Tai Poutini
RESOURCES

BARRYTOWN MINERALS PROJECT

SOUTHERN BLOCK

REHABILITATION MANAGEMENT PLAN

tprl.co.nz

May 2026

Quality Assurance:

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Status: Draft V2 **Issued:**

Revision schedule		
Rev. Number	**Date**	**Description**
1.0	30 March 2026	Draft Rehabilitation Management Plan
2.0	22 May 2026	Updated following wetland shape amendment

Table of Contents

1. Introduction

1.1 Scope

This Rehabilitation Management Plan (the Plan) for the Southern Block sets out the framework to guide the rehabilitation activities across the site in order to return the area to a stable, self-sustaining landform reflecting the consent requirements.

The Plan will detail the progressive rehabilitation of the site including streamworks and diversions for creeks and drains, riparian and other planting and construction of the wetland. Central to the rehabilitation are the erosion and sediment control practices. The rehabilitation activities identified in the Plan take place throughout the life of the project.

Rehabilitation will restore productive pasture and ensure the rehabilitated land can be returned to viable agricultural use alongside the ecological enhancements made.

Rehabilitation will be undertaken progressively and works will take place pre-mining, during mining and post-mining. 'Progressive rehabilitation' is the staged restoration of mined land as each part of the site becomes available, rather than waiting until all mining has finished. It involves progressively reshaping the landform, redistributing and replacing material, reinstating drainage and creek systems, constructing wetland features and undertaking planting and stabilisation so that disturbed areas are returned to a stable and functional condition as soon as practicable.

In the context of the Southern Block, progressive rehabilitation means that final landform works will be completed in sequence behind mining, with tailings and borrow material used to establish the intended post-mining topography. This approach reduces the amount of land disturbed at any one time, allows rehabilitation outcomes to be integrated with mining operations and supports the early establishment of vegetation, drainage function and long-term land stability.

This RMP should be read in conjunction with the following documents:

(a) Landscape Mitigation Package;
(b) Erosion and Sediment Control Plan; and
(c) Native Freshwater Fish Capture and Relocation Management Plan.

The Rehabilitation Management Plan has been guided by the Conditions of the Project (refer Conditions 9.0 and 28.0 in particular).

1.2 Goals and Objectives

Rehabilitation is an integral component of the overall mining operation. The primary goal of rehabilitation is to restore the site to a stable, productive and environmentally resilient landscape that integrates with the surrounding environment. Rehabilitation of the site will be undertaken progressively as mining occurs across the site (progressive rehabilitation). At the completion of mining, the majority of rehabilitation will have been completed.

Progressive rehabilitation will be undertaken to achieve the following outcomes to meet Condition 9.1:

1. Reinstatement of productive pasture;
2. Reinstatement of existing creek and drainage patterns to reflect pre-mining catchment areas ensuring no loss of extent, with appropriate riparian planting;
3. Construction of wetland and riparian areas;

At the completion of mining, successful rehabilitation will have:

1. Created a landform with a similar contour and profile that existed prior to mining with improved drainage;
2. Established vegetation cover on all areas disturbed by mining activity;
3. Protected freshwater values associated with the natural waterways;
4. Reinstated existing creek and drainage patterns to reflect pre-mining catchment areas ensuring no loss of extent and values (refer Section 5.3 below); and
5. Constructed and established a permanent wetland that contributes to ecological enhancement, hydrological function and landscape integration at mine closure.

1.3 Project Description

Tāiko Critical Minerals Ltd (Tāiko) proposes to operate a mineral sand mine located between Fagan Creek and Canoe Creek and west of State Highway 6 on the Barrytown Flats approximately 32km north of Greymouth. The area is referred to as the Southern Block (SB).

The SB is approximately 408ha with mining activity to be undertaken across a mining disturbance area of 280ha. The maximum disturbed area at any one time is 16 hectares. Approximately 72ha to the east of the mining disturbance area will be used as 'borrow areas' to assist in land recontouring. This will be limited to 2ha areas at any one time and is included within the 16ha total disturbed area.

The mining disturbance area will be set back from key environmental features and boundaries as follows:

(a) 20m from the consent boundary;
(b) 20m from Granite Creek;
(c) 20m from Fagan Creek;
(d) 50m from Mean High Water Springs (MHWS);
(e) 20m from the SNA PUN-049, which is adjacent to Section 2 (Granite Creek South);
(f) 20m from all private property boundaries not within the consent area; and
(g) 200m from dwellings other than where noise bunds are proposed.

Mining on the SB will be undertaken using a floating dredge within a 100m x 100m dredge pond (mining void) with mining to be undertaken in three sections:

(a) Section 1: Granite Creek North;
(b) Section 2: Granite Creek South;
(c) Section 3: Cargill Road.

Mining will be undertaken in 100m wide strips across the respective sections, including some small areas of vegetation associated with creeks, drains and former dredge ponds. To facilitate mining, diversions of existing creeks and drainage channels will be required (refer Native Freshwater Fish Capture and Relocation Plan (NFFCRP) and Section 6 of this Plan).

Rehabilitation of the SB will be undertaken:
- Progressively, as an area is mined and the dredge and mining void progress across the site;
- During the final mine-closure rehabilitation.

Progressive rehabilitation is the practice of restoring land concurrently with, or shortly after, disturbance occurs, rather than waiting until the end of operations. For this Project, it involves rehabilitating areas as soon as they become available (e.g. as the mining void moves forward), including deposition of tailings, recontouring, soil replacement and seeding, so that the overall disturbed footprint is minimised at any one time. This also includes the reconstruction of creeks, drains and constructed wetland.

This approach is intended to reduce environmental effects, improve rehabilitation success through early establishment of vegetation and allow for ongoing monitoring and refinement of methods throughout the life of the project. It also enables parts of the site to return to a stable and productive condition sooner, supporting both ecological and land use outcomes and minimising effects.

This Rehabilitation Management Plan specifies the following rehabilitation to be undertaken across the Southern Block for:
- Rehabilitated landform (Section 4)
- Diversions and streamworks (for the creeks) (Section 5);
- Riparian margins and other planting (Section 6); and
- Wetland construction and planting (Section 7).

2. Background

2.1 Ecological context

The site is located within the Punakaiki Ecological District, most of which remains in indigenous forest except for extensive pakihi in logged areas of the Tiropahi Valley, the strip of coastal flats near Barrytown and some lower valley flats and coastal gullies which are either farmed or have been modified by coal or gold mining.

The Barrytown Flats are comprised of a complex sequence of old dune ridges and alluvial deposits, which originally would have been entirely covered in lowland (coastal) forest and wetland. Nearly all of the Barrytown Flats have been modified by forest clearance and drainage for timber harvesting, mining, and farming, although remnants of wetland and forest remain. Since approximately 2010, there has been a concerted effort to rehabilitate sand plain forest on the 80ha former Rio Tinto property at the northern end of the Barrytown Flats (adjoining Nikau Scenic Reserve and known as Te Ara Tāiko Nature Reserve) with the aim of restoring ecological connection between the coast and habitats inland.

Wetland habitats within the SB are generally limited, highly modified, and often associated with historic land disturbance, including drainage works, hump-and-hollow systems, and legacy dredge features. Within the mining disturbance area, approximately 6.7ha of natural inland wetlands are

present. These comprise a mix of floodplain wetlands of moderate ecological value, associated with creeks and drains, and palustrine wetlands of generally low ecological value, typically dominated by exotic species and offering limited ecological connectivity. A small coastal lagoon at the north-western extent of the SB, located outside but within 100m of the disturbance area, provides some hydrological and ecological connectivity and is also considered to have moderate ecological value.

To the north of the SB, Maher Swamp represents a higher quality and more intact wetland system, historically utilised for flax harvesting until the mid-20th century and notable for being comparatively nutrient-rich relative to other regional swamps as shown by the presence of raupō (*Typha orientalis*). In contrast to the largely modified wetlands within the Southern Block, Maher Swamp retains greater ecological significance and forms part of a broader landscape context that includes ongoing ecological restoration efforts at nearby Te Ara Tāiko Nature Reserve.

2.2 Site Description

Extensive land clearance, drainage, and mining activities, particularly during the 1930s and 1940s, have significantly modified the original landform and vegetation patterns. These historic activities, along with more recent drainage and farming practices, have contributed to the current low-relief landscape and altered hydrological conditions.

The Southern Block is currently used for dairy farming and is dominated by highly modified ‘humped and hollowed’ pasture. Remnant indigenous vegetation is limited, with only small areas of mature pine and scattered native trees present. The site is intersected by Granite Creek, Little Granite Creek, and several smaller tributaries, springs, and farm drains, which convey water to the coast. While some watercourses are fenced, some are unfenced and are subject to erosion and pugging due to unrestricted livestock access and limited riparian vegetation. Many channels have also been historically straightened or diverted, resulting in simplified and modified stream forms.

No Schedule 1 or Schedule 2 wetlands are located within or adjacent to the SB, with the nearest being Maher Swamp to the north. Overall, the SB is situated within a highly modified agricultural and historical mining landscape, with limited remaining natural vegetation and waterways that have been substantially altered over time.

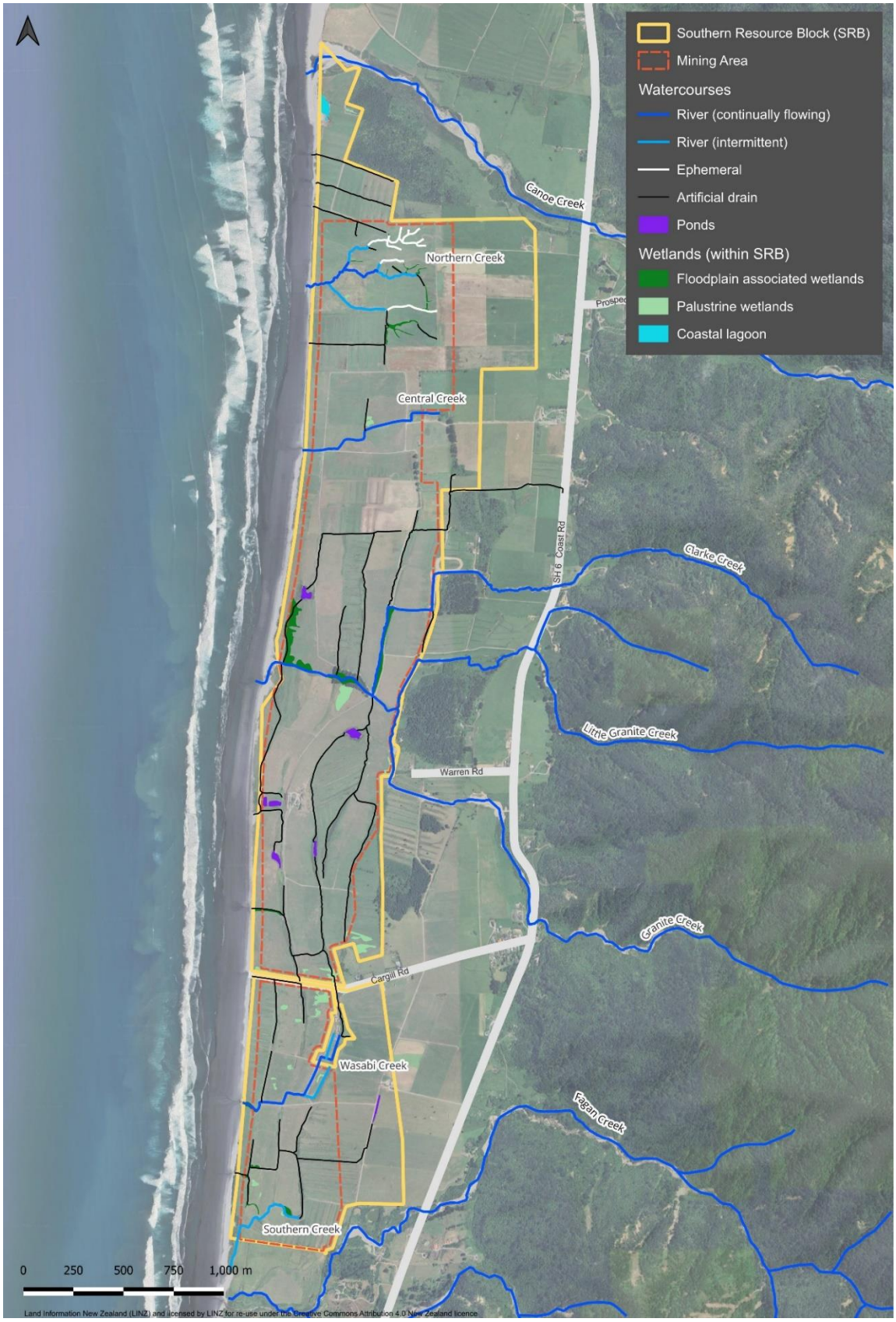


Figure 1: Waterbodies on the Southern Block (Source Ecological Solutions ECIA)

4. Pre-mining

3.1 Overview

As soon as practicable prior to mining in each section, bunding and planting are to be undertaken. These works will occur before mining commences.

3.2 Bund construction

Bund construction for Lot2 DP2178 and the Warren Road bunds will occur within year one of the project commencing. Bunds will be established on the north side of Cargill Road and adjacent to 114 Cargill Road in later years (approximately 2040 – 2045) due to timing of mining reaching this Section.

Bunds will be capped with topsoil and grassed on the mining disturbance side, with planting of taller (or indigenous) vegetation undertaken on the eastern side. Species to be used for planting on the bund adjacent to Lot 2 DP2178 are to be confirmed in consultation with this landowner. Plant species to be used for the bunds are illustrated on pages 22-23 of the Landscape Mitigation Package.

Bunds will have a maximum height of 3m and width of 24m, with variable total lengths depending on their location. Sediment retention fences will be installed during construction, and bunds will be progressively stabilised and revegetated. Once mining has been completed within a Section, bunds within that area will be deconstructed as part of the final landform rehabilitation.

Bund locations are illustrated on pages 5-8 of the Landscape Mitigation Package.

3.2 Planting

Refer Section 6 of this Plan.

5. Rehabilitated Landform Construction

4.1 Overview

Progressive rehabilitation will create a new landform across most of the mined area as mining concludes in each area. The final landform will replace temporary mining works with a stable, gently contoured landscape that integrates reconstructed creeks, farmland and new wetland area. This will blend the higher eastern terrace with the final landform of the mining area.

4.2 Process of Progressive Rehabilitation

Figure 2 illustrates the final post-mining landform, including the location of the constructed wetland and rehabilitated creek systems following completion of mining. Rehabilitation of the final landform will be undertaken progressively as mining is completed in each area, with the land south of Cargill Road being the final section to be rehabilitated.

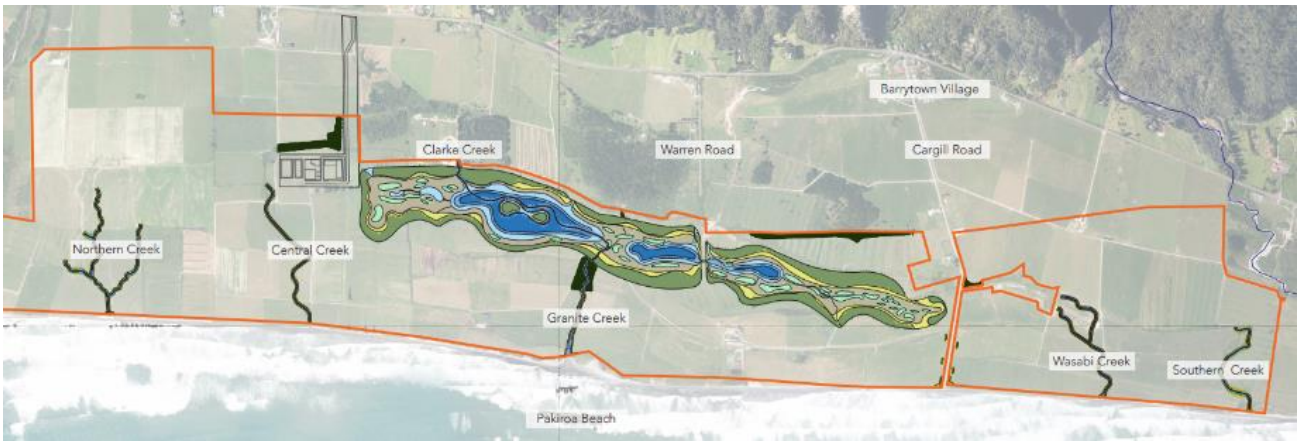


Figure 2: Final Mine Landform (Source: Landscape Mitigation Package)

Mining will commence in Section 1 adjacent to Granite Creek, moving eastward to the boundary of the mining disturbance area before then progressing in a north–south "snaking" pattern across the Section. Progressive rehabilitation starts immediately behind the advancing dredge pond in each section, before final landform contouring is completed across the wider mine path. As mining progresses, the mined void will be rehabilitated in a staged sequence that generally includes:

- Placement of mine tailings and slimes within the mining void (approximately 1 ha at any one time);
- Replacement of overburden and topsoil (approximately 0.5 ha); and
- Re-establishment of pasture and vegetation cover (approximately 1.5–3 ha at any one time).

These activities will generally occur within approximately 5 ha of the active mining area, so rehabilitation closely follows extraction rather than being deferred until the end of mining. This process enables disturbed land to be stabilised and revegetated as soon as practicable after the dredge has passed. Once pasture is established, the area is no longer considered disturbed and progressive rehabilitation is regarded as complete, even though final recontouring and broader landform integration may occur later as part of final closure and landform rehabilitation.

The constructed wetland will be developed progressively within the mined and rehabilitated void as this sequence advances. Wetland formation is proposed to begin in the northern part of the Southern Block, (in Section 1: North of Granite Creek) during the first two years of mining, taking advantage of the extraction along the eastern boundary of Section 1. Additional wetland construction will then occur in central part of the site (Section 2: South of Granite Creek) during Years 10–11 as later mining stages are completed. In this way, the wetland will be created incrementally alongside mining, with pond shaping, creek reconstruction, planting and hydrological connections established progressively as each part of the site is rehabilitated, rather than being deferred until the end of the project. **Figure 15** illustrates the staged cell development of the constructed wetland.

Management of Disturbance Area

The maximum total disturbed area is expected to occur approximately seven months after the commencement of mining and will be up to 16 ha. From this point onwards, progressive rehabilitation will be undertaken concurrently with new disturbance to maintain a relatively constant disturbed footprint. Once 80% vegetative cover has been achieved the area is no longer considered to be 'disturbed'.

Mine Closure

At mine closure, all temporary infrastructure, including internal haul roads, pipes, pumps, and any remaining noise control bunds, will be removed. Any recoverable resource material contained within these structures will also be extracted. By this stage, the constructed wetland will be fully formed and planted, and riparian margins along all reconstructed creeks will be established and fenced. **Figures 3 and 4** compare the pre-mining and post-mining contours across the site.

Haul roads may be rehabilitated by ripping to a depth of approximately 50cm and adding topsoil as required to get grass to establish.

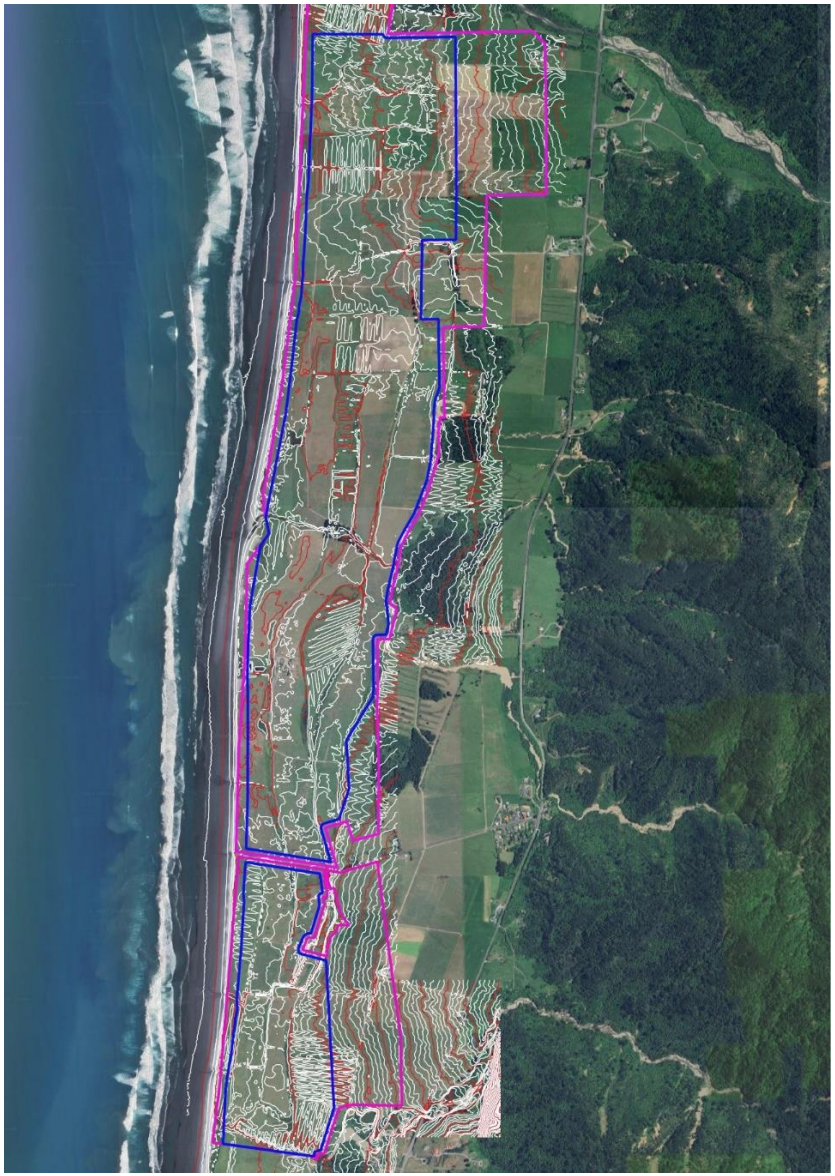


Figure 3: Pre-mining Land Contour

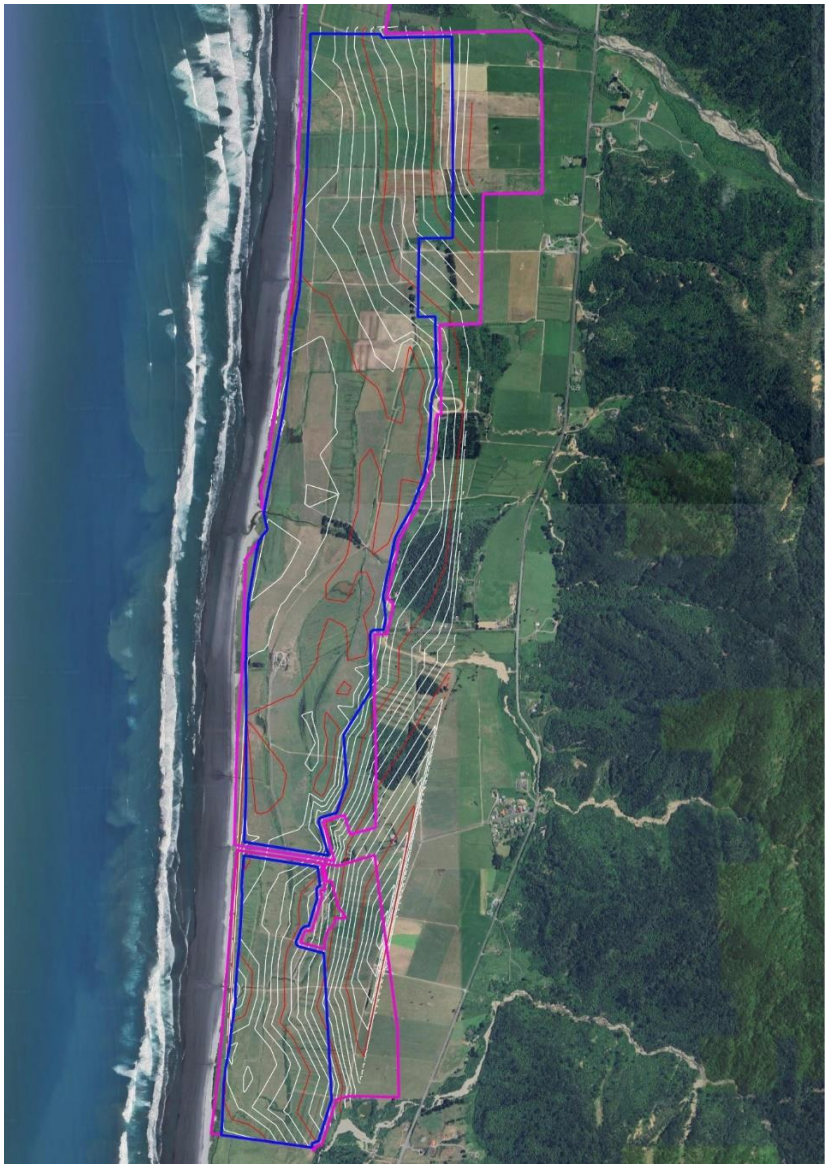


Figure 4: Post-mining Land Contour

4.3 Final Landform Topography

The final landform will replace the existing "hump and hollow" topography with a more stable and gently contoured landscape that integrates with surrounding rehabilitated areas and the site drainage network. Where humping and hollowing is retained or re-established, hollows will be formed at shallower depths than currently, so that they remain above the water table and reduce the potential for nutrient runoff to adjacent waterways.

Because material will be permanently removed from the site through extraction of Heavy Mineral Concentrate (HMC), additional fill will be required to achieve the final rehabilitated landform. This will be sourced through the strategic redistribution of material from designated borrow areas located between the consent boundary and the edge of the mining disturbance area, together with material generated through wetland construction. Approximately 72 ha to the east of the mining disturbance area has been identified for this purpose, although disturbance within these borrow areas will be limited to discrete sections of up to 2 ha at any one time and are included within the overall 16ha disturbance limit. Following extraction, these areas will be progressively recontoured and integrated into the surrounding rehabilitated landform.

Based on an average redistribution depth of approximately 1 metre, up to 1.1 million cubic metres of material will be available for final landform construction. This material will be used to create smooth transitions between rehabilitated areas, maintain long-term landform stability, and support future land use.

Over the life of the project, approximately 5.6 million tonnes of HMC (equivalent to around 2.6 million cubic metres at a bulk density of 2.2 g/cm^3) will be removed from the mining disturbance area. When balanced against the available redistributed material, this results in an average reduction in land height of approximately 0.63 m across the 408 ha consent area.

The post-mining landform will be developed progressively as mining advances. In the western part of the mining disturbance area, rehabilitation will generally return the site to ground levels similar to those that existed prior to mining. As mining progresses eastward, the difference between pre- and post-mining ground levels will gradually increase, reflecting the net removal of HMC.

South of the processing plant, this elevation change will assist in forming the constructed wetland as part of the rehabilitation works. North of the processing plant, material will be redistributed from the higher ground located east of the mining disturbance area. This land rises from approximately RL 17 to RL 27, and 1–2 metres of material can be regraded from this area (as required) to address any landform shortfall resulting from heavy mineral concentrate extraction within that section (refer **Figure 5**). Borrow areas are as shown in Figure 6 of the ESCP.

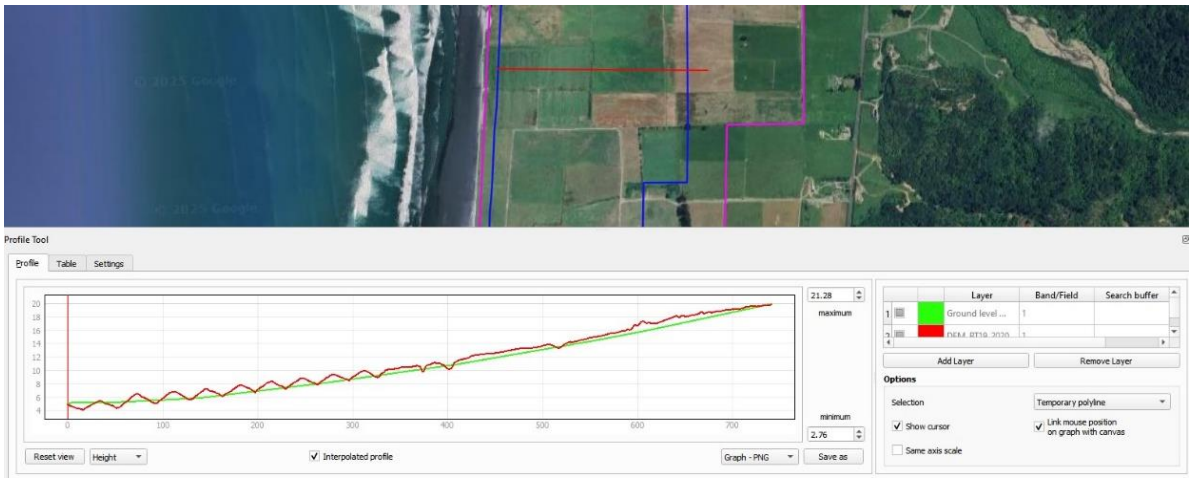


Figure 5: Northern Cross Section (existing landform – red; post-mining landform green)

A similar redistribution approach will be adopted within Section 3 (the land south of Cargill Road), although no wetland is proposed in this area. This will result in a consistent east-to-west land gradient across the rehabilitated land. In this section, ground levels rise from approximately RL 15 to RL 27, and it is similarly estimated that 1–2 metres of material can be redistributed to offset the volume removed through HMC extraction.

Figures 6 - 8 present representative cross-sections illustrating existing (red line) and post-mining (green line) ground levels across the site.

Figure 6: Granite Creek North Cross Section (existing landform – red; post-mining landform green)

Figure 7: Granite Creek South Cross Section (existing landform – red; post-mining landform green)

Figure 8: Cargill Road South Cross Section (existing landform – red; post-mining landform green

4.4 Erosion and Sediment Control for borrow areas

Erosion and sediment control through rehabilitation is to be undertaken in accordance with the ESCP. Earthworks associated with the borrow areas will be subject to the following criteria:

- The earthworks will form part of the Project maximum 16ha limitation and will also be subject to a maximum 2ha at any one time;
- To achieve the 2ha maximum open area the borrow locations will be progressively stabilised throughout the Project lifetime;
    - No creeks or wetlands will be diverted or removed as part of the earthworks borrow activity with the setbacks applying as per the mining disturbance area (set out earlier in the plan);

- If borrow earthworks are immediately adjacent to the mining void (or it remains practicable to do so) then the 2ha cut location will be fully bunded and all runoff diverted via diversion channels or pipes into the mining void;
- If not adjacent to the mining void (or it is impracticable to do so) the 2ha area will be independently managed and a sediment retention pond (as per GD05) established for each area which will discharge to land;
- As an alternative the 2ha borrow area will be fully bunded to impound any runoff and then pumped to the mining void or to the MWF treatment ponds as required;
- Any associated haul roads from the borrow area to the location of rehabilitation will be bunded on either side to contain any dirty water that eventuates and divert this to the mining void; and
- Progressive stabilisation of all exposed areas will occur.

6. Diversions and Streamworks

5.1 Overview

Diversions to the creeks are required to facilitate mining and as each mine path intersects a creek a diversion will be required. The intent of this approach is that the mine path will always operate in a "dry" environment with no flowing water entering the mine void. Given the presence of Northern Creek, Central Creek, Clarke Creek, Wasabi Creek and Southern Creek, and farm drains within the mining area, these works will be carefully planned and implemented to maintain water conveyance and fish passage, protect freshwater values and minimise adverse environmental effects.

Reconstruction will focus on achieving no net loss in creek extent and enhancing freshwater values through improved channel alignment and planting to a minimum width of 3m either side of the five creeks. Reconstructed creeks will be designed to provide a more natural form than the existing straightened alignments resulting from historic mining and farming activities.

5.2 Affected Watercourses

The five creeks subject to diversion and reconstruction activities include the Northern Creek, Central Creek, Clarke Creek, Wasabi Creek and Southern Creek. Each will be progressively reinstated during mining operations. Pre-mining and indicative post-mining channel lengths and diversion methods are outlined in **Table 1**. Granite Creek will not be diverted during the mining of the Southern Block.

Table 1: Creek extent pre-mining

Creek	Length pre-mining (based on continually or intermittent flow extent)	Diversion methodology to be applied
Northern Creek	1,178m	East West
Central Creek	764m	East West
Clarke Creek	681m	North South
Wasabi Creek	733m	North South / East West
Southern Creek	469m	East West

Drains located across the site will also require diversion. Not all drains will be reconstructed. Land will be recontoured and drains constructed as required to maintain drainage patterns.

Planting of reconstructed creeks is set out in Section 6.

5.3 Design Principles

Diversions and reconstructed waterways will be designed in accordance with best practice fluvial geomorphology and freshwater management principles, and will:

(a) Maintain hydraulic capacity to convey design flows and prevent flooding;
(b) Minimise erosion and sediment generation;
(c) Promote stable channel forms and banks;
(d) Support the establishment of a variety of riparian and aquatic habitat;
(e) Integrate with final landforms and wetland systems; and
(f) Reflect, where practicable, natural channel patterns and gradients.

Diversion channels will be sized and aligned to accommodate expected flows and will incorporate gentle batters, stabilised beds and erosion-resistant materials where required.

5.4 Diversion Sequence and Methodology

The diversion methodology will vary between watercourses depending on their orientation, position within the mining sequence and long-term drainage function. Creek diversions could be temporary to allow a mine path to progress or permanent, where the diversion remains as a permanent location post mining in a completed rehabilitated location. In both temporary and permanent cases, the creek diversion will be necessary in order to establish an 'off-line' environment to allow mining works to be completed outside of active creek channels.

Both creeks and artificial drains will be managed in accordance with this Plan, with some drains potentially retired or replaced by new drainage channels.

North–south oriented creeks and drains will be diverted into a previously mined area before mining reaches the creek system. This is expected to require adjustments (widening or narrowing) of the mine path to facilitate this. A permanent reconstructed channel will be built in advance as part of the rehabilitation of the mined land, and the creek flow will then be redirected into it.

East–west oriented creeks and drains will also be diverted into previously mined areas (behind the mining void) and into the adjacent mine path (to the east as mining moves inland), prior to mining progressing through the creeks existing alignment. This requires a temporary diversion of the creek around the active mining area. Once mining has advanced beyond the temporary diversion, a permanent reconstructed channel can be constructed and the creek reinstated.

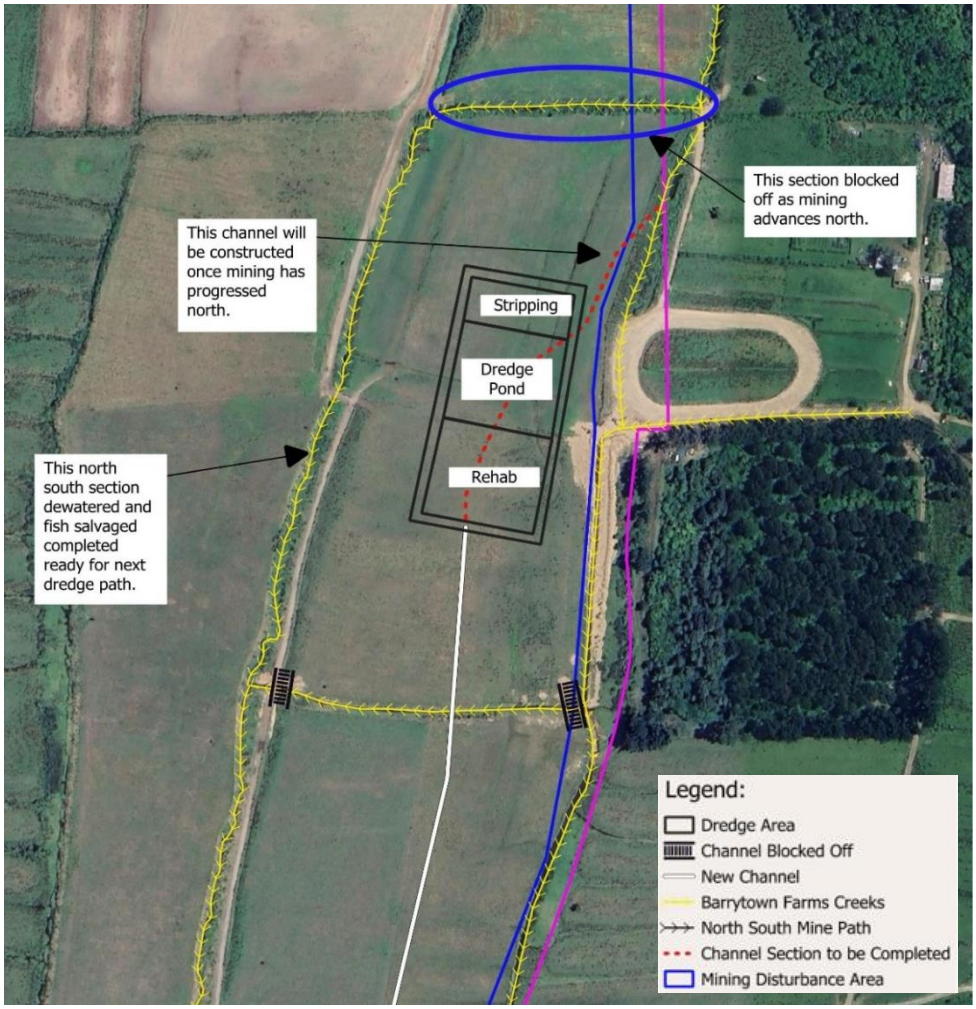
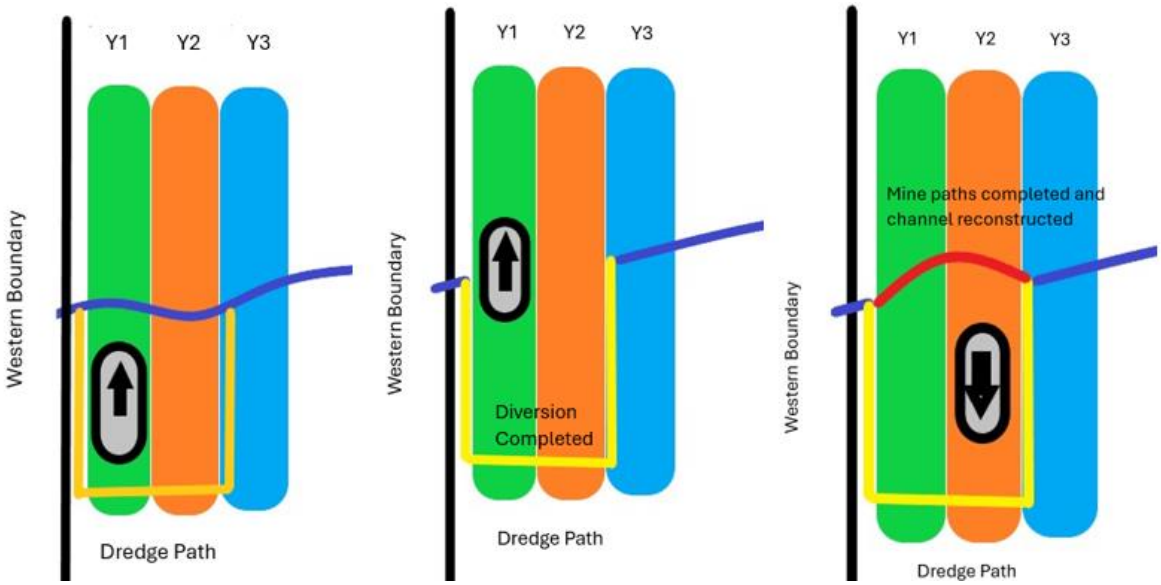


Figure 9: North South Diversion Methodology



As the dredge approaches the creek or drain, a temporary diversion (shown in yellow) is constructed behind the mining void.

The creek or drain is then diverted into this temporary channel, allowing the dredge to continue along its planned path.

Once the mining void has progressed beyond the proposed reconstructed alignment, the diversion is redirected into the newly rehabilitated channel (shown in red).

Figure 10: East South Diversion Method

To minimise the potential harm to native fish in creeks before they are diverted (either into temporary or permanent channels) it is proposed that fish relocations be carried out as per the Native Freshwater Fish Capture and Relocation Plan (NFFCRP).

The following outlines the sequence of works required to complete both temporary and permanent diversions:

- Excavation of the new diversion channel (likely to be through the completed mine path that has been rehabilitated) will be carried out offline from the existing creek, so that excavation works can be carried out in a dry environment. A solid plug will be left in place at each end of the diversion channel to ensure that the existing creek cannot breach and flow through the new channel prior to it being stabilised.
  - For temporary diversions the dimensions and design of the diversion will be such that it replicates the existing channel profile. This will be detailed within the SSESCP; and
  - For permanent diversions the dimensions and design of the diversion will be confirmed in the SSESCP process and will ensure ecological and hydrological function.
- Material excavated from the diversion channel will be placed in the mine path location or in stockpiles away from the creek diversion, with any flows to installed silt fences (refer section 4.3.2 of the ESCP);
- Stabilisation of the newly constructed diversion channel will be carried out to ensure it does not become a source of sediment. This may be achieved using natural materials such as coir matting, rip rap material or rock armour;
- Once the diversion channel is fully stabilised, the downstream and upstream plugs will be removed to allow creek flows to enter the diversion channel.
- A non-erodible dam (such as sandbags with an impermeable liner) will then be placed within the original channel immediately downstream of the inlet to the diversion channel in order to divert flows into it. A non-erodible dam will also be immediately placed at the downstream end of the original channel, upstream of the diversion channel outlet to prevent backflow into the mining area. Once the flows have been diverted and the dams placed, fish removal from the original channel can be completed. Mining activity associated with the mine path can then take place within the original channel location as required;
- There will remain a buffer zone between the creek and drain systems and the mining activity and in some circumstances, there will be the requirement to place silt fences between these two locations to ensure no dirty surface water runoff enters the creek. In addition to this, the mine void will continue to have bunding around the perimeter which will ensure all mine void water is fully enclosed;
- Once the mining and rehabilitation has been completed and the surrounding area stabilised then the channel can be reinstated back within its original position or remain in the new location as a permanent creek.

Creek and drain diversion activities will be programmed for fine periods of weather. In the event of forecast rainfall, or before leaving the work area for more than 24 hours the following will occur:

- Any loose material that could enter a “live” creek or drain system is to be removed from the work area, depending on the quality of the material this will be to a stockpile area or sent for processing;
- Where possible, all exposed areas will be covered with geotextile to ensure no flows overtopping the creek or drain banks create scour issues. It is expected that this will be achieved through geotextile with the geotextile appropriately trenched in at the head and toe of the area;
- All existing and additional erosion and sediment control measures will be inspected, secured and maintained where required;
- Additional mulch and geotextile / polythene will be kept onsite at all times to cover exposed areas and stockpiled material; and
- Extended working hours will be considered if it is of significant benefit with regard to programme and environmental impact.

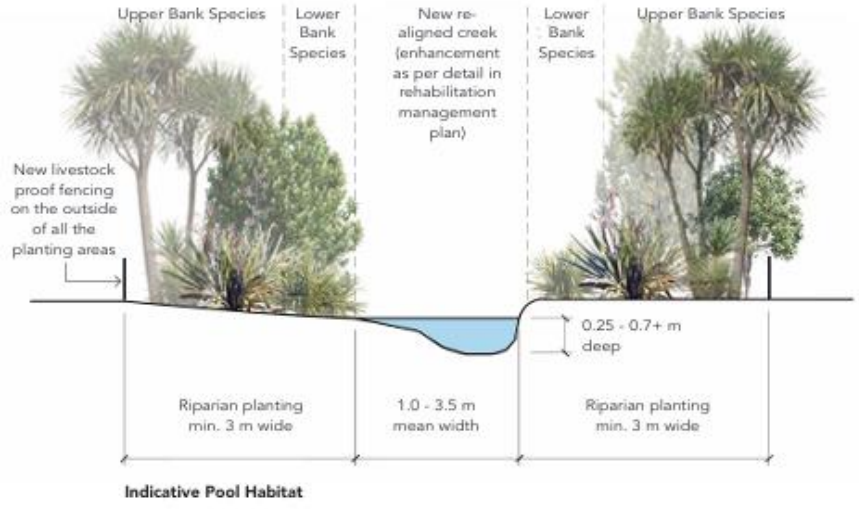
5.5 Stream Rehabilitation Techniques

Reconstruction of diverted creeks will focus on enhancing ecological function, channel stability, and connectivity with surrounding habitats. Creeks within the mining area typically range from 1m to 3.5m in mean width and will be reconstructed using the following techniques.

Stream Channel Profile and Pattern

Creeks will have a base flow channel, a wider bank-full channel and floodplains either side. Appropriate water depths will be maintained within the active base flow channel at all times to provide permanent habitat for invertebrates and fish. Water will spill from the base flow channel into the wider floodplains during high flows to provide flood conveyance and connection with the floodplain (e.g., trap fine sediment, reduce flow velocities and erosive forces within the stream).

The channels will have variable channel widths and depths with habitat comprising deeper pools, moderately deep runs and shallower riffles. Indicative cross sections showing the run, riffle and pool habitats is shown in **Figure 11**. Variable channel widths and depths will enhance instream habitat diversity over time as natural erosive forces shape the channel into a natural state based on hydrology.



Realigned Creeks - Typical Cross Sections

This page includes three typical cross sections to illustrate how the five realigned creeks (Northern, Central, Clarke, Wasabi and Southern) will work once mining has gone past. Each of these creeks will have riparian planting a minimum of 3.0 metres width on either side. There will be no loss of extent of the creeks once mining is complete. Design details will be further developed through the **Rehabilitation Management Plan.**

Of note, Granite Creek and Little Granite Creek will not be disturbed by mining activity. Granite Creek will be enhanced with riparian planting a minimum of 5.0 metres width on either side.

Habitat sequences, widths and depths

The aim is to have: run -> riffle -> pool habitat sequences. There will be meandering channels with variable widths and depths as this will encourage the formation of different habitats. Floodplains will also be incorporated. There will typically be deeper pools on bends, moderately deep runs on straighter sections, and shallow riffles that can flow into pools or between runs. Habitat depths will depend on the future hydrology and catchment size.

Pool habitat

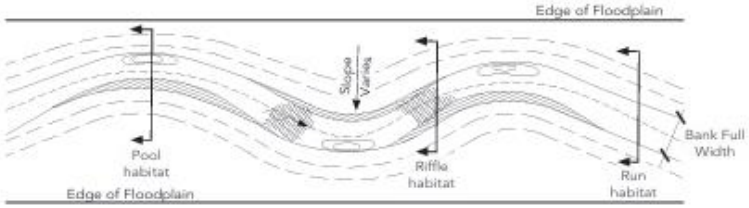
- Located on the meander bends of a channel
- Typically has fine sediment or small gravel
- Naturally grades from shallow on the inside of the bends to deeper on the outside
- Wider floodplains may occur on the inside of bends adjacent to pools

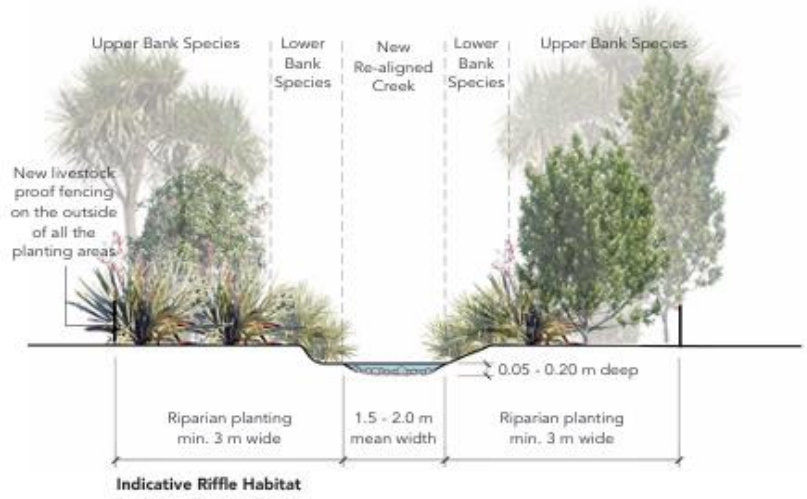
Riffle habitat

- Shallowest habitat
- Generally less common in lowland streams
- Bed has medium to large gravel plus small/large cobble plus the occasional boulder
- Typically narrower than pools and runs (but not always)

Run habitat

- Located on straighter sections of a channel
- Typically dominated by small to large gravel
- Can be more 'U' shaped but with variable depths if possible
- Typically narrower than pools





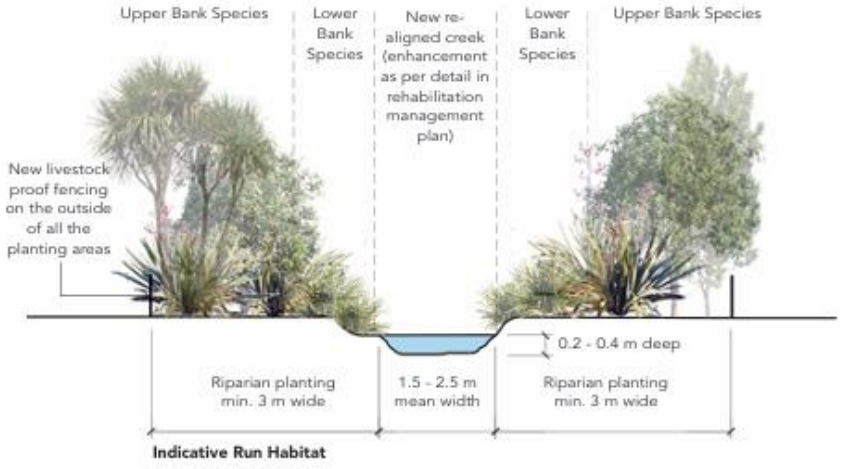


Figure 11: Indicative Pool, Riffle and Run Cross Sections

Existing channel dimensions for the five creeks are summarised in the below table and will provide a minimum for what the reconstructed channels will be.

	Widths								Depths								Habitat					Streambed					
Stream	Width 1	Width 2	Width 3	Width 4	Width 5	Min width	Max width	Mean width	Depth 1	Depth 2	Depth 3	Depth 4	Depth 5	Min width	Max width	Mean depth	Pool%	Riffle%	Run%	Chute%	Total	Bedrock	Boulder	Cobbles	Gravel	Sand/Silt	Total
Northern Creek	1.80	2.40	3.00	1.30	2.40	1.30	3.00	2.2	0.14	0.17	0.14	0.48	0.32	0.14	0.48	0.25	5	15	80		100	3	2	15	70	10	100
Central Creek	1.60	2.50				1.60	2.50	2.1	0.65	0.70				0.65	0.70	0.68	40		60		100				30	70	100
Clarke Creek	0.65	1.30	1.00	1.30	0.90	0.65	1.30	1.0	0.24	0.15	0.14	0.10	0.09	0.09	0.24	0.14	3		95	2	100				5	95	100
Wasabi Creek	5.30	2.80	2.50			2.50	5.30	3.5	0.19	0.18	0.30			0.18	0.30	0.22	20	40	40		100		5	45	50		100
Southern Creek	1.20	1.80				1.20	1.80	1.5	0.10	0.20	0.30			0.10	0.30	0.20	30		70		100			40	40	20	100

Table 2: Creek channel dimensions

Channel widths will be similar to the current channels (mean widths between 1.0–3.5m). Existing channel widths may be constrained by historical channelisation so there is potential to have wider channels where appropriate to allow for greater channel width variability depending on area available (i.e., within the floodplain), location along the stream continuum (i.e., upper, mid, lower) and the type of habitat proposed to be created (i.e., run, riffle or pool).

Channel depths will be similar to the current range (mean depths between 0.15 –0.7m) but will depend on the size of the channel, location in the catchment and habitat created (e.g., run, riffle, pool). The aim will be to maximise habitat diversity by having variable depths across various habitats. Pools will range in depths between 0.5–0.7m, runs between 0.3–0.5m and riffles between 0.05–0.2m. Water depths in runs and pools will vary along the channels and will be shallower in upper sections than in mid-lower sections. Channels widths and depths along the stream are to be determined in conjunction with the project hydrologist, ecologist and engineers to ensure feasibility and confirm habitat value.

The width of the permanent base flow channel will be within a wider floodplain and will maintain an appropriate water depth in the channel at all times of the year to provide permanent habitat for aquatic life. Run habitats of various lengths with variable widths and depths will be the dominant habitat type (40–60%), pools the next most common on meander bends (10–30%) and shallow riffles the least common (10–20%).

The base flow channel profile will vary between sections with steeper streambanks and some sections with gentle sloping streambanks. Steeper streambanks will allow vegetation on floodplains (e.g., sedges) to overhang the channel and provide immediate stream cover for native fish species that prefer overhead cover (e.g., kōkopu species, eel). Steeper streambanks will also allow natural erosion to undercut banks over time and increase shelter for native fish (e.g., kōkopu and eel). Gently sloping streambanks along some sections (e.g., inside of bends of pools and along runs) will provide good connectivity with the floodplain and allow wetland plants (e.g., sedges) to encroach up to, and into, the channel.

The outside streambank on meander bends where pools will be formed, or form over time, will have a steeper streambank whilst the inside of the bend will have a more-gentle slope that

extends into the floodplain where water from the base flow channel can spill out onto during higher flows and where riverine wetlands could form.

Armouring of streambanks with riprap on the outside of bends of pools may be required to minimise streambank erosion. The amount of armouring used will be minimised to maintain natural stream character and floodplain connectivity. Voids amongst boulder armouring would be filled with soil allowing riparian vegetation to establish.

Streambed and Woody Debris

Most creeks naturally have coarse streambeds dominated by gravel with lower proportions of cobble and sand/silt. The aim will be to have more small cobbles (64–128 mm), large cobbles (128 – 256 mm), gravel (2–64 mm) and occasional bounders (>256 mm) in riffles, more gravels in runs and occasional gravel in pools. Replicating the existing streambeds in channels will maintain the natural character and provide similar habitats for the invertebrate and fish species that currently exist.

Large woody debris (e.g., tree stumps, logs) will be anchored to streambanks and stream channel in selected locations in deeper runs and pool habitats to increase stable instream habitat for invertebrates and provide shelter for native fish (e.g., eel, kōkopu). **Figure 12** shows an example of the type of woody debris that can be used.

Large woody debris will be specified when doing detailed design and dependent on local site conditions at the time and secured to the streambed or streambanks so that they are not easily washed downstream during high flow events and cause blockages. This will be done by embedding a portion of the log/wood into the streambank when it is constructed.

Figure 12: Example of large woody debris to be used in instream habitat construction

Fish Passage

Fish passage will be provided along the full extent of the reconstructed channels for the native species currently occurring within the watercourses. This means meeting conditions in regulation 70(2) of the National Environmental Standards for Freshwater (NES-F) for culverts (e.g., embedded culverts, bed substrate over length of culvert, similar velocity in culvert as that upstream and downstream) and avoiding introducing other barriers to fish passage (e.g., velocity barriers, steep rapids, ephemeral flows) as part of stream construction.

5.6 Clarke Creek Reconstruction

Clarke Creek will be reconstructed within the proposed wetland area, with **Figure 11** showing its indicative new alignment. The channel will be designed to convey flows from the upstream hill catchment through a meandering path across the northern lobe of the wetland complex before reconnecting with Granite Creek at a similar downstream location to its existing confluence. Reconstruction of Clarke Creek can occur alongside wetland formation and will incorporate a range of habitat features, including runs, riffles, and pools, although pool habitat is expected to predominate where the channel crosses the low-gradient wetland area.

The reconstructed Clarke Creek will include a variety of bed substrates to support ecological function, although finer organic material is expected to dominate within the pool habitats through the wetland complex.

Reconstruction in this manner will ensure compliance with Condition 28.2 and no loss of extent.

Figure 11: Clarke Creek reconstructed within the wetland complex

5.7 Riparian Rehabilitation and Protection

Riparian planting and exclusion of livestock is addressed in Section 5. Planting will focus on stabilising banks, reducing erosion, providing shade and enhancing habitat connectivity.

5.8 Monitoring and Maintenance

Monitoring will be undertaken to assess the ecological recovery of diverted creek systems following rehabilitation. Two years after permanent diversion to the new channel and completion of riparian planting, fish and macroinvertebrate surveys will be carried out to confirm recolonisation and evaluate ecological health relative to pre-works conditions. The results will be used to determine whether the rehabilitated channel is functioning as intended.

If monitoring indicates that a pre-works equivalent state of ecological health has not been achieved (as defined in Condition 24.5), a specific stream or creek diversion and development plan will be prepared and submitted to the Consent Authority within two months of completing the monitoring. The Consent Holder will then implement any additional works identified in the approved plan within six months of approval, or within the next appropriate planting season, depending on the nature of the required measures.

7. Riparian Margin Planting and Planting

6.1 Overview

Riparian planting will form an integral component of the diversion, creek reconstruction and wetland rehabilitation works outlined in Sections 3 and 4 of this Plan. Along with the progressive reinstatement of permanent creek alignments and completion of landform reconstruction, indigenous riparian margins will be established along each of the five reconstructed creeks to enhance bank stability, water quality and ecological connectivity. Additional riparian planting will be undertaken along Granite Creek and further new planting will occur along Cargill Road and beside the Freedom Camping area.

6.2 Riparian Planting

Riparian planting on either side of the reconstructed creeks will extend across a minimum width of 3m on each side of the creek bank and will comprise eco-sourced native species appropriate to local conditions, including harakeke (flax), tī kōuka (cabbage tree), kōhūhū, Coprosma species, and Carex sedges. Granite Creek will be planted with a 5m riparian margin either side. Riparian planting will provide shading, reduce erosion, filter surface runoff and link habitat corridors across the site. Indicative planting for reconstructed creeks is illustrated in **Figure 14**. Plant species to be used for the riparian areas are illustrated on pages 22 and 23 of the Landscape Mitigation Package.

Planting will be undertaken in consultation with a suitably qualified ecologist to ensure appropriate composition and establishment densities, with a minimum density of one plant per square metre is applied to meet Condition 16.5. Riparian planting will be undertaken once creek segments have been reconstructed and all rehabilitation works (such as contouring) alongside the creek have been completed in that mine path.

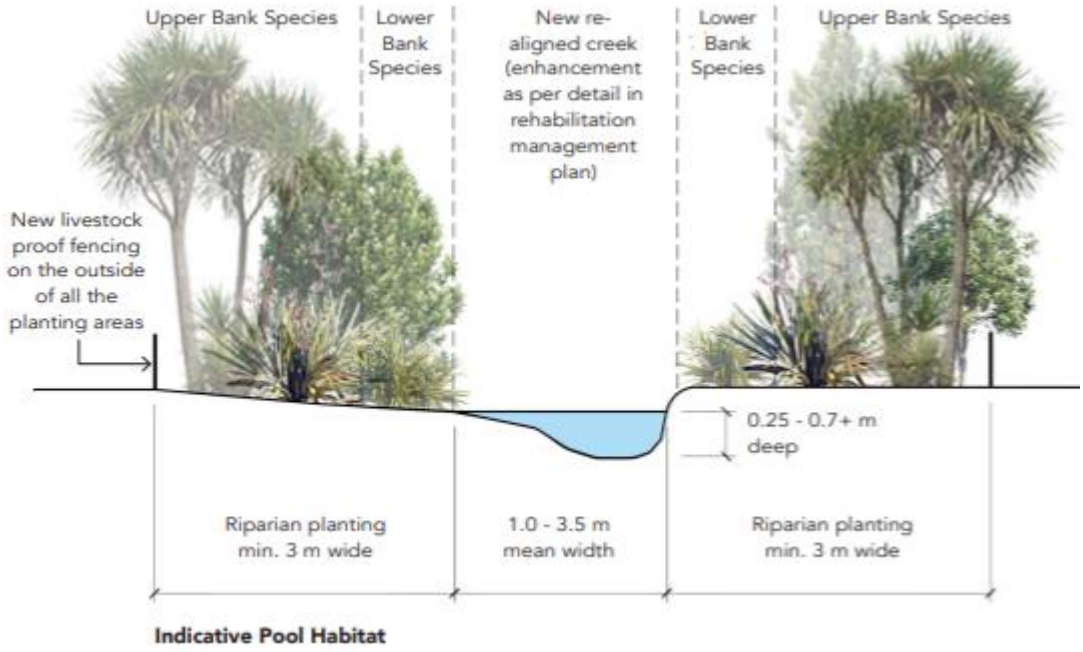


Figure 14: Reconstructed Creek Cross Section showing Riparian Planting

Planting within wetland areas will be undertaken in segments as each of the ponds are developed. **Figure 15** shows a cross section of one area of the wetland illustrating the different water depths and type of vegetation to be planted (refer pages 17-18 of the Landscape Mitigation Package).

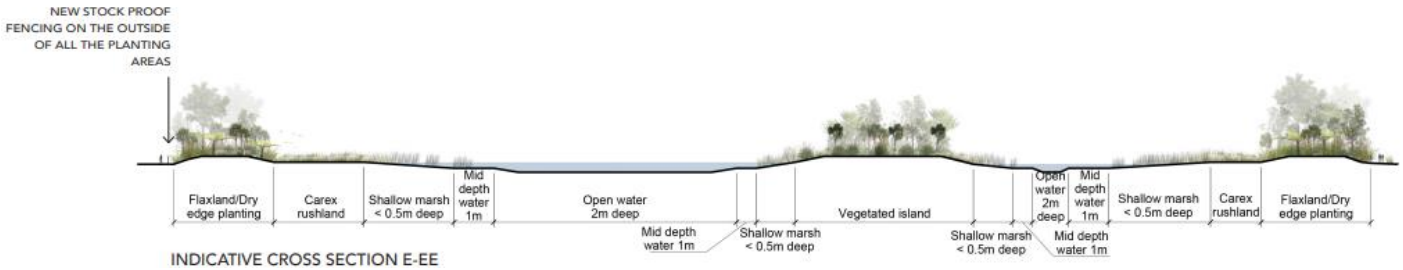


Figure 15: Wetland Habitat Cross Section

6.3 New Native Planting for Landscape Mitigation

Staggered informal 3.5m wide clusters of native vegetation are to be planted along the northern and southern sides of Cargill Road to screen and soften some of the mining activity when it comes closest to this point. This new planting is balanced with the desire to maintain some views up and down the coast and not create a 'tunnel' effect along Cargill Road. Refer page 11 in the Landscape Mitigation Package.

Cluster planting will include species such as flax and small trees identified in the Landscape Mitigation Package on pages 22 and 23 and be undertaken in consultation with a suitably qualified landscape architect to ensure an appropriate species arrangement, grade and quality of plants are established and maintained. This planting will be undertaken in year 1.

A cluster of dense native vegetation planting is to be planted either side of the Freedom Camping Area to screen the activity when it is closest to this area. Refer page 7 in the Landscape Mitigation Package, which illustrates the location of these two areas.

This planting will include species identified in the Landscape Mitigation Package on pages 22 and 23 and be undertaken in consultation with a suitably qualified landscape architect to ensure an appropriate species arrangement, density, grade and quality of plants are established and maintained. This planting will be undertaken in year 1.

6.4 Retention of Existing Planting

Existing vegetation offers immediate screening and visual softening of the site. There are clusters of vegetation which will be retained as identified in the Landscape Mitigation Package within the pre-mining section, pages 5 to 8. These areas include:

- The stand of Old Man Pines and the large cluster of vegetation near the consented WCP.
- Clusters of vegetation along the eastern application area boundary north of Cargill Road.
- The patch of vegetation adjacent to 101 Cargill Road.
- The stand of trees and other riparian vegetation adjacent to Granite Creek.

6.5 Protection and Management

Livestock will be prevented from entering riparian margins to protect establishing vegetation. Access points will be limited to designated maintenance locations. This exclusion may be undertaken via traditional post and batten or electric fencing, or as technology advances virtual fencing.

Ongoing maintenance of planting will be undertaken for a period of no less than three years and as required for the life of the consent to achieve the outcomes specified in the conditions (80% cover). This will include ongoing monitoring and eradication of woody weed species which may establish including blackberry and gorse. This will be programmed twice annually for three years. Where weeds are identified, appropriate control measures will be implemented, including manual removal, mechanical methods or targeted herbicide application, with priority given to aggressive or invasive species.

8. Wetland Construction

7.1 Overview

A wetland of at least 50ha will be progressively constructed at the location shown in **Figure 16** as part of the site rehabilitation. The lower elevation and profile of the wetland area will counteract the overall loss of material from the site due to the removal of Heavy Mineral Concentrate whilst minimising the reduction in elevation as well as having ecological benefits. The wetland will form an integral component of the final rehabilitated landscape and will be hydraulically and ecologically connected to reconstructed creeks and riparian margins. Further detail on the timing and location of wetland development is outlined in the Landscape Mitigation Package on pages 12 to 18.

7.2 Integration of the Constructed Wetland

The final landform at the SB will be a more gently contoured landscape as opposed to the current 'humped and hollowed' form with an approximate overall reduction in land height of 0.63m across the 408ha site. There will be fewer farm drains across the site due to the recontouring of land. The wetland will be constructed as mining progresses through Sections 1 and 2 (indicatively these are years 1 - 2, 8 and 10 – 11 of mining).

Figure 16: Approximate Constructed Wetland Area (Source: Landscape Mitigation Package)

7.3 Design Principles

The constructed wetland will be designed in accordance with best-practice wetland restoration and management principles and will:

(a) Maintain permanent and seasonal areas of open water and saturated soils;
(b) Provide sufficient storage and conveyance capacity for site drainage and stormwater flows;
(c) Promote sediment settling and nutrient uptake;
(d) Support indigenous wetland vegetation and fauna;
(e) Enhance connectivity between waterways and surrounding habitats; and
(f) Integrate visually and physically with the final landform.

The wetland will incorporate shallow margins, variable depths and gently sloping batters to encourage vegetation establishment and ensure long-term stability.

7.4 Construction Methodology

Wetland construction will be undertaken progressively as mining advances across the site, ultimately forming a network of up to 31 individual cells (as shown in **Figure 17**). Cells will be gradually linked together to form the larger wetland complex as mining moves across the site. This staged approach ensures the total disturbance will not exceed the maximum 16ha exposed area limit for the project.

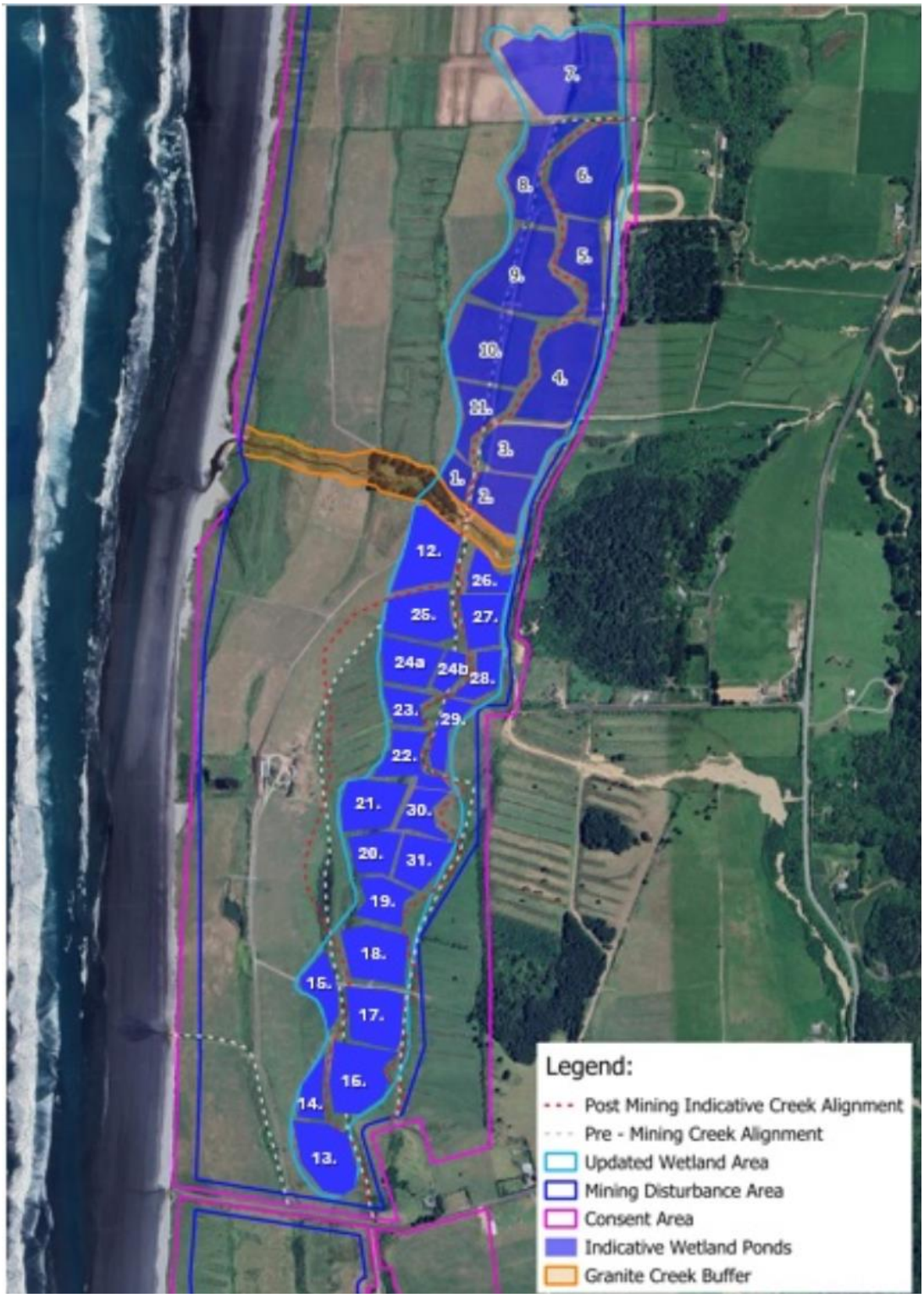


Figure 17: Wetland Construction using Individual Ponds

As set out in the ESCP, where creek systems intersect the mine path, they will be temporarily diverted around active mining areas to enable operations to proceed. Following completion of mining, permanent creek channels will be reinstated in their diversion locations at levels consistent with pre-mining conditions, allowing for full stabilisation and riparian planting. Surrounding these channels, wetland features will be established at slightly lower elevations, forming interconnected ponds with shallow shelves, deeper pools, and transitional zones.

Construction will be staged to minimise exposed surfaces and will be undertaken alongside erosion and sediment control measures, with wetland planting progressing in tandem with rehabilitation. The wetland establishment will utilise the mining void to divert any dirty water runoff.

The east-west segregation of initial ponds allows for the later formation of deep water, open water fens and marshes. This includes a midline running down part of the line of the future wetland allowing for further excavation linking the wetland ponds from west to east and linking low gradient creeks internal to the wetland complex.

Figure 17 displays the indicative final wetland complex. Clarke Creek and Granite Creek main stem enter the wetland from the east at elevations between 6 and 7 metres. Granite Creek main stem is an existing creek which is preserved from disturbance during operations. The main stem water course would be maintained somewhat hydrologically separate from the wetland complex by the original banks and bed gradient, slightly perched above that of the wetlands bounding the creek course.

7.5 Wetland Planting and Establishment

Wetland margins and internal zones will be planted with eco-sourced indigenous wetland and riparian species appropriate to local conditions. Planting will be undertaken progressively in tandem with wetland construction, with vegetation established as individual ponds are formed and continuing as these features are incrementally connected across the site. Planting will reflect moisture gradients and include emergent, marginal and riparian vegetation communities. The Landscape Mitigation Package sets out the indicative wetland area on pages 12 to 18 along with the various species on pages 22 and 23 to be planted as shown on **Figure 18**. Species will include Carex, rushes, sedges, harakeke (flax), tī kōuka (cabbage tree) and other locally occurring wetland plants. Planting will be undertaken in consultation with a suitably qualified ecologist to ensure appropriate species selection, composition and establishment densities, with a minimum density of one plant per square metre is applied to meet Condition 16.5.

The final wetland area, when planting has been completed, will cover an area of at least 50ha with the following habitats:

1. At least 5.3ha of shallow marsh with an average depth of 0.4m
2. At least 2.8ha of mid-depth water with an average depth of 1m
3. At least 4.8ha of deep open water with an average depth of 2m
4. At least 16.8ha of flaxland and dry edge vegetation
5. At least 5.9ha of Carex Rushlands
6. At least 14.3ha of Raupo
7. At least 3.2ha of raised islands
8. Riparian planting of 3-5m in width either side of channel

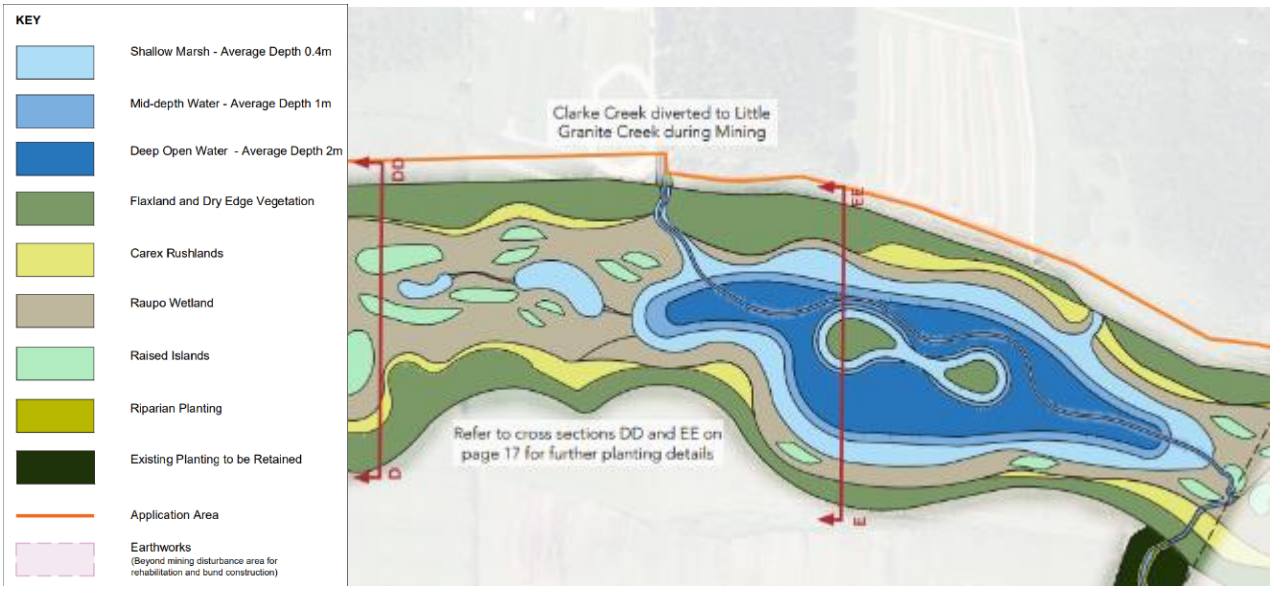


Figure 18: Indicative Wetland Formation and Planting Plan (Source: Landscape Mitigation Package)

7.6 Protection and Management

Livestock will be prevented from entering the wetland to protect establishing vegetation. Access points will be limited to designated maintenance locations. This exclusion may be undertaken via traditional post and batten or electric fencing, or as technology advances virtual fencing.

Ongoing maintenance of planting will be undertaken for a period of no less than three years and as required for the duration of the consent. This will include ongoing monitoring and eradication of woody weed species which may establish including blackberry and gorse. Where weeds are identified, appropriate control measures will be implemented, including manual removal or mechanical methods, with priority given to aggressive or invasive species.

9. Conditions

To be included