Draft Rehabilitation Management Plan

Mananui

Version	Date	Description	Approved	Position

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1. Introduction

Rehabilitation of the Mananui Project site (the **site**) during mining (**Progressive Rehabilitation**) and post mining (**Final Mine-Closure Rehabilitation**) is an integral part of the mining process.

Re-establishing the landforms post extraction of the HMC and replacement of the topsoil, will be undertaken in a systematic manner consistent with the objectives of the Rehabilitation Management Plan. Those objectives contained in consent are:

a) To create a stable dune landform with a similar contour and profile at final mine closure as that which existed prior to mining;
b) To establish vegetation cover on all areas disturbed by mining activity; and
c) To protect freshwater values associated with Mahinapua Stream and associated wetlands.

The mining process is expected to be continuous with no breaks in operations. Should the mine need to cease operations for any reason for a period of more than 3 months, all disturbed areas shall be rehabilitated as detailed in this document within 6 months from the date of the last mining works, except where Force Majeure applies.

This Rehabilitation Management Plan should be used in conjunction with the Erosion and Sediment Control Plan.

2. Resource Consent Requirements

The proposed conditions of consent which relate to rehabilitation are outlined below.

4.0 Bond Conditions	
4.1	The Consent Holder must provide and maintain in favour of the Consent Authority a bond to secure compliance by the Consent Holder with all the conditions of these consents, including the completion of all final mine closure activities required by these consents and to avoid, remedy or mitigate any adverse effects on the environment arising as a result of the exercise of these consents.
4.2	The payment of the bond quantum by the Consent Holder, as required by Condition 4.4 must either be: a) A bond in favour of the Consent Authority for the guarantee sum in a form and executed by a surety acceptable to the Consent Authority; or b) A cash bond deposited with and held in a bank account by the Consent Authority
4.3	Where a bond is guaranteed in accordance with Condition 4.2 a), the guarantor must bind itself to pay up to the bond quantum for the carrying out and completion of all obligations of the Consent Holder under the bond.
4.4	The bond (as set at any time under Condition 4.1) must be held or remain in full force and effect throughout the term of these consents and until all conditions under these consents have been performed unless otherwise agreed by the Consent Authority.
4.5	The amount of the bond must be $286,650 (two hundred and eighty-six thousand six hundred and fifty dollars).
4.6	The amount of the bond may be inflation adjusted annually, if requested by the Consent Authority, by the movement of the CPI relative to the CPI at the date when the bond is first provided.

4.7	The Consent Holder will not exercise or must cease exercising these consents: a) Until the bond required by Condition 4.1 has been fully executed by the Consent Holder and guarantor, or has been deposited with the Consent Authority, or b) In respect of any inflation adjusted bond referred to in Condition 4.6, after 30 working days have expired from the date the Consent Holder was notified of the terms of the inflation adjusted bond by the Consent Authority unless the inflation adjusted bond has been executed with the Consent Authority by the Consent Holder and guarantor, or has been deposited with the Consent Authority; or c) In respect of any bond sum changed or reviewed pursuant to Sections 127 or 128 of the Act, after thirty 30 working days have expired from the date the Consent Holder was notified of the decision of the changed or reviewed bond by the Consent Authority unless the changed or reviewed bond has been executed with the Consent Authority by the Consent Holder and guarantor, or has been deposited with the Consent Authority, or d) If, during the term of these consents, the whole or any part of the bond is required to be used for the carrying out and completion of all obligations of the Consent Holder under the bond, unless the full bond has been executed with the Consent Authority by the Consent Holder and guarantor, or has been deposited with the Consent Authority.
4.8	The Consent Holder must complete such work requested in respect of which any bond or deposit is held, within the reasonable time period nominated by the Consent Authority's written request.
4.9	If the consents are transferred in part or whole to another party or person, the bond must continue until any outstanding work at the date of transfer is completed to ensure compliance with the conditions of these consents, unless the Consent Authority are satisfied adequate provisions have been made to transfer the liability to the new Consent Holder.
4.10	In the event of any such transfer of the consents, the Consent Holder must ensure that the transfer provides a replacement bond to the Consent Authority on the terms required by the Bond Conditions.
5.0 Annual Work Programme	
5.1	At least 20 working days prior to mining activities commencing and thereafter on or before the anniversary date of the commencement of these consents, the Consent Holder must submit a programme of work ("Annual Work Programme") for certification by the Consent Authorities detailing: ○ The proposed works to be carried out over the next 12 months including: ▪ Equipment to be used; ▪ Areas of topsoil and overburden stripping and stockpile locations; ▪ New areas of land disturbance that will be mined; ▪ Access tracks; ▪ Drill/prospecting sites and other tracks to be constructed; and ▪ Any other site works within the consent area. ○ The approximate open volume of the working pit at the start of the year including depth of excavations and the area of the working pit.

	○ The progressive rehabilitation works to be carried out over the next 12 months including: ▪ Areas of unrestored land (i.e. all land not finally topsoiled and revegetated) at the beginning of the new year; ▪ The area that will be fully rehabilitated during the forthcoming year; ▪ Maximum slope angles, bench heights and widths of recontoured ground, if applicable; and ▪ Rehabilitation method and technique including replacement of topsoil and vegetation cover. ○ Description of measures to prevent adverse effects on natural waterbodies, including drainage works within the consent area, and the collection and treatment of site run-off before discharge to land. ○ Measures that must be adopted to ensure soil conservation and slope stability are controlled; ○ A description and analysis of any unexpected adverse effects that have arisen as a result of activities within the last 12 months, and the steps taken to address the adverse effect.
5.2	The following plans, reports and results of monitoring must also be submitted as part of the Annual Work Programme: ○ A detailed plan or aerial photograph showing: ▪ The open working area at the start of the year; ▪ Proposed mine path for the forthcoming year including haul and access roads; ▪ Rehabilitated ground behind the open pit area; ▪ Location of existing and intended topsoil or overburden dumps and their dimensions; ▪ Location of natural waterbodies; ▪ Location of present and intended drainage works and settling ponds; and ▪ Any other site works within the consent area. ○ An Erosion and Sediment Control Plan in accordance with condition 23.0. ○ Results of water quality, flow and water level monitoring from the previous 12 months in the form of an annual monitoring report required by condition 26.7. ○ Any proposed updates to Management Plans submitted in accordance with the respective conditions of consent. ○ Results of dust monitoring from the previous 12 months required by Condition 28.3 for the previous 12 months.
5.3	The Consent Holder must provide the Consent Authorities with any further information, which the Consent Authorities may reasonably request after considering any Annual Work Programme. This information must be provided in a timely manner as required by the Consent Authorities.
6.0 Management Plans	

6.1	At least 20 working days prior to undertaking any activities authorised by these consents, the Consent Holder must submit the following management plans to the Consent Authorities for certification: (a) Noise Management Plan (b) Fauna Management Plan (c) Dust Management Plan (d) Transport Management Plan (e) Water Management Plan~~,~~ (f) Monitoring and Mitigation Plan (g) Erosion & Sediment Control Plan and (h) Indigenous Restoration and Rehabilitation Plan *Advice notes:* *(a) These are ~~(~~collectively referred to as Management Plans.~~)~~* *(b) Where a plan requires the input of an appropriately qualified professional, the Consent Authorities may engage an appropriately qualified person to peer review the plan as part of the certification process.*
6.2	The purpose of the Management Plans is to implement the relevant conditions of these consents. All Management Plans must include (where relevant): a) The purpose of the plan; b) Reference to the conditions of these consents that the management plan implements~~;~~; c) How each of the relevant conditions will be given effect to; d) Procedures for implementing the relevant plan; e) Plan auditing check lists; f) Monitoring programmes and/or monitoring protocols; g) Feedback mechanisms for any adaptive management, including circumstances in which a material change to the management plan would be required; h) An organisational chart showing staff and contractor positions and responsibilities for plan implementation; i) Relevant training and induction procedures and training schedules; and j) Reporting procedures and format for providing the results of any monitoring or surveying required by the Management Plans.
6.3	Site activities must not commence until the management plans required in condition 6.1 have been certified by the relevant Consent Authorities If the response from the Consent Authorities is that they are not able to certify the management plans, the Consent Holder must consider any reasons and recommendations provided by the Consent Authorities, amend the management plans accordingly, and resubmit the management plans to the Consent Authorities.
6.4	If the Consent Holder has not received a response from the Consent Authorities within one month of the date of submission of the management plans under Condition 6.1, the management plans must be deemed certified. The Consent Holder may amend the management plans at any time to take into account: (a) Any positive measure/s to ensure the stated objectives of the management plans are achieved;

	(b) Any required actions identified as a result of monitoring under these consents; and (c) Any changes required to further reduce the potential for adverse effects as a result of actions identified in the Annual Work Programme. Where management plans require the input of an appropriately qualified person, any amendments to those management plans must also be undertaken by an appropriately qualified person. *Advice Note: Some management plans have ongoing annual review requirements which ar required in order to avoid, remedy or mitigate effects. These specific review requirements are stipulated in the relevant conditions on this consent.*
6.5	Any amended management plans must be provided to the relevant Consent Authorities within 20 working days of the amendment for review and for certification in accordance with Condition 6.1.
6.6	The Plans must not be amended in a way that contravenes the matters set out in the conditions for the respective Plans.
6.7	If the response from the Consent Authorities is that they are not able to certify the management plan, the Consent Holder must consider any reasons and recommendations provided by the Consent Authorities, amend the management plan accordingly, and resubmit the management plan to the Consent Authorities.
6.8	A copy of the latest version of the certified Management Plans must be kept on site at all times and all key personnel must be made aware of the contents of each Plan and their responsibilities under each Plan If the Consent Holder has not received a response from the Consent Authorities within one month of the date of submission of any reviewed management plan, the management plan must be deemed certified.
6.9	Subject to any other conditions of these consents, all activities must be undertaken in accordance with the latest version of the certified Management Plans.
7.0 Method of Operations	
7.1	The mine boundaries must be clearly marked on the ground before any earthworks take place, with the following setbacks in place: (a) 10m setback from the northern and southern property boundaries (b) 20m setback from the State Highway 6 property boundary
7.2	The maximum site disturbance must not exceed 22.5 hectares at any one time, excluding the processing plant area. *Advice note: The disturbed area includes the mine pit and associated water management infrastructure, active rehabilitation areas and the service road.*
7.3	The Consent Holder must strip soil material ahead of operations and stockpile it for progressive and final mine closure rehabilitation purposes. Stockpiled soil must be protected from erosion caused by water and wind as far as practicable.
7.4	The Consent Holder must not bury any topsoil or soil material suitable as a growing medium or remove it from the site.

9.0 Restoration and Rehabilitation Programme	
9.1	The Consent Holder must prepare an Indigenous Rehabilitation Plan (IRRP), which provides: a) For the remediation of 4.2ha of indigenous treeland and grazing forest on the Site through the provision of direct vegetation transfer and planting of 4.75ha of indigenous broadleaf-podocarp forest along the full length of the eastern forest area (1.7 kilometres), that is at least 30 metres in width (Revegetation Site); and b) the creation of three new wetlands of total 2.37ha. *Advice note: the indigenous habitat restoration mentioned above excludes additional landscape and visual mitigation planting as shown in the Landscape Mitigation Plan (LMP) for the Project (prepared by Glasson Huxtable, October 2023). The LMP proposes additional boundary planting on the western bunds (1.08ha) and infill planting in between them (0.18ha). Planting is also proposed along the length of the northern boundary (0.54ha). While not targeting ecological remediation or mitigation gains, these plantings of native species, have both a resource and a landscape movement benefit for the local indigenous species.* c) The IRRP shall include; i. Description of the Site; ii. Description of the remediation and provision of planting; iii. Description of the wetland construction; iv. Revegetation mitigation methodologies and outcomes; v. Process of remedial forest restoration; vi. Revegetation site preparation; vii. Revegetation monitoring methods including the use of plots and transects to measure vegetation presence, cover and species abundance; viii. Wetland monitoring methods; and ix. Pest plant and weed control.
9.2	The consent holder must comply with the following for any direct vegetation transfer to the Revegetation Site: a) before any direct vegetation transfer to the Revegetation Site occurs, the consent holder must prepare an appropriately sized area in the Revegetation Site to facilitate the direct vegetation transfer; and b) the direct vegetation transfer to the Revegetation Site must include as much tree, shrub, ground tier native vegetation, leaf litter, top soil and woody debris as practicable.
9.3	The consent holder must comply with the following for any new planting in the revegetation Site: a) the planting in the Revegetation Site does not need to be like for like however it should provide ecological connectivity;

	b) he new planting in the Revegetation Site must be done using appropriate eco-sourced species as identified in the IRRP; and c) upon completion, there shall be 80% canopy cover over the entire Revegetation Site and the canopy species in the Revegetation Site is at least 80% kamahi, hinau and kahikatea. *All Management Plans are required to adhere to the requirements in Conditions 6.1-6.10.*
9.4	The Consent Holder must carry out progressive land rehabilitation, to achieve the following requirements: a) Reinstatement of the productive pasture; b) Reinstatement of existing drainage to reflect pre-mining catchment areas; c) Ensure rehabilitated land is stabilised as quickly as possible; and d) Protect all waterbodies from the effects of erosion and sediment generation. *Advice Note: Stabilised means an area inherently resistant to erosion such as rock, or rendered resistant by the application of aggregate, geotextile, vegetation, mulch or an approved alternative. Where vegetation is to be used on a surface that is not otherwise resistant to erosion, the surface is considered stabilised once an 80% vegetation cover has been established.*
10.0 Complaints and Non-Compliance	
10.1	Upon receipt of any complaint, the Consent Holder must promptly investigate the complaint, take action to remedy or mitigate the cause of the complaint and inform the Consent Authorities within 48 hours of the report, of the details of the complaint and the action taken.
10.2	The Consent Holder must maintain a complaints register for all aspects of operations in relation to these consents. The register must be available to the Consent Authorities at all times and must: a) detail the date, time and type of complaint; b) cause of the complaint; and c) the action taken in response to the complaint.
10.3	Complaints which may infer non-compliance with the conditions of these consents, must be referred to the Consent Authorities within 48 hours of the report.
10.4	In the event of any breach of compliance of the conditions of these consents, within 5 working days of becoming aware of any breach the Consent Holder must provide written notification to the relevant Consent Authorities which explains the cause of the breach, and if the cause was within the control of the Consent Holder, steps which were taken to remedy the breach and steps which must be taken to prevent any further occurrence of the breach.

	Advice Note: This consent condition does not replace the compliance and enforcement responsibilities of the Consent Authorities.

12.0 Hours of Operation	
12.1	The mining and processing activities must comply with the following hours of operation: o Topsoil stripping and rehabilitation works – 0700-2200 7 days a week o Mining Activities – 24 hours a day / 7 days a week o Processing Plant Activities - 24 hours a day / 7 days a week o Heavy Mineral Concentrate Trucking Activities - 24 hours a day / 7 days a week *Advice Note: In addition to condition 12.1, further noise restrictions are contained in Condition 16.0 Noise.*

21.0 Method of Mining	
21.1	The consent holder must only carry out mining activities within the mining area shown on the attached map titled "Mananui Consent Brief Map" prepared by Westland Mineral Sands Co. Ltd attached as Att N Schedule 1 Site Plan.
21.2	The maximum combined surface area of un-rehabilitated disturbed land in the application area must not exceed 27.74 hectares at any one time, excluding the processing plant area.
21.3	The mining and associated activities under this consent must not cause or induce erosion or slope instability outside the application area.
21.4	The mine pit must be constructed and operated to maintain batter slopes of: 27 degrees for virgin/undisturbed land 22 degrees for tailings deposition
21.5	The consent holder must engage a suitably qualified geotechnical engineer to review the batter slopes and ensure that land instability is avoided beyond the pit area. A report shall be provided to the Consent Authority no later than 6 months after the commencement of mining in the southwestern corner of the site, which confirms that the slope batters in Condition 21.4 are suitable.
21.6	Mining must not occur within 100m of the escarpment forest in the southeastern corner of the site before condition 21.5 is satisfied and the slope batters are confirmed or amended as required.

3. Mining and Progressive Rehabilitation process

Progressive rehabilitation is required to achieve the following requirements :

a) Reinstatement of the landform;

b) Reinstatement of existing drainage patterns to reflect pre-mining catchment areas which discharge to the major drains;

c) Ensure short and long term stability of the reinstated landform; and

d) Protect Mahinapua Stream, associated wetlands and the forest along the southern site boundary from the effects of erosion and sediment generation.

Progressive rehabilitation is defined as the 3ha area of progressive rehabilitation occurring behind the mine pit area. Progressive rehabilitation involves the placement of mine tailings and slimes in the mining void, followed by the replacement of overburden, spreading of topsoil and returning the land to pasture to maintain a maximum disturbed area at any one time of 22.54 hectares.

The total disturbed area will be 119 hectares and within this area there is an estimated 357,000 m^3 of topsoil. This is based on data from test hole and site examination. However, this may vary across the site. For calculations, the following assumptions have been used:

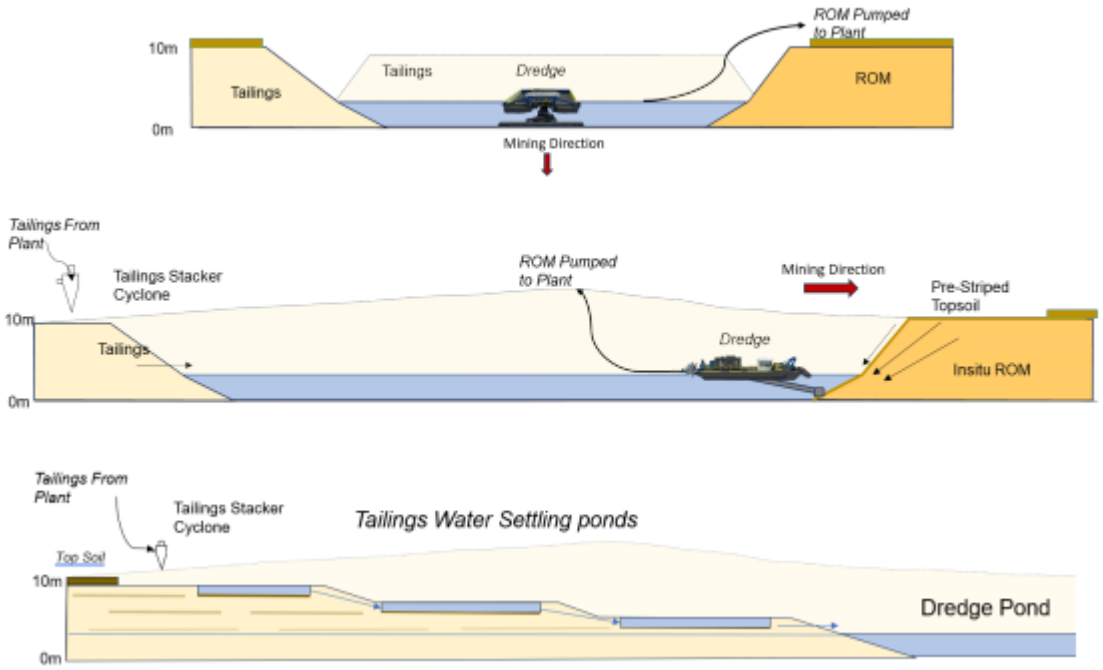
- Mine site topsoil thickness – 0.3 m (approx. 357,000 m^3)
- Plant Site topsoil cover – 0.3 m (approx. 6,000 m^3)
- Temporary out-of-pit tails stockpile location – 0.3 m (approx. 3,000 m^3)

Prior to the removal of any topsoil, the area will be treated for weed control within the previous 12 months.

Topsoil from the plant site area will be used to provide bunding along the State Highway adjacent to the plant site.

The topsoil over the extraction area will be removed to allow access to the sand for mining and either used for visual bunding, stockpiled (initial topsoil removal) or placed back onto already prepared backfilled areas as part of Progressive Rehabilitation.

The below cross-section demonstrates the mining pit through extraction and Progressive Rehabilitation, with the left (northern) part of the cross-section demonstrating extraction and the right (southern) part of the cross-section demonstrating the ongoing Progressive Rehabilitation.



Cross-section: Mining Pit extraction and Progressive Rehabilitation

Figure 1 (below) details the mining sequence schematics, which details the extraction and Progressive Rehabilitation process.

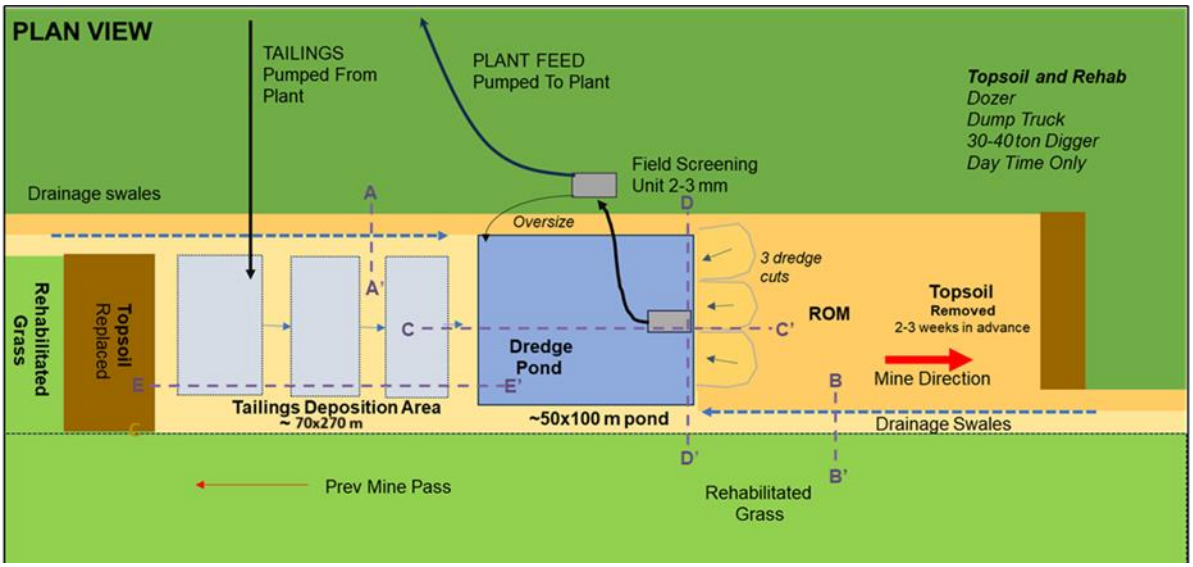


Figure 1: Mining sequence schematics

Figure 2 shows that as mining commences, topsoil is stripped, sand is mined and tails are placed in the temporary storage area (due to the fact that mining is in the early stages of extraction). Priority is given to rehabilitating this stockpile as the dump progresses.

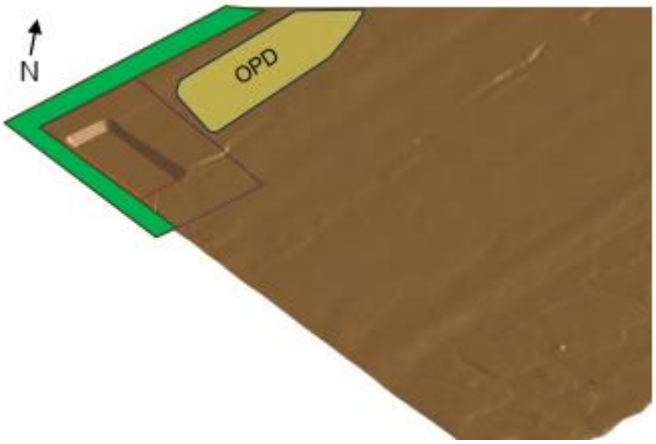


Figure 2: Placement of temporary tails on a stockpile with commencement of mining

Figure 3 shows stripping and mining continuing. At this point, since there is insufficient void space in the mine, tails will be placed directly back to the mined areas which is then subsequently rehabilitated.

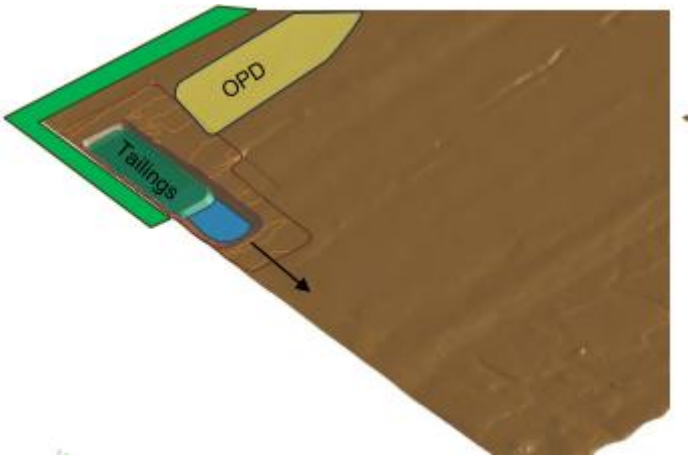


Figure 3: Placement of tailings direct to mining areas

The out of pit dump has the following physical properties:

- Maximum height above current land of 8 m;
- Maximum total surface area of 1.5 hectare; and
- Volume of approx. 60,000 m^3.

This temporary stockpile will be formed during the first three months of extractive operation and will then be rehandled and used in rehabilitation of the first mining strip.

Once in sequence, as topsoil stripping occurs, progressive rehabilitation is undertaken at the same rate to keep the total disturbed area at approx. 22.54 hectares for the remainder of the mine life.

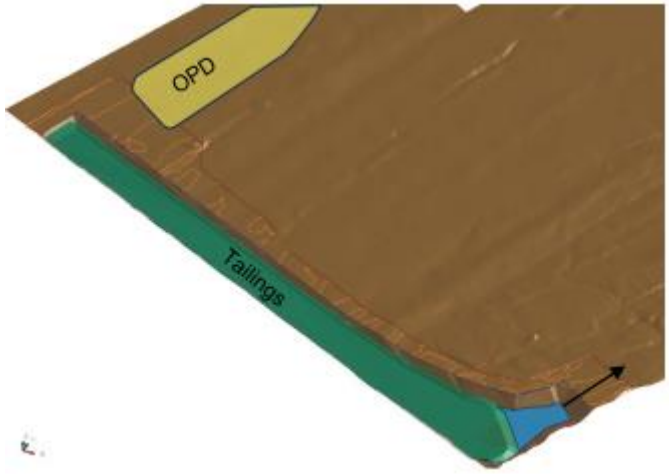


Figure 4: Steady state mining

From now topsoil stripping, mining and tails replacement (extraction and Progressive Rehabilitation) continues until final tails landforms are achieved and then topsoil is removed from in front of the dredge areas and placed directly on the tails behind the dredge (commencing at the beginning of the Final Mine-Closure Rehabilitation).

The mining sequence includes all six stages of the mining process as per Figure 1.

The six stages are:

- Undisturbed farmland;
- Topsoil stripping – used to form bunds, temporarily stockpiled or placed directly onto backfilled and contoured tailings;
- Mining of sand – pumped to the processing plant;
- Tailings deposition – tailings collected from plant stockpile, trucked and paddock dumped close to final location and positioned and contoured by use of small excavator;
- Rehabilitation of tailings with topsoil (as detailed above), then seeded with suitable arable grass seed; and
- Return to pasture – including stock fences and fences to protect existing waterways.

Figure 5 shows the mine area final landform and the rehabilitation of the temporary tailings stockpile area (all tails removed and rehabilitated back to a similar (pre-mining) landform with topsoil replaced).

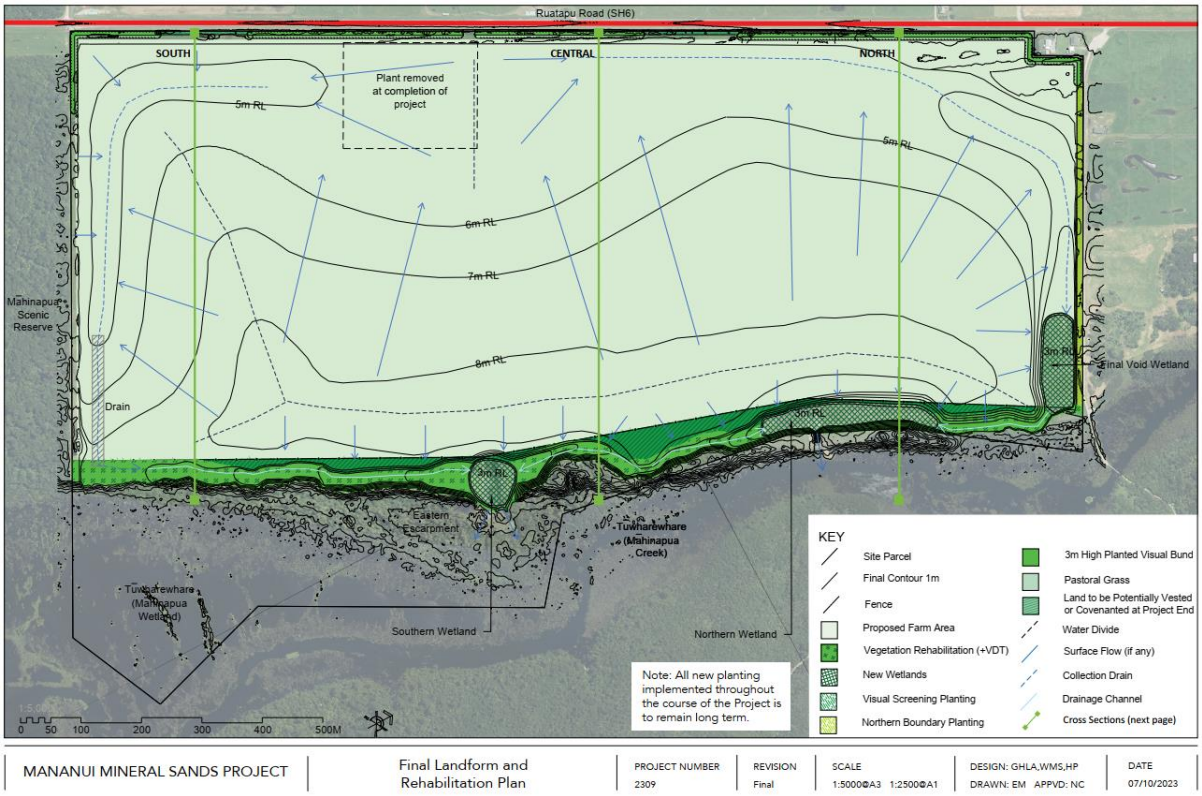


Figure 5: Final landforms

Figures 6, 7 and 8 compare the contours of the original topography and the final site landform. The rehabilitated dune landform will be lower than the original landform. The final landform will have the former dune ridges removed and will have a flatter overall profile.

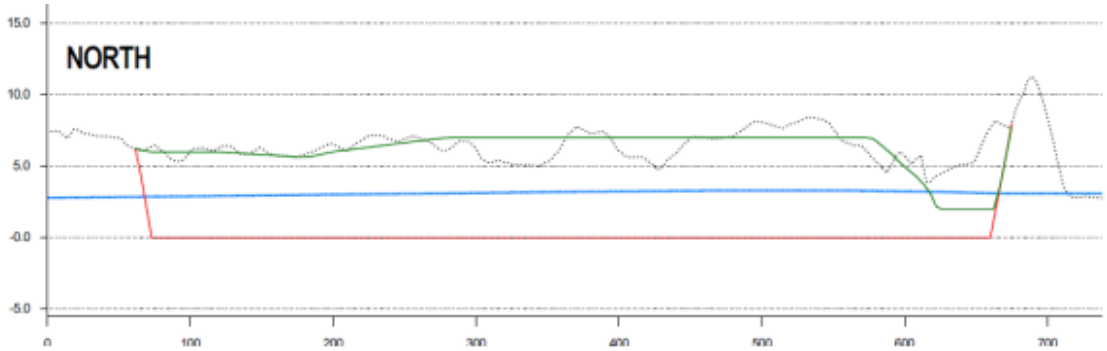


Figure 6: Northern Cross Section

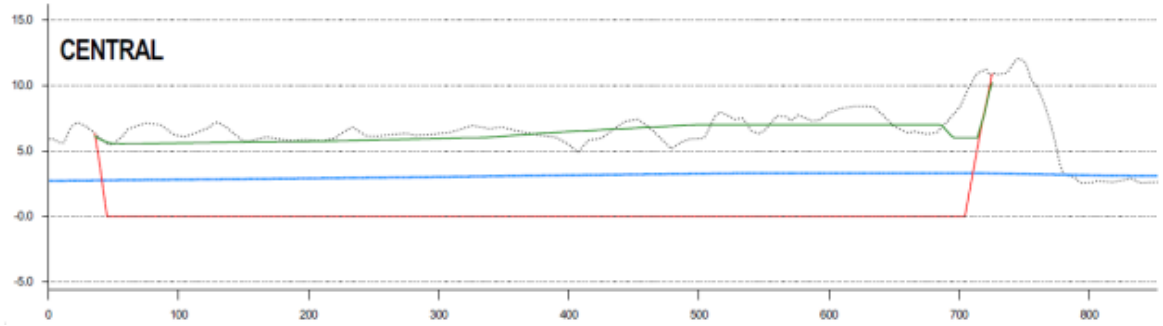


Figure 7: Central Cross Section

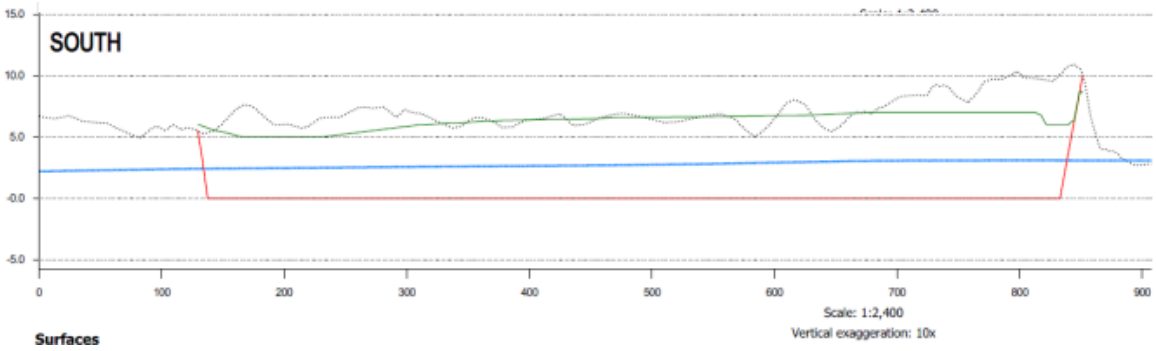


Figure 8: Southern Cross Section

All rehabilitated areas will be treated for weeds during each annual weed control program .

4. Rehabilitation quality assurance

The resource consent conditions require that this Rehabilitation Plan addresses specific measures that will ensure a robust rehabilitation. These measures include:

- *A programme of progressive rehabilitation of the pre-mining landform, adhering to maximum disturbed area limits;*
- *The original and anticipated final mine closure topography;*
- *Contour and stability of all post-mining landforms;*
- *Establishment of pasture cover over all disturbed land;*
- *Restoration of drainage discharge channels;*
- *Protection of water and soils from the effects of erosion;*
- *The achievement of water quality standards for water interacting with previously distributed sites/areas in the long term to protect aquatic values;*
- *Removal of buildings, equipment and structures; and*
- *Post-mining weed and pest control requirements.*

Each of these measures is addressed as follows:

4.1 A programme of progressive rehabilitation of the pre-mining landform, adhering to maximum disturbed area limits

The programme of progressive rehabilitation is extensively covered in Section 3 above.

4.2 The original and anticipated final mine closure topography

The original and final mine closure topography are shown in Figures 6,7 and 8. The rehabilitated dune landform will be lower than the original landform, however the contours will be reflected as far as possible in the final rehabilitated landform, avoiding having ridges running north-south through the site.

4.3 Contour and stability of all post-mining landforms

As tailings are deposited back to the mining areas, due to the moist nature of these tailings, the natural angle of repose will be approx. 22°. This is less than the natural angle of repose of sand to ensure tailings stability.

Topsoil will be placed onto these tailings within 1-2 months of final profile to ensure minimal wind disturbances. The placed topsoil will be lightly compacted by a 12-tonne excavator used to position the topsoil.

4.4 Establishment of pasture cover over all disturbed land

Once final topsoil is in place and a suitable area has been established and compacted, sowing of suitable pasture grass seeding will be undertaken. It is also expected that, as topsoil has been relocated from other areas, a significant amount of self-seeding will also occur.

4.5 Restoration of drainage discharge channels

All the existing drainage channels will have wetlands constructed to allow any surface run off both during mining and during farming post mining will be treated before exiting the site. The area of the mine has surface run-off only.

4.6 Protection of water and soils from the effects of erosion

Topsoil removed from the plant site will largely be used for the visual bunds and will be immediately profiled and planted as part of the visual mitigations. Further detail regarding protection from erosion is provided in the Erosion and Sediment Control Plan.

4.7 The achievement of water quality standards for water interacting with previously distributed sites/areas in the long term to protect aquatic values

The Water Management Plan and the Monitoring and Mitigation Plan required by the conditions of consent provide actions that will be undertaken to manage water quality effects. The conditions of consent also require water monitoring, which will ensure the achievement of water quality standards throughout the mining process, and consequently following rehabilitation.

4.8 Removal of buildings, equipment and structures

The processing plant and any associated buildings, tanks or pipework are all of a "portable nature". This means none of the plant requires any major concrete foundations, with most simply using skids to distribute their load to the sand base. It is intended that all of the site equipment will be removed for use at a potential future operation. If any concrete is used for foundations, this will be removed before topsoil is replaced in the plant site area.

The silt and settling ponds, and stormwater drains, will be cleaned of any silt and sediments followed by the backfilling, compaction and re-seeding of these areas back to pasture.

4.9 Post-mining weed and pest control requirements.

The mine owner is also the landowner and intends to revert the site to stock farming. As part of the farm's ongoing business, weed control, fertilisation and land management will be key to sustainable farm management.

5. Final Mine Closure

Final mine closure will occur at the completion of all mining and progressive rehabilitation works, end of mine landscaping on the northern boundary, and includes the replacement of the temporary tailings stockpile back to the mine area, and where the previous dune landform and pre-mining land drainage patterns are reinstated acknowledging a reduction in elevation associated with the removal of HMC material.

Landforms at the point of final mine-closure at detailed at Figures 6 to 8.

The Consent Holder must notify the Consent Authorities of the intended completion of final mine closure rehabilitation activities at least 5 working days prior to works ceasing on-site in accordance with the general conditions of the WCRC Consent.