the Wharekirauponga Access Tunnel decline to potentially dewater the shallow younger volcanics (ignimbrites and tuffs) and cause settlement effects at Boyd Road and eastern end of Barry Road in a manner which could affect dwellings in that area. EGL (2025f) identifies several available options for managing this potential effect, including designing the tunnel to avoid the younger volcanics and stay completely within the andesite, or mitigation of groundwater inflows into the tunnel during construction with grouting.

The preferred option for managing this effect will be chosen at the detailed design stage and, as it does currently for its Waihi operations, OGNZL will manage this potential effect through its Dewatering and Settlement Monitoring Plan.

While no property damage effects are expected OGNZL also proposes conditions (refer to Conditions 48-49) which require it to remedy any damage at its own cost as soon as practicable and to the reasonable satisfaction of the property owner.

6.5.3 Area 4

Area 4 comprises the Services Trench, which does not form part of this application.

6.5.4 Area 5

The GOP is expected to have some drawdown effects in the shallow groundwater system around the pit however these effects significantly reduce further away from the pit. Settlements around the GOP have followed a relatively consistent trend over time as the Martha and Favona vein systems have been progressively dewatered (and currently remain dewatered) by existing mining activities. The level of groundwater drawdown anticipated by the GOP development is likely to be considerably less than that associated with these earlier projects. The vein is indicated to have limited extent, ending approximately at the Ohinemuri River. Overall, the extent of potential additional settlement from GOP is expected to diminish towards Heath Road, and settlements which were anticipated as part of the Project Martha development will not be significantly altered because of the addition of the GOP.

A series of additional settlement monitoring points around the remaining Gladstone Hill are recommended to provide an understanding of the settlement effects close to the GOP, acknowledging that the pit is proposed to become a TSF on closure. For the Heath Road area it is proposed that the settlement zonation remains the same, and additional monitoring points be added near to the existing dwellings to provide any forward warning of any unforeseen settlement effects.

With respect to the replacement Favona Portal (i.e. the Gladstone Portal), EGL (2025f) does not identify any potential settlement effects of concern with the GOP option. If the site to the north of the conveyor is selected, as per the Wharekirauponga Access Tunnel effects discussed in Section 6.5.2 above, EGL identifies there being some risk of dewatering the younger volcanics in a manner which could cause some surface settlement and a possible need to manage this potential effect.

As with the Wharekirauponga Access Tunnel the preferred option for doing this will be chosen at the detailed design stage and as it does currently for its Waihi operations OGNZL proposes to manage this potential effect through its Dewatering and Settlement Monitoring Plan.

6.5.5 Areas 6 and 7

No underground works are proposed within Areas 6 and 7. As such, there is no potential for associated ground settlement effects.

6.5.6 Outside Areas 1 – 7

As set out in Section 2.13.3, the proposed parking area at Kenny Street, Waihi will be established on land that has been mapped as being at risk of subsidence. OGNZL has designed the parking area to avoid areas of high hazard, but parking is proposed within areas of medium and low hazard. A bus stop, where staff will congregate will be located within the low hazard zone. Access to the car parking area will be controlled, and the public will be excluded.

To manage any residual risk, OGNZL will undertake ground monitoring in this area (in accordance with a proposed Kenny Street Carpark Subsidence Hazard Zone Management Plan) to detect any ground movement in the car parking or surrounding area and will accept and manage any risks presented to its employees as a result of the utilisation of this site for car parking purposes.

This approach is secured by the proposed conditions, included in **Part D** of these application documents.

6.6 ECOLOGICAL EFFECTS

6.6.1 Effects on Terrestrial Ecology

A detailed assessment of the actual and potential effects of the WNP on terrestrial ecological values is provided in Boffa Miskell (2025a) and Bioresearches (2025a), copies of which are provided in **Part B** of these application documents.

In addition, several assessments have been prepared to complement the assessments above in respect of native frogs. These comprise RMA Ecology (2025a), Bioresearches (2025b) and Lloyd (2025a, 2025b, and 2025c).

Given the broad array of matters covered by a number of the expert reports, RMA Ecology (2025b) has also prepared an overall summary of the ecological effects of the WNP. This report is also provided in **Part B**.

A summary of the key conclusions of the various reports is provided below.

6.6.1.1 Area 1 / Coromandel Forest Park

Introduction

A detailed assessment of the actual and potential effects of the WNP on terrestrial ecological values of the Coromandel Forest Park from works associated with the WUG is provided in Boffa Miskell (2025a), a copy of which is provided in **Part B** of these application documents.

Effects on Archey's and Hochstetter's Frogs

Overview

Due to the significance and threat classification of Archey's (At risk - Declining and Globally Critically Endangered) and Hochstetter's frogs (At risk – Declining), specific consideration has been given to the effects of the WUG on these species. Effects on Archey's and Hochstetter's frogs could arise from the following potential causes:

> Habitat loss and / or mortality associated with the clearing of ventilation shaft and exploration drilling areas;

> Potential air quality effects from ventilation evasé;

> Potential habitat modification if groundwater drawdown leads to surface water effects; and

> Vibration from underground blasting activity.

Vegetation Disturbance and Clearance, and Potential Habitat Loss

In terms of vegetation disturbance and clearance for ventilation and drilling sites, the ecologists identified a range of mitigation measures which will be implemented to avoid, remedy or mitigate the potential effects of the WNP on native frogs which include:

> Avoiding establishing ventilation shaft and investigation drill sites in locations where the density of Archey's frogs is high;

> Commissioning ecological advisors to assist with the selection and micro-siting of ventilation shaft and investigation drill sites;

> Involving ecological advisors in the site clearance process to minimise the effects of this clearance on flora and fauna;

> Commissioning ecological advisors to undertake any required frog relocation for frogs found within the clearance footprint; and

> Fitting the ventilation fan for each ventilation shaft to the base of shaft to reduce noise experienced at the surface.

Air Quality Effects

Native frogs are particularly susceptible to particulate matter deposition because of their porous skin. Dispersion modelling was undertaken to predict ambient contaminant concentrations around likely ventilation locations. These concentrations were then compared to measured contaminant concentrations on metalled public roads to infer conditions that native frogs (Archey's frogs) may experience (and persist with) at sites elsewhere in the Coromandel where they are recorded near unpaved roads. The comparison method allows for an assessment of native frogs' potential tolerance to particulates and nitrogen oxide.

Boffa Miskell (2025a) sets out that, based on Beca (2025c) (Air Quality Assessment), the change to air quality in the area surrounding the ventilation evasé is expected to be very low.

The findings of the Assessment of Mine Ventilation Air Quality with respect to native frogs includes:

- Predicted cumulative concentrations of PM_{10} in the vicinity of the ventilation evasé will be lower than measured concentrations adjacent to an unpaved road (which was assessed on a road in Northland based on weekend traffic volumes); and
- Based on similarity in traffic levels, PM_{10} concentrations are likely to be similar in areas adjacent to an unpaved public road in the Coromandel (north of the WUG) where baseline ecological assessments of Hochstetter's frog habitat have been undertaken. Therefore, it can be inferred that Hochstetter's frogs at this Coromandel location are exposed to greater levels of PM10 than anticipated in the vicinity of the proposed ventilation evasé.

Boffa Miskell (2025a) concludes that there is a low likelihood of residual effects on native frogs from discharges from the ventilation evasé.

Dewatering Effects

In terms of mine associated dewatering effects, any potential impacts on surface water through baseflow losses from streams will not be the same for Archey's and Hochstetter's frogs because of their different ecologies and habitat preferences (i.e., Archey's being terrestrial and Hochstetter's semi-aquatic), with potential dewatering effects primarily affecting Hochstetter's frogs. The effects associated with potential dewatering are addressed in Section 6.6.2.1 (in respect of aquatic ecological effects of natural state waterbodies) and Section 6.4.1 (in respect of the effects of dewatering more generally) of this report.

In respect to Hochstetter's frogs, although reductions in flow and wetted width may occur in the most impacted catchments, such as Edmonds and Thompson Streams, the ecological

impacts on the aquatic system are likely to be minor, if not negligible. Hochstetter's frogs, which are mobile and adapted to living on the banks of dynamic streams with naturally fluctuating water levels, are unlikely to be adversely affected by any small reductions in flow, wetted width, and instream habitat.

Away from streams, the groundwater modelling predicts that there may be minor or negligible impacts of mine dewatering on groundwater in the shallow aquifers (WWLA 2025a) but these aquifers are largely rain-fed. It is not expected that vegetation cover in the Wharekirauponga Catchment that supports Archey's frog populations will be affected (Bioresearches 2025b).

Vibration Effects

In terms of vibration, the level of knowledge regarding the potential of vibration to disrupt frog behaviour is not well researched. However, investigations to date suggest that there is no evidence to verify vibration sensation or perception in leiopelmatid frogs, nor is there firm evidence that vibration leads to a particular response in these frogs (Bioresearches 2025b). The best available comparator is the previous mining activity at Golden Cross, where blast vibrations of typically <5 mm/s and infrequently up 10 mm/s were experienced in the areas immediately surrounding Golden Cross Mine. Despite this exposure both Archey's and Hochstetter's frog populations remained abundant over the life of the mine.

Notwithstanding the conclusions set out above, there remains a low (but uncertain) risk for this project to generate residual adverse effects on native frogs. OGNZL accepts that, insofar as effects on frogs are concerned, a precautionary approach is necessary. Key measures to support this approach include:

- **Further mitigation:** intensive pest control within 314 ha of the WUG surface footprint (where surface vibrations greater than 2 mm/sec are expected) to deliver benefits specifically for Archey's frogs (and associated benefits for Hochstetter's frogs);
- **Offset enhancements:** Intensive pest control within a 318 ha area (outside of the vibration footprint) of frog habitat that is superior habitat to that which is located within the WUG footprint; and
- **Compensation: I**n the form of financial support for researchers to undertake investigative work within the WUG and wider habitat (frog) enhancement areas to assess the efficacy of pest control regimes for frog recovery, and surveys of the broader Coromandel Peninsula to better understand the distribution and habitat preferences of native frogs.

The management response set out above is expected to provide a demonstrable net benefit for the species. Benefits are also anticipated for a wide range of other native flora and fauna as a result of the pest management proposed.

The proposed programme of pest control outlined above is the subject of the Wharekirauponga Pest Animal Management Plan (Boffa Miskell 2025b), included in **Part H** of these application documents. The Wharekirauponga Pest Animal Management Plan incorporates the following key components:

> Pest control designed specifically to supress rats and mice as key predators of frogs, and to reverse destruction of frog habitat caused by ungulates (in particular, pigs), and sustain this over a prolonged period;

> The design of the programme, including control devices, layout, toxins, trapping and shooting programmes, control targets, operational trigger thresholds, and adaptive management responses is based on work undertaken by the Department of Conservation at Whareorino and the successes of private landowners on the Coromandel at controlling pest species over smaller areas with demonstrated benefit for Archey's and Hochstetter's frogs;

> Measures to monitor pest presence and assess their densities against the intended targets to inform adaptive management responses, including the use of chew cards, cameras and tracking tunnels; and

> The spatial location of the proposed pest control areas is intended to buffer and augment existing areas where Archey's frogs are known to exist, and target habitat where high densities of frogs are known or predicted to exist (based on habitat-abundance associations modelled through other parts of the Coromandel Peninsula).

Figure 6-11 shows the Wharekirauponga Pest Management Area, relative to the area potentially impacted by vibration:

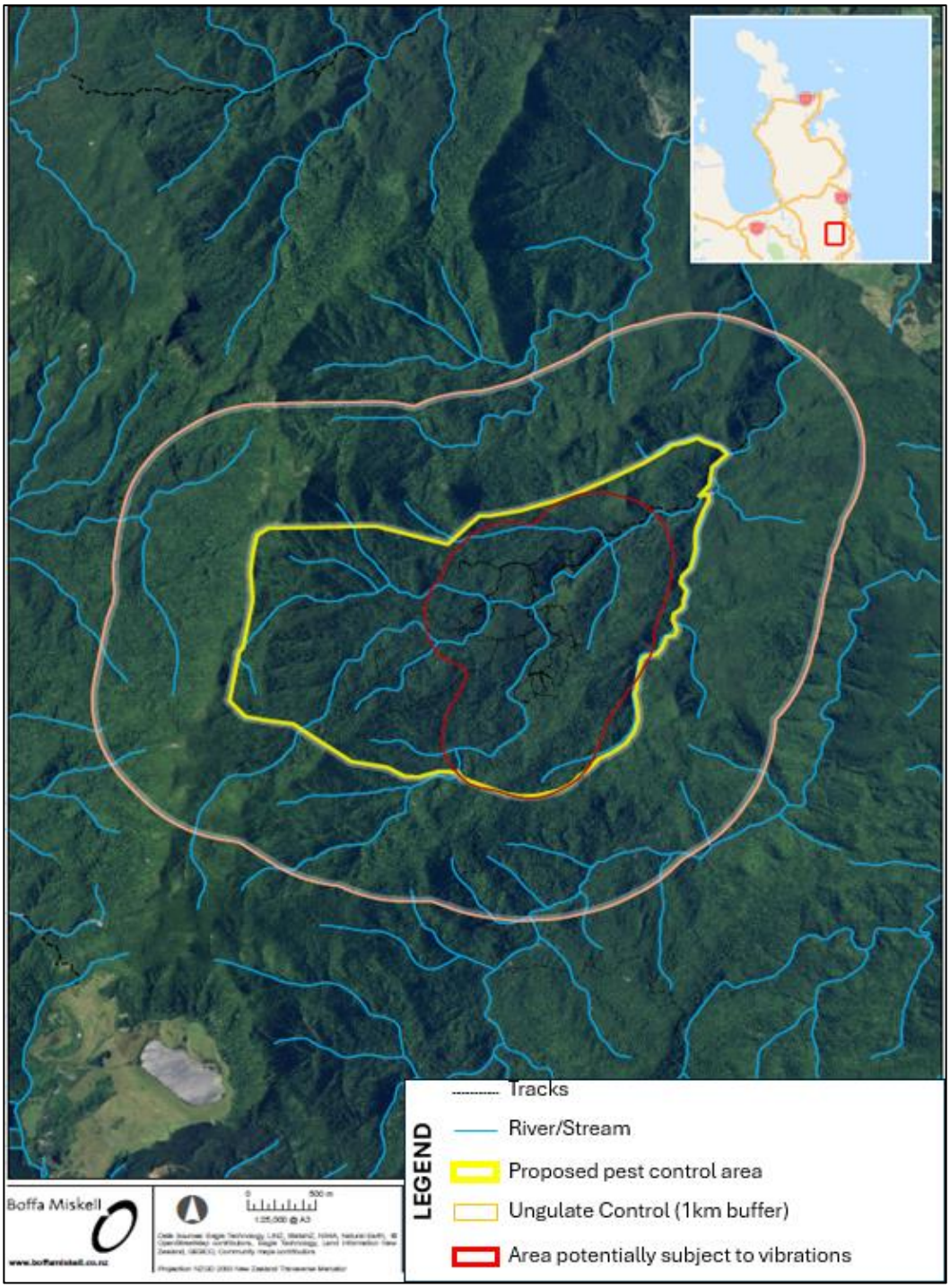

Figure 6-11: Wharekirauponga Pest Management Area

With effective pest control in place, Boffa Miskell (2025a) anticipates that the population of Archey's frogs could be expected to increase between 2.3 and 4 times the current population over a period of 3-4 years (and possibly greater in years after that). The potential benefits of undertaking pest control within 318 ha of habitat adjoining the vibration exposure areas of the WUG surface footprint will be more than sufficient to balance any losses that

may occur under a worst-case scenario of adverse effects on native frogs within the WUG surface footprint.

Collectively, the proposed enhancements to frog habitat are intended to provide for a net benefit to frogs (and other native fauna due to the substantial pest control work) as a result of the WNP.

Management of Potential Effects on Native Frogs

OGNZL proposes to implement and adhere to a Native Frog Monitoring Plan for monitoring potential effects resulting from the proposed WUG activities. A draft version of this plan is provided as Lloyd (2025c) within **Part B** to these application documents. OGNZL seeks to undertake further consultation with the Department of Conservation and HDC regarding this plan, prior to it being finalised for certification.

Effects Associated with Vegetation and Potential Habitat Clearance

While the majority of the WUG activities are proposed to occur underground, there will be areas of vegetation clearance within the Coromandel Forest Park associated with the establishment and operation of exploration and investigative drill sites, pumping test sites, and ventilation evasé. New and existing drill sites may be subsequently used for camps / messing facilities and helipads to service the drilling and mining operations (as set out in Section 2.6.1). These supplementary uses of the sites will not require additional vegetation clearance but will instead utilise sites already in use. The vegetation proposed to be removed within the Coromandel Forest Park will be no more than 0.66 ha in total area.

The Coromandel Forest Park is a large conservation park administered by the Department of Conservation. The Coromandel Forest Park comprises approximately 71, 900 ha of continuous native forest. Surface works within the Coromandel Forest Park are limited to:

- Up to eight exploration drill sites, requiring a maximum vegetation clearance area of 150 m^2 per site;
- Up to four hydrological drill sites, requiring a maximum vegetation clearance area of 900m^2 per site;
- Up to four geotechnical drill sites for tunnel alignment, requiring a maximum vegetation clearance of 150m^2 per site;
- Up to 50 portable rig sites, however these sites only require minimal disturbance (namely, canopy trimming) and moving groundcover to accommodate the rigs; and
- Up to four ventilation evasé, which do not require any additional vegetation clearance as the ventilation evasé will be located on sites previously cleared for drilling.

The vegetation clearance required for the WNP equates to approximately 0.0009% of the total area of the Coromandel Forest Park.

A detailed set of requirements will govern the site selection and vegetation clearance process for the WUG components requiring vegetation clearance. They are based on some of the requirement's the Department of Conservation has imposed on the clearance of OGNZL's existing exploration drilling sites in the Coromandel Forest Park in the past which have proven protective of ecological values. The requirements are included in the proposed conditions included in **Part D**. Site selection for these surface facilities will account for the presence of native fauna with the objective of minimising ecological impacts, by selecting sites that are not occupied by notable fauna species (native frogs, native lizards, and nesting native birds and significant native invertebrates (i.e. stag beetles, paua slug and peripatus), and do not include trees with a diameter at breast height of more than 50 cm.

Specifically, locations of these sites will be chosen to achieve the outcomes set out below:

> The loss of 'At Risk' or 'Threatened' **herpetofauna i**s avoided;

> The loss of 'At Risk' or 'Threatened' **terrestrial invertebrates** is avoided;

> The removal of **bat roosting trees** is avoided; and

> The removal of trees in which **native birds** are actively nesting is avoided.

> The loss of 'At Risk' or 'Threatened' **flora** is avoided;

> The loss of **mature trees** (trees that are greater than 50 cm in diameter at breast height (1.4 m above ground level)) is minimised where practicable; and

> Preference is given to sites where trees can be trimmed or tied back in such a way as to minimise felling.

In respect to the impact on vegetation communities, vegetation clearance within small areas of the Coromandel Forest Park will cause temporary changes to forest structure and species composition in the immediate environs. However, the extent of the vegetation clearance is small and likely to be readily recolonised by native species. Boffa Miskell (2025a) has assessed that the magnitude of effect of delayed forest regeneration as small and Low. The ecological value of vegetation communities with the Coromandel Forest Park is Very High. The level of effect of vegetation clearance is assessed as being Moderate (but very localised and temporary).

In respect to effects on native fauna resulting from the vegetation clearance, the intent of the site selection criteria described above is to minimise impacts on native fauna by selecting sites with poorer quality habitat from the range of sites available, and to as far as practicable avoid sites with 'At Risk' or 'Threatened' species.

Boffa Miskell (2025a) sets out that due to the widespread distribution of native species within the Coromandel Forest Park, it is unavoidable that some localised effects on the habitat of native species could occur as a result of the proposed vegetation clearance. Therefore, fauna salvage and translocation protocols will be implemented prior to any clearance occurring in accordance with the approach set out in the ELMP-WUG (provided in **Part H** to these application documents).

While the footprints of vegetation / habitat clearance will be very small, particularly in the context of the large area of habitat available in the Coromandel Forest Park, the magnitude of effect is assessed as being Very High within the sites where such work will occur. The ecological value of the potentially impacted fauna communities is Very High, and therefore, the level of effect (prior to mitigation) is assessed as being Very High. Given this, OGLNZ is proposing the following measures, in addition to the adherence to the site selection protocols described above; to mitigate and offset the actual and potential effects:

- To offset the effect on 0.66 ha of forest area within the Coromandel Forest Park, revegetate 21 ha on the north-east ridge of the Willows site (Area 2). The proposed revegetation will connect an existing remnant bush fragment (with Hochsetter's frogs) to the Coromandel Forest Park. This will be fenced and will be subject to pest control provisions;
- Buffer planting adjacent to the existing forest edge within the Willows site (Area 2) (5.5 ha in total); and
- Remediation of drill sites and ventilation evasé areas within appropriate timeframes.

With these measures in place, there will be an overall net-gain in biodiversity values across the project site.

Ecological Effects Associated with Noise

Exploration Drill, Pump and Helicopter Operational Noise

The noise generated at the surface within Area 1 is associated with the establishment and operation of the exploration and investigative drills, pumps, and supporting helicopter activity. Potential effects on fauna are frequency and amplitude dependent, as well as being species-specific. Boffa Miskell (2025a) sets out that fauna in close proximity to the proposed work areas will be more impacted than other areas. Fauna responses to elevated noise might include behaviour responses, physiological responses, reduced emergence / activity, adaptation to compensate for increased background noise, elevated stress, and impacts on breeding success.

Noise modelling for the construction phase (pad construction, drilling and ventilation shaft construction, including helicopter support) indicates that there will likely be high noise levels (up to 70 dB) around the construction sites, but that these drop off quickly in the surrounding forest.

Boffa Miskell (2025a) assesses the potential effect of helicopter take-off noise and drill and pump noise.

Boffa Miskell (2025a) concludes that:

> For all fauna groups, there will be a localised High level of effect in the vicinity of the drill rigs / pumps over an area of less than 400 ha[57] at any one time (based on continuous noise from 6 drill rigs, spread out in arrangement);

> Based on the available noise prediction information, sensitive species will likely be more impacted and will potentially exhibit avoidance or reduced emergence / activity behaviour for the duration of drilling activities. However, it is noted that the drilling is temporary and episodic;

> Due to the episodic and short-term nature of helicopter activity, it will not change the noise environment significantly, because helicopters will be most active within an already noisy part of the forest area; and

> The magnitude of this effect is assessed as High within the impacted area. However, the impacted area is localised and only a very small part of the wider Coromandel Forest Park area would be subject to this work. Moreover, the effect is temporary. The post-project character of the forest will not be altered as a result of noise generated by the WNP.

Continuous Noise from Ventilation Raises

In respect of operational noise, the source of noise from the ventilation evasé are the fans located at the base of the ventilation evasé within the WUG. Predictions of fan noise at the surface were found to be only just above ambient noise levels (around 40 – 45 dB L_{Aeq} (15 min)) in very close proximity to the ventilation evasé. At the predicted levels, the noise profile will likely dissipate rapidly, and the primary impact area will be very localised.

Boffa Miskell (2025a) concludes that:

57 This being the maximum area of continuous noise above 35 dB L50 (500 Hz – 8 kHz) and 31 dB L50 (2 – 8 kHz).

- For invertebrates, the magnitude of effect associated with noise from ventilation evasé operation is expected to be Low;
- For frogs, the magnitude of effect of noise from ventilation evasé operation is Negligible given the low sensitivity of frogs to noise;
- For lizards, the magnitude of effect of noise from ventilation evasé operation is Low given the capacity of lizards to move away from disturbance;
- For bats, the magnitude of effect of noise from ventilation evasé operation is Negligible given the ability of bats to avoid a localised unsuitable noise environment; and
- For birds, the magnitude of effect of noise from ventilation evasé operation is Negligible given the ability of birds to avoid a localised unsuitable noise environment.

Ecological Effects Associated with Discharges to Air

There will be discharges to air from the ventilation evasé, consisting of particulate matter generated from the tunnelling and / or mining activities below, and products of combustion (exhausts of mining equipment and trucks, as well as blasting events). Vehicle emissions will be largely continuous during mining, with machine presence associated with tunnelling more transient. The discharge of particulate matter associated with blasting will be of very short duration (seconds per day).

The potential effect of air charges to fauna habitats within areas immediately adjacent to ventilation evasé includes particulates settling on vegetation and settling on the animals themselves.

Dispersion modelling was undertaken to predict ambient contaminant concentrations around likely vent locations. In respect to effects on fauna, native frogs were used in this assessment as an 'indicator species' as they are particularly susceptible to particulate matter because of their porous skin. As discussed above, Boffa Miskell (2025a) concludes that there is a low likelihood of residual effects on native frogs from discharges from the ventilation evasé. As frogs are the species most susceptible to air discharges, it can be concluded that there is also low likelihood of the discharges from the ventilation evasé impacting other native fauna.

The assessment also considered the potential effects of air discharges on *Dactylanthus taylorii* (Threatened – Nationally Vulnerable). Because *Dactylanthus* has no above-ground foliage, its health depends primarily on the health of the host plant. It is not anticipated that discharges from the ventilation evasé will adversely affect the health of prospective *Dactylanthus* host trees in the vicinity, therefore any populations of *Dactylanthus* that might be present are similarly unlikely to be affected.

Ecological Effects Associated with Lighting

Artificial lighting will be required to illuminate work and camp sites during and outside daylight hours in the Coromandel Forest Park. Artificial lighting may be associated with exploration and investigative drill, camp, pump, portable rig, pumping test, and ventilation shaft site (during construction) activities.

In respect to light spill, localised spill light may attract invertebrates and their predators (ruru / morepork, geckos and bats, if present). Other taxa groups, including native frogs, invertebrates, and native birds may experience disruption to orientation, foraging and environmental cues for particular behaviours (e.g. emergence).

Glare effects could be visible for hundreds of meters if the light sources are directly visible and sufficiently bright. Direct screening by foliage and topography will restrict visibility distance and is likely to limit (in addition to engineering controls set out in Pedersen Read (2025)) the extent of glare effects associated with the WNP.

In respect to sky glow, Boffa Miskell (2025a) sets out that the localised nature of the lighting effect, the shielding provided by surrounding vegetation, and the short duration of the effect at any particular site will manage potential sky glow effects. The effects of artificial lighting are immediately reversible once the drill rig / camp site / pump is removed.

Boffa Miskell (2025a) concludes that, with mitigations including careful lighting selection, location and luminaire orientation, controls for lighting and timing of activities, the magnitude of lighting effects will be Low – Moderate. As the ecological value of fauna is Very High, the overall level of effect is assessed as Moderate.

Ecological Effects Associated with Vibration

As set out earlier in this AEE (in respect to native frogs), it is expected that underground blasting associated with the WUG will generate perceptible levels of vibration on the surface of parts of the Coromandel Forest Park within the WUG footprint.

Vibration modelling indicates that blasting associated with the development of the Access Decline (i.e. the tunnel required to access the orebody originating at the Willows site / Area 2) will not produce vibration levels above 1 mm/s north of the Willows site (i.e. under Coromandel Forest Park). As such, the key period for potential impacts from blasting vibration is during the mining operation under the Wharekirauponga area of the Coromandel Forest Park.

OGNZL and project ecologists have collaboratively developed a mine plan to minimise vibration effects to the extent practicable to minimise effects on ground dwelling species. The output of that work is a viable mine plan which will limit the area expected to experience

vibration above 2 mm/s to approximately 315 ha (noting that the Coromandel Forest Park is 71, 900 ha in size), and which limits the maximum vibration at the surface to no more than 15 mm/s for 95% of blast events. In terms of the duration and frequency of occurrence blasts that generate a level of vibration above 2 mm/s (where effects on frogs are likely to be low, but there is some uncertainty), these can comprise up to 78 % of the total blasts. However, the total number of such events will be around 3-4 events per day, each of around 10-12 seconds in duration, with a total time of such events around 30-50 seconds per day.

Boffa Miskell considers that vibrations are likely to be felt more strongly by ground-dwelling species. The potential effects of vibration on native frogs is addressed earlier in this sub-section. In respect of invertebrates, lizards, bats and birds, Boffa Miskell (2025a) concludes that:

> For invertebrates, the magnitude of effect associated with vibrations is expected to be Low, given the short duration and infrequency of the blasts. Invertebrates are also typically resilient to non-lethal disturbance;

> For lizards, the magnitude of effect of blast vibrations is Low**.** This assessment takes into account the short duration and infrequency of the blasts and the apparent very low density of lizards in the proposed works areas;

> For bats, the magnitude of blast vibrations is Negligible given the low density (if not absence) of bats within in the proposed works areas; and

> For birds, the magnitude of effect of blast vibrations is assessed as Negligible. Birds are most sensitive during the nesting season (from laying to fledging), but it is expected that vibrations will be barely perceptible in an arboreal nest. Natural disturbance (e.g. high winds) is more likely to impact nesting success.

OGNZL is proposing the following measures to manage the effects of vibration:

> Variable mining methods to minimise vibration related impacts; and

> The biodiversity offset initiatives / substantial pest control implemented to benefit native frogs discussed earlier in this report, will also have significant benefits to other native fauna.

Terrestrial Ecological Effects Associated with Dewatering

The potential of the WUG to reduce surface water volumes and moisture content in soils and streams (dewatering) was identified as a potential impact on vegetation communities and fauna habitats. Based on the assessment undertaken by others (i.e. WWLA 2025, GHD 2025), deep mine dewatering will have limited effects at the surface due to the vertical separation of the deep groundwater and the geological conditions / low connectivity

between surface waters and groundwaters. With respect to impacts on the forest environments in Wharekirauponga, soil moisture content is predominantly rainfall derived, and it is unlikely that vegetation will be affected by groundwater changes.

Based on the above, Boffa Miskell (2025a) concludes that there will be No Effect on terrestrial ecosystems, or specific taxonomic groups, from dewatering. The effects of dewatering on aquatic ecology and natural state waterbodies are addressed later in Section 6.6.2.1 of this application.

Spread of Kauri Dieback Disease

Phytophthora agathidicida ("**PA**") is the pathogen regarded as a primary causal agent of dieback disease in otherwise healthy kauri, while other *Phytophthora* species may also have a role in the expression and severity of disease symptoms.

No PA has not been recorded in the vicinity of the Wharekirauponga Sub-Catchment to date. The magnitude of effect of introducing / spreading kauri dieback disease in the Wharekirauponga Sub-Catchment will be Very High and the ecological value of kauri within the catchment is Very High.

OGNZL has an established Kauri Dieback Management Plan for working within the Wharekirauponga Sub-Catchment to minimise both the introduction of PA spores and to reduce potential spread from one site to another. Current management practice operates on the basis that PA may be present but undetected within the proposed work areas and assumes that the greatest risk is in close proximity to kauri where the pathogen load is likely to be high. The likelihood of contacting and spreading PA in the course of works is minimised through avoidance of all kauri, and / or application of stringent hygiene protocols in the vicinity of kauri where trees are not avoidable.

Boffa Miskell (2025a) considers that the proposed surveillance protocols in the Kauri Dieback Management Plan (included within the ELMP-WUG and ELMP-WA provided in **Part H** to these application documents) will allow for early detection of the presence of the disease within the forest. In addition, OGNZL is proposing the following management actions for kauri dieback:

> Preparation of a site / activity specific kauri dieback plan;

> Development and implementation of a polymerase chain reaction ("**PCR**") based disease surveillance programme; and

> Training all staff and contractors on kauri dieback hygiene protocols.

6.6.1.2 Area 2 / Willows Site

Introduction

A detailed assessment of the potential effects of the WNP on terrestrial ecological values of the proposed Willows site (Area 2) is provided in Boffa Miskell (2025a), a copy of which is provided in **Part B** of these application documents. A summary of the key conclusions is provided below.

Effects Associated with Vegetation and Potential Habitat Clearance

The proposed footprint for the Willows SFA is 18 ha. Approximately 0.25 ha of mixed native / exotic vegetation (assessed as having a Low ecological value) will be removed to provide for the Willows SFA.

The magnitude of effect of vegetation and potential terrestrial habitat clearance has been assessed as being Negligible, with the overall level of effect assessed as being Very Low.

The effects management associated with this vegetation clearance includes:

> Comprehensive vegetation clearance protocols to be followed (i.e. pre-clearance surveys of bird nests, bat roosts, and lizards);

> Revegetation and fencing of riparian areas. The proposed area of revegetation of riparian margin is 56,619 m^2; and

> Revegetation and remediation of the rock stack area at or before mine closure.

Ecological Effects Associated with Noise

In respect to noise, Boffa Miskell (2025a) notes the following:

> The noise modelling undertaken includes noise mitigations (bunds and installing the ventilation fan in an insulated shipping container);

> Modelled noise contours within the proposed work area show that noise effects largely avoid the areas with the highest ecological values. Vegetation within the proposed work area that will be exposed to higher noise levels includes narrow riparian markings with low ecological value for fauna habitat;

> Modelled noise contours that extend from the Willows site to the Coromandel Forest Park are comparable to the measured ambient noise levels; and

> Birds are the fauna group most likely to be present within the areas impacted by noise from construction activities at the Willows site.

Given the small zone of area influenced by construction noise (that is within a larger area of high-quality habitat within the Coromandel Forest Park), and the small change in ambient noise, Boffa Miskell (2025a) concludes that the magnitude of effect of noise will be Negligible (with an overall level of effect in respect of construction noise of Very Low).

Ecological Effects Associated with Discharges to Air

Potential discharges to air include dust from surface sources; products of combustion from surface and underground vehicles; dust from excavation discharged from the Willows Portal and Ventilation Shaft 1; contaminants from underground blasting discharged from the Willows Portal and Ventilation Shaft 1 (as the tunnel progresses); and rehabilitation of surface areas after the development of the Willows Access Tunnel. Blasting emissions will be infrequent and of short duration (during the tunnel drive, it is expected that blasting will comprise two blast events per day, with each event lasting for about 10 seconds) and emissions are expected to disperse rapidly.

The results of air quality monitoring at Waihi Mine were used to assess the likely effects of emissions of key contaminants (deposited dust, TSP, $PM_{2.5,}$ PM_{10} and silica). The Air Assessment concludes that there is a short-term moderate to high risk of dust, from the construction of the bund and storage of topsoil, adversely affecting the nearest houses along Willows Road to the east / southeast of the site. The risk of dust generated from other site activities, such as constructing the rock stack, blasting and tunnelling, adversely affecting residences (and thus, fauna and habitats) in the proximity of the project is low

Based on the conclusions of Beca (2025c), Boffa Miskell (2025a) considers that the magnitude of effects from construction related discharges to air on flora and fauna habitats will be Negligible (with an overall level of effect of Very Low – Low).

Ecological Effects Associated with Lighting

The Willows site is located in open pasture farmland with a backdrop of forested conservation land, with limited existing lighting sources (farm buildings only). The impact of lighting on wildlife is largely species dependent. Boffa Miskell (2025a) sets out that wildlife appears to respond to high-intensity short-wavelength light, point sources of light, skyglow and directional light.

The lighting on site has been designed to minimise potential effects, including careful mobile lighting plan selection, location and luminaire orientation (i.e. aiming into the site), careful timing of activities within sensitive areas and lighting controls for any permanent lighting.

In respect to lighting, Boffa Miskell (2025a) sets out the following points:

> Localised spill light may attract invertebrates and their predators (ruru / morepork and bats, if present) but is unlikely to impact a wider suite of species as it will be located around the built-up Willows SFA;

> Lighting designed to minimise adverse effects should result in minimal, if any, direct glare effects; and

> Sky glow has the largest areal extent of the lighting proposed within the Willows site and will therefore likely have the most pronounced effect on avoidance behaviours. Sky glow is also most likely to impact orientation, dispersal, foraging, migrating and natural behavioural cues for species sensitive to it.

Based on these conclusions, and including adherence to the mitigation measures set out in the lighting effects assessment (as set out in Section 6.14 of this report), Boffa Miskell (2025a) considers that there will be a Low magnitude of effect in respect to lighting, with an overall Low level of effect.

6.6.1.3 Area 3 / Wharekirauponga Access Tunnel

The proposed works within Area 3 are located underground. As such, no further assessment of effects on terrestrial ecology in Area 3 has been provided.

6.6.1.4 Area 4 / Services Trench

Area 4 comprises the Services Trench, which does not form part of this application.

6.6.1.5 Area 5 / Gladstone Open Pit

Introduction

A detailed assessment of the potential effects of the WNP on terrestrial ecological values of the proposed GOP site is provided in Bioresearches (2025a), a copy of which is provided in **Part B** of these application documents. A summary of the key conclusions is provided below.

Effects Associated with Vegetation and Potential Habitat Clearance

Vegetation Clearance

The construction of the GOP and associated stockpile will involve permanent removal of approximately 1.4 ha of moderate value planted and remnant (rocky hilltop) indigenous vegetation and habitat (including for 'At Risk' copper skink), and 5.1 ha of low value pine plantation. This equates to less than 5% of the available local regenerating native vegetation

and habitats within the Waihi ecological district and removes only a small part of the previously voluntarily revegetated area.

Bioresearches (2025a) considers this to be a Low overall magnitude of effect. Low magnitude effect to a Moderate value resource results in a Low level of adverse effect. Such levels of effect do not typically require any mitigation or offsetting, although mitigation for 'At Risk' copper skinks by way of capture, relocation and associated habitat enhancement via a lizard management plan is recommended as a minimum and will be required under the Wildlife Act.

The pine plantation currently forms part of a rotational harvest pattern and will ultimately be felled once it reaches harvestable age. Under normal use patterns, this area will then be replanted with pines for future harvest, however under the WNP, the ecological value of the pine block (negligible) is expected to be permanently lost.

Habitat Clearance

Threatened fauna, including bats and native frogs have either not been detected within the proposed footprint and are not considered to be present (frogs), or present on any regular basis (bats). However, in respect of bats, their future presence within the GOP cannot be discounted as bat flight paths change over time. Because long-tailed bats are a threatened species, the removal of vegetation that supports an active roost will be a significant (High to Very High level) adverse effect. The very Low likelihood of this occurrence will be reduced to minor by way of undertaking preclearance surveys for bats and employing tree-felling protocols for bats where 'high risk' trees are identified by a suitably qualified bat expert. Where loss of a bat roost is confirmed, a bat management plan, prepared by a suitably qualified bat expert, will additionally detail measures to compensate for any loss with provision and placement of artificial roost boxes.

A suite of common native birds will be expected to lose a low magnitude of nesting, roosting and foraging habitat, as well as the eggs and unfledged chicks of common native birds, which have a lower likelihood of escape during vegetation removal. Non-volant eggs and chicks will likely be destroyed if unmanaged. Given their protection under the Wildlife Act, mitigation actions to minimise death or injury should be included in the management of the vegetation clearance. Such management could include avoidance of vegetation removal during the main bird breeding season (where practicable) or that vegetation removal be preceded by nesting surveys to confirm that any nesting native birds have fledged.

In respect to native lizards, 'High Value' copper skinks occur within native plantings, pine forest edges and the rocky outcrop at the proposed GOP. This species is still relatively common throughout its range in the upper North Island and was relatively easy to detect

from plantings, the rocky outcrop, pine edge, the eastern end of Union Hill and at the Favona Wetland (although they were not found elsewhere within the surrounding area). The loss of known habitats of this species is likely to represent a higher magnitude of effect than when compared to potential habitats in the surrounding landscape, or other fauna. Overall, some 6.5 ha of copper skink habitat will be removed. Copper skink has a High ecological value, and therefore, the overall level of effect is considered by Bioresearches (2025a) to be High.

In addition to the capture and relocation of lizards within the area affected by the GOP, OGNZL is proposing revegetation and pest control to compensate for the high level of effect expected as a result of loss of habitat for high value copper skinks. This will include 11.2 ha of revegetation with pest control and 4.45 ha of pest control in the existing habitat.

The relocated powerline to the western side of Gladstone Hill will predominantly traverse planted pasture, and is not anticipated to impact any ecological features.

Ecological Effects Associated with Noise and Vibration

Potential indirect effects associated with degradation of surrounding vegetation and habitats by way of noise (traffic and blasting), dust, and vibration disturbance are minor on the basis that such vegetation and habitats are relatively young plantings that generally support low value (common native birds) or disturbance-tolerant (copper skinks) fauna. Copper skinks are typically common in northern North Island urban environments, including roadside grasses and scrub.

Some reduction in habitat availability to local, common native fauna that currently use the vegetation for foraging, roosting or potentially nesting, causing some level of displacement into surrounding habitats may occur but given the scale relative to the remaining resource in the immediate vicinity Bioresearches (2025a) considers this effect to be minor. Given the generally poor habitat quality and low value fauna that may use these habitats, a Negligible magnitude of effect of such displacement is considered (with the Low value) to result in a Very Low level of adverse effect.

Potential construction and operations related noise and vibrations or dust effects on adjacent vegetation and habitats are considered to be low level effects, given the variously low value vegetation and planted terrestrial habitats.

Ecological Effects Associated with Discharges to Air

There is a short-term moderate to high risk of dust, adversely affecting properties within approximately 100 m of the works during dry, windy conditions. Based on this, there is a moderate to high risk of dust affecting vegetation and habitats within 100 m of works areas. The risk for the remainder of the area is considered to be low.

The magnitude of effect of dust on flora and fauna is considered to be negligible, providing mitigation measures set out in Beca (2025b) are followed. To date, no damage to adjacent vegetation has been reported from existing mine activities as a result of air quality concerns. Dust generation is not expected to increase as a result of the WNP operation, however locations of generation will change as the development proceeds. The ecological values of areas within 100 m of works range from negligible to moderate, therefore the overall level of effect from dust generation is considered to be low.

6.6.1.6 Area 6 / Northern Rock Stack

Introduction

A detailed assessment of the potential effects of the WNP on terrestrial ecological values of the proposed NRS site is provided in Bioresearches (2025a), a copy of which is provided in **Part B** of these application documents. A summary of the key conclusions is provided below.

Effects Associated with Vegetation and Potential Habitat Clearance

Vegetation Clearance

The proposed NRS will require removal of approximately 8.1 ha of moderate value planted native vegetation and approximately 1 ha of negligible value pine-dominated vegetation. The total area of the NRS development is approximately 28 ha meaning vegetation to be removed occupies approximately one third of the total NRS footprint. The 8-9 ha of planted vegetation represents around 10% of the local habitat present (the two SNA 166 fragments and various small riparian and pine forest patches). The NRS avoids the higher value SNA 166 vegetation further east and has also deliberately avoided occupying a valley immediately south of the northern fragment, where 'At-Risk' moko skink habitat may be affected alongside a block of pine dominated vegetation.

Bioresearches (2025a) considers this vegetation removal to be a low magnitude effect (given not only the size but the age and diversity of the plantings). A Low magnitude on a Moderate value ecological resource results in a Low level of adverse effect.

Habitat Clearance

Common native fauna that may be within the vegetation at the time of clearance / removal will be affected by injury or mortality. Affected fauna may include the eggs and unfledged chicks of common native birds, which have a lower likelihood of escape during vegetation removal and will likely be destroyed if unmanaged. Threatened fauna, including bats and native frogs have not been detected within the proposed footprint and are not considered to

be present, even on an intermittent basis. OGNZL is proposing to salvage and relocate individual native fauna within these areas prior to vegetation clearance.

Because long-tailed bats are a threatened species, the removal of vegetation that supports an active roost would be a significant (High to Very High level) adverse effect, depending on whether the vegetation supports single or multiple individuals. The very low likelihood of this occurrence will be reduced to minor by way of undertaking preclearance surveys for bats and employing tree-felling protocols for bats where 'high risk' trees are identified by a suitably qualified bat expert. Where loss of a bat roost is confirmed, a bat management plan, prepared by a suitably qualified bat expert, will additionally detail measures to compensate for any loss with provision and placement of artificial roost boxes.

While not recorded as part of the surveys undertaken to support this application, native lizards (copper and / or moko skink) have the potential to be present within the NRS vegetation. Native and established plantings within the NRS are contiguous with identified moko skink habitat on the northern side of the northern fragment of SNA 166, and copper skink may also be present in pine or plantings at less than detectable, very low abundance. Because native lizards have not been found in the area of vegetation clearance, despite significant survey efforts, Bioresearches (2025a) has assessed the value of the vegetation and potential habitats to native lizards as being Low. The magnitude of effect is assessed as being Moderate. The overall level of this effect on low-value lizard habitat is considered to be Low. This effect will be minimised through precautionary lizard survey and relocation prior to and during removal of potential habitats, and in accordance with a lizard management plan that details a suitable enhanced relocation area with provision for habitat restoration where necessary.

Potential indirect effects associated with degradation of surrounding terrestrial vegetation and habitats are minor on the basis that such vegetation and habitats are relatively young plantings that support low value fauna (common native birds). The western side of SNA 166 will retain areas of plantings where they occur against SNA vegetation.

Ecological Effects Associated with Noise and Vibration

In respect to noise, Bioresearches (2025a) sets out that there is higher value avifauna present at TSF1A and TSF2, which support habitats adjacent to the NRS and are approximately 300 m to 1 km south of the proposed NRS borrow site (the far side of TSF2 is approximately 900 m). Species include the threatened weweia / New Zealand dabchick and pāpango / New Zealand scaup (which occur predominately on water) and threatened northern New Zealand dotterel, and at-risk New Zealand pipit, Australian coot (which predominately inhabit terrestrial environments around water edges).

Overall, while the avifauna values at the existing tailings facilities are High to Very High, the level of effect on these species is considered to be Low to Very Low, on the basis that blasting will be infrequent, and generally at distances of between 300- 1000 m from occupied habitats.

Effects Associated with Habitat Fragmentation

Some low-level habitat fragmentation and isolation may occur for lizards (if present) and birds as a result of loss and reduction of available habitat (8.1 ha planted native, 1 ha pine) and by reducing the ability for common fauna to disperse across the landscape for food, shelter, and breeding purposes.

Given the availability of similar adjacent habitat and the generally poor habitat quality and low value fauna that may use the affected areas of planted vegetation, Bioresearches (2025a) concludes that the effect of such displacement is considered minor.

Potential construction and operations related noise and vibrations or dust effects on adjacent vegetation and habitats are considered to be low level effects, given the variously low value vegetation and planted terrestrial habitats and highly mobile nature of the common native and exotic bird species which occur throughout the surrounding landscape.

Ecological Effects Associated with Discharges to Air

There is a short-term moderate to high risk of dust, adversely affecting properties within approximately 100 m of the works during dry, windy conditions. Based on this, there is a moderate to high risk of dust affecting vegetation and habitats within 100 m of works areas. The risk for the remainder of the area is considered to be low.

The magnitude of effect of dust on flora and fauna is considered to be negligible, providing mitigation measures set out in Beca (2025b) are followed. To date, no damage to adjacent vegetation has been reported from existing mine activities as a result of air quality concerns. Dust generation is not expected to increase as a result of the WNP operation, however locations of generation will change as the development proceeds. The ecological values of areas within 100 m of works range from negligible to moderate, therefore the overall level of effect from dust generation is considered to be low.

6.6.1.7 Area 7 / Tailings Storage Facility 3

Introduction

A detailed assessment of the potential effects of the WNP on terrestrial ecological values of the proposed TSF3 site is provided in Bioresearches (2025a), a copy of which is provided in **Part B** of these application documents. A summary of the key conclusions is provided below.

Effects Associated with Vegetation and Potential Habitat Clearance

Vegetation Clearance

The establishment of TSF3 will permanently remove an 8.3 ha area of Moderate value rewarewa / tree fern forest within the southern SNA 166 fragment. Beyond the SNA, some 1.8 ha of Low value vegetation / habitat from three smaller fragments will also be permanently removed. The affected area avoids the main key elements of the SNA including moko skink habitat and a kauri stand, both on the northern side of the southern fragment.

As SNA 166 has an overall Moderate ecological value (despite the effect avoiding the features that qualify its SNA status), a Moderate magnitude of effect results in an overall Moderate level of effect, being the permanent removal of 8.3 ha of Low value vegetation and habitats. OGNZL is proposing to offset the effect of this vegetation removal by establishing 17.5 ha of offset restoration plantings with an additional 20ha of the SNA to be enhanced.

Habitat Clearance

Common native fauna that may be within the vegetation at the time of removal will be affected by injury or mortality. Affected fauna may include the eggs and unfledged chicks of common native birds, which have a lower likelihood of escape during vegetation removal and will likely be destroyed if unmanaged. While not recorded, native copper skinks may be present because they are locally common in the surrounding landscape. OGNZL is therefore proposing to salvage and relocate individual native fauna within these areas prior to vegetation clearance.

NZ pipit (and At-Risk NZ dotterel) could also be expected to utilise the proposed TSF3 at various stages of its development, and therefore, the outcome of the establishment of TSF3 could be positive for these 'At-Risk' bird species.

In respect to native lizards, the affected vegetation and potential habitat feature within SNA 166 are contiguous with a moko skink record on the northern side of the fragment, beyond the proposed works area. Moko skink typically inhabit high light-level edge scrub and open environments and are less likely to be present beneath a vegetated canopy, between the recorded Moko skink habitat and the proposed TSF3. This species is present on the northern side of SNA 166, and other north-facing vegetated edges beyond the proposed works area. There is some low potential for this species, or copper skink, which similarly inhabit dense ground cover edge habitats, to be present, however survey effort within the southern and central parts of the southern fragment of SNA 166 and nearby fragments did not record any. Overall, 10.1 ha of native vegetation will be removed from approximately 58.8 ha of low value potential habitats in the immediate area (within which native lizards have not been recorded). Overall, a Moderate magnitude of effect will be anticipated, being that a

moderate proportion of the available potential habitats will be removed, and therefore the overall level of effect is expected to be Low.

This Low-level effect will be minimised however, through precautionary lizard survey and relocation prior to and during removal of potential habitats, and in accordance with a lizard management plan that details a suitable enhance relocation area with provision for habitat restoration where necessary.

Edge Effects

Approximately 1.15 km of new edge, some 100 m inside of the existing edge, will be created along the retained area of the SNA at TSF3 as a result of removal of vegetation. At least half of this new edge will be where existing seral mamaku-dominant vegetation occurs, and half is through young rewarewa dominant vegetation. All of these areas are currently or were recently subject to high light levels and weed presence.

In addition, large blocks of pine north of TSF3 footprint and above the TSF1A footprint are inhibiting natural regeneration and limiting rewarewa-dominant forest at the western and north-eastern end of TSF3 footprint. This pine reduces the potential value of the native forest in these areas. These factors lead to a consideration of the magnitude of the effect of the new edges to be no more than Low.

Bioresearches (2025a) considers that the potential edge effects on vegetation values of a Low magnitude edge effect (where values are Low in the rewarewa and low in the native scrub) are Very Low.

Ecological Effects Associated with Noise and Vibration

The activities within the proposed TSF3 area will involve noise generated from vehicle movements and blasting at borrow sites. Noise generated by intermittent blasting and more regular truck movements within and around TSF3, may have a Low to Very Low-level degradation effect on the habitats of birds and may cause some disturbance to avifauna that use adjacent habitats. Such adjacent habitats include the retained, southern fragment of SNA 166, and common native birds that forage, roost and potentially, nest there.

The avifauna present at TSF1A generally use bare ground habitats on the embankment and include breeding black backed gulls and New Zealand dotterel.

Once construction of TSF3 has been completed, noise is expected to be negligible, and high value habitats that have established at TSF2, which support a diversity of indigenous wetland birds, including threatened and At Risk species, are expected to expand to TSF1A and, later, TSF3.

Ecological Effects Associated with Discharges to Air

There is a short-term moderate to high risk of dust adversely affecting properties within approximately 100 m of the works during dry, windy conditions. Based on this, there is a moderate to high risk of dust affecting vegetation and habitats within 100 m of works areas. The risk for the remainder of the area is considered to be low.

The magnitude of effect of dust on flora and fauna is considered to be negligible, providing mitigation measures set out in Beca (2025b) are followed. To date, no damage to adjacent vegetation has been reported from existing mine activities as a result of air quality concerns. Dust generation is not expected to increase as a result of the WNP operations, however locations of generation will change as the development proceeds. The ecological values of areas within 100 m of works range from negligible to moderate, therefore the overall level of effect from dust generation is considered to be low.

6.6.2 Effects on Aquatic Ecology

A detailed assessment of the actual and potential effects of the WNP on aquatic ecological values is provided in NIWA (2024) and Boffa Miskell (2025c and 2025d), copies of which are provided in **Part B** of these application documents.

RMA Ecology (2025b) also provides an overall summary of the ecological effects of the WNP.

A summary of the key conclusions of the various reports is provided below.

6.6.2.1 Area 1 / Coromandel Forest Park

Introduction

NIWA (2024) and Boffa Miskell (2025c and 2025d) have considered the potential effects of the WNP on freshwater ecological values of waterbodies within the Coromandel Forest Park. A summary of the key conclusions is provided below.

Natural State Waterbodies

Area 1 includes natural state waterbodies, in particular:

- Wharekirauponga Stream and its tributaries:
  - Adams Stream;
  - Edmonds Stream;
  - Teawaotemutu Stream;
  - Thompson Stream; and

- Trib R; and

- Waiharakeke Stream:
  - Main stem; and
  - Right branch.

Boffa Miskell identifies that the ecological values and ecological integrity of the Wharekirauponga Sub-Catchment are very high. The catchment is subject to naturally occurring extreme climatic and weather events and evidence that the ecosystem retains considerable resilience to such climatic extremes is strong.

Whilst the underground mining methodology for the WUG has been carefully developed to minimise dewatering impacts, groundwater modelling has indicated that groundwater drawdown is likely to occur beneath the Wharekirauponga Sub-Catchment, and that in turn this has potential to affect stream flows. Any changes in stream flows, if they were to occur, are anticipated to be no more than minor and within the range of natural flow variability (GHD (2025e)). There are no effects anticipated in terms of drawdown or stream ecology for the Waiharakeke Catchment.

The effect of potential dewatering on the natural state of the Wharekirauponga Stream and its tributaries has been assessed by NIWA (2024) and Boffa Miskell (2025d). These reports conclude that even under worst-case scenario modelling, the natural state and ecological values of the mainstem and tributaries of the Wharekirauponga Stream will be retained.

NIWA examined the extent to which in-stream habitat may be reduced under 7-day MALF conditions as a result of potential dewatering effects resulting from the proposed WUG activities. The anticipated reductions in suitable instream habitat for taxonomic groups ranges from -0.72% for fish in Adams Stream to -4.20% for invertebrates in Thompson Stream. The average reduction of suitable instream habitat for seven study sites and three taxonomic groups is -2.08%. Under a worst case scenario (which is the unlikely 95th percentile flow reduction) reductions in suitable instream habitat for taxonomic groups range from -1.20% for fish in Adams Stream to -5.66% for invertebrates in Thompson Stream. The average reduction of suitable instream habitat for the seven study sites and three taxonomic groups is -3.20%.

Boffa Miskell notes that, when compared with natural low flows, any predicted changes in flow are reduced by a very small and marginal amount. These marginal changes in flow are considered unlikely to challenge the existing ecological values of the streams of the Wharekirauponga Sub-Catchment. Effects on ecosystem function are likely to be minimal and largely undetectable compared to existing low flow circumstances. Boffa Miskell considers that, overall, the ecological natural state of the mainstem and tributaries of the

Wharekirauponga Sub-Catchment will be retained even if the potential for surface water flow changes eventuates.

Discharges to the main stem of the Wharekirauponga Stream from pumping test activities will be within the parameters already established under the exploration consents, which are currently set to protect aquatic biota and ensure that any effects arising from pump testing discharges are less than minor.

Overall anticipated effects are considered to be minimal (less than minor).

Effects on the Warm Spring

There is one warm spring within the Wharekirauponga Sub-Catchment (refer to Section 3.8.1), which is understood to have a deep groundwater source. Dewatering within Area 1 is expected to result in the cessation of flows in this spring for the life of the project. The warm spring, and the length of the waterbody affected by its presence, is very small and its life supporting capacity is compromised by the attributes of the spring water itself. In terms of ecological values, Boffa (2025c) concludes that there is minimal aquatic habitat present, and it is poor habitat for macroinvertebrates and fish, as it is shallow and smothered in a heavy deposit.

The overall ecological value of this spring is assessed as Low, and therefore the loss of this spring is not considered to be an adverse effect on ecological values that is more than minor. Notwithstanding this conclusion, Boffa Miskell recommends compensating the effects of the loss of this spring by implementing stock exclusion and habitat enhancement at several headwater spring and seepage gullies of Tributary 3 (Mataura Stream) within Area 2.

Effects on Wetlands

Bioresearches (2025c) provides an assessment of the ecological effects on wetlands located on land above the proposed WUG. This follows the completion of groundwater modelling which shows that there is potential for a reduction in groundwater levels to occur in a way that could lead to surface-level effects.

Fifty (50) natural inland wetlands have been identified within the Wharekirauponga Sub-Catchment based on vegetation type (Bioresearches (2025c)) and delineation in extent and characteristics using the hydric soils and hydrology tools (WWLA (2025e)). The wetlands are largely located within the Adams, T-Stream, and South Edmonds Sub-Catchments. Following the identification of these 50 wetlands within the Wharekirauponga Sub-Catchment, a 305 ha ‘Area of Investigation’ for further assessment was determined by WWLA (2025e), using a combination of ‘depth to groundwater’ and ‘drawdown contour’

datasets to identify where wetlands, if present, will be at greatest risk of impact from dewatering associated with the proposed WUG.

Bioresearches (2025c) sets out that:

> In total, 39 natural inland wetlands were identified within the Area of Investigation. These wetlands are predominantly vegetated with swamp forest, and are of very high ecological value;

> WWLA (2025e) identified that six of the wetlands within the Area of Investigation are most at risk of dewatering effects; however, the modelling predicts that the likelihood of dewatering occurring for wetlands is very low. Hydrological changes arising from dewatering, if they were to occur, could lead to reductions in wetland extent, or changes in hydrological regimes of the wetlands. This could lead to ecological impacts such as a loss of habitat for flora and fauna or a change in vegetation community;

> Because of the uncertainty in whether these effects will occur, and also to aid in the detection of effects, monitoring of both wetlands assessed as most at risk, as well as control or reference wetland/s, is proposed to be undertaken; and

> If effects of dewatering are detected, it is proposed that remedial actions such as provision of supplementary water, grouting of fissures which drain shallow groundwater and / or reinjection of water into aquifers may occur to augment flows. If these measures are unsuccessful, inadequate or otherwise unable to be undertaken, an offsetting or compensation package will be developed to address any residual effects and ensure that the project results in no net loss of wetland habitat or wetland ecological value.

This approach is set out in the proposed conditions provided in **Part D** to these application documents.

Bioresearches (2025c) concludes that the magnitude of effect of the project upon wetlands in the affected catchment, when the potential effects as well as the effects management measures are accounted for, is considered to be negligible. This corresponds to an overall low level of effect to wetlands within the Area of Investigation.

6.6.2.2 Area 2 / Willows Site

Introduction

A detailed assessment of the potential effects of the WNP on freshwater ecological values of waterbodies within Area 2 is provided in Boffa Miskell (2025c), a copy of which is provided in **Part B** of these application documents. A summary of the key conclusions is provided below.

Effects on Mataura Stream

GHD (2025c) concluded that the effects on the flow in the Mataura Stream resulting from the proposed WRS development at the Willows site are expected to be minimal. The footprint of the proposed rock stack (6 ha) is estimated to be less than 1% of the catchment area and runoff will be collected and diverted to the WTP. GHD (2025c) concluded that this is not expected to have a noticeable effect of the Mataura Stream flow.

Effects on Mataura Stream Tributary (Tributary 2)

The proposed surface infrastructure in Area 2 will result in 558 m of stream length being lost. An offset (riparian restoration of 1,995 m of stream length of Tributary 1 and Tributary 3) is being proposed to redress the effects on stream ecological values arising from the loss of this stream area. The offset will deliver a no net loss outcome in stream ecological values.

Instream works during construction have the potential to cause injury and / or mortality to native freshwater fauna. Prior to overburden placement over Tributary 2, fish salvage and relocation will occur to avoid the potential for fish mortality. Fish salvage and relocation will be carried out as set out more fully in a recommended Aquatic Fauna Salvage and Relocation Plan.

Instream works will be temporary (for the duration of construction) and potential injury and / or mortality of aquatic fauna will be avoided through relocation efforts. Provided salvage and relocation is conducted, the potential effect (likelihood) of aquatic fauna mortality is very low.

OGNZL is proposing to implement and adhere to a Stream Enhancement Riparian Planting Plan. A draft copy of this plan is provided with Boffa Miskell (2025c) in **Part B** to these application documents.

Effects on Mataura Wetland

The works will avoid the Mataura Wetland containing swamp maire, and a minimum 10 m planted buffer (with fencing) is proposed around this wetland. During mining, inflows into the wetland could potentially decrease, however this is not likely to be discernible from natural variability which occurs during the summer period. Fencing and substantial habitat enhancement of this wetland are also proposed which will enhance its value.

Sediment Discharge to Receiving Environments

Earthworks over the Willows site as well as other proposed activities (i.e. vegetation clearance, drilling, excavation, and stock piling) have the potential to reduce the water quality within the Mataura Stream through erosion and sediment runoff and potential

contaminants from the WRS. Some species occurring in the Mataura Stream are particularly sensitive to sediment intrusions, notably those that affix or graze on the hard substrates or capture food from the water column.

An erosion and sediment control plan will be prepared as part of the proposed works for the components of the WNP project (see Section 6.4), which will document measures to ensure water is treated (via sediment retention ponds) prior to discharge to the environment.

Effects Management

A range of additional ecological enhancement measures are also proposed at Area 2 which will result in an improved and enhanced catchment compared to that at present, including riparian planting, fencing and pest management of the full extent of the Mataura Stream and Tributary 3 within Area 2.

The loss of Tributary 2 is temporary and following removal of the WRS it will be rehabilitated such that in the long-term Tributary 2 will contain an improved and enhanced catchment compared to that at present.

These additional actions are positive effects of the project and are beyond the extent of riparian planting required to offset for the reclamation of Tributary 2. When combined with the offset measures, Boffa Miskell (2025c) considers that the proposed activities will result in a long-term net gain in freshwater ecological benefit for this location.

As noted, OGNZL is proposing to implement and adhere to a Stream Enhancement Riparian Planting Plan. A draft copy of this plan is provided with Boffa Miskell (2025c) in **Part B** to these application documents.

6.6.2.3 Area 3 / Wharekirauponga Access Tunnel

The proposed works within Area 3 are located underground. As such, no further assessment of effects on aquatic ecology in areas Area 3 has been provided.

6.6.2.4 Area 4 / Services Trench

Area 4 comprises the Services Trench, which does not form part of this application.

6.6.2.5 Area 5 / Gladstone Open Pit

Introduction

A detailed assessment of the potential effects of the WNP on freshwater ecological values of waterbodies within Area 5 is provided in Boffa Miskell (2025c), a copy of which is provided in

Part B of these application documents. A summary of the key conclusions is provided below.

Loss of Extent of Headwater Gully

Approximately 47 m / 79.4 m^2 of intermittent stream channel length of a headwater gully (assessed as having Moderate ecological values) will be reclaimed as part of the GOP. In addition, there is potential for sediment to enter the gully as a result of the proposed activities.

As discussed below, riparian restoration of a stream reach in the adjacent Ruahorehore Stream Catchment is proposed to compensate the loss of the extent of the headwater gully.

No native freshwater species or trout were observed during sampling of the headwater gully, nor were the habitats conducive to such species. However, Boffa Miskell (2025c) suggests the areas still be subject to fish salvage and relocation before stream works commence.

Effects on Gladstone Wetland

The reclamation of the upper reaches of the headwater gully is predicted to reduce groundwater and surface flows to the Gladstone Wetland. A 0.5 m reduction in the groundwater level adjacent to the wetland is also predicted. This variability is however within the natural fluctuations of the Gladstone Wetland.

Following closure of the GOP TSF, the capping layer will be recontoured to direct rainfall runoff towards the Gladstone Wetland. Rewatering of the deep groundwater system will also occur. Discharge of groundwater, stormwater and interflow to the wetland is therefore predicted to increase, with the deep and shallow groundwater levels returning to similar pre-mining conditions.

Effects of Potential Overflows from GOP TSF

There have been no overflows from the currently active TSFs since the mining operations in Waihi have been in operation. The tailings storage ponds are designed with a freeboard allowance that must contain the probable maximum rainfall event with an additional 1 m contingency above the normal operating levels. Decant water is pumped to the Processing Plant for re-use or to the WTP. As part of the WTP operation, the storage available in the active TSF is monitored and if necessary, decant water treatment is prioritised to ensure freeboard is maintained.

Effects Management

In summary, to effectively mitigate the potential for adverse effects on freshwater ecology associated with the activities occurring within the GOP and GOP TSF, OGNZL is proposing the following:

- The loss of 47 m in length of an intermittent headwater gully (approximately 79.4 m^2 of surface area) of an intermittent watercourse be offset with stream enhancement (including riparian enhancement) of a reach of stream. The compensation package for GOP, the NRS, and TSF3 involves the restoration of 7,646 m of stream margins along the Mataura Stream and Ohinemuri River catchment;
- The potential for sediment to enter the headwater gully be remedied through sediment controls and associated sediment monitoring;
- Implementation of the Aquatic Fauna Salvage and Relocation Plan (included within the ELMP-WA and ELMP-WUG provided in **Part H** of these application documents); and
- Baseline monitoring of the Gladstone Wetland vegetation be undertaken prior to the commencement of GOP works and re-assessed periodically (e.g. every five years) to ascertain whether hydrological changes, however immeasurable, have resulted in changes in the existing wetland flora or soil moisture.

The overall level of ecological effect of the proposed activities at the GOP on the freshwater ecological values is assessed as Low.

The Water Treatment Plant Discharge and Effects on the Ohinemuri River

The WTP is a key part of OGNZL's existing Waihi water management infrastructure. All water from mine areas which is not of suitable quality to be directly discharged to the environment via silt ponds is diverted and treated within the WTP before being discharged to the Ohinemuri River. In respect to water quality and ecological values of the Ohinemuri River, information available shows that the ecosystem attributes and the ecological values of the Ohinemuri River have not varied throughout the duration of the current treated water discharge to which the United States Environmental Protection Agency ("**USEPA**") (1986) receiving water criteria have applied and has not been adversely affected by the existing OGNZL treated water discharge.

Despite the MCI and QMCI biological indices recorded from the annual biological monitoring programme returning generally poor-fair scores for water and habitat quality (both before and after the establishment of the WTP discharge), the ecological metrics for the Ohinemuri River both upstream and downstream of the discharge show fluctuations in ecological values from poor to high values. At-Risk fish have been recorded in the Ohinemuri River, and

the river is also an important rainbow trout fishery, with spawning grounds in the river tributaries, and is classified as a significant trout fishery.

Further details of the treatment process for water directed to the WTP are provided in GHD (2025c), a copy of which is provided in **Part B** of these application documents. It is considered that the WTP has sufficient capacity to deal with anticipated / modelled inflow conditions associated with the WNP, with contingency storage options available should they be required.

In that context there are two important considerations for the WTP operation during the WNP, namely:

> Confirming the water quality parameters that the WTP discharge to the Ohinemuri River must achieve to ensure its effects on instream values are acceptable; and

> Confirming that the WTP will be able to manage all affected mine water from the WNP and existing mine activities in a manner which will meet those discharge requirements.

The discharge parameters and operational considerations of the WTP have been assessed in Section 6.4.2.1 of this report.

6.6.2.6 Area 6 / Northern Rock Stack

Introduction

A detailed assessment of the potential effects of the WNP on freshwater ecological values of waterbodies within Area 6 is provided in Boffa Miskell (2025c), a copy of which is provided in **Part B** of these application documents. A summary of the key conclusions is provided below.

Stream Diversion

The main effect on aquatic ecology due to the activities in Area 6 is the diversion of 1,389 m (2,401 m^2) of aquatic habitat (TB1) within its footprint. TB1 has moderate ecological values, noting that that TB1 is itself an ecologically enhanced stream diversion.

Part of the stream diversion channels will include the diversion of TB1 headwaters through a diversion channel located between the NRS and the SNA to the north-east of the footprint. The diversion will convey clean surface water (i.e. uncontaminated by mining activities) from above the site to a new confluence with the lower reaches of TB1. The design of the diversion channel is planned to replicate aquatic habitat attributes with a range of suitable stable microhabitats for fish and invertebrates, including the creation of stable pool habitats, the

inclusion of gravel and cobble riffle habitats, and provide for the passage of climbing fish, especially eels.

OGNZL is proposing to implement and adhere to a Stream Diversion and Development Plan. A draft copy of this plan is provided with Boffa Miskell (2025c) in **Part B** to these application documents.

Fish and kōura salvage and best practice erosion and sediment control measures will also be implemented during the construction works.

Groundwater

The NRS will incorporate similar design features as the existing TSFs to restrict the potential for generation of acid leachate and for leachate to enter shallow groundwater.

Effects Management

To manage the potential effects, OGNZL is proposing the following:

- The compensation package for GOP / NRS and TSF3 involves the restoration of 7,646 m of stream margins along the Mataura Stream and Ohinemuri River catchment;
- Adherence to an erosion and sediment control plan;
- The selection and construction of culverts is to be undertaken utilising current best practice to minimise impacts on water quality and in-stream disturbance;
- Water flow is to be diverted around the working area by using an open diversion channel or by pumping the water around the work area;
- Fish passage is to be maintained through any culverts installed in permanent or intermittently flowing waterways to allow the migration of eel species; and
- All native fish and trout, kōura and freshwater mussel within the working area are to be salvaged and relocated outside the area of works, prior to work starting.

Boffa Miskell (2025c) concludes that provided all design features, requirements and recommendations are successfully implemented, the effect on ecological values from the construction and use of the NRS will be very low.

6.6.2.7 Area 7 / Tailings Storage Facility 3

Introduction

A detailed assessment of the potential effects of the WNP on freshwater ecological values of waterbodies within Area 7 is provided in Boffa Miskell (2025c), a copy of which is provided in

Part B of these application documents. A summary of the key conclusions is provided below.

Stream Diversion

The main effect on aquatic ecology due to the activities in Area 7 is the diversion / loss of some 2,118 m of waterways and aquatic habitat within its footprint. The waterways to be lost include permanent, intermittent and ephemeral streams, and artificial watercourses including a farm pond with low ecological value. A stream diversion of some 2,503 m will be created to convey surface water from the upper Ruahorehore Stream to its lower reaches. The 2,118 m of loss of extent is incorporated within the full diversion length (including the upper reaches of the diversion that are not classified as ecologically functional) and thus meets the requirement of no loss of extent of watercourse.

A section of the Ruahorehore Stream meets the ecological significance criteria and overall, the Ruahorehore Stream is assigned Moderate to High ecological values.

The design of the diversion channel is planned to replicate aquatic habitat attributes with a range of suitable stable micro-habitats for fish and invertebrates, including the creation of stable pool habitats, the inclusion of gravel and cobble riffle habitats, and provide for the passage of climbing fish, importantly for eels. The channel will seek to maintain connectivity between the lower and upper catchment. Boffa Miskell (2025c) also recommends that riparian vegetation extend to 10 m either side of the channel, where feasible, and include low-growing species with overhanging cover. The long-term creation of a wetland to the east of TSF3 is also proposed. This wetland is expected to be 1.2 ha in size and a portion of water within the diversion channel will be directed through the wetland to ensure it has ecological function.

As noted, OGNZL is proposing to implement and adhere to a Stream Diversion and Development Plan and a Stream Enhancement Riparian Planting Plan. A draft copy of this plan is provided with Boffa Miskell (2025c) in **Part B** to these application documents.

Fish and kōura salvage and best practice erosion and sediment control measures will also be implemented during the construction works.

This loss of aquatic habitat, along with the 1,435 m which will be lost from other activities associated with the WNP in Areas 5 and 6 is to be offset with the creation of 2,765 m of new stream diversion (that is ecologically functional) and 7,646 m of stream riparian restoration.

Effects Associated with the Discharge of Sediment

The movement of additional sediment from the construction of TSF3 embankment and haul road could give rise to potential adverse effects on downstream habitats. Sediment can

become suspended in stormwater and enter waterways, having the potential for a decline in water quality and the health of downstream aquatic ecosystems.

Boffa Miskell (2025c) sets out that sediment can be managed via erosion and sediment controls.

Effects of Overflow from TSF3

A spillway will be developed from TSF3 to the Ruahorehore Stream as part of the closure activities for the TSF. It is noted there have been no overflows from the currently active TSFs since the mining operations in Waihi have been in operation. The tailings storage ponds are designed with a freeboard allowance that must contain the probable maximum rainfall event with an additional 1 m contingency above the normal operating levels. Decant water is pumped to the processing plant for re-use or to the WTP. As part of the WTP operation, the storage available in the active TSF is monitored and if necessary, decant water treatment is prioritised to ensure freeboard is maintained.

Effects Management

OGNZL is proposing the following to manage the effects of the proposed activities:

> The compensation package for GOP / NRS and TSF3 involves the restoration of 7,646 m of stream margins along the Mataura Stream and Ohinemuri River catchment;

> The potential for sediment to enter the headwater gully be remedied through sediment controls and associated sediment monitoring;

> Implementation of the Aquatic Fauna Salvage and Relocation Plan (included within the ELMP-WA and ELMP-WUG provided in **Part H** of these application documents); and

> Boffa Miskell (2025c) states that provided all design features, requirements and recommendations are successfully implemented, the overall level of ecological effect of the proposed activities at TSF3 on the freshwater ecological values will be low.

6.6.3 Ecological Effects Summary and Effects Management Approach

Table 6-1 presents a summary of the key ecological effects associated with the WNP and details the measures OGNZL proposes to implement to manage those effects.

Table 6-1: Ecological Effects Summary

Ecological Feature	Effect	Effects Management
WUG / Area 1		
Wharekirauponga / Coromandel Forest Park	Temporary loss of vegetation / habitat (0.66 ha).	Site selection processes to avoid high quality habitats from a range of options. Fauna and habitat salvage within the footprint of all clearance areas. Translocation of salvaged animals to an intensively pest-controlled, prepared release site. Remediation for each drill site will occur when work has finished on each site. This will include removing drill platforms, ventilation shafts and exclusion fences, weed control, returning wood debris and fern stumps to cleared area. Replanting and facilitating natural regeneration (enhancement planting) of a 21 ha area on the north-east ridge of Willows Road Farm and buffer planting on the edge of Coromandel Forest Park 5.5 ha.
	A low (but uncertain) risk of adverse effects on Archey's and Hochstetter's frogs. The potential areas of habitat include 314 ha for Archey's frogs and up to 1.5 km of stream in the Edmonds Catchment for Hochstetter's frogs.	Variable mining methods to minimise vibration related impacts on the surface and potential disturbance to fauna above the WUG. The primary offsetting measure to address these potential residual effects on frogs and other fauna, is wide scale intensive pest control over an area of 632ha, including 314 ha exposed to vibration levels greater than 2mm/s and 318 ha immediately adjacent for a period of 15 years. Compensation as research funding is proposed to undertake investigative work above WUG and within the wider Wharekirauponga Animal Pest Management Area to assess efficacy of pest control regimes for frog recovery
Wharekirauponga warm spring	Total loss of warm spring (7 m / 9m^2)	Aquatic fauna salvage and relocation. Fencing and planting of 85 m of headwater springs and seepage gullies of Tributary 3 at Willows SFA - amounting to 80 m length of watercourse (approx. 51 m^2 of freshwater habitat), which is a 12:1 enhancement ratio.
Wharekirauponga Stream	No effect likely but potential for stream reductions associated with dewatering	Because of the uncertainty in whether effects associated with groundwater will occur, and also to aid in the detection of effects, monitoring of streams and wetlands assessed as most at risk, as well as control or reference wetland/s, is proposed to be undertaken.

Ecological Feature	Effect	Effects Management
Wharekirauponga Tributary Streams	No effect likely but potential for stream reductions associated with dewatering	If effects of dewatering are detected, it is proposed that remedial actions such as provision of supplementary water, grouting of fissures which drain shallow groundwater and / or reinjection of water into aquifers may occur to augment flows. If these measures are unsuccessful, inadequate or otherwise unable to be undertaken, an offsetting or compensation package will be developed to address any residual effects and ensure that the project results in no net loss of habitat or ecological value.
Waiharakeke Stream	No effect likely but potential for stream reductions associated with dewatering	
Wetlands	Potential for dewatering	
Willows Site / Area 2		
Vegetation / Habitat	Vegetation habitat / clearance, primarily in the rock stack footprint (2,500 m2)	Revegetation and remediation of rock stack area at mine closure Fence riparian margin to protect vegetation to be retained. The proposed area of revegetation of riparian margin is 56,619 m^2 (stream enhancement to tributary 1 and tributary 3 described below). Vegetation clearance protocols to ensure there are no active bird nests and lizards present
Tributary 2	Reclamation of 558 m of stream habitat, reduced aquatic connectivity and instream works	Reinstatement of stream after the removal of rock stack (long term / approximately 10 years). Aquatic fauna salvage and relocation. Erosion and sediment controls. Offset ecological effects with stream enhancement (tributary 1 and tributary 3 – total enhancement extent of 1,863 m).
Mataura Stream	Earthworks and sediment discharge & contaminant water management	Earthworks – settlement and treatment prior to discharge. Contaminant water management – treatment at WTP.
Mataura wetland	Potential partial dewatering of the Mataura wetland	Avoid works within or near the wetland. Enhance the Mataura wetland (0.28 ha) by 10 m fenced buffer, remove stock, weed & pest management, and planting programme.

Ecological Feature	Effect	Effects Management
Gladstone Open Pit / Area 5		
Planted native trees	1 ha vegetation removal	Timing of vegetation removal to avoid the main bird breeding season (or preclearance nesting surveys). Implementation of a lizard management plan. Adoption of bat-tree felling protocol. Site wide 20 ha of offset restoration planting (for loss of 10.1 ha of sitewide vegetation). Compensation for copper skink habitat removed (6.5 ha removed). Including 11.2 ha of revegetation with pest control and 4.45 ha of pest control in the existing habitat.
Naturally occurring native trees	0.4 ha vegetation removal	
Pine trees	5.1 ha vegetation removal	
Headwater gully	Loss of 47 m of intermittent stream length (~79.4 m^2 of surface area) through reclamation	Aquatic fauna salvage and relocation. For sediment discharges, settlement and treatment prior to discharge. Compensation package for GOP / NRS and TSF3: For the 47 m of stream reclaimed and the residual 644 m of stream not replaced by diversions, and to address time lags in functional restoration of diversions, restore 7,646 m of stream margins along the Mataura Stream and Ohinemuri River catchment.
	Loss of 0.14 ha of riparian vegetation	
Gladstone Wetland	Sediment intrusions	Settlement and treatment prior to discharge.
Northern Rock Stack / Area 6		
Planted natives	8.1 ha of vegetation removal	Timing of vegetation removal to avoid the main bird breeding season (or preclearance nesting surveys). Implementation of a lizard management plan. Adoption of bat-tree felling protocol Site wide 20 ha of offset restoration planting (for loss of 10.1 ha of sitewide vegetation).
Pine trees	1 ha of vegetation removal	
TB1	Diversion of 1,389 m length of stream, reduced aquatic connectivity and sediment intrusion	Aquatic fauna salvage and relocation. Creation of a stream diversion channel (695 m in length) that is ecologically functional. For managing sediment, settlement and treatment prior to discharge Compensation package for GOP / NRS and TSF3: For the 47 m of stream reclaimed and the residual 644 m of stream not replaced by diversions, and to address time lags in functional restoration of diversions, restore 7,646

Ecological Feature	Effect	Effects Management
		m of stream margins along the Mataura Stream and Ohinemuri River catchment.
Tailing Storage Facility 3 / Area 7		
Naturally occurring natives (SNA 166)	8.3 ha of vegetation removal	Mitigation: Timing of vegetation removal to avoid the main bird breeding season (or preclearance nesting surveys). Implementation of a lizard management plan. Buffer plant new SNA edge. Offset: 17.5 ha of offset restoration plantings with an additional 20ha of the SNA to be enhanced.
Naturally occurring natives (non-SNA western fragment)	1.2 ha of vegetation removal	
Naturally occurring natives (non-SNA eastern fragment)	0.3 ha of vegetation removal	Timing of vegetation removal to avoid the main bird breeding season (or preclearance nesting surveys). Implementation of a lizard management plan. Adoption of bat tree felling protocols. Site wide 20 ha of offset restoration planting (for loss of 10.1 ha of sitewide vegetation).
Southern planted fragment	0.3 ha of vegetation removal	
Ruahorehore Stream	Diversion of 2,118 m of stream length, reduced aquatic connectivity and sediment intrusion	Aquatic fauna salvage and relocation prior to works. Creation of a stream diversion channel (2,503 m in length) that is ecologically functional. For managing sediment, settlement and treatment prior to discharge Compensation package for GOP / NRS and TSF3: For the 47 m of stream reclaimed and the residual 644 m of stream not replaced by diversions, and to address time lags in functional restoration of diversions, restore 7,646 m of stream margins along the Mataura Stream and Ohinemuri River catchment.
Farm detention pond	Loss of pond habitat	Aquatic fauna salvage and relocation prior to works occurring.

6.7 LANDSCAPE, VISUAL AMENITY AND NATURAL CHARACTER EFFECTS

The potential effects of the WNP on the landscape, visual amenity, and natural character values of the surrounding environment have been assessed by Boffa Miskell (2025e). Copies of these assessment are provided in **Part B** of these application documents, and the key findings are summarised below

6.7.1 Wharekirauponga Underground Mine

6.7.1.1 Visual Amenity

Because WUG is an underground mine, there will be no potential views of underground tunnelling and below ground mining activity within the Coromandel Forest Park. The combination of topography and landcover in this area of the Coromandel Forest Park also ensures the proposed ventilation evasé will not be seen from beyond their immediate context.

Once operational, water vapour plumes from the ventilation shafts could potentially occur under certain climatic conditions. However, given the limited visibility, considerable viewing distances and transient nature of views, Boffa Miskell (2025e) assesses any potential broader visual effects associated with such plumes to be very low.

In visual terms, the very localised changes associated with the ventilation shafts will remain well concealed in the context of the Coromandel Forest Park and any potential for visual effects is largely avoided.

6.7.1.2 Landscape

The Coromandel Forest Park is recognised as an ONL. OGNZL has carefully designed the WNP so that except for four isolated ventilation evasé, there will be no changes to this landscape. Boffa Miskell (2025e) considers that the sensitive siting of the ventilation evasé and associated activities within the extensive homogenous forest cover (in accordance with the site selection protocol detailed in Section 2.6.1.2), combined with their comparably small scale, will ensure the characteristics and values of this ONL are protected.

6.7.1.3 Natural Character

The potential for effects on natural character has principally been avoided through the underground nature of the WUG activities. There are no direct or physical modifications proposed along existing waterbodies or their margins in the Coromandel Forest Park.

Any potential natural character effects are limited to indirect changes which are largely indiscernible in the context of existing variable surface water flows, and the loss of a single warm spring. Beyond this, Boffa Miskell (2025e) does not anticipate a reduction in the overall condition or quality of existing streams or their margins that contribute to the natural characteristics or qualities of the surrounding Coromandel Forest Park. Given the nature of the localised and limited impacts anticipated, Boffa Miskell considers effects of the WUG on natural character to be very low, and these can be readily addressed by the proposed ecological mitigation measures set out below.

6.7.1.4 Mitigation

Overall, Boffa Miskell (2025e) considers the landscape, visual, and natural character effects of the WUG to be acceptable. However, to further reduce landscape, visual, and natural character effects associated with the WNP activities within the Coromandel Forest Park, Boffa Miskell (2025e) recommends:

- Ensuring ventilation shaft evasé and associated temporary activities are not highly visible from within or beyond the Coromandel Forest Park or from the Wharekirauponga Walk;
- Minimising native vegetation clearance within the Coromandel Forest Park, ensuring any vegetation removal is clearly identified prior to occurring to avoid accidental vegetation loss;
- Sensitive design of temporary buildings and structures (including evasé) using neutral colours which relate to their natural setting; and
- Effectively rehabilitating disturbed areas to ensure they re-establish within the context of the surrounding nature conservation and recreation values of the Coromandel Forest Park.

These matters are incorporated into the proposed conditions, included in **Part D** of this application.

6.7.2 Willows SFA

6.7.2.1 Visual Amenity

Due to the topography of the site and its surrounds, the potential views of the proposed activities at the Willows SFA will be mainly from within the site itself (and a localised area which extends to the south-east). A limited number of roads – many of which service rural properties located off more major transport corridors – may also have potential views of the Willows SFA. This includes parts of SH25, Willows Road, Corbett Road, and very long-distance views from Heard Road and Golden Valley Road. Boffa Miskell (2025e) provides a detailed assessment of the visibility of the proposed activities within Area 2 from these vantage points.

With respect to nearfield viewpoints, the viewing area to the south-east of the site primarily includes the northern end of Willows Road as well as rural and rural lifestyle properties and road users along Willows Road. In this area, the most sensitive views are likely to occur from within adjoining residential dwellings at the northern end of the road (noting that these dwellings are typically enclosed by vegetation). From some of these locations the WRS will become visible although this tends to be glimpses and partial views, and it will only be

visible for a temporary period until it is removed, and the landform is recontoured and returned to grazing.

This viewing area for the site also comprises the northern portion of Highland Road (which originates from Willows Road). Highland Road gradually ascends in elevation from the junction with Willows Road and supports a cluster of four residential properties at the northern end which have a higher sensitivity. Boffa Miskell (2025e) anticipates that 98A and 98B Highland Road (which are at the most northern end of the road) may have partial views of the proposed explosives magazine and upgrades to the existing access over distances of approximately 550 m.

Overall, Boffa Miskell (2025e) considers that due to the sympathetic siting of surface elements in response to sensitive views, and by implementing the mitigation measures set out in Section 6.7.2.5 below, the visual effects associated with the activities at the Willows SFA will not be significant.

6.7.2.2 Landform

The undulating and folded landform of the Willows SFA site is a key characteristic of the foothills of the Coromandel Ranges. Boffa Miskell (2025e) considers that the development of the Willows SFA will alter this existing landform, most notably by the creation of the WRS.

The positioning of the WRS has been considered in relation to the ability for this element to remain visually contained and integrated within the existing folded topographical characteristics in the centre of the proposed Willows SFA. During implementation, the worked appearance resulting from the depositing of material and nature of machinery will appear atypical within the established character of adjoining working rural areas, predominantly comprised of pasture and grazing and areas of intervening vegetation and landforms. Following operation, all rock within the WRS will be returned underground and the area recontoured to the original landform and returned to a tributary surrounded by arable farmland. This area will effectively be reintegrated with the surrounding topography and assimilated within the sequence of foothills at the base of the Coromandel Range.

OGNZL has concentrated the facilities and building required at Willows SFA near the Willows Portal and WRS to maintain operational efficiencies and minimise the overall footprint of disturbance within the Willows SFA site. Where practicable, areas of flatter, low-lying land have been utilised to provide areas for these facilities, particularly to the east of the main access road along terracing above the Mataura Stream. OGNZL also proposes to use an area to the west of the main access road for private carparking, which will be accommodated by localised benching and associated bunds within the lower flanks of the rising topography.

The establishment of the explosive magazines and Ventilation Shaft 1 in the west and north-west area of Area 2, and the access to these features will also result in localised effects. The remaining parts of Area 2 will retain a mosaic of working rural areas with fencing and access tracks alongside pockets of reinforced native regeneration which assist with integrating landform disturbance within the site.

6.7.2.3 Landscape

Part of the Willows SFA will gradually change as the WRS is formed. The establishment of supporting facilities such as the workshop and wash bay will remain comparable to the size, scale and nature of agricultural buildings that are observed in the wider area. Most of these facilities are located within lower lying areas of the Willows SFA and enclosed by the landform alongside existing and proposed vegetation to ensure minimal external views and no detrimental effects on the surrounding open rural character. Most of the established vegetation surrounding the proposed Willows SFA will remain and retain the rural amenity of the area through a predominant cover of pasture and various shelterbelts and tree stands.

Following rehabilitation, Boffa Miskell (2025e) considers that the landscape character of the Willows SFA will appear largely unchanged and continue to be associated with a working rural landscape.

6.7.2.4 Natural Character

The development of the Willows SFA will modify both permanent and intermittent watercourses and tributaries along the Mataura Stream. Whilst the project will remove the upper section of Tributary 2, Boffa Miskell (2025e) considers that such modification will remain embedded in the context of an existing modified working rural environment within which natural elements and influences remain apparent. Boffa Miskell (2025e) considers that the changes to existing streams, alongside the substantial additional riparian planting across the site will provide associated beneficial natural character outcomes.

OGNZL has designed the Willows SFA to avoid potential adverse effects on identified wetlands and to restore the natural character values of tributaries and the margins of the Mataura Stream. At completion, Tributary 2 will also be reinstated. This will remediate any potential adverse natural character effects in the longer term.

6.7.2.5 Mitigation

To effectively mitigate the potential for landscape, visual amenity, and natural character effects associated with the Willows SFA, Boffa Miskell (2025e) recommends:

- Retention of existing shelterbelts, trees and hedges in the Willows SFA site outside disturbed areas where practicable to provide a visual buffer;
- Strengthening of existing shelterbelts through additional planting managed through an effective rehabilitation strategy. This shall encompass:
  - Native buffer planting along escarpment edges;
  - Native buffer planting and exotic shelterbelt planting beyond riparian margins where this may assist in reducing available views;
  - Enhancement planting of existing and proposed wetland areas; and
  - Riparian planting along the Mataura Stream where riparian areas enter the Willows SFA;
- Finishing all exposed batters supporting access roads with rounded edges to integrate within the adjoining landform and scarifying and hydroseeding all exposed soil with pasture and / or native vegetation to assimilate within the surrounding land cover;
- Seeding the proposed earth mounding associated with the explosives magazine and vegetating the area around the explosive magazine to reduce the visibility of buildings;
- Sensitive design of buildings including the use of neutral recessive colours which relate to the rural setting;
- Signage for the entrance of the site should be as discrete as practicable (adhering to NZTA Waka Kotahi sign requirements) and not visually dominate the entrance; and
- Minimising lighting throughout the project as far as practicable so it meets the permitted standards of the zone. Placement and direction of lights should avoid high points which are visible outside of the Willows SFA. Light shields should be used where necessary, and all lightings shall be down facing to minimise effects on the night sky.

These matters are incorporated into the proposed conditions, included in **Part D** of this application.

6.7.3 Gladstone Open Pit and In-pit TSF

6.7.3.1 Visual Amenity

Despite the substantial modification to Gladstone Hill, the potential for visual effects associated with the GOP and subsequent tailings storage are relatively limited. During construction and operation, the southern slope of Winner Hill will remain intact, with the mine centred on Gladstone Hill and within the existing low point extending between Winner and Gladstone Hills. In this context, visual effects are well contained and primarily occur

from adjoining areas that observe Gladstone Hill in the context of the existing Processing Plant. In addition, potential wider views of landform changes associated with the GOP will remain largely obscured by intervening landforms including Winner Hill and Union Hill.

Potential views from the eastern area of Waihi, including rural residential dwellings along Heath Road, are primarily contained by intervening plantation pine trees retained along the western edge of the pit rim and residual form of Winner Hill, as well as native planting extended along the margins of the Ohinemuri River. Over longer distances, the proposed removal of Gladstone Hill may be visible from residential areas of Waihi. At completion of mining, Boffa Miskell (2025e) considers that the GOP TSF will remain visually well contained and avoid the potential for any longer-term visual exposure and associated potential adverse visual effects.

The relocated powerline to the western side of the GOP will be viewed in the context of the GOP, and will not appear unexpected in the surrounding environment.

6.7.3.2 Landscape

The GOP will substantially modify an existing working rural area and part of the sequence of rounded elevated landforms which extend to the east of Waihi. This will gradually extend mining activity within a localised area adjoining the existing Processing Plant but will remain relatively well contained beyond Union and Winner Hills. During operation, Boffa Miskell (2025e) considers that the retention and enhancement of vegetation, including plantation pine on Winner Hill, and expanded native planting along the margins of the Ohinemuri River will ensure potential views from surrounding rural areas remain well contained.

The relocated powerline is not expected to impact landscape values.

6.7.3.1 Natural Character

The GOP is located within a modified rural area where man-made elements / influences are dominant, comprising grazing, forestry and proximity to the existing Processing Plant. Construction of the GOP will result in the removal of a small headwater gully containing an area of planted riparian vegetation, previously carried out voluntarily by OGNZL, with moderate ecological value as identified in the assessment of ecological effects described in Section 6.6 above. OGNZL will undertake pre-operation ecological mitigation and substantial replacement planting to offset any habitat loss, as well as undertake rehabilitation to reinstate surface water flows at completion. Boffa Miskell (2025e) considers that implementing these measures will ensure that any potential adverse natural character effects are not significant or inappropriate in this modified rural context.

6.7.3.2 Mitigation

To mitigate the potential for visual effects associated with activities at GOP and the GOP TSF, Boffa Miskell (2025e) recommends:

- Retaining the remaining areas of plantation pine, including established pine trees on Winner Hill outside the footprint of the GOP;
- Establishing further terrestrial planting along the margins of the Ohinemuri River and within intervening rural land during operations to reinforce the overall contribution to a vegetated landscape context containing mining activity;
- Where practicable, the activity progresses from east to west to ensure any activity associated with the removal of landform remains concealed from wider views to the south-east of Waihi; and
- Following closure of the GOP TSF, the final landform surrounding the pit be re-established with pasture and native shrubs, therefore offering opportunities to further assimilate the modified landform within a working rural landscape to reduce the potential for any longer-term significant adverse effects.

These matters are incorporated into the proposed conditions, included in **Part D** of these application documents.

6.7.4 Waihi SFA Upgrades

6.7.4.1 Visual Amenity

Upgrades within the existing Waihi SFA will remain contained between Union Hill and the Ohinemuri River and typically concealed from view, except for views from parts of Black Hill and glimpse views obtained along Golden Valley Road. No potential longer distant views have been identified, including the potential for any views from the urban area of Waihi.

6.7.4.2 Landscape

Upgrades to the existing Processing Plant and the WTP will remain within the established development footprint and largely concealed from external view. Any change in configuration of the existing operation is unlikely to be discerned from beyond this contained area of the site accessed along Baxter Road.

6.7.4.3 Natural Character

The upgrades will occur within an existing modified mining environment, such that there will be no natural character effects. The new outfall structures will be similar in design and located in the same area as the existing outfall structures. Therefore, no adverse change in the natural character values of the waterbody in those locations is expected.

6.7.4.4 Mitigation

To mitigate the potential for visual effects associated with activities at the Waihi SFA, Boffa Miskell (2025e) recommends that all replacement infrastructure installed on-site is the same colour as the existing infrastructure and therefore remains visually recessive in this established and contained industrial context.

6.7.5 Northern Rock Stack

6.7.5.1 Visual Amenity

Despite its scale, Boffa Miskell (2025e) considers that the NRS will appear relatively enclosed by adjoining more elevated hills and remain associated with existing mining activity, which will limit the potential for more significant visual effects.

During operation, some visual effects will occur from within Golden Valley, however these will predominantly occur in association with temporary stockpiles near Golden Valley Road introducing a temporary disruption and subsequent grassed bunds in the context of this existing working rural area. The majority of such views will gradually be reduced by planting introduced along the immediate boundary of the site consistent with adjoining areas.

Some longer distance glimpse views may also occur from rural areas to the east of Golden Valley and north of Waihi, however these will result in limited change in the context of existing elevated landforms and existing mining activity generating low visual effects. Views of the gradual change in landform as proposed will remain consistent with this established working area and largely enclosed by adjoining hills. At completion, Boffa Miskell (2025e) considers that rehabilitation of the landform including revegetation will assist the NRS to tie in with the working rural context and will successfully serve to mitigate the potential for any longer term adverse visual effects.

6.7.5.2 Landscape

The construction of the proposed NRS will result in the progressive and gradual modification of a localised rural area within the existing Martha Mineral Zone. Moreover, during operation, temporary topsoil stockpiles will be developed along the margins of Golden Valley Road. These will be progressively reinstated in grass cover and enclose the area where the

Western Borrow Area and subsequently the NRS is formed. Impacts of mining activity have already occurred in this location and will continue to influence the character of this area of landscape. At completion, much of the rock will be reused and the resultant landform will be recontoured and grassed to support adjoining rural land use through rehabilitation.

6.7.5.3 Natural Character

During construction of the NRS, small areas of degraded and restored wetlands will be removed alongside the diversion of 1,389 m of permanent and intermittent watercourses and tributaries of the Ohinemuri River. These have been planted with native vegetation with medium ecological value as set out in the assessment of freshwater effects.[58] In natural character terms, such modification occurs in the context of existing mining activity and associated man-made elements and influences which remain dominant in this location.

As part of mitigating potential natural character effects, OGNZL will undertake substantial replacement planting around a diverted stream corridor following the perimeter of the NRS, combined with additional planting and the development of associated habitat opportunities along the margins of the Ohinemuri River and within SNA 166. Boffa Miskell (2025e) does not consider the NRS to be inappropriate within this more modified rural context given that it has been configured to ensure no significant adverse effects on natural character will occur.

6.7.5.4 Mitigation

To effectively mitigate potential for landscape, visual amenity, and natural character effects associated with the NRS, Boffa Miskell (2025e) recommends:

> Establishing fast-growing native planting along the periphery and margins of Golden Valley Road;

> Maintaining temporary stockpiles in pasture to reduce the ongoing raw worked appearance of the NRS;

> Reinstating riparian and terrestrial vegetation along the margins of diverted streams and reinforcing of existing vegetation along the Ohinemuri River; and

> Upon closure, removing and rehabilitating areas accommodating temporary stockpiles, rounding off the final contour of the NRS, and reinstating with pasture.

These matters are incorporated into the proposed conditions, included in **Part D** of these application documents.

[58] Boffa Miskell (2025c) Waihi North Project – Freshwater Ecological Assessment.

6.7.6 TSF3

6.7.6.1 Visual Amenity

The existing TSFs are located within the Martha Mineral Zone and east of the Processing Plant and Ohinemuri River. The TSFs form part of an established modified landscape character which is relatively well enclosed from the urban area of Waihi and surrounding rural areas by a sequence of surrounding more elevated and vegetated hills. Views of TSF3 will generally be limited to adjoining rural areas, with intervening vegetation frequently reducing available views, and viewers will typically observe TSF3 in the context of the existing TSFs. In this context the available viewing audience comprises those residing in rural dwellings and transient viewers traveling along rural roads.

Boffa Miskell (2025e) identifies that the adverse visual effects associated with TSF3 will primarily be generated during its construction and will be limited to properties located along Trig Road North and Waihi Beach Road. At completion, TSF3 and the stockpile will be re-established in pasture to ensure the extended TSFs recede into the pastoral landscape against the larger existing vegetated backdrop. Based on this, and incorporating the mitigation measures set out below, Boffa Miskell (2025e) assesses the level of residual adverse effects on properties along Trig Road North to be low to moderate. For all other locations, Boffa Miskell assesses the level of residual adverse effects on visual amenity as low.

Over greater distances, Boffa Miskell concludes that TSF3 will not be visible from any part of Waihi's urban area given the nature of intervening landforms including Black Hill and intervening vegetation.

6.7.6.2 Landscape

The proposed development of TSF3 will adjoin the existing TSFs and extend along the slopes of a larger more elevated undulating backdrop to the north and east. During construction, the Central and Eastern Borrow Areas and subsequently TSF3 will remain relatively well contained whilst generating relatively localised landscape effects within this working rural area. At completion, TSF3 will extend as a linear terrace in the foreground of the larger more elevated and vegetated natural backdrop. Vegetation removal will be replaced with enhancements to native vegetation and habitats within the adjoining SNA and riparian planting along the Ruahorehore Stream and the Ohinemuri River. Once completed, the faces of TSF3 will be reinstated in pasture to become visually assimilated with adjoining rural areas, which Boffa Miskell (2025e) considers will mitigate the potential for any longer term significant adverse effects.

6.7.6.3 Natural Character

Constructing TSF3 will result in the loss of several small permanent, intermittent and ephemeral streams, artificial watercourses and a water silt pond with low to moderate-high ecological value.[59] The resulting stream diversion will follow the contour of the landform and create a more engineered linear appearance along the eastern edge of TSF3.

In natural character terms, TSF3 extends from a mixed vegetative backdrop through a more highly modified rural character which adjoins an existing TSF where man-made elements and influences are dominant. Potential adverse natural character effects are therefore primarily associated with modifications to streams and include substantial riparian enhancements along diverted streams and the margins of the Ruahorehore Stream to reinforce habitat opportunities. Given this modified rural context and the extent of mitigation proposed, Boffa Miskell (2025e) considers that such changes in natural character are not inappropriate and will avoid any potential for ongoing or significant natural character effects.

6.7.6.4 Mitigation

To effectively mitigate the potential for landscape, visual amenity, and natural character effects associated with TSF3, Boffa Miskell (2025e) recommends:

> Ensuring temporary stockpiles are hydroseeded with pasture to resemble adjoining rural areas during operation;

> Replacing vegetation proposed to be removed, with the establishment of vegetation in SNA 166 and along existing watercourses to offset vegetation loss and improve connectivity and ecologically functioning along the Ruahorehore Stream; and

> Re-establishing the final embankment and stockpile in pasture and facilitate re-establishment with native wetland plants within stored tailings areas at completion.

6.7.7 Conclusion

Overall, Boffa Miskell (2024, 2025e) concludes that:

> Due to the underground nature of the WUG, landscape, visual, and natural character effects within the Coromandel Forest Park will be largely avoided. The distinctive peaks, ridges and valleys will remain intact alongside its existing broader native forest cover and backdrop consistent with its inherent vivid, wild and remote qualities. No physical modification to existing streams or rivers is anticipated, and potential localised impacts

[59] Boffa Miskell (2025c) Waihi North Project – Freshwater Ecological Assessment.

on aspects relating to landscape and natural character will avoid potential for any significant adverse effects and are addressed through appropriate remediation; and

> Beyond the Coromandel Forest Park, the project will remain visually well contained and primarily in the context of established mining activity, resulting in no significant increase in adverse landscape or visual effects. Sympathetic siting alongside identified landscape mitigation will ensure the project avoids significant adverse effects and remains well integrated within its local landscape setting and facilitates positive landscape and natural character outcomes in the long-term. Such outcomes include facilitating greater connectivity between inherent values within the Coromandel Forest Park and the wider surrounding rural landscape

6.8 GEOTECHNICAL EFFECTS

OGNZL has undertaken extensive geotechnical investigations into each element of the WNP. Assessments associated with these investigations include WSP (2025a), EGL (2025c, 2025d, and 2025e), GHD (2025a), PSM (2025a), copies of which are provided in **Part B** to these application documents. The key considerations and conclusions of these investigations are summarised in the following sub-sections.

6.8.1 Tunnelling and Underground Mining

An assessment of geotechnical matters relating to the proposed tunneling and underground mining activities of the WNP is provided in WSP (2025a).

6.8.1.1 Wharekirauponga Underground Mine

WSP (2025a) reviewed the Preliminary Economic Analysis ("**PEA**") of the WUG.[60] The PEA used data from 77 cored drill holes to develop a geological model and geotechnical database, which included the distribution of identified lithological units and major structural features. This work has informed the preliminary conceptual approach to the proposed underground mining.

OGNZL will refine and adapt this preliminary conceptual approach as the design of the WUG progresses, and as a more detailed understanding of ground conditions is developed. This will include collecting and analysing additional rock mass characterisation data.

WSP (2025a) concludes that, based on the available geotechnical information to date, the PEA follows industry practice, and the input parameters for the stope design are

[60] The PEA was completed by SRK Consulting (Australasia) Pty Ltd and by OGNZL. The relevant geotechnical section of the PEA is attached as an Appendix D to WSP (2025a).

appropriate. In addition, WSP (2025a) considers that the proposed mine design and mining methodology is appropriate for the Wharekirauponga deposit given the current design stage.

In accordance with the recommendations of WSP (2025a), OGNZL will assess the following matters as part of the next design stage:

> Ground support regime;

> Vertical opening stability;

> Strength of the stope backfill options including cemented rock fill; and

> Proposed geotechnical monitoring instrumentation during mining.

6.8.1.2 WUG Dual Tunnel

WSP (2025a) anticipated that the WUG Dual Tunnel will encounter a range of volcanic rocks including flows, tuffs, breccias or pyroclastic materials and potentially minor sedimentary deposits. Core samples indicate that the layers are in the order of tens to hundreds of metres in thickness and oriented sub-horizontal or gently inclined. The materials are typically strong rock or weak altered rock based on available drill core; however, very weak materials are anticipated within fault zones.

Mapped faults and lineaments, inferred to be faults, cross the tunnel alignment at various locations. Higher permeability zones are anticipated to be present within fault zones and some sub-horizontal to gently inclined volcanic layers. Consequently, minor groundwater inflows are expected in most of the tunnel length, with high inflows in localised zones. WSP (2025a) considers that it is possible that groundwater temperatures may be elevated due to hydrothermal processes.

OGNZL will likely undertake exploratory drilling ahead of the tunnel face to identify inflow rates along the alignment and will mitigate high groundwater inflows by grouting and lining. Inflows in low inflow zones will be collected at sumps and pumped to the surface for treatment at the WTP.

Tunnel support will likely mainly comprise pattern rock bolting and shotcrete installed shortly after excavation. Heavier, full shotcrete lining, with mesh and bolts will likely be required for areas of weak or highly fractured ground.

Additional boreholes proposed along the WUG Dual Tunnel alignment will provide valuable geotechnical information to assist in detailed design. This will include rock strength data, discontinuity orientation, spacing and condition data and characterisation of groundwater conditions.

6.8.1.3 Willows Access Tunnel

WSP (2025a) expects the Willows Access Tunnel to mainly encounter Whiritoa Andesite, with the underlying Waipupu Formation Andesite to be intercepted a few hundred metres from Ventilatoin Shaft 1. Core samples from borehole investigations indicate that about half of the length of the Willows Access Tunnel will encounter very weak, soil-like material ('poor rock') and half will be moderately strong rock or better ('good rock').

Groundwater inflows are likely to occur in some parts of the decline. In particular, the inflows are anticipated to be significant from within strong, fractured rock units, faults and from permeable unit boundaries. OGNZL will manage these inflows using standard industry techniques, for example, grouting and lining. Groundwater inflows have been discussed in Section 6.4.1.1 above.

Tunnel support requirements will be variable, but will generally include pattern rock bolts and shotcrete, with zones of full shotcrete support in poor ground.

6.8.1.4 Willows Portal

The Willows Portal will be accessed via a road from the Willows SFA that will cross the lower part of the WRS. The slope above the portal is affected by shallow slope instability and will require measures to ensure that portal security is maintained. Such measures will include management of surface water and shallow groundwater and local support measures such as shotcrete and bolts or construction of a mass gravity wall.

6.8.1.5 Wharekirauponga Access Tunnel

WSP (2025a) anticipates that the construction of the Wharekirauponga Access Tunnel will encounter a range of different volcanic rock types. Based on the available drill core reviewed as part of the assessment, the layers are in the order of tens to hundreds of meters thick and are oriented sub-horizontal or gently inclined. The Wharekirauponga Access Tunnel will encounter either Whiritoa Andesite or the Waipupu Formation Andesite, which comprise geotechnically similar materials. Andesite rock has low permeability so in such areas groundwater and surface water inflows are not anticipated to be significant. The andesitic rocks do not contain enriched sulphides or trace elements.

A portion of the Wharekirauponga Access Tunnel is expected to encounter the Waihi Fault. The Waihi Fault is likely to be an east dipping normal (extensional) fault associated with local tectonic setting. Ground conditions in the vicinity of the Waihi Fault are likely to include weak materials and brecciated zones tens to hundreds of metres in width with local highly sheared clay gouge zones. Groundwater inflows into the tunnel have the potential to be high in fault zones or within brecciated zones and will require specific engineering management

in such locations. This will be done using standard management techniques applied to this type of tunnelling activity.

Tunnel support will mainly comprise pattern rock bolting and shotcrete installed as soon as practical after short excavations. Heavier support, including full shotcrete lining with mesh and bolts will likely be required for areas of weak or highly fractured ground. As the Wharekirauponga Access Tunnel extends deeper into the andesite, tunnel support requirements will likely reduce.

6.8.1.6 Ventilation Shafts

Ventilation Shaft 1 will be up to 250 m deep and located near the northern boundary of Area 2 and the Coromandel Forest Park. Ventilation Shaft 1 will be located in andesite rock with strength ranging from very weak to strong. Under these conditions, WSP (2025a) recommends a construction methodology that allows suitable support to be progressively installed during construction for the upper weaker portions combined with raise-boring for lower sections where ground conditions allow. This construction methodology will ensure the construction, operation, and closure of Ventilation Shaft 1 is geotechnically sound.

Ventilation Shafts 2 – 5 will be located above the Wharekirauponga orebody within the Coromandel Forest Park on sites previously utilised as hydrogeological / pumping test sites. OGNZL will select the sites based on technical requirements and will undertake investigations to ensure that selected sites are suitable from a geotechnical perspective.[61] OGNZL will use industry standard construction methodology to ensure the construction, operation and closure of Ventilation Shafts 2 – 5 is geotechnically sound.

6.8.1.7 Conclusion

Based on the geotechnical investigations that have been undertaken, and the management measures proposed, it is considered that the WUG and its associated components can be established in a manner that will not compromise underground or surface stability.

6.8.2 Willows Waste Rock Stack

A study relating to the design of the WRS is provided in EGL (2025g), a copy of which is provided in **Part B** of these application documents.

In summary, EGL (2025g) considers that any potential risks associated with the geotechnical stability of the WRS can be successfully mitigated by:

[61] As set out in Section 2.6.1.2, the pumping test / ventilation shaft sites will also be subject to an MCA to evaluate potential sites against ecological, freshwater, landscape, heritage, and recreational criteria.

- Utilising design, construction and operational techniques which have been employed at other sites at Waihi;
- Closely monitoring and supervising the construction of the WRS with appropriately experienced expertise;
- Implementing specific design, construction and monitoring features such as:
  - The removal of weak foundation soils;
  - The adoption of appropriate geometry and zoning;
  - Placement and compaction of fill in structural zones to specified standards;
  - Controls on layer thickness and locations of bulk fill;
  - Subsurface drains to intercept seepage beneath and within the WRS to control the level of saturation; and
  - Appropriate detailing of drains and monitoring of groundwater levels within, beneath and downstream of the WRS;
- Cutting the foundation to rock to form a shear key at the downstream toe to minimise risk associated with instability in the foundations; and
- Preparing erosion and sediment control plans for the works. The layout of the site allows for effective erosion and sediment control measures to be implemented.

During the detailed design phase, the WRS design will be subject to a rigorous independent peer review and council certification process. This is reflected in the proposed conditions provided in **Part D** of these application documents.

6.8.3 Gladstone Open Pit, Gladstone Open Pit Tailings Storage Facility, and Gladstone Portal

A geotechnical study of the GOP, GOP TSF and Gladstone Portal is provided in PSM (2025a), and a study relating to the design of the GOP TSF is provided in GHD (2025a). A copy of each of these reports are provided in **Part B** of this application.

6.8.3.1 Gladstone Open Pit

Extensive underground and open pit mining at Waihi has generated a large body of knowledge and a good understanding of the geotechnical conditions that are likely to be encountered by the GOP. Additional geotechnical investigations have also been undertaken to inform the GOP. This is described in PSM (2025a).

This current information has been used to develop a preliminary, conceptual approach to the proposed GOP development. This conceptual approach will be refined and adapted as mining proceeds, and a more detailed understanding of ground conditions is developed. This will be obtained through further studies and analysis, some of which can only occur when the GOP development takes place and as a result of further investigations before and during the development. PSM (2025a) indicates that this approach will be relatively straightforward to achieve at GOP because the centre of the open pit is on low hills, and significant excavation occurs early in the mining plan.

PSM (2025a) confirms that the planned slopes in the GOP are achievable, and with suitable dewatering and depressurisation, the risk of rock mass failure will be sufficiently low.

PSM (2025a) advises that OGNZL must formulate a Ground Control Management Plan ("**GCMP**") for the GOP prior to the commencement of mining. The GCMP will provide the further information necessary for OGNZL to undertake a detailed design of the pit. It will likely include:

- A detailed staged pit development plan to allow the rock mass conditions, geological structure and geology to be confirmed before commitment to final pit crest and overall design slopes;
- A comprehensive piezometer network around the pit, established before mining commences to measure groundwater levels and pore pressures;
- The characteristics of faults and shears, particularly the continuity;
- The unconfined compressive strengths and shear strengths of the young volcanic units and the Andesite Class 4;
- Confirming Andesite Class 3 shear strengths;
- Stability conditions around problem areas in nearby underground mines and the appropriate remediation treatments during mining;
- Planning for a comprehensive horizontal drain programme in the pit; and
- Horizontal grading of the berms (that is inclined berms) in the upper flatter sections of the pit wall slope to direct rainfall runoff and any shallow seepage away from lower slopes.

The GOP presents no risk to the stability of land not owned by OGNZL. As such, the GCMP will be an internal document and is not proposed as a consent requirement. A condition is proposed, however, which limits the footprint of the GOP within which OGNZL must manage excavation. OGNZL will ensure the works within the footprint of the GOP achieve the

purposes of the GCMP. No further effects management requirements are considered necessary at this location.

6.8.3.2 Landslides Near the Gladstone Open Pit

Two landslides adjacent to the GOP have been investigated by PSM (2025a). The landslides occurred on the eastern and western sides of Gladstone Hill at the northeastern end of the Gladstone Open Pit. The eastern landslide will be removed by the proposed open pit mining. The upper reaches of the western landslide will be removed by mining. These landslides will have no impact on the proposed open pit mining and can be appropriately managed by over-excavating (as necessary) along the upper reaches of the western landslide to maintain or improve its stability.

6.8.3.3 Gladstone Pit Tailings Storage Facility

The GOP TSF, to be formed following the completion of the mining of the GOP, will require backfilling the lower part of the pit with rock, and laying rock at flatter angles against the upper pit walls to achieve adequate levels of safety prior to it receiving tailings. Further stability and an appropriate long-term Factor of Safety in the pit walls will be achieved by filling the GOP TSF with tailings.

The design of the GOP TSF, as outlined in GHD (2025a), has been completed in accordance with NZSOLD Dam Safety Guidelines and the Australian National Committee on Large Dams ("**ANCOLD**") (2019) Guidelines on Tailings Dams. The design of the TSF reduces any geotechnical or future hazard risk, by:

- Not receiving any tailings until all potentially connected underground mining is completed;
- Mapping and remediating historical adits that pass through the pit shell and daylight outside of the pit footprint or connect to underground workings so they do not provide a path for release;
- Reducing any risks of the underdrainage system leading to instability and failure of the liner and backfill surface through stability modelling and by providing added redundancy to the underdrainage system; and
- Reducing the risk of a wave overtopping event by ensuring the amount of freeboard above the maximum operating pond is sufficient to reduce the risk of a rockfall event causing an overtopping event.

Unlike a traditional embankment TSF, the GOP TSF is an in-pit storage facility with tailings contained without relying on a constructed embankment. No dam breach assessment has been completed, as any risk in this respect is negligible.

6.8.3.4 Gladstone Portal

As described in Section 2.10.2.2, the GOP will mine out the existing Favona Portal that provides access to the Martha Underground Mine via the Trio Upper Drive. As such, provision will be made for a new portal and decline within the north wall of the GOP itself (the Gladstone Portal). Alternatively, provision may be made for a new portal to the Martha Underground Mine (the MUG Portal) adjacent to the proposed WUG Portal.

PSM's preliminary geotechnical review of the new Gladstone Portal location does not identify any significant geotechnical issues.

6.8.3.5 Conclusion

The GOP and GOP TSF will be designed in accordance with best practice engineering and geotechnical standards. This will ensure a safe and stable structure in the long term.

6.8.4 Northern Rock Stack

The design of the NRS and associated activities is described in EGL (2025d), provided in **Part B** of these application documents.

In summary, EGL (2025d) considers that any potential risks associated with the geotechnical stability of the NRS can be successfully mitigated by:

- Utilising design, construction and operational techniques which have been employed at other sites at Waihi;
- Closely monitoring and supervising the construction of the NRS with appropriately experienced expertise;
- Diverting surface water and runoff around the NRS;
- Cutting the foundation to rock to form a shear key at the downstream toe to minimise risk associated with instability in the foundations;
- Designing the outer surface of the NRS so that it has slopes of 3h to 1v with suitable capping and internal drainage within the stockpile. These features will ensure good performance of the stockpile when subject to earthquake ground motions; and
- Erosion and sediment control plans will be prepared for the works. The layout of the site allows for effective erosion and sediment control measures to be implemented.

During the detailed design phase, the NRS design will be subject to a rigorous independent peer review and council certification process. This is reflected in the proposed conditions provided in **Part D** of these application documents.

6.8.5 TSF3

The design of TSF3 is described in EGL (2025c) which is provided in **Part B** of these application documents.

EGL (2025c) confirms that the proposed TSF3 can be developed in a similar and safe manner as that which has been accomplished for existing storage facilities at Waihi. The preliminary design also confirms that the expected performance of the facility will meet (or exceed) the necessary criteria for engineering and dam safety requirements (acknowledging that TSF3 and its collection ponds are classified as large dams under the Building Act 2004) and will minimise the natural hazard risk via a comprehensive suite of measures built into the location, design, construction, operation, maintenance and surveillance of the facility (as detailed further in EGL (2025e)). Dams that are designed and operated in accordance with these criteria and standards have a low and acceptable risk of potential failure and a breach will be highly unlikely to occur.

The proposed conditions will require this to be confirmed at the detailed design phase through a rigorous peer review and council certification process.

OGNZL will also need to obtain building consent under the Building Act 2004 for TSF3 and its collection ponds due to their classification as large dams. Insofar as it relates to geotechnical matters and natural hazards, the design and operation of TSF3 will also need to be assessed and confirmed as appropriate through that process.

6.9 GEOCHEMISTRY AND ACID ROCK DRAINAGE EFFECTS

An assessment of geochemistry and the potential for acid rock drainage in relation to the tunneling and underground mining components of the WNP is provided in GHD (2025b) and AECOM (2025), copies of which are provided in **Part B** of these application documents.

6.9.1 Area 1

Analysis of the acid-generating potential of the WUG material suggests that like the material currently managed at Waihi, the WUG spoil has low acid neutralising capacity ("**ANC**") values and may result in acid generation and leaching of trace elements unless appropriate control measures are implemented.

To ensure appropriate geochemical management of any PAF spoil to reduce potential effects on water quality, the implementation of an appropriate spoil management strategy will be required.

OGNZL has utilised a combination of methods to effectively manage spoil at its Waihi operations to date, and it is proposed that management of rock sourced from the WUG Dual Tunnel and the WUG will employ similar methods. They include:

- Oxidation Control – Control of oxygen flux to reactive sulphides, such as by deposition under water or through the application of low permeability layers;
- Geochemical Control - Blending rock types or addition of neutralising materials to control pH and oxidation rates; and
- Hydrological Control - Placement of low permeability layers, evapotranspiration layers and spoil management structures to control the potential leaching rate from the disposal facility.

During the development and operation of the WUG Dual Tunnel and the WUG, groundwater will be diverted around active workings (using grouting or similar techniques). However, some will be drained into the mine workings. This water will either be recycled for drilling purposes or conveyed via the WUG Dual Tunnel and the Willows Access Tunnel to collection ponds at the Willows SFA and ultimately the WTP (Area 5) for treatment prior to discharge.

6.9.2 Area 2

The assessment provided for the WUG Dual Tunnel in the section above is representative of the geochemistry and acid rock drainage characteristics of the Willows Access Tunnel, and as such has not been repeated here.

The Area 2 WRS facility will provide for storage of PAF and NAF rock. The PAF rock requires a carefully laid out management strategy that mitigates acid generation and leaching potential. This will involve the WRS being established on a low permeability footprint, provision of subsurface drainage to collect and divert seepage to the Willows Collection Pond for appropriate treatment, and addition of crushed limestones to any PAF rock to increase its acid neutralising capacity. Monitoring data to date has confirmed that NAF materials are not leaching trace elements at the site. This monitoring will continue, and if leaching is identified appropriate remedial steps will be taken in accordance with the Willows Rock Stack Monitoring and Management Plan provided for with the proposed conditions (refer to Condition SC2.F.23), provided in **Part D** to these application documents.

The proposed monitoring will be the same as has been used and shown to be effective in the construction of the existing TSFs and rock stacks by OGNZL at Waihi.

6.9.3 Area 3

Geochemical modelling confirms that in general, the andesite material which is likely to be encountered during the development of the Wharekirauponga Access Tunnel is likely to be elevated in mercury, antimony, and arsenic.

As noted, OGNZL has utilised a combination of methods to effectively manage spoil at its Waihi operations to date, and it is intended to adopt similar management methodologies for effective spoil management for material sourced from the Wharekirauponga Access Tunnel. The management will integrate with the existing management regime and be in accordance with the methods set out for Area 1 above (in Section 6.9.1).

Rock material extracted from the development of the Wharekirauponga Access Tunnel will be taken to the northern end and to the WRS, and to the Polishing Pond stockpile at the southern end. Management of the rock material within these stockpiles will be based on strategies to reduce oxygen and water ingress, to prevent as far as practicable the oxidation of materials, and to reduce the mobilisation of contaminants. Water from these stockpiles will be managed so that it is captured and taken to the WTP for treatment and discharge.

Water encountered during the tunnel construction will be drained to sumps. Water not recycled for drilling purposes will be pumped to the WTP for treatment and discharge.

6.9.4 Area 4

Area 4 comprises the Services Trench, which does not form part of this application.

6.9.5 Area 5

Analysis of the acid-generating potential of the GOP material suggests that, like the material currently managed at Waihi, there is the potential for leaching of sulphate and trace metals which may impact groundwater quality unless appropriate control measures are implemented.

To ensure appropriate geochemical management of any PAF spoil to reduce potential effects on water quality, the careful implementation of an appropriate spoil management strategy will therefore be required.

The proposed management of rock sourced from the GOP will be similar to methods already utilised by OGNZL in Waihi for effective spoil management. The management will integrate with the existing management regime and be in accordance with the methods set out for Area 1 above (in Section 6.9.1).

The closure of the GOP involves backfilling with approximately 5 Mt of rock and installation of a liner over this rock to enable tailings placement. The key mitigation measures for the placement of any PAF rock within the GOP will include:

> For rock placed below the GOP TSF liner, material will be paddock dumped and spread and compacted in lifts in the order of 1 m in height, limestone amendment of these layers will be completed to provide lag to limit acid generation until subsequent lifts are placed and compaction via track rolling vehicle movement across each of these lifts; and

> For tailings above the GOP TSF liner, the continued placement and encapsulation of material will be in the same manner as other permanent storage facilities.

The rate of limestones amendment for rock material will be dependent on the required lag period.

6.9.6 Area 6

The NRS facility will provide for the storage of PAF and NAF rock. The PAF rock requires a carefully laid out management strategy that mitigates acid generation and leaching potential. The NRS will incorporate a system of subsurface drains, a low permeability NAF earth fill liner, leachate drains, addition of crushed limestones to any PAF rock to increase its acid neutralising capacity, and a rehabilitation strategy to prevent long term infiltration of oxygen and water.

This is the same approach used and shown to be effective in the construction of the existing TSF embankments and rock stacks by OGNZL at Waihi.

While this approach is aimed at preventing leaching of contaminants from occurring (i.e. through the placement and encapsulation of material), any seepage of leachate will be captured by the subsurface drains and directed to the WTP for appropriate treatment prior to it being discharged to the environment.

6.9.7 Area 7

TSF3 will be constructed from PAF and NAF rock. The PAF rock requires a management strategy that mitigates acid generation and leaching potential.

The proposed management of rock sourced from TSF3 will be similar to methods already utilised by OGNZL in Waihi for effective spoil management. The management will integrate with the existing management regime and be in accordance with the methods set out for Area 1 above (in Section 6.9.1).

At TSF3, this will include:

> Limiting the exposure time for PAF rock before its permanent disposal;

> Treating PAF rock with limestones prior to permanent disposal where that is necessary to delay the onset of acid generation;

> Covering PAF rock with NAF material as sealing intermediate layers or as final cover to limit oxidation of sulphides in the PAF material; and

> Compaction of surface material to reduce permeability and ingress of oxygen and water.

The design of TSF3 also incorporates a comprehensive water management system which will collect any runoff and seepage from the structure and divert it to the WTP for treatment prior to it being discharged to the environment.

6.9.8 Conclusion

The mitigation and management practices identified above for potential acid rock drainage are considered suitable based on more than thirty years of successful application of such practices at Waihi, including in relation to existing mines, tunnels, and TSFs

6.10 NOISE EFFECTS

The actual and potential noise effects associated with the WNP have been assessed by Marshall Day (2025). Copies of both reports are included in **Part B** of these application documents. Marshall Day has assessed both the construction related noise effects and the operational noise effects. This includes the effects of helicopter noise, which will occur during both the construction and operational phases of the project. The noise calculation methodology that Marshall Day used, and the conclusions from the assessment are summarised in the following sub-sections.

6.10.1 Noise Calculation Methodology

Marshall Day (2025) undertook a significant amount of 3D computer noise modelling to account for the spatial and temporal extent of the WNP works. For each of the discrete project elements, different scenarios were modelled for each year or activity phase, as were cumulative effects. By combining scenarios, Marshall Day (2025) was able to assess how the project's noise envelope will vary over its lifespan.

To assess the effects of noise on sensitive receivers, Marshall Day selected representative receivers for each aspect of the project and reported discrete noise levels at each receiver. The selected receivers were chosen because of their likelihood to be most adversely

affected by noise generated from different parts of the WNP. This includes consideration of how close the receiver is to the project, and the presence of, or lack of existing screening. They therefore represent the reasonable worst case locations and thus if noise levels are compliant at these representative receivers, they will be compliant everywhere else. Marshall Day also prepared area-wide noise contours to depict the spatial noise emission extent (included as Appendix D – E in Marshall Day (2025)).

For further details of the noise calculation methodology, including the assessment parameters, refer to Marshall Day (2025).

6.10.2 Construction Noise

For specified construction activities, Marshall Day (2025) considers that noise can be appropriately managed by complying with the construction noise limits set out in New Zealand Standard 6803:1999 Acoustics – Construction Noise ("**NZS6803:1999**"), which is consistent with the HDP noise limits. NZS6803:1999 allows for higher noise levels during normal working hours for construction in residential areas to accommodate construction activities.

Marshall Day considers that compliance with NZS6803:1999 is the best practicable option for the control of construction noise. Accordingly, the assessment considers that NZS6803:1999 limits are 'trigger values', and noise levels beyond these should be managed to ensure the best practicable option is achieved. This approach is consistent with the proposed conditions, included in **Part D** of these application documents.

The activities that Marshall Day (2025) determines to be construction activities are shown in in Table 6-2.

Table 6-2: WNP construction activities, as defined by Marshall Day (2025)

Project Component	Construction Activities
WUG	> All ventilation shaft construction and évasé installations (including helicopter operations). > All construction of and within the Willows SFA, and of all site roads and access tracks. > Construction of Willows Portal, initial sections of the underground drives, and associated infrastructure. > Upgrades required to Willows Road and SH25 intersection.

Project Component	Construction Activities
GOP	> Relocation of overhead powerline, existing Favona Portal and associated infrastructure. > Construction of crusher and conveyor system. > Construction of silt ponds, associated drains, and noise barriers (bunds or walls). > Topsoil stripping and construction of a topsoil stockpile. > Initial mining preparation for a period of 12 months. > Construction of MUG and WUG Portals, initial sections of the underground drives, and associated infrastructure.
Processing Plant	> All activities associated with installing replacement and new facilities within the Processing Plant and WTP.
NRS	> Construction of the initial clean and dirty water perimeter drains and collection pond. > Rock stack preparatory work, including topsoil stripping and stockpiling, foundations, compacted liner, underdrains, surface water diversion drains and silt ponds. > Relocation of existing facilities: workshop and amenities. > Development of borrow areas.
TSF3	> Construction of the upstream clean water diversion drain. > Placement and compaction of the TSF3 initial embankment foundation and Zone A liner materials. > Foundation preparation for the soil stockpiles and then stripping and consolidating soil from construction activities. > Development of borrow area.

The results of the noise modelling demonstrated that construction noise levels will be compliant with NZS6803:1999 in almost all circumstances.

For ventilation evasé sites in the Coromandel Forest Park, Marshall Day (2025) assesses that noise levels from the construction of the ventilation evasé, both on ground and from helicopter operations, will potentially have a small effect on users of the Coromandel Forest Park. However, Marshall Day considers that the effect will not be significant due to the relatively short duration and the infrequent use by recreational users. The effects of helicopter noise are considered in detail in Section 6.10.4, below.

Construction / development activities associated with the GOP, the Processing Plant upgrades, the NRS and TSF3 are expected to predominantly be compliant with NZS6803:1999. Any limited localised exceedances of these limits can be appropriately managed through the development and implementation of a Construction Noise Management Plan ("**CNMP**") for each project area to ensure all construction activities are undertaken in such a way to achieve compliance with the recommended noise limits. The CNMPs will be prepared in accordance with NZS6803:1999, as set out in the proposed conditions, included in **Part D** of these application documents.

6.10.3 Operational Noise

A key focus of Marshall Day (2025) was to establish operational noise limits / controls for the activity that are appropriately protective of the amenity of the surrounding environment and community. This does not mean undertaking mining activities without generating any noise effects; rather, the focus is on ensuring that the generation of noise is managed within recognised limits to preserve the ability for people to continue to reasonably enjoy their properties.

With respect to operational noise, Marshall Day (2025) recommends that, provided noise is managed to achieve the following standards, amenity values of neighbours will be suitably protected:

> *The noise level arising from activities authorised by this consent must not exceed the limits specified below when measured at or within the boundary of any residentially zoned site or the notional boundary of any occupied dwelling in the Rural Zone:*

0700 – 2200, Monday to Saturday	*50 dB L_{Aeq}*
All other times	*40 dB L_{Aeq}*
2200 – 0700 (the following day)	*70 dB L_{AFmax}*

Compliance with these limits will achieve consistency with the limits recommended in New Zealand Standard 6802:2008 Acoustics – Environmental Noise ("**NZS6802:2008**") and be consistent with the recommendations for daytime noise published by the World Health Organisation. The proposed noise limit of 40 dB $_{LAeq}$, which applies overnight, is also consistent with NZS:6802:2008 and World Health Organisation guidance for the preservation of sleep when residents may have their windows open at night.

In accordance with the Marshall Day (2025) recommendations, OGNZL proposes to implement a comprehensive Operational Noise Management Plan ("**ONMP**") for each project area to ensure all operational activities are undertaken in such a way so as to achieve compliance with the recommended noise limits at all adjoining sites.

The ONMPs will typically include the following details:

- The activity and location of proposed works;
- The timing and duration of the activity;
- The equipment to be used and sound power levels for that equipment;
- Updated noise modelling; and
- Use of monitoring to provide verification of compliance and to inform the scheduling and adaptation of activities so that compliance with the recommended noise limits is confirmed.

The ONMPs will be prepared in accordance with NZS6802:2008, as set out in the proposed conditions, included in **Part D** of the application documents.

Within the Coromandel Forest Park, operational noise emissions from the ventilation evasé are predicted to be generally only above ambient noise levels (of around 40 – 45 dB $_{LAeq}$) within 100 – 200 m of the ventilation evasé located at the orebody. It is unlikely that noise from the raises will be audible on the Te Wharekirauponga Track. Noise emissions from helicopter operations associated with the operation of the WUG are not predicted to exceed 50 dB $_{LAeq}$ at any noise sensitive receiver. The effects of helicopter noise are considered in further detail in Section 6.10.4, below.

Noise associated with the Willows SFA is predicted to comply with the relevant noise limits at all locations. At most receivers, noise levels readily comply by a comfortable margin, due to the distance between the site and the dwellings. As such, Marshall Day (2025) considers that the existing amenity will remain largely unaffected. Night-time operations will comply with the 40 dB L_{Aeq} noise limit in all cases. At most receivers, nighttime noise from Willows SFA is likely to be inaudible over other existing sounds. Measures such as enclosure or bunding may be required to reduce the noise from generators to meet relevant night time noise standards.

Unmitigated operational noise levels from the GOP will be below 50 dB $_{LAeq}$ at all receivers except for 27 dwellings located on Moore Street, Barry Road and George Street. For these residents, there is a small adverse impact on the level of amenity these properties experience. Although the modelling predictions are conservative and represent a worst-case scenario, works within the GOP will need to be carefully managed to ensure compliance with the above limits.

The noise modelling predicts a slight increase in noise levels generated by the Processing Plant (of 3 – 5 dB) as a result of the upgrades but also a small decrease to the south-west. It is considered this will be a 'barely discernible' to 'just noticeable' increase. During the day,

noise levels will remain compliant with noise limits, and the increased noise levels are unlikely to be discernible for much of the time. However, it is possible that noise levels at night may slightly exceed the night-time noise limit of 40 dB $_{LAeq}$. This prediction is conservative, and it is considered that in practice noise levels will likely be lower. Notwithstanding, Marshall Day (2025) considers that any exceedances can be appropriately managed to comply with the noise limits above through the implementation of the relevant ONMP, which will ensure noise levels do not exceed 40 dB $_{LAeq}$ at any residence not owned by OGNZL or subject to an agreement with OGNZL. The mitigation methods that could be implemented to ensure this is achieved could include (but not be limited to):

- Restrictions on operating hours;
- Bespoke screening of individual sources (primarily by the use of full enclosures);
- Screening of noise sensitive receivers; and
- Noise monitoring programmes (including detailed noise modelling of the new plant when installed and measurement regimes).

The results of the noise modelling predict that operational noise levels at the NRS and TSF3 will be compliant with the limits set out above.

6.10.4 Helicopter Noise

Helicopter noise is a key source of noise in and around the Coromandel Forest Park, Willows SFA and Waihi SFA during both the construction and operational phases of the WNP. Marshall Day (2025) calculated helicopter noise in accordance with DIN 45684-1:2013 *Acoustics – Determination of aircraft noise exposure at airfields – Part 1: Calculation method*. The methodology in this standard allows the acoustic screening of topography and buildings to be calculated. The calculation accounts for both arrivals and departures, and periods where a helicopter will be hovering.

During construction of the ventilation shafts, helicopters transiting to the ventilation shaft sites only pass houses for a short period of time. The maximum noise levels received at affected dwellings are comfortably below 70 dB L_{AFmax} at the notional boundary of all dwellings. This means they are significantly lower than the construction criteria of 90 dB L_{AFmax}.

Operational noise emissions from helicopters do not exceed a noise level of 50 dB L_{dn} at any noise sensitive receiver. Mashall Day (2025) therefore concludes that noise levels from general helicopter operations as a result of the project are acceptable.

Individual helicopter operations will be clearly audible for some receivers in proximity to the helicopter bases and the overflying tracks and will be noticeable above the existing ambient

noise environment. However, considering the large periods of respite between events and the ambient noise environment in the vicinity of nearby receivers, as well as the other noise sources present, Marshall Day (2025) considers that helicopter noise effects on people as a result of the project are reasonable.

Within the Coromandel Forest Park, helicopter noise will be elevated only in close proximity to the ventilation shafts during construction, or during a flyover in the operational phase, and generally not across the park as a whole.

Noise levels from individual helicopter operations will still likely be audible more widely across the Coromandel Forest Park. However, these events will be at low noise levels, for only a brief duration and for only a small number of events per campaign. Marshall Day (2025) therefore considers that helicopter noise impacts on users of the Coromandel Forest Park are not significant and overall will have acceptable effects on recreational users of the park.

OGNZL will further minimise helicopter noise effects by choosing flight paths that avoid residential areas of Waihi township where possible, and rural dwellings as far as is practicable. Whenever practicable, helicopter use will also be undertaken in accordance with the "Fly Neighbourly" guide published by Helicopter Association International.

6.10.5 Drone Noise

As set out in Section 2.6.2.10, OGNZL proposes to undertake drone operations over the Coromandel Forest Park no more than twice per year. Drone operations will replace an otherwise authorised helicopter flight, noting that the potential noise effects from the use of drones over the Coromandel Forest Park will be significantly less than the noise generated by a helicopter flight.

6.10.6 Noise Effects on Fauna

In addition to the effect of noise on people, Marshall Day (2025) also considered the effects of noise effects on fauna. Of the fauna that inhabit the Coromandel Forest Park, it is anticipated that forest birds are likely to be most sensitive to anthropogenic noise.

Given that there are no established guidelines or criteria for assessing behavioural noise effects on New Zealand forest birds, Marshall Day (2025) instead determined potential effects zones by predicting where anthropogenic noise – particularly noise generated by exploration activities including helicopters, drill rigs, pumps and generators – will be above the ambient noise levels in the frequency range of the forest bird vocalisations. These zones estimate where there is the potential for masking effects on forest birds.

Marshall Day undertook a noise survey near the Wharekirauponga orebody to quantify ambient noise levels and the noise generated by existing exploratory operations.

To summarise, Marshall Day (2025) found that:

- The existing drilling operations generate continuous broadband noise:
  - The noise overlaps the same frequency range as forest bird vocalisations in areas close to active sites.
  - At distance (e.g. 500 m away), the drill / pump noise becomes a low frequency hum because the high frequency content is absorbed by the atmosphere, vegetation and soft ground. This low frequency hum has less overlap with the bird vocalisations, and therefore less potential masking.
- The masking is greatest for tui, morepork and bellbird which vocalise at a relatively wide frequency range (500 Hz – 10 kHz) that overlaps with the anthropogenic noise. There is less masking for forest bird species with higher frequency vocalisations such as the fantail, silvereye, tomtit and similar (vocalisations at 2 kHz – 10 kHz).
- There were significantly less bird vocalisation detections in forest areas near existing active sites as compared with quieter locations. The greatest reduction in detections was for the morepork, which is expected because its 'hoot' can be easily masked by anthropogenic noise
- The helicopters generated high levels of broadband noise when travelling overhead, masking all other forest sounds. Helicopter noise reduced to a low frequency rumble at distance, which had less overlap with the forest bird vocalisations and therefore less potential masking. Marshall Day (2025) noted the helicopters are intermittent, so the duration of masking is limited.

Marshall Day (2025) also notes that forest noise levels can vary significantly with weather and proximity to waterways. Wind in trees, rainfall and water flowing can generate broadband noise in the same frequency range as forest bird vocalisations and can therefore cause masking. While these ambient noise sources are not as loud at source as the drilling operations, they raise the noise level in large areas of the forest.

In accordance with the recommendations of Marshall Day (2025), OGNZL will use the best practicable option to minimise construction and operational noise within the Coromandel Forest Park and limit the area of forest affected and duration of the noise as far as practicable.

These finding were used by Boffa Miskell (2025a) to assess the effects of the WNP noise on forest birds, with a summary provided in Section 6.6, above.

6.10.7 Conclusion

Overall, Marshall Day (2025) considers that construction and operational noise generated by the WNP can be effectively managed via the implementation of comprehensive CNMPs and ONMPs. If the noise limits set out in the proposed conditions are met, then noise effects as a result of the WNP will be acceptable.

6.11 BLASTING AND VIBRATION EFFECTS

Drilling and blasting will be required to construct and operate the WUG, the WUG Dual Tunnel, the Willows Access Tunnel, the Willows Portal, the Wharekirauponga Access Tunnel, the WUG Portal, the GOP, and the three borrow areas (located within the NRS and TSF3). An assessment of the actual and potential effects from blasting and vibration associated with the WNP is provided in Heilig (2025), a copy of which is included in **Part B** of these application documents.

6.11.1 Vibration

Ground vibration limits are typically set to preserve amenity, which are at levels significantly below those at which property damage could occur. There is no one limit in use worldwide but rather limits vary with countries like New Zealand and Australia adopting the most stringent values applied in the world. Vibration limits are always based on research conducted over decades by various independent groups and subsequently form the basis for internationally accepted standards and guidelines. By design, they are typically conservative to provide a high safety factor, particularly with reference to building damage.

To identify the appropriate approach to achieve these outcomes for vibration effects resulting from the WNP, Heilig (2025) completed a comprehensive analysis of:

> The vibration conditions contained on the mining licence and resource consents which authorise existing and past mining activities at Waihi;

> The HDP vibration performance standards; and

> Various international guidelines.

In this analysis, Heilig (2025) identified that the effects of vibration on amenity values are dependent on various matters, including:

> The vibration amplitude experienced by receivers;

> The number of blast events;

> The timing of blast events; and

> The duration of blast events.

Based on this analysis, it is recommended that a number of conditions be imposed on the WNP blasting and vibration activities to ensure the amenity values of Waihi and the wider community are protected. Conditions for the blasting for surface operations, including the GOP and the three borrow areas (located within the NRS and TSF3), as recommended by Heilig (2025), include:

> Vibration at the surface must be no more than 5 mm/s for 95% of blast events between the hours of 0700 and 1800, Monday to Saturday (excluding public holidays); and

> Vibration at the surface must be no more than 1 mm/s for 95% of blast events at all other times.

Conditions for all blasting within Areas 2, 3 and 5 associated with the establishment of portals and underground tunnels, as recommended by Heilig (2025), include:

> Vibration at the surface must be no more than 5 mm/s for 95% of blast events between the hours of 0700 and 2000, Monday to Saturday (excluding public holidays); and

> Vibration at the surface must be no more than 1 mm/s for 95% of blast events at all other times.

Heilig and the WNP ecologists undertook considerable work to assess the effects of vibration on native frogs and to determine appropriate vibration limits. As a result of this analysis, Heilig (2025) recommends that for all underground blasting at WUG (Area 1), vibration at the surface must be no more than 15 mm/s for 95% of blast events (at any time of day).

A summary of the proposed blasting conditions is included in Table 6-3, below.

The effects of vibration on frogs, on people, and on dwellings are considered further in the sub-sections below.

Table 6-3: Summary of Proposed Blast Vibration Conditions

Name	Type	Vibration Limit	Blast Windows		Maximum Blast Event 95%ile Duration (s)			Maximum Blast	Overpressure	AEP Applicable
		Maximum (95%ile)[1]	Days	Times	Production	Development	Combination	Event Duration (s)	(dBL)	
GOP	O	5 1	Monday-Saturday[2] All other times	0700-1800					120	Yes
Borrow areas	O	5 1	Monday-Saturday[2] All other times	0700-1800					120	Yes
Willows/WUG Access Tunnels	UG	5 1	Monday-Saturday[2] All other times	0700-2000		12		12	120	Yes
WUG Dual Tunnel	UG	15								
WUG	UG	15								

Notes:

[1] Determined over a rolling six-month period.

[2] Excluding public holidays.

6.11.1.1 Effects on People and Dwellings

The WUG operation is planned to include production blasting over a range of depths, including both cut and fill mining and conventional stoping in deeper sections.

The modelling undertaken by Heilig (2025) shows that the vibration from blasting at WUG will not be noticeable to occupants of the closest residential properties as the production blasting for the WUG will occur more than 5 km away. Except for a 40 m section of the Te Wharekirauponga Track directly above the blasting – where vibration may be strongly perceptible– vibration will only be slightly perceptible to trampers at all other locations along the track. Greenaway (2025) concludes that this represents a negligible effect given the low likelihood of detonations occurring while a tramper is nearby, and the low scale of effect should a blast event be experienced.

There are no areas of the decline where drilling and blasting associated with the establishment of the Willows Access Tunnel and Willows Portal will produce levels of vibration at the nearest properties that will be perceptible to the residents. The separation distance reduces vibration from the decline blasting to immeasurable levels at these properties.

Blasting to construct the Wharekirauponga Access Tunnel and WUG Portal could potentially generate detectable vibration at some residences. Where potentially detectable, such effects will occur for short periods as development approached then moved away from a receiver. Once the tunnel is constructed, there will be no further blast-related or vibration effects. Operationally, there will be no detectable vibration from the use of the Wharekirauponga Access Tunnel.

With regard to blasting in Waihi, Heilig (2025) assesses that the mining of the GOP will change the existing vibration environment for only a small, isolated area at the eastern end of Moore and Clarke Streets and Boyd Road. The location of the GOP virtually eliminates any combined effects from the existing Martha Underground Mine blasting or other blasting at the Martha Open Pit when this recommences. The envelope of impact for the GOP is estimated to be around 50 properties with most of these subjected to only low and marginally perceptible levels of vibration. Fewer than five properties are modelled to receive more than 2 mm/s and in all cases the predicted vibration levels are predicted to comply with the compliance limits set out above which Heilig (2025) considers appropriate for protecting amenity and building integrity.

The three borrow areas (located within the NRS and the GOP) have a minimum separation distance to residential properties of between 550 and 800 metres for the Western Borrow Area and Eastern Borrow Area respectively. The Central Borrow Area is at least 900 meters

from the closest residential property. There are less than 15 properties within 1,000 metres of the three borrow areas. When blasting in either the Central or Eastern Borrow Areas, some residents may perceive the vibration. However, Heilig (2025) considers that these vibrations will be below the levels that most people find disturbing. When blasting at the Western Borrow Area, one property (669 Golden Valley Road) is modelled to receive vibration close to 5 mm/s. The modelled vibration levels at the next five closest properties are between 2 and 3 mm/s. Whilst vibration levels at the three borrow areas may be perceptible to nearby residents on occasion, they are predicted to always comply with the proposed 5 mm/s vibration limit.

OGNZL will use a 10 m bench height for blasting at the borrow areas, compared to a 5 m bench height at GOP. This is possible in the borrow areas because there is no need to limit the movement of ore. As a result, a larger scale blast can be adopted. The 10 m bench height in the borrow areas will provide better breakage of blasted rock, and will result in a greater yield per blast. With a 10 m bench height, each blast is expected to yield approximately 20,000 m^3 of rock, and as a result of this only one to two blasts will be required per week. The blasthole diameter will be kept at 89 mm to limit vibration and possible flyrock.

6.11.1.2 Potential Ecological Effects from Vibration

The potential effects of the vibration from blasting at WUG were considered important for Archey's and Hochstetter's frogs in the Coromandel Forest Park, and for this reason considerable work has been undertaken in consultation with the project ecologists to characterise the level of surface vibration from blasting activities and to minimise surface vibration to the extent it is practicable to do so.

The output of that work is a viable mine plan which limits the area expected to experience vibration above 2 mm/s to approximately 315 ha, and which limits the maximum vibration at the surface to no more than 15 mm/s for 95% of blast events. The ecology assessments discussed in Section 6.6 above have been completed based on this vibration envelope, and conditions are proposed which ensure OGNZL manages its blasting operations to achieve it.

6.11.2 Overpressure Effects

Overpressure (air borne vibration) refers to the momentary levels of pressure above atmospheric pressure caused by a blast. It is measured irrespective of frequency with no weighting, and on this basis is distinguished from noise and audibility. Unlike vibration, which can be perceived at very low levels, any direct perception of overpressure is unlikely unless the level of overpressure exceeds 145 to 150 dBL.

Heilig (2025) considers that by managing overpressure levels from blasting to no greater than 120 dBL at any non-OGNZL owned residence, the overpressure effects at that residence will be acceptable. Heilig (2025) identifies no issues with the proposed blasting being managed to achieve the proposed consent limit.

6.11.3 Flyrock Effects

Flyrock refers to the movement of rock beyond a small working area around the blast pattern, commonly in the order of 20 to 50 metres. Like ground vibration and air overpressure, flyrock can also be controlled, as demonstrated by the few isolated instances of flyrock that have occurred from the many thousands of blasts that have occurred at the Martha Open Pit mine.

Heilig (2025) assesses that flyrock can be controlled to a lesser distance than that required to achieve vibration compliance with 5 mm/s value, or in general, to less than 50 metres.

Flyrock from the underground blasting at both WUG and within the three proposed access tunnels will be necessarily controlled and requires no mitigation measures.

OGNZL will use mitigation measures as recommended by Heilig (2025) to control potential flyrock effects associated with surface blasting.

6.11.4 Monitoring

In accordance with the recommendations provided in Heilig (2025), OGNZL proposes to undertake vibration monitoring in relation to a number of the WNP components.

Vibration monitoring for blasting in the WUG is proposed to manage potential effects on Archey's frogs. The proposed method for monitoring the vibration from the WUG blasting activities will include measuring vibration at selected locations within the underground mine and applying algorithms to calculate the vibration level that will have occurred at the surface.

Vibration monitoring locations for blasting at the GOP will utilise, where possible, the existing Favona Underground Mine vibration monitoring system with key locations at Boyd Road, and Moore and Clarke Streets, as shown in Figure 6-12. Potential vibration monitoring locations for the Western, Central, and Eastern Borrow Areas are shown in Figure 6-13.

Potential monitoring sites for the Wharekirauponga Access Tunnel are shown in Figure 6-14. Given the short duration of effects, the monitoring arrangement will include roving units rather than establishing permanent monitoring sites.

Figure 6-12: Possible Vibration Monitoring Sites for the GOP (red circles)

Figure 6-13: Possible Vibration Monitoring Sites for the Borrow Areas (red circles)

Figure 6-14: Possible Vibration Monitoring Sites for the Wharekirauponga Access Tunnel

The vibration results from each of the monitoring locations will continue to be displayed shortly after each blast on OceanaGold's web page. The same approach has been successfully implemented for existing mining operations at Waihi.

Monitoring will be undertaken in accordance with the proposed conditions, included in **Part D** of these application documents.

6.11.5 Compensation for Potentially Affected Parties

In addition to complying with the vibration and overpressure limits identified in Heilig (2025) as being appropriate for protecting amenity and building integrity, OGNZL proposes to provide compensation to potentially affected landowners by:

- Continuation and extension of an existing Amenity Effect Programme which makes six monthly payments to the owners of occupied residences affected by vibration based on the number and level of vibration and number of blast events they experience; and
- Offering an ex-gratia payment to the registered proprietor of any residence that the Wharekirauponga Access Tunnel passes directly beneath which is equal to 5% of the that property's market value.

While no property damage effects are expected, OGNZL also proposes conditions which require it to remedy any damage at its cost as soon as practicable and to the reasonable satisfaction of the property owner.

6.11.6 Conclusion

The vibration and blasting assessments undertaken in relation to the WNP have identified:

- The current vibration environment around Waihi will remain unchanged from the blasting at the GOP, except for some properties at the eastern end of town where perceptible vibration from some of the blasts will occur;
- Vibration from blasting at the three borrow areas will on some occasions be perceptible to adjacent residents but always compliant with proposed vibration limits;
- Blasting to construct the Wharekirauponga Access Tunnel and WUG Portal could potentially generate detectable vibration at some residences. Where potentially detectable, such effects will occur for short periods as development approach then moves away from a receiver;
- The blasting for the WUG will have no effect of the amenity of residents and will be limited to avoid adverse effects on Archey's frogs; and
- No adverse effects on residents are expected due to overpressure or flyrock.

The likely scale of blasting, and the associated effects for the WNP have been based upon an analysis of the recorded vibration levels monitored during previous mining in Waihi. These data have been analysed to establish relationships between vibration level, distance, and explosive quantity for the WNP. The analyses have shown that with good practices and control over explosive weights, blasting can be completed for the WNP without unnecessary impact. Overall, Heilig (2025) concludes that with good practices, which will be outlined in a Blasting Management Plan provided in **Part H** of these application documents, the effects of blasting for the WNP can be appropriately managed.

6.12 EFFECTS RELATING TO RECREATION AND TOURISM

An assessment of the potential effects of the WNP on recreational and tourism values is provided in Greenaway (2025), a copy of which is provided in **Part B** of these application documents. The conclusions from this assessment are summarised in the following sub-sections.

6.12.1 Coromandel Forest Park

6.12.1.1 Increased Exploration Activities

OGNZL proposes to establish additional drill sites, additional camps with messing facilities, and additional helipads within the Coromandel Forest Park. These project elements (described in Section 2.6.1 of this document and shown in Figure 2-3), will also be associated with an increase in helicopter activity.

Greenaway (2025) considers that three drill sites located near the western terminus of the Te Wharekirauponga Track (depicted as sites 8, 9 and 10 in Figure 2-3) have the highest likelihood of affecting visitors to the Coromandel Forest Park via noise associated with drilling, other works and helicopter movements. Noise effects will be largely limited to the temporary sound of drilling activity near the Te Wharekirauponga Track, noting that the majority of the Te Wharekirauponga Track has been closed for kauri protection since September 2024. Prior to the track's closure, a track counter installed on the track recorded a daily average of 7.3 walkers heading south and 8.1 heading north (refer to Section 3.12).

The drill sites will be out of sight of all sections of formal walking tracks and visitors will need to walk off-track to access them.

In accordance with the recommendation of Greenaway (2025), OGNZL will cease drilling activity and helicopter activity to service drill sites within 400 m of the Wharekirauponga Track from 1 December to 28 February (inclusive), when the track is open.

Overall, Greenaway (2025) considers that although low levels of aircraft noise would be preferred within this area, OGNZL's proposed exploration activities will have very low impacts on recreation values, by virtue of very low levels of visitor activity (with or without the track closure in place). Drill, camp and mess sites will be located away from tracks but may be encountered by pig hunters – although Greenaway (2025) notes that this will be less likely given that OGNZL's proposed pest control is likely to remove pigs from this part of the Coromandel Forest Park.

6.12.1.2 Ventilation Shafts 2 – 5

Ventilation Shafts 2 – 5 will be located within an area defined by the Department of Conservation as recreation 'remote' zones. These areas are typically characterised by limited infrastructure and basic facilities that support recreation – such as "basic low-use tracks, marked routes and huts". Within these areas, low levels of recreational use are expected, as are encounter rates with other people.

Greenaway (2025) notes that the location of built structures within recreation remote zones is generally incompatible with the expectations of visitors within such settings (although the raises will avoid tramping tracks). Therefore, there is likely to be adverse effects on those few trampers who are traversing the Coromandel Range on the Wharekirauponga to Golden Cross Track who are aware of the evasé (noting that the Wharekirauponga to Golden Cross Track has been temporarily closed for kauri protection since 2018). However, Greenaway (2025) considers the net effect will remain minor considering the focus of the activities (pig hunting and crossing the Coromandel Range).

Operational noise emissions from the ventilation evasé were assessed by Marshall Day (2025) and are addressed in Section 6.10.3. Marshall Day concluded that noise emissions from the ventilation evasé will generally be only above ambient noise levels (of around 40 – 45 dB $_{LAeq}$) within 100 – 200 m of the ventilation evasé and are unlikely to be heard at the Te Wharekirauponga Track.

Vibration from underground detonations was assessed by Heilig (2025) and is addressed in Section 6.11.1. Heilig concluded that except for a 40 m section of the Te Wharekirauponga Track directly above the blasting – where vibration may be strongly perceptible – vibration will only be slightly perceptible to trampers at all other locations along the track. Additionally, production blasts are expected to be scheduled during shift changes to avoid unnecessary downtime during shifts. This means that most production blasts will be fired between 6 – 7 am and 6 – 7 pm. Given that the affected section of the track is approximately 6 km from the carpark, it is expected that very few trampers will be near the site during these times. Greenaway (2025) recommends locating the raises to avoid historic tramway lines to minimise effects on recreation access and experiences. These tramway lines – where they exist – are the most obvious forms of track in the area and have potential for future development for improved recreation access. Measures to minimise the effects on heritage features are incorporated into the ventilation shaft site selection protocols, which form part of the proposed conditions, included in **Part D** of these application documents.

Greenaway (2025) also notes that the use of signs and interpretation near the raises will help make them part of the visitor experience, rather than unexpected.

6.12.2 GOP, NRS and TSF3

The effects of the GOP, the NRS and TSF3 on recreation and tourism values are limited to:

> The displacement of mountain biking from Winner Hill and effects on access to the Black Hill Motor Cross Track. These opportunities rely on access over OGNZL land, and there are no agreements in place to secure tenure;

- Noise effects on visitors to Ngāti Koi Domain, specifically at the summit of Black Hill and on its eastern side, noting that Marshall Day (2025) describe noise from surrounding mining activity, including the GOP, as unlikely to cause annoyance to visitors;
- Temporary track closures within the 300m GOP flyrock zone affecting Ngāti Koi Domain and the Ohinemuri Riverside track, managed according to the Blasting Management Plan; and
- Limited effects on landscape values from the summit of Black Hill and other publicly accessible areas (Boffa Miskell, 2025e).

Greenaway (2025) considers the displacement of activity from private land is not an adverse effect but also notes OGNZL's efforts to secure alternative recreation settings for affected recreation groups. Effects of temporary track closures are potentially moderately adverse at the local level, depending on frequency and duration. However, Greenaway (2025) notes that similar closures were required for the Martha Mine and have not been identified as significant issues to date. Landscape effects are assessed as minor, and noise effects on recreation amenity will be low.

6.12.3 Ohinemuri River

The Ohinemuri River is defined by Auckland / Waikato Fish & Game as a regionally significant trout fishery with rural values. However, angling activity has steadily declined from 2,600 angler days recorded on the river in the 2001–2002 season to almost 300 in 2021–2022. Water quality for swimming is monitored by the WRC at Karangahake Gorge just upstream of Mackaytown, with (between 2018 and 2023) 81% of records suitable for swimming ('good' or 'excellent' contact recreation grades). Kayaking is popular in the Karangahake Gorge, with walking and cycling occurring on the river's banks.

Most water contact recreation and angling occur downstream of the top of the Karangahake Gorge, which is more than 13 km downstream of the discharge points, or in the case of dry fly angling, upstream of the discharge.

Boffa Miskell (2025c) found no evidence that the water quality of the Ohinemuri River has caused any detrimental effects to the ecological values of the river, and the ecological values have been upheld as anticipated by the criteria as set out in OGNZL's proposed conditions. Accordingly, re-consenting the WTP with the same receiving water quality standards will not result in detrimental effects on the ecological values of the Ohinemuri River. Greenaway (2025) therefore concludes that the recreational values of the Ohinemuri River, considering its trout angling, contact recreation and terrestrial recreation values, will be sustained within the current consented operating regime for the discharge.

6.12.4 Conclusion

Overall, Greenaway (2025) considers that the WNP can be managed to limit adverse effects on recreation and tourism in the Coromandel Forest Park and the wider region

6.13 AIR QUALITY EFFECTS

The potential effects of air discharges from the WNP have been assessed by Beca, with the assessment divided into two reports:

- One with a focus on the WUG and its associated infrastructure, including the Willows SFA (Areas 1 & 2) (Beca 2025b); and
- One with a focus on activities in Waihi, including the GOP, the Processing Plant and WTP upgrades, the NRS, and TSF3 (Areas 5 – 7) (Beca 2025c).

Copies of each of these reports are provided in **Part B** of these application documents.

The discharges to air associated with the WNP are a permitted activity under the Regional Plan, subject to conditions. Beca (2025b and 2025c) notes that those relevant permitted activity standards are likely to be complied with, however, for certainty and completeness, OGNZL seeks to apply for an air discharge consent for the WNP activities.

A summary of the key findings of the Beca assessments are provided below.

6.13.1 Emission Sources

Beca (2025b) anticipates that the air discharges from WUG and its associated infrastructure (Areas 1 – 4) will be of a similar nature to those from the existing Martha Open Pit and underground mines but on a smaller scale and across a shorter timeframe. The potential sources of air discharges from the WUG and its associated infrastructure includes:

- Dust from surface activities such as earthworks, topsoil stripping, vehicle movements, unconsolidated surfaces, stockpiles and materials handling;
- Products of combustion from surface vehicles;
- Products of combustion from underground vehicles, dust from excavations discharged via portal and ventilation evasé and contaminants from underground blasting; and
- Rehabilitation of surface areas after development of the tunnel.

Beca (2025c) anticipates that the air discharges from the GOP, the Processing Plant and WTP upgrades, the NRS, and TSF3 will be of a similar nature to those from the existing Martha Open Pit and underground mines, associated infrastructure and Processing Plant,

but the location and scale of some of the individual sources change as a result of some of the new mine features. The potential sources of air discharges from Areas 5 – 7 include:

> Dust from surface activities such as earthworks, excavation, topsoil stripping, vehicle movements, unconsolidated surfaces and materials handling;

> Relocation and construction of site roads;

> Products of combustion from vehicles;

> Contaminants produced from blasting;

> Rehabilitation of completed mine areas; and

> Contaminants from the Processing Plant and the WTP upgrades.

6.13.2 Ventilation Shaft Emissions

All underground emissions will be discharged to air via either portals or the ventilation shafts. Therefore, unlike surface activities, discharges generated underground will be exhausted as point sources, rather than as diffuse sources over a larger area. In cool calm conditions emissions from the ventilation evasé may be visible as a plume of water vapour.

The amount of ventilation provided underground will be sufficient to provide a safe working environment for underground workers. This means that the concentration of contaminants will be required to be below the Workplace Exposure Standards (2020) set by WorkSafe New Zealand. As stated by Beca (2025b), this means that any effects from exposure after discharge from the ventilation evasé will be negligible.

OGNZL will carry out regular monitoring of the underground air quality to ensure that the WorkSafe air quality standards are being met.

The visual effects of water vapor plumes have been assessed by Boffa Miskell (2025e) and found to be very low (refer to Section 6.7.1.1).

6.13.3 Dust and Particulate Matter

6.13.3.1 Effects from Current and Past Mining Activities

Beca (2025b and 2025c) concludes as part of its analysis that any increases above background concentrations of deposited dust, total suspended particulate ("**TSP**"), fine particles less than 10 microns in diameter ("**PM_{10}**") and silica, measured at sites in the vicinity of the previous and current mining operations, are small and well below the relevant standards and guidelines recommended by the Ministry for the Environment. They are also

within the current resource consent and permitted activity limits of the Regional Plan. The concentrations of PM_{10} measured in Waihi are comparable to concentrations in other small towns in the Waikato Region.

6.13.3.2 Nuisance Effects of Deposited and Suspended Dust

The closest privately owned dwelling to the proposed Willows SFA is located approximately 145 m to the east, southeast of the closest point to the topsoil storage area (111 Willows Road). Another privately owned dwelling is located 245 m from the topsoil stockpile (122 Willows Road). Beca (2025b) considers during the formation of the topsoil stockpile, under dry and windy weather conditions the dwelling at 111 Willows Road may be at a moderate to high risk of being affected by nuisance dust if not properly managed. The risk of dust nuisance at 122 Willows Road from the topsoil stockpiles is assessed as moderate. Once the construction works are finished and the surfaces of the topsoil stores are consolidated and grassed, the risk of dust impacts on the nearest dwellings will reduce to low. No other privately owned dwellings are expected to be adversely affected by dust during the construction and operation of the WUG and its associated infrastructure.

The closest privately owned dwellings to the GOP are located at least 310 m from the boundaries of the proposed development. There are no houses downwind of the GOP in the prevailing westerly wind directions, but there are a group of houses on Heath Road, to the southwest of the pits, which will be downwind during secondary winds. All these properties are located approximately 400 m from the proposed works. Winds from the northeast quarter that exceed 5 m/s, the critical wind speed for the generation of dust from undisturbed surfaces, occur for less than 3% of the time, which is infrequent. Beca (2025c) considers the risk of dust generated from the GOP creating offensive or objectionable effects on the closest sensitive receptors is low considering the given separation distances and proposed measures for managing dust emissions.

The closest privately owned dwellings to the NRS are located approximately 100 m to the east of the closest stockpile associated with the NRS and approximately 300 m from the nearest corner of the NRS. These dwellings will be downwind of the proposed NRS and associated stockpiles in the prevailing westerly winds for approximately 19.6% of the time. OGNZL proposes to revegetate the stockpile as soon as practical after construction is complete, which will minimise the generation of dust and the duration of potential impacts on this dwelling from the closest potential source. There are also additional privately owned dwellings and developable privately owned land, located approximately 500 m and 350 m respectively from the NRS. Beca (2025c) considers the risk of these properties being adversely affected by dust from the construction and operation of the NRS is low, given their separation distance and natural features which will shield them from adverse dust effects.

There is one rural residence located on Trig Road North, which is approximately 250 m south of the proposed topsoil stockpile that will be constructed to the southeast of TSF3. This dwelling is downwind of the proposed stockpile for approximately 2.2% of the time. Once the stockpiles are completed and the sides of the stockpiles are vegetated or otherwise consolidated, the stockpiles will shelter and screen the houses from TSF3. Based on the locations of the existing dwellings in relation to the proposed stockpile and TSF3, the risk of the nearby dwellings being adversely affected by dust, whilst the stockpiles are being formed, is low.

There are no other residential properties in the vicinity of TSF3 and topsoil stockpile site which will potentially be impacted. There is developable land approximately 180 m southwest of TSF3, however implementation of control measures will ensure discharges to air from the construction and operation of the topsoil stockpile and TSF3 will be able to be adequately avoided and mitigated.

6.13.3.3 Health Effects

The concentrations of PM_{10}, respirable crystalline silica ("**RCS**"), nitrogen oxides ("**NO_2**" and "**NO**") and carbon monoxide ("**CO**") has been assessed as remaining within the Resource Management (National Environmental Standards for Air Quality) Regulations 2004 ("**NES Air**") guideline values and current consent limits.

6.13.3.4 Effects to Flora and Fauna

As dust emissions from the WNP are not expected to result in any significant increase in dust concentrations, adverse effects on vegetation are also not expected to occur. The area has relatively high rainfall, and any dust collected on vegetation will be regularly washed off in rain events. However, there is some uncertainty in respect of how native frogs may be impacted due to their porous skin. This potential effect was accounted for in the Leiopelmatid Frog Assessments addressed in Section 6.6 above and the associated management response which will mean the WNP delivers a net benefit to native frogs.

6.13.3.5 Mitigation and Monitoring

To effectively mitigate the potential for adverse air quality effects associated with the WNP, Beca (2025b and 2025c) recommends:

> Continuing use of the dust mitigation measures that have been successfully employed at the Waihi mine sites through development and implementation of an Air Quality Management Plan for each Area (provided within **Part H** of these application documents);

- That a monitoring station is installed on a suitable site in the vicinity of 132 Willows Road (an OGNZL owned dwelling) to provide for the measurement of meteorological information and TSP associated with the Willows SFA. The purpose of the monitoring is to monitor short term (< 1 hour) dust concentrations and wind conditions with the outputs of the instruments able to be used to trigger additional dust control measures and stop contributing dust generating work, if necessary;
- That ongoing visual monitoring of dust be undertaken across the site during construction and operations, and that daily monitoring measures be implemented when surface infrastructure is being installed and during operations in Areas 1 – 4;
- That additional mitigation measures be implemented when weather conditions are conducive to the generation of dust in Areas 5 – 7, in order to mitigate the effects of nuisance dust for sensitive receptors located within 100 m of mining activities;
- For the sensitive receptors located within 100 m of the proposed surface-based mining activities in Areas 5 – 7, continuous instrumental monitoring of TSP concentrations, wind speed and wind direction be undertaken at the boundary of the site when activities with potential to discharge dust occurs. The outputs from the instruments should be able to be monitored remotely and should be able to produce an alarm when TSP concentrations or wind speeds approach trigger values; and
- For OGNZL to continue to undertake an extensive suite of air quality monitoring in the vicinity of Waihi and that in accordance with current practice, the details of air quality monitoring to be undertaken will be set out in the Air Quality Management Plan.

6.13.4 Processing Plant Emissions

The primary air quality concern for the Processing Plant upgrades is the emission of mercury, although other metals will also be emitted. Emissions of mercury from the Processing Plant are expected to increase when the GOP and the WUG ore is being processed and in response to the proposed increase in the ore processing rate and due to the comparatively high concentration of mercury in the GOP ore.

Before processing ore from the GOP or the WUG, OGNZL proposes to install a retort oven at the Processing Plant to reduce its mercury emissions. This is a requirement of the proposed conditions provided in **Part D** to these application documents.

An assessment of the potential impact of mercury and other metal emissions from the Processing Plant with and without the retort oven in place has been undertaken by Beca (2025c) using dispersion modelling methods. The potential health impact of mercury emissions has been assessed by comparing predicted concentrations against the relevant annual average guideline concentrations. The California Office of Environmental Health

Hazard Assessment (**"OEHHA"**) annual average reference exposure level ("**REL**") of 0.03µg/m^3 is the most conservative of the published guidelines and is protective of the most sensitive members of community. The results of the dispersion modelling show mercury emissions from the Processing Plant are not predicted to exceed the Ministry for the Environment, USEPA, or OEHHA annual average guideline limits both with, and without, the retort oven in place, when 2.25 Mt per annum of ore is being processed and no more than 0.611 Mt of that ore is from the GOP (which has higher levels of mercury than other ore sources). However, with the retort oven in place ambient concentrations are much lower with the maximum annual average mercury concentration predicted at any of the nearby dwellings only being 24.7% of the OEHHA REL.

The results of the modelling indicate that emissions of other (non-mercury) metals do not exceed any of the relevant ambient guideline concentrations for the proposed ore processing of 2.25 MtPA. For all other metals, the predicted maximum concentration is less than 1% of the relevant guideline concentrations.

6.13.5 Conclusion

Beca (2025b and 2025c) concludes that, provided OGNZL continues to use the methods it currently uses successfully to minimise discharges to air, and adopts the additional recommended mitigation measures referenced above, the adverse effects of discharges to air from the WNP will be adequately avoided and mitigated. These measures have been incorporated into the proposed conditions and consequently, the likelihood that these discharges will result in noxious, dangerous, offensive or objectionable effects is low.

6.14 LIGHTING EFFECTS

An assessment of effects on the surrounding environment from artificial lighting associated with the WNP is provided in Pederson Read (2025), a copy of which is provided in **Part B** of these application documents.

Existing lighting in Waihi is characteristic of a small town in rural New Zealand. Traditional street lighting provides higher illumination near the town centre and lower levels in the suburbs. Street lighting stops at the town boundary with many of the rural roads not lit. The Coromandel Forest Park has no artificial lighting other than that associated with existing exploration activities and camp sites.

Part of the existing Waihi mine activities are lit at night for operational and safety reasons, including the Kenny Street and Baxter Road entry gates, the Processing Plant, the central parking lot and the existing conveyor structure. The change to LED lighting technology and

appropriate onsite light selection has lessened glare and sky glow across OGNZL's mining operations.

Artificial lighting will be required for the proposed WNP construction and operation activities outside of daylight hours, and in accordance with OGNZL's Standard Operating Procedure which requires lighting towers to be positioned so that they do not face towards public roads or buildings.

At the surface above the WUG, lighting will be established at investigative and exploration drill sites and camp sites, to provide for work occurring outside of daylight hours. Temporary lighting will also be required through the establishment of ventilation evasé. Whilst the lighting associated with these activities is localised, it takes place in an environment that is largely free of artificial lighting (the exception being existing drill and camp sites). Lighting will be designed and installed using the best practice principles in the National Light Pollution Guidelines for Wildlife, as per Condition 54, provided in **Part D** to these application documents.

With the measures above in place, the localised and unavoidable effects of lighting on fauna will be Moderate-High, but of short duration, and immediately reversible when drill machinery and campsites are removed. The overall effect in the context of the wider Coromandel Forest Park is compensated for by the benefits afforded to fauna from the proposed pest control programme (discussed in Section 6.6).

The area for the Willows SFA is presently sparsely lit with no permanent lighting. Road lighting is not provided along Willows Road, and there are few residential buildings or farm outbuildings with external lighting. The proposed above-ground construction activities in Area 2 that require lighting will result in an increase in both glare and sky-glow at locations with a view of the proposed works area. This will be mitigated through a careful selection of both the location for lighting and the direction of lighting (i.e. into the site), and with any works in potentially sensitive locations to occur during daylight hours. Planting is proposed between the Willows SFA and the end of Willows Road which will provide screening for some of the lighting. Potential lighting effects within Area 2 are expected to be minor.

The Waihi SFA presently includes artificial lighting required to support existing operations. The GOP will be set against this existing operational site and require artificial lighting to enable mining operations outside of daylight hours. Permanent lighting within these areas is likely to be of a similar form to that presently installed throughout the existing mine. The effects are expected to be less than minor in the context of the existing environment. All lighting within this area and at the boundary of any site not owned by OGNZL will be no greater than 8 lux, consistent with the HDP requirements.

For the NRS and TSF3, lighting will be visible from various locations outside the work sites with any effect dependent on location and the viewer's perspective. Effects may be moderate-low or moderate-high for nearby residents. Overall, the expected effects are minor to acceptable given the proximity to existing mining operations, noting that permanent lighting is likely to be of a similar form to that presently installed throughout the existing mining operations.

6.15 ARCHAEOLOGICAL AND HISTORIC HERITAGE EFFECTS

An assessment of the potential effects of the WNP on archaeological and historic heritage values is provided in Clough (2025), a copy of which is provided in **Part B** to these application documents.

In accordance with existing Waihi mining operations, OGNZL will implement an accidental discovery protocol across all the WNP proposed work sites. Should accidental discovery of archaeological remains occur during the proposed works, work will cease in the immediate vicinity, HDC and HNZPT will be informed, and if the site appears to be of Māori origin OGNZL will notify appropriate iwi representatives of the discovery and ensure site access to enable appropriate cultural procedures and tikanga to be undertaken (as long as all statutory requirements are met under the HNZPT Act and the Protected Objects Act 1975).

The pump site and ventilation shaft sites which are to be located within Project Area 1 near the Wharekirauponga orebody are likely to be located to the south of the two known heritage features associated with the Royal Standard Battery and Mining Complex T12/681. In accordance with the site selection protocol detailed in Section 2.6.1.2 of this report, the location of the ventilation shafts will be determined based on an MCA of environmental values that includes consideration of archaeological and heritage features and the avoidance of disturbance to, or interference with, listed or known heritage features and / or sites, and the avoidance of archaeological features and features of particular significance to Māori. The ventilation shaft locations are to be established on the sites which the MCA determines to have an overall least disruptive resulting environmental effect. There are no known pre-European Māori sites within the boundaries of Project Area 1.

The Willows SFA will remove a section of the Mataura or Waihi Gold Mining Co. Water Race, (Archaeological site (T13/961)) and the WRS and helipad will remove one, possibly two branches of a section of the Walmsley Tramway located above and south and west of the Willows Portal. Access to the Willows SFA may also affect a small part of the previous Willows Timber Tramway alignment (Archaeological site (T13/962)). Overall, the effects of these actions on historic heritage features are assessed to be minor and suitably addressed through the HNZPT authority process (set out below). No additional restrictions are

proposed. There are no known pre-European Māori sites within the footprint of the Willows SFA.

The proposed underground construction of the Wharekirauponga Access Tunnel will not impact on any known archaeological or historic heritage features.

A substantial part of the Gladstone Hill gold mining complex (T13/821), part of the Winner Hill gold mining complex (T13/820), and part of the Lower-Level Water Race (T13/817) will be affected by the proposed GOP. It is also possible that additional subsurface remains in relation to past mining activities could also be destroyed, however it is noted that many of the sites have already been affected by modern gold prospecting and farming, with only minimal remains still visible. Any areas impacted can be effectively mitigated through archaeological recording and investigation, and the dissemination of new information on early mining activities, interpretation, education and outreach. Overall, the effects on known archaeological and historic heritage features within the vicinity of the GOP (and relocated power line) after mitigation are likely to be minor. There are no known archaeological features of Māori origin on Gladstone Hill or Winner Hill, or within the GOP footprint.

There is only one recorded or known archaeological or historic heritage site near the NRS, being the Queen of Waihi mining shaft. The footprint of the NRS and the associated infrastructure will not interact with the Queen of Waihi Shaft, however for safety reasons the proposed works will require the backfilling and capping of the Queen of Waihi mining shaft. Clough (2025) considers that with detailed recording of the visible remains of this mining structure, and the clear marking of the feature on the ground so to avoid accidental damage during the NRS proposed works, any effects on the heritage value of this feature will be nil to minor. There are no known pre-European Māori sites within the NRS footprint.

The proposed TSF3 will have no direct physical impact on any known archaeological or historic heritage items. It is also highly unlikely that any old underground workings exist in this area, or any other features associated with historical mining. There are no known pre-European Māori sites within the TSF3 footprint.

As the project may impact a number of recorded archaeological sites. OGNZL is seeking archaeological authority under the HNZPT Act as part of this application. In addition, there is potential for work associated with the WNP to expose unidentified sub-surface or near surface features relating to mining activities and the early history of Waihi township. Therefore, a general archaeological authority is being sought for the project as a whole, with the exception of Area 4 (which comprises the Services Trench and does not form part of this application), and the Area 2 works for which a separate archaeological authority has already been granted outside of the fast-track process (reference number 2025/359).

As noted above, there are no known pre-European Māori sites within the footprint of any of the proposed WNP works. However, the historical associations of tangata whenua with the general area are evident in recorded sites (namely middens, pits, terraces, and pa), traditional histories, and known Māori place names. Based on these associations it is expected that pre-European activities in the area would have related to the utilisation of rich resources in the Ohinemuri area to support Māori occupation.

Three of the iwi that have been consulted as part of the WNP have provided CIAs. These iwi are Ngaati Whanaunga, Ngāti Tamaterā, and Ngāti Tara Tokanui / Ngāti Koi. Each of these iwi have chosen to keep their CIAs confidential between OGNZL and themselves. Given this, a high level summary of Māori values identified within the CIAs is provided below, giving an indication of the values iwi may have for any archaeological sites or features that are identified during the proposed works:

- Natural and physical resources provide mauri and mana relating to climate, topography, geology, soils, freshwater vegetation, wetlands, and associated fauna. These resources have and continue to support the lifestyles of iwi, who are intimately connected to the natural and physical resources via whakapapa;
- There has been a dissociation and dislocation of Māori people from ancestral land which has implicated the ability to recall the exact locations of some ancestral places;
- While no specific archaeological features or features of particular significance to iwi have been identified within the project area, iwi are intimately connected to land and waters within the project area via whakapapa, with strong linkages maintained through waka traditions, mythology, and places names which demonstrate the value of the area as a source of food and resources;
- Rawa tuuturu (customary resources) are known to be evident within the project area and have significance as reminders of how Māori people lived and interacted with the environment. These include various types of rock, soil, water, and vegetation;
- While places of historic and cultural interest are not necessarily evident within the project area, they are evident within the wider environment within which the WNP will occur and provide meaning and value to the project area. Features of interest within the wider environment include, but are not refined to:
    - Te Tai Tangata (the world of people), including:
        - The inhabitance and settlement of Māori within the Waikato Region since pre-1900;

- The historic establishment of Māori settlements predominantly along shorelines and adjacent to rivers; and
- The significance of the Coromandel Peninsula in traditional Māori imagery and in early Polynesian voyages;

- Te Tai Moana (the world of the ocean), including the importance of nearby moana and associated fauna;
- Te Tai Whenua (the world of the land), including:
  - The resources, habitats, and migratory pathways provided by surface water bodies;
  - The resources provided by the nearby and surrounding maunga and ranges;
  - The high conservation and vegetation values of the Coromandel Forest Park; and
  - The abundance of fauna and associated habitat present within the project area and surrounding environment;
- The āhurangi (climate) of the region;
- Te Ato Marama (the natural world of light and life);
- Māori place names in the region reflecting the history, landscape and provisions of the environment; and
- Knowledge of pa sites, defensive pa sites, urupa, and burial sites near Ohinemuri and Waihi.

It is recognised that an assessment on Māori values should only be made by tangata whenua and the proposed accidental discovery protocol (discussed earlier in this section of the report) and Archaeological Management Plan (discussed below) provide for the undertaking of such an assessment by appropriate iwi representatives in the instance that pre-European archaeological sites or features are identified.

An Archaeological Management Plan has been prepared to support the substantive application, which is contained in **Part H** to these application documents, which documents the procedures OGNZL will put into place to manage archaeological / heritage effects. These include:

- Pre-start requirements, including the Project Archaeologist meeting with the contractor to brief them on archaeological requirements, the implementation of protection measures around known / recorded archaeological sites;

- Investigating and recording, including the undertaking of machine-excavated cross-section cuts in some areas of known / recorded archaeological sites to determine whether pre-1900 archaeological remains are present, the investigation and recording of any in situ archaeological deposits or features exposed, the potential utilisation of laser scanning underground to identify and record the extent of known / recorded features, the photographing of any pre-1900 workings that are intersected, and if safe to do so the retrieval of items from historic workings that might be useful for displays and interpretation;
- Monitoring, including of preliminary excavations required in the vicinity of known / recorded archaeological sites, the ceasing of works within the vicinity of any in situ archaeological features or deposits that are identified during monitoring and the supplementary investigation and recording of those features or deposits, if archaeological remains relating to Māori occupation are exposed, appropriate iwi representatives will be informed;
- Implementation of koiwi tangata (human remains) protocols, including the ceasing of works in the immediate vicinity of any identified koiwi tangata, assessment of the remains by the Project Archaeologist, notification of appropriate iwi representatives, HNZPT, and the NZ Police, securing of the remains from any further damage, and the implementation of appropriate process / protocol in accordance with tikanga, HNZPT and the NZ Police; and
- Implementation of taonga (Māori artefacts) protocols, including the securing of the area containing the taonga in a way that protects the taonga as far as possible, notification of appropriate iwi representatives and HNZPT so that appropriate actions can be determined.

The proposed conditions contained in **Part D** to these application documents reference this management plan and require works to be undertaken in accordance with it, as well as requiring investigation and recording of any archaeological remains or features impacted.

6.16 EFFECTS RELATING TO THE STORAGE AND HANDLING OF HAZARDOUS SUBSTANCES

The WNP includes the storage and use of explosives, oxidising and toxic substances, workshop gases, fuels, maintenance oils and greases. The potential effects resulting from these activities has been assessed by Tonkin + Taylor in three reports (Tonkin + Taylor 2025a, 2025b, and 2025c). A copy of each assessment is provided in **Part B** of these application documents, and a summary is provided in the sub-sections below.

6.16.1 Surface Activities in the Coromandel Forest Park

OGNZL proposes to use and store fuels, maintenance oils and greases within the Coromandel Forest Park during exploratory drilling and associated surface activities. The risks associated with the use and storage of these substances relate primarily to spillage from a container leak or whilst undertaking refuelling activities.

The Coromandel Forest Park is sensitive to the effects of a spill of diesel or of packaged goods. Any risk of a spill event will be managed through site and equipment design, and by implementing best practice management controls. Management controls will be set out in a Hazardous Substances Management Plan ("**HSMP**") which OGNZL will prepare for Area 1, as set out in the proposed conditions included in **Part D** of these application documents.

No hazards with potential risks to offsite persons or the public have been identified.

With appropriate controls and mitigations in place, Tonkin + Taylor (2025c) considers that – as with other exploration sites already consented in the area – the storage and use of hazardous substances within the Coromandel Forest Park can be appropriately managed such that any risk of adverse effects on the surrounding environment is less than minor.

6.16.2 Activities at the WUG and the Willows SFA

The risks associated with the use and storage of hazardous substances at the WUG and the Willows SFA relate primarily to:

> Spillage from a container leak or whilst undertaking refuelling activities; and

> The potential for a fire or detonation at the explosives magazines, oxidiser storage area, gas storage at the Willows SFA workshop or diesel tanks.

The areas surrounding the Coromandel Forest Park above the WUG and the Willows SFA are sensitive to the effects of an unintended detonation. However, the risks to people, property and the environment from an unintended detonation at the proposed explosives storage locations is low and will be managed through site and equipment design (such as separation distances to offsite locations and other explosives stores, the provision of fire protection systems and certification of the explosives storage magazines) and management controls.

The impact of a detonation of the Class 1 explosives in the WUG has potential to impact people in the Coromandel Forest Park in the vicinity of the ventilation shafts. A quantitative assessment of the effect using dispersion modelling was undertaken by Beca (2025c). The assessment found that criteria for the protection of human health is met at all locations around the ventilation shafts.

The environment surrounding the Willows SFA is sensitive to the effects of a spill of diesel or spill of packaged goods. Any risk of a spill event will be managed through site and equipment design (for example, spill containment measures such as double skinned tanks, sealed refuelling areas, bunded storage areas and the provision of water treatment for runoff arising from areas where these substances are stored or used) and operational procedures, as set out in the relevant HSMP.

The risks to people, property and the environment from a fire at Willows SFA is low and will be managed through site and equipment design (for example, the separation of incompatible substances, combustible material and ignition sources and provision of firefighting facilities), staff training, and emergency response plans. The proposed hazardous substances storage locations are isolated from public access.

With the proposed controls in place Tonkin + Taylor (2025b) considers the effects on offsite people and property from the storage and use of hazardous substances at the WUG and the Willow SFA will be less than minor.

6.16.3 Processing Plant and WTP Upgrades

The risks associated with the use and storage of hazardous substances at the Wahi SFA, as part of the Processing Plant and WTP upgrades relate primarily to:

- Fire risk in the diesel, oxygen or hydrogen peroxide storage tank areas at the Processing Plant and WTP; and
- The risk of ecotoxic or human health effects from a spill of corrosives, oxidizers, diesel, mercury or cyanide at the Processing Plant or WTP during delivery, storage or use.

The risk to people and property from a fire at the Processing Plant is low, as hydrocarbons and oxidising substances onsite are managed through operational controls (as set out in the relevant HSMP), and equipment design (for example, separation distances to the site boundary, separation from ignition sources, certification of storage areas to comply with safety regulations, provision of firefighting infrastructure at tank compounds). The storage locations are isolated from public access and are within the site's security boundary.

The environment is considered sensitive to the effects of a spill of the ecotoxic liquid hazardous substances stored and used at the Processing Plant and the WTP, which includes diesel, corrosive substances (hydrochloric acid, caustic soda, hydrated limestones), oxidisers (hydrogen peroxide), cyanide or mercury. The risk to the environment will be managed through site design (including secondary containment, automation including interlock systems, segregation of incompatible substances, certification of storage systems tanks), and operational procedures. In particular, cyanide poses a high hazard to the

environment due to its high toxicity to both humans and ecological receptors. OGNZL has provided additional structural controls within the Processing Plant to retain hazardous liquid spills in engineered ponds in the event of an accidental release.

With the proposed controls in place, Tonkin + Taylor (2025a) considers the effects on the environment from the use and storage of hazardous substances at the Processing Plant and the WTP will be less than minor.

6.16.4 Activities at the Waste Disposal Area

OGNZL intends to relocate the Waste Disposal Area (including two 20,000 L diesel tanks), and two 40,000 L LPG tanks in Area 6. OGNZL will also construct the Waste Disposal Area Magazine, a new Class 1 explosives storage to service ongoing mining operations in Waihi, which includes the storage of mass explosion detonators and mass explosion blasting explosives, up to 6,400 kg, within approved magazines. The risks associated with the storage and use of hazardous substances at the Waste Disposal Area relate primarily to:

- The risk of ecotoxic or human health effects from a spill of corrosives, oxidizers, diesel or oils during delivery, storage or use; and
- The risk of an unplanned detonation at the proposed Waste Disposal Area Magazine.

Any risk of a spill event will be managed through site design (for example, secondary containment, automation including interlock systems, segregation of incompatible substances, certification of storage systems tanks) and operational procedures (as set out in the relevant HSMP).

The risk to people and property from a fire at the flammable or oxidising substance locations at the Waste Disposal Area has been assessed as low, as hydrocarbons and oxidising substances on-site are managed through operational controls and equipment design (for example, separation distances to the site boundary, separation from ignition sources, certification of storage areas to comply with safety regulations, provision of firefighting infrastructure at tank compounds). The storage locations are isolated from public access and are within the site's security boundary.

The proposed transformers contain a low hazard mineral oil and are each bunded to contain the oil in the event of a leak.

The neighbouring rural properties surrounding the Waste Disposal Area are considered sensitive to the effects of an unintended detonation at the Waste Disposal Area Magazine. However, the potential effects are appropriately managed by the controls which apply to the activity under the *Health and Safety at Work (Hazardous Substances) 2017 Regulations*. These include securing the facility from unauthorised access, segregation of incompatible

materials, provision of fire-fighting facilities and emergency management procedures, and separation from sensitive locations. In order to establish and operate the Waste Disposal Area Magazine, OGNZL must notify WorkSafe and obtain certification from an accredited independent compliance certifier for both the facility itself and its Class 1 substance handlers. With the proposed controls in place, Tonkin + Taylor (2025a) considers the effects on people and property from the proposed activities at the Waste Disposal Area, including the new Waste Disposal Area Magazine to be less than minor.

6.16.5 Conclusion

Overall, with appropriate controls and mitigations in place, Tonkin + Taylor (2025a, 2025b, and 2025c) considers that the storage and use of hazardous substances associated with the WNP can be appropriately managed such that any risk of adverse effects on people, property and the surrounding environment is less than minor.

6.17 CONTAMINATED LAND MANAGEMENT

A PSI assessing potential ground contamination has been prepared by WWLA (2024), a copy of which is included in **Part B** of these application documents.

The PSI identified several potential sources of contamination associated with mining operations within Area 5. These include the Processing Plant (due to bulk storage and use of cyanide, acids and solvents), the WTP, and ancillary activities such as mechanical workshops, fuel storage, transformers, explosives storage and accidental contamination from historic spills or fires.

Within currently undeveloped project areas, potential contamination sources primarily relate to farming activities (for example, the use of drenches, market garden chemicals and minor fuel storage) and asbestos use within dwellings and some sheds.

WWLA (2024) indicates that contamination sources are predominantly point sources, and if contamination is present, it is likely to be confined to surface soils in the immediate vicinity of the activity. This means that the scale of the earthworks proposed significantly exceed the volumes of contaminated soil that may be present.

The presence of contamination will be determined by pre-works testing. Based on the test results, OGNZL will remediate contaminated areas if necessary, so that bulk earthworks can proceed under standard earthworks controls. Any asbestos contaminated soils will likely be removed from site and disposed to a licensed landfill. Other contaminated material will likely be mixed and diluted with parent rock and retained onsite, unless significant contamination is encountered (noting that WWLA (2024) considers the discovery of significant contamination to be highly unlikely).

Prior to soil disturbance in any project area, OGNZL will prepare a Site Management Plan ("**SMP**") for that area, setting out the measures to be implemented to manage the risks of contaminated soil disturbance on workers and the environment. A draft SMP is included in **Part H** of these application documents, and provisions relating to the preparation and certification of the SMP are included in the proposed conditions included in **Part D** of these application documents.

WWLA (2024) concludes that provided OGNZL carries out soil disturbance in general accordance with the SMP, human health will be protected from the effects of soil borne contamination encountered during the life of the WNP.

6.18 TRANSPORTATION EFFECTS

An assessment of effects on the transportation network arising from the WNP is provided in Stantec (2025), a copy of which is provided in **Part B** of these application documents.

As the WNP contains geographically discrete but interlinked components, effects on the transport network were a key consideration during the project's design process. Significant measures have been incorporated into the design which substantially reduce the volume of traffic that will otherwise have been generated.

These measures include:

- The establishment of the Wharekirauponga Access Tunnel between the WUG and the Waihi SFA to reduce the need for trucks to transport material between the Willows SFA and Waihi; and
- A proposal to bus shift workers to the Willows SFA from Waihi rather than have those workers travel to and from the Willows SFA each day in private transport.

Notwithstanding this, the WNP results in some roading and traffic effects in and around Waihi. Generally, these effects are centred on Willows Road (associated with the WUG and Willows SFA), and Baxter Road (associated with the GOP and the Waihi SFA). Roading and traffic effects in these areas are addressed in the sub-sections below.

6.18.1 Effects on Willows Road

6.18.1.1 Willows Road / State Highway 25 Intersection

Modelling undertaken by Stantec (2025) indicates that there will be no capacity issues arising at the Willows Road / SH25 intersection as a result of the WNP. A high level of operational service is expected to be maintained at this intersection as a result.

The Willows Road / SH25 intersection does, however, have limited shoulder widening for right or left turning traffic. Stantec (2025) recommends the provision of a right turn bay on SH25 and the widening of the left turn shoulder into Willows Road to 2.5 m. These measures are being worked through and agreed with NZTA Waka Kotahi, and the proposed conditions require this intersection to be upgraded early in the project.

6.18.1.2 Willows Road

The current formed two-way section of Willows Road varies in width from around 5.5 m to 7.2 m (with the exception of short, isolated areas). For rural roads, HDC engineering standards require a sealed width of 6 m for roads carrying up to 300 vehicles per day, with a minimum width of 5 m subject to approval. At peak the expected traffic volume associated with the WUG plus base flows is less than the 300 vehicles per day threshold, excepting for a short period of around 3 to 6 months early in the project, indicating a road width of 5 – 6 m is appropriate in terms of the HDC Engineering Manual.

Stantec (2025) notes that the existing single lane bridge at approximately 110 m from SH25 imposes a constraint and will add some delays in peak times, however, as the bridge is already signposted (but with little marking) with priority for northbound traffic (away from SH25) there is little concern that any queues will form back to SH25.

In turn, to ensure Willows Road is able to safely cater for the expected volumes of traffic, Stantec (2025) recommends that:

- A road centreline be marked over the full length of road, in particular those sections with limited forward visibility i.e. at curves in the alignment;
- Curve seal widening be implemented where necessary to ensure the design vehicle is able to negotiate all curves within its lane;
- A roadside barrier system or similar is designed and installed by a suitably qualified road barrier designer on both sides of the road at culvert number 40;
- The single lane bridge approaches be upgraded in accordance with the Manual of Traffic Signs and Markings for single lane bridge approaches and controls (which will require some minor widening);
- A Construction Traffic Management Plan ("**CTMP**") be prepared and implemented which includes protocols for drivers on Willows Road to meet (e.g. with respect to speed, queuing and courtesy); and
- The pavement performance be monitored over the project's duration and maintained as necessary (this recommendation is intended to monitor both pavement deterioration

due to the heavy vehicle loading and any edge break due to isolated areas of narrow seal width).

These matters have been incorporated into the proposed conditions, included as **Part D** of these application documents.

6.18.1.3 Willows Road Extension and Access

OGNZL proposes to extend Willows Road by approximately 160 m, from the current end of the two-way section (adjacent to the entrance to 122 Willows Road) to the proposed Willows SFA access.

Stantec (2025) recommends that the Willows Road extension incorporate a minimum 6 m sealed width on the basis of the mitigation measures outlined for Willows Road above. A 6 m width also meets the requirements of the HDC Engineering Manual for the expected volume of traffic.

Stantec also recommends that a turning head be provided at the existing extent of the two-lane work, or near the proposed access location to enable the public to turn around.

These matters have been incorporated into the proposed conditions, included as **Part D** of these application documents.

6.18.2 Effects on Baxter Road

The Waihi related traffic movements primarily relate to the transportation of the workforce, plus the less frequent delivery of materials and plant via Baxter Road. Other WNP components and existing and already consented mining activities associated with Project Martha and OGNZL's other underground mines also contribute to the site traffic generated in this location, and the cumulative effects of all these activities has been assessed.

Ore, overburden and tailings associated with mining activities will be transported within the mine by truck, conveyor, or pipeline to and within the existing processing areas. All vehicle movements associated with these materials will occur on internal roads within the mine area and not the public road network.

The expected workforce requirements for Moresby Avenue and Baxter Road facilities (plus Project Martha) are summarised over the life of the project in Figure 6-15.

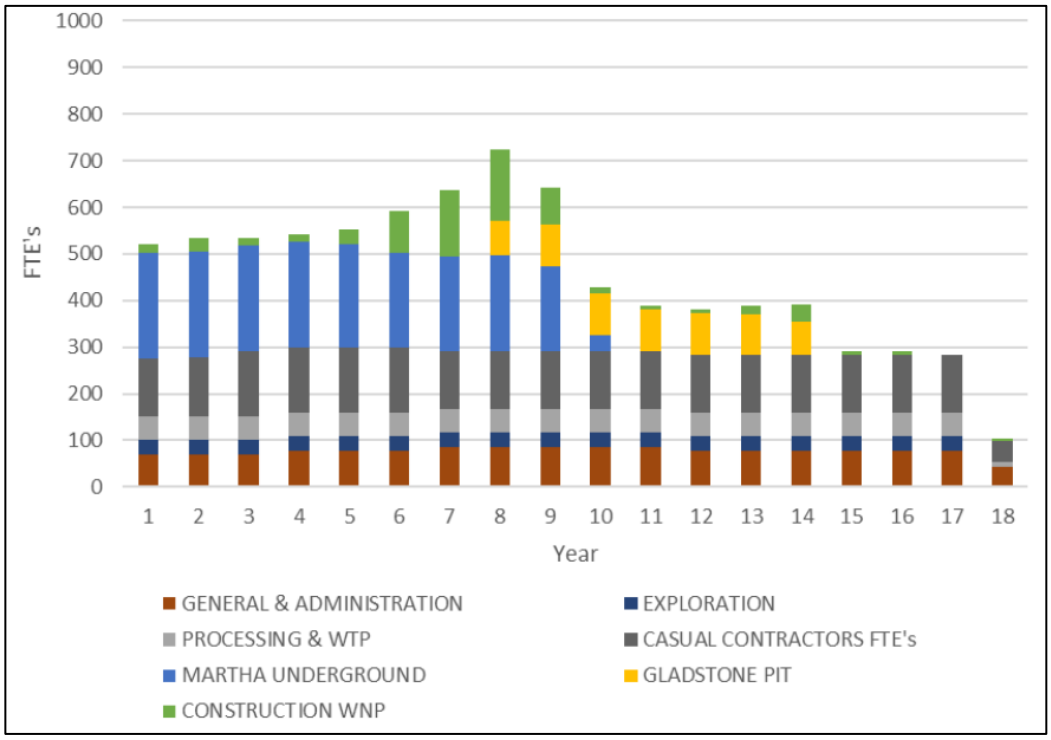

Figure 6-15: Moresby Avenue and Baxter Road Facilities – Workforce Forecasts (including Project Martha) (Stantec (2025))

Much of the workforce is common to both Project Martha and the WNP, and as Project Martha (underground) winds down, much of the workforce can be expected to transfer to the WNP. Existing employees involved in administration and support functions associated with Project Martha will also assist with the WNP and in the later years transfer completely to the WNP.

The Baxter Road / SH2 intersection has been modelled to identify the expected performance during peak hours at various stages of the project. The traffic generation profile for the site as it applies to Baxter Road peaks year 8 of the project. In that year, the departure of the workforce in the evening peak around 5pm results in delays and queues on Baxter Road depending on the exact departure profile of the workforce. While drivers typically tend to adjust their departure times according to traffic conditions, this is more difficult with set work times, and Stantec (2025) recommends that the end of the day shift time is spread over a minimum of an hour (i.e. have a minimum of three end of shift times at 20 min separation of equal numbers). Furthermore, OGNZL proposes to manage heavy vehicle movements associated with construction (including materials deliveries and logging trucks) outside of peak hours.

Moore Street, Clark Street and Golden Valley Road provide secondary access to OGNZL's Waihi operations. During the Processing Plant and WTP upgrades, there will be a total of 10

oversize or heavy loads at Moore Street, with a Traffic Management Plan established for each. Apart from this, the WNP is not expected to result in a change to the existing and consented traffic movements at Moore Street, Clarke Street or Golden Valley Road.

OGNZL will ensure that there is sufficient parking onsite to accommodate all expected staff, contractor and visitor vehicles entering the Baxter Road site. This is incorporated into the proposed conditions, included in **Part D** of these application documents.

6.18.3 Mitigation and Monitoring

To account for other potential variations in either traffic profile on the state highway or the traffic patterns (workforce and heavy vehicle) arrival and departure profile, Stantec (2025) recommends that an adaptive approach is adopted to construction traffic management with the ability to make changes to reflect any issues that may arise related to transportation. For clarity this recommendation relates to the construction phase and not for other mine operations for the duration of the project. This is intended to be managed via the CTMP. The CTMP will be required to be submitted to the HDC before physical works begin. The CTMP provides stakeholders with a clear understanding of the confirmed construction programme, traffic volumes during each stage, the road improvements to be undertaken, and the management measures being implemented.

6.18.4 Conclusion

Based on the recommended mitigation and management measures, Stantec (2025) concludes the effects on the transportation network arising from the WNP (as a whole) to be acceptable.

6.19 SOCIAL IMPACTS

An assessment of the social effects of the WNP has been undertaken by WSP (2025b). A copy of the WSP assessment is included in **Part B** of these application documents**.**

A summary of the key findings of WSP (2025b) is provided below.

6.19.1 Demographic Context

6.19.1.1 Age Profile

A community's age profile can signal potential impacts on educational, health and commercial / employment facilities and services. The 2023 census data indicates that Waihi has a larger elderly population (60 + years), a smaller youth population (<15 years) and is generally an older community (with a median age of 50.8 years) when compared to the average demographics of the Waikato Region.

These demographic characteristics indicate a need to consider:

> Potential impacts of the WNP on health care facilities; and

> Consideration as to if the local schools have room to accommodate an influx of families with school-age children moving to the area for employment opportunities.

6.19.1.2 Socio-economic Deprivation

The New Zealand Deprivation Index ("**NZDI**") provides an indicative geographic measure of socio-economic deprivation. It provides a basis, not an unequivocal measure, for the allocation of resources to health, community and related social services and research.

The NZDI scale is from 1 (least deprived) to 10 (most deprived). The local area around Waihi scores 6.8 and New Zealand scores 5.6 overall. Waihi Town scores 8.4.

WSP (2025b) considers that Waihi's higher score may be skewed by the large elderly population. The high proportion of older people reduces the proportion of people in employment. Nonetheless, other data indicates that the community generally has more unemployment and fewer formal qualifications than the average.

The WNP will require OGNZL to enlarge its Waihi workforce. Waihi's working-age population may be able to fill unskilled roles. However, OGNZL also proposes to support locals into skilled roles created by the WNP, using targeted skills development and training.

6.19.1.3 Employment Profile

Waihi had an unemployment rate of 3.3% at the 2023 census, above the national unemployment rate of 3.0%. However, WSP (2025b) considers that unemployment in the current period is uncertain due to evolving market conditions, and notes that Statistics NZ data reflects a national unemployment rate of 4.8% for the September 2024 quarter. . For the 2023 census, the three most common occupations in Waihi were 'Professionals', 'Managers' and 'Technicians and Trades Workers'. This is consistent with the norm for local, regional and national occupational profiles. There is a higher percentage of Clerical and Administrative Workers, Sales Workers and Technicians and Trades workers when compared with local, regional and national areas. OGNZL's gender and diversity policies promote a workforce composition that represents the wider population's gender and ethnic diversity. Based on a voluntary employee survey undertaken in 2022, OGNZL's existing workforce is 15% female and 85% male, which is reflective of mining being a largely male dominated industry. The proportion of OGNZL employees who identify as being of Māori descent was 27%, which is higher than the average of 17.9% within the local area. It is also higher than the proportion in New Zealand of 16.5%. WSP (2025b) notes that while not all employees responded to the voluntary survey, the percentages regarding diversity are the

best available representation of the workforce. WSP (2025b) suggests that OGNZL could increase its workforce diversity through targeted training and employment initiatives in support of the WNP.

Most of the current Waihi mine workforce lives within a 30 minute drive / 30 km radius of Waihi. WSP (2025b) suggests that OGNZL skills development and training initiatives may increase local workforce participation. If so, this will reduce the number of non-local new staff who have to be employed, consequently influencing the scale of any WNP related population influx.

6.19.1.4 Housing Availability

Dwelling occupancy rates are high in Waihi and dwelling construction rates are lower than regional and national rates. As such, housing demand currently exceeds supply. This is an important social impact consideration as the WNP will increase housing demand.

6.19.1.5 Community Facilities and Services

Waihi and the local area are reasonably well serviced with essential services and infrastructure needed for a balanced social environment. There are 25 schools and a wide range of community facilities including churches, marae, community centres, libraries and sport and recreation facilities and clubs in the area. Medical and emergency facilities are available in Waihi, and the Thames and Tauranga hospitals provide 24-hour emergency departments, within 60 km of Waihi.

6.19.2 WNP Potential Social Impacts

WSP (2025b) describes the community engagement that has been completed to gather and validate baseline data about the WNP's potential social impacts. The assessment identified both positive and negative potential impacts of the WNP, relating to the following categories:

- Way of life;
- Community;
- Environment;
- Wellbeing; and
- Fears and aspirations.

A summary of the relative significance attributed to these potential impacts after considering OGNZL's proposed measures for avoiding, remedying or mitigating actual or potential social effects of the WNP is provided in Table 6-4 below.

Table 6-4: Significance of Social Impacts Pre and Post implementation of Mitigation Measures Proposed for the WNP

Impact / Effect	Phase	Positive / Negative	Significance Pre-Mitigation	Significance Post-Mitigation
Loss of recreational facilities	Construction, Operation and Decommissioning	Negative	High	Low
Impact on recreational facilities (Te Wharekirauponga Track)	Construction, Operation and Decommissioning	Negative	Low	Low
Reduced safety of stock movement	Construction	Negative	Moderate	Low
Job security and sustained livelihoods	Operation	Positive	Extreme	Extreme
Social uplift from reduced local unemployment	Construction and Operation	Positive	Moderate	High
Social uplift from increased business activity and indirect employment opportunities	Construction and Operation	Positive	High	High
Increased business reliance on mining	Construction, Operation and Decommissioning	Negative	Low	Low
Increased demand for housing	Construction,Operation and Decommissioning	Negative	High	Moderate
Increased demand on community facilities and services	Construction, Operation and Decommissioning	Negative	Low	Low
Change in sense of place	Construction, Operation and Decommissioning	Negative	Moderate	Moderate
Reduced quality of the environment – traffic	Construction, Operation and Decommissioning	Negative	Moderate	Moderate
Reduced quality of the environment – noise	Construction, Operation and Decommissioning	Negative	Low	Low

Impact / Effect	Phase	Positive / Negative	Significance Pre-Mitigation	Significance Post-Mitigation
Reduced quality of the environment – blast and vibration	Construction and Operation	Negative	Low	Low
Reduced quality of the environment – air quality	Construction and Operation	Negative	Low	Low
Reduced quality of the environment – lighting	Construction and Operation	Negative	Low	Low
Reduced quality of the environment – visual amenity	Construction and Operation	Negative	Low	Low
Reduced wellbeing	Construction and Operation	Negative	Moderate	Low

Job security, sustained livelihoods, social uplift from reduced local unemployment and social uplift from increased business activity and indirect employment opportunities were all assessed as significant positive social effects of the project.

After considering the various measures proposed to avoid, remedy, mitigate or offset the effects of the WNP the only negative social effects that WSP (2025b) attributed moderate significance were:

> Increased demand for housing;

> Change in sense of place for the Willows Road area; and

> Reduced quality of the environment as a result of increased traffic movements in the Willows Road area.

With respect to the increased demand for housing, in consultation with WSP a suite of proposed conditions (Conditions 92 – 103), provided in **Part D**, has been proposed which require OGNZL to prepare and implement:

> A Workforce Accommodation Assessment, 6 months prior to the commencement of the construction and operational phase of the project – the objective of which is to reduce the extent to which the WNP activities contribute to any local housing shortages; and

> A Waihi Skills Development and Training Action Plan – the objective of which is to improve local skills and to expand the locally available workforce for employment in mining and its servicing sectors.

In addition, OGNZL will also implement the following mitigation measures:

- Contract agreement with offshore contractors to include specifications to employ from the local area;
- Contract agreements with local civil and drilling contractors to include specifications to:
  - employ from the local area; and as far as possible;
  - maximise local participation across their workforce through training and skills development;
  - engage local specialist contractors; and

Provide information packs which include guidance on the housing and accommodation options (in various towns) and associated travel distances as part of its recruitment strategy.

The Waihi Skills Development and Training Action Plan seeks to increase the participation of the local workforce to reduce the need for new employees to come into the local area, thereby reducing the demand for housing. The plan will be established and implemented in partnership with a Waihi Skills Development Training and Action Group which will be facilitated by OGNZL and include the following, subject to agreement to participate:

- Relevant secondary education providers;
- Relevant tertiary education providers;
- Relevant transitional industry training organisations;
- Representatives from WRC and HDC; and
- Relevant government agencies.

It is considered that by implementing the mitigation measures identified above, OGNZL will reduce the WNP's contribution to an increase in the demand for housing.

With respect to the Willows Road related amenity effects, a variety of measures have already been integrated into the project design to avoid, remedy or mitigate these issues. They include:

- Including the Wharekirauponga Access Tunnel in the WNP so that the trucking of material to the Waihi SFA can occur via an underground tunnel and does not need to pass along Willows Road;
- Bussing WUG shift workers to the Willows SFA where practicable rather than having workers travel to and from the site in private vehicles to reduce vehicle movements on the road;

- Locating the Willows SFA and WRS in a confined area and managing activities to achieve noise and vibration levels at neighbouring properties which recognised standards assessed as suitably protective of the amenity values in this area; and
- Screening the Willows SFA and WRS where it is practicable to do so.

Other mitigation measures identified as important for potential social impacts consist of clear project communications (including the provision of specialist reports) to nearby residents, and the establishment of grievance processes / mechanisms for OGNZL to receive, acknowledge, investigate and respond to any complaints about WNP impacts (see Conditions C24 – C28) provided in **Part D** to these technical reports. OGNZL is also committed to entering into a memorandum of understanding with HDC and the Waihi Mountain Bike Club about the establishment of new mountain bike trails.

6.19.3 Social Impacts of Closure

The identification and assessment of closure impacts requires a good understanding of the social context in which closure is likely to take place. With the closure of WNP forecasted for around 2041, WSP (2025b) anticipates that the social environment will be somewhat different to present day, and the information required to support a detailed assessment of the social implications of mine closure will need to be collected closer to the time of closure. Notwithstanding, WSP (2025b) undertook a preliminary assessment of the potential social effects of closure based on its current understanding of the social environment.

The assessment identified the following negative effects of closure:

- Loss of direct employment;
- Reduced local community stability; and
- Reduced wellbeing due to stress and anxiety.

To better identify, assess and manage the social effects (positive and negative) of the closure of the WNP, OGNZL will prepare a Social Economic Impact Assessment of Closure at least 5 years prior to the planned closure date for the WNP, if the company does not plan any further mining activities at Waihi. The Social Economic Impact Assessment of Closure is included in the proposed conditions provided in **Part D** to these technical reports (refer Condition 109).

6.19.4 Conclusion

The WNP's potential social impacts have been analysed using an internationally accepted social impact assessment methodology.

The WNP will have positive social impacts insofar as it will contribute to:

> Job security and sustained livelihoods;

> Social uplift from reduced local unemployment; and

> Social uplift from increased business activity and indirect employment opportunities.

After considering the various measures proposed to avoid, remedy, mitigate or offset the effects of the WNP, the only negative social effects to which WSP (2025b) attributed moderate significance were:

> Increased demand for housing;

> Change in sense of place for the Willows Road area; and

> Reduced quality of the environment as a result of increased traffic movements in the Willows Road area.

Various measures are contained in the proposed conditions, provided in **Part D** to these technical reports, which are considered to appropriately mitigate these effects.

6.20 CLOSURE AND AFTERCARE

A comprehensive and integrated rehabilitation and closure concept is proposed for the WNP which ties in with the existing rehabilitation and closure obligations which apply to OGNZL's existing mining activities at Waihi. The details of the proposed rehabilitation and closure plan have been informed by the various technical assessments commissioned to provide advice on the WNP.

It requires OGNZL to rehabilitate and close all mine areas such that in the long term:

> The proposed work areas, and any structures on them, remain in a stable, self-sustaining, rehabilitated state;

> The soils on the proposed work areas are such that it is highly unlikely that there will be a risk to human health considering the post closure use of that land; and

> Any water discharging from the proposed work areas, and any groundwater under the proposed work areas, is of a quality such that it will not adversely affect aquatic life, or other users of the water resource.

In Area 1 it includes:

> Removing all fencing and ventilation evasé / egress surface infrastructure;

> Capping all ventilation shafts with a structural cap or stabilised backfill;

- Managing weeds and pests within disturbed areas for two years following the capping of ventilation shafts to support natural revegetation processes;
- Backfilling any void where geotechnical conditions require it to ensure long term stability; and
- Completing all necessary works to ensure that after the completion of mining the voids created by the WNP and any associated dewatering activities that natural flows and water quality in any surface water body identified as a Natural State Water Body at the date of issue of this consent, except that associated with the re-emergence of the warm spring located at E1850258, N5868719, is maintained or returned to a state that reflects the pre-mining characteristics of that water body.

In Area 2 it includes:

- Removing the WRS;
- Fully reinstating and rehabilitating the tributary impacted by the WRS;
- Restoring and recontouring disturbed landforms to appear similar to the existing landforms;
- Removing all fencing and ventilation evasé / egress surface infrastructure;
- Capping Ventilation Shaft 1 with a structural cap or stabilised backfill;
- Restoration and riparian planting in general accordance with the concept set out in Figure 6-16 below;
- Backfilling 100 m of the Willows Access Tunnel from the Willows Portal; and
- Backfilling any void or portal where geotechnical conditions require it to ensure long term stability.

In Area 3 it includes:

- Backfilling 100 m of the Wharekirauponga Access Tunnel from the WUG Portal; and
- Backfilling any void where geotechnical conditions require it to ensure long term stability.

In Area 5 it includes:

- Capping the tailings in the GOP TSF with a NAF layer of rockfill, suitable rooting medium, topsoil layer, and contouring and drainage as required, to ensure the establishment and maintenance of a surface which will protect water quality and avoid soil erosion. The final capping shall allow for long term settlement of tailings;

- Grading the final capped surface of the GOP TSF towards two outlets, one on the southern side near the Gladstone Wetland and one of the western side where the pit crest is lowest;
- Backfilling 100 m of the Wharekirauponga Access Tunnel from the WUG Portal;
- Backfilling 100 m of the Martha Underground Tunnel from the Gladstone or MUG Portal;
- Backfilling any void where geotechnical conditions require it to ensure long term stability;
- Subject to the matter below, removal of all buildings and structures from the Waihi SFA;
- The WTP may remain on site if it is needed for ongoing treatment of water from rehabilitated areas (of if it is determined that the WTP and / or its associated infrastructure can be utilised for other purposes);
- Restoring and recontouring disturbed landforms to appear similar to the existing landforms; and
- Restoration, riparian and wetland edge planting, and provision of recreational trails, in general accordance with Figure 6-17 below.

In Area 6 it includes:

- Recontouring and smoothing the remaining rock in the NRS to reflect the adjoining rounded landforms;
- Capping the remaining rock, including provision of a low permeability NAF layer to limit water and oxygen ingress, suitable rooting medium, topsoil layer, and contouring and drainage as required, to ensure the establishment and maintenance of a surface which will protect water quality and avoid soil erosion; and
- Restoration, riparian and wetland edge planting, and provision of recreational trails, in general accordance with Figure 6-17 below.

In Area 7 it includes:

- Progressive rehabilitation of the TSF3 embankment surface as areas of a practical working size become available, include the provision of a low permeability NAF layer to limit water and oxygen ingress, suitable rooting medium, contouring and drainage as required, to ensure the establishment and maintenance of a surface which will protect water quality and avoid soil erosion;

- Unless otherwise agreed in writing by the HDC, the revegetation on an annual basis of the lift undertaken in the previous season (i.e. the lift undertaken in the previous season is to be revegetated while the current seasons lift is being undertaken);
- Conversion of the TSF3 tailings deposition area to a wetland with a spillway into Ruahorehore Stream;
- Conversion of Collection Pond (S6) and (S7) to a wetland;
- Restoration, riparian and wetland edge planting, and provision of recreational trails, in general accordance with Figure 6-17 below; and

The Consent Holder shall prepare a Rehabilitation and Closure Plan covering all project areas that will be affected by the mining activities authorised as part of this consent in accordance with Conditions C5 and C62 -C71.

As conditions of the consents granted for the expansion of the Martha Mine in 1998 (**EMMA Consent**) the consent holder (now OGNZL) was required to establish:

- **A rehabilitation bond** in an amount set by and in favour of HDC and WRC to secure performance of all the consent holder's obligations up to and including closure of the site. It provides the HDC and WRC with access to funds sufficient to close and rehabilitate the mine site in the event that OGNZL fails to meet its closure obligations. The quantum of this bond is reviewed annually;
- **A trust** (the Martha Trust) - to take ownership of key components of the site[62] post closure and to manage them in perpetuity. The Martha Trust is required to be in a form approved by the HDC and the WRC and provides for the appointment of trustees by each Council (but not by OGNZL); and
- **A capitalisation bond** in an amount set by the HDC and WRC to secure settlement on the Martha Trust of funds sufficient to enable it to undertake post-closure management and monitoring of the assets to be transferred to it.

The EMMA Consent has expired and the activities it authorised are now permitted activities under the HDP, subject to the observance of the EMMA Consent conditions, including the above provisions relating to bonds and the Martha Trust.

Resource consents for subsequent developments of the Waihi mines have adopted the model established under the EMMA Consent, most recently in the consents for Project Martha in 2019.

[62] Relevantly the tailings storage areas (TSF 1A and 2) and WTP.

The Martha Trust was originally established by deed in 2000 and was replaced with an updated deed in 2021 in a form approved by HDC, WRC and OGNZL.

For the WNP OGNZL proposes that the existing model should be extended, and this is reflected in the proposed conditions.

The existing performance bond will be extended to incorporate completion of the consent holder's closure responsibilities in relation to all WNP components. All the relevant existing consent conditions relating to the performance bond will be included in WNP consents.

On closure it is proposed to transfer the GOP, the NRS, and the TSF3 areas to the Martha Trust to be managed in perpetuity in the same manner as the existing TSFs and the WTP (unless it is determined that the WTP and its associated infrastructure can be utilised for other purposes). At closure the Willows SFA will be dis-established and the area made suitable for alternative land use (such as reversion to farming) and this area does not need long term management under the Martha Trust.

Figure 6-16: Proposed Rehabilitation and Closure Concept for Area 2

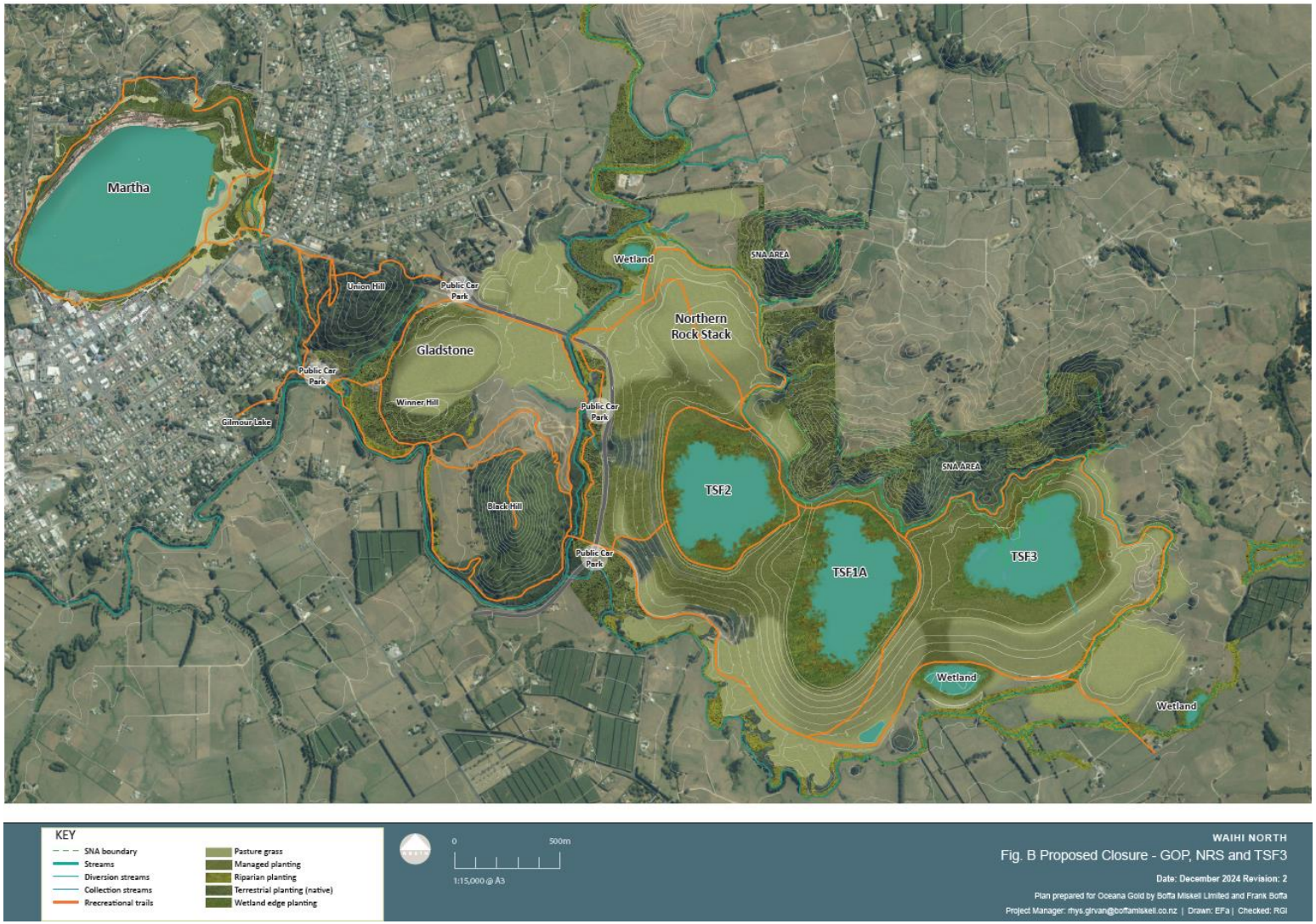

Figure 6-17: Proposed Rehabilitation and Closure Concept for the Waihi Based Areas