DRAFT Earthworks Management Plan

Southland Wind Farm, Southland

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0.1	Draft	27 June 2025
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DRAFT Earthworks Management Plan

PART A Introduction

1.0 Scope and Structure of the Plan

The Earthworks Management Plan (EMP) provides for the environmental management, through the establishment of management procedures, for earthwork activities to be implemented during the construction of the Southland Wind Farm (SWF).

The EMP is structured as follows:

- ***Part A – Introduction.*** This part of the EMP introduces, and establishes, the context for the Plan that follows. It also:
    - Provides an overview of the scope and structure of the Plan.
    - Establishes environmental objectives for the earthworks construction.
    - Outlines the manner in which the EMP will be implemented.
- ***Part B – Earthworks Management Plan Main Body.*** The main body of the EMP outlines how adverse effects of the earthwork activities are mitigated through the effective design and construction management processes, and specifically addresses the following areas:
    1. ***Earthworks Design and Development Layout.*** This part outlines the anticipated earthworks quantities to construct the SWF and establishes the work that has been undertaken to minimise to the extent practicable, the area and volume of earthworks, and minimise the construction footprint on indigenous vegetation, streams, and wetlands.
    2. ***Surplus Fill Disposal Sites.*** This part establishes the design and layout of the Surplus Fill Disposal (SFD) sites, and how they will be constructed to minimize environmental effects.
    3. ***Impacts on Wetlands.*** This part establishes the control measures that will be employed to minimise impacts of earthworks on wetlands.
    4. ***Works within Streams.*** This part establishes the control measures that will be employed to minimise impacts of earthworks on streams.
    5. ***Erosion and Sediment Control.*** This part outlines the erosion and sediment control, dust control, and site rehabilitation measures that will be employed to minimise the impacts of earthworks on the environment.

2.0 Objective of the Plan

The objective of the EMP shall be to establish management procedures specifically in relation to earthworks activities, sediment, dust mobilisation and stormwater contamination to be implemented during the construction of the Southland Wind Farm. More specifically, the EMP shall achieve the following outcomes:

a) Minimise to the extent practicable the area and volume of earthworks required for construction of the Southland Wind Farm;

b) Maximise the effectiveness of erosion and sediment control measures associated with earthworks by minimising sediment generation and sediment-laden runoff and discharges, seeking to protect sensitive receiving environments to the extent practicable, such as streams or wetlands;

c) Minimise the construction footprint on indigenous vegetation, streams (excluding ephemeral streams) and potential adverse effects on archaeological features;

d) Avoid or minimise to the extent practicable impacts on wetlands (including 'fen' and 'bog' habitats) and areas of high or very high ecological value with respect to road and turbine hardstand earthworks;

e) Ensure that fill disposal sites are contoured to be consistent with the adjacent topography, and that no fill disposal occurs within wetlands, streams or areas of high or very high ecological value; and

f) Rehabilitation and revegetation at each worked area during the next available planting season to achieve vegetation cover as soon as practicable.

3.0 Plan Implementation

3.1 Overview

Contact Energy as the consent holder, is responsible for ensuring the overall implementation of the EMP.

The day-to-day operation, implementation, and thus compliance with the EMP, is the responsibility of the Contractor in accordance with the construction contract. The Contractor is to ensure compliance with the resource consents issued by Environment Southland (ES) Southland District Council (SDC), and/or Gore District Council (GDC) and the effective implementation of the EMP.

3.2 Plan Induction Procedure

All site personnel (i.e. contractor and subcontractors) at the SWF site, as well as visitors, are required to have completed an induction programme, where the scope is appropriate for the tasks and/or role of individual/s, covering the requirements of the EMP. The purpose of the induction programme will be to ensure that personnel play an effective role in ensuring that the requirements of the EMP are complied with.

Where visitors or other personnel to site have not completed an induction programme, they shall be accompanied at all times by personnel who have.

The induction programme is to be conducted by the Environmental Officer/s, or other personnel delegated and trained to undertake the task.

3.3 Site or Activity-Specific Management Plans

At least ten working days prior to the commencement of construction activities in any given area of the Project Site, a Site or Activity-Specific Management Plan (SSMP) prepared by a Suitably Qualified and Experienced Person shall be submitted to ES for approval. SSMP's shall be prepared in accordance with the control measures outlined in this EMP.

Any SSMP shall include the following information:

a) Specific locations and extent of wetlands, streams, areas of high or very high ecological value and any archaeological sites/features;

b) Specific identification of any buffer zones required;

c) The specific erosion and sediment control measures that will be applied to each stage of earthworks, including location(s), dimension(s) and capacity of any control structure(s), all designed in accordance with Condition CM5;

d) Details of the water quality monitoring that shall be completed throughout the construction works;

e) Supporting calculations and design drawings of all stormwater and sediment control structures;

f) Catchment boundaries and landforms contours;

g) Location(s) of stabilised entranceway(s);

h) Details of any temporary and/or permanent stabilisation;

i) Construction methodologies applying to any proposed instream structures;

j) Specific details of the flocculation management and implementation of the Flocculation Management Plan (FMP), if relevant; and

k) Details of the earthworks mitigation measures to minimise impacts on wetlands, if relevant.

PART B Earthworks Management Plan

1.0 Earthworks Design and Development Layout

Earthworks are required for the formation of:

1. Access tracks to the Wind Turbine Generator (WTG) sites and Transmission Line Towers.
2. WTG foundations, hardstand and construction laydown areas at each WTG site.
3. Platforms for the permanent and temporary wind farm site facilities:

1.1 Access Tracks

The internal (circulation) tracks to WTG's will have a carriageway width of up to 8.0m to allow for the transportation of WTG components and the movement of mobile cranes between the WTG hardstands. The access tracks to the Wind Farm Site will have a carriageway width of 6.5m (to accommodate two-way construction traffic) although the route through the Port Blakely Forest will have localised widening on corners to allow for the transportation of the WTG components. For sections of track servicing two or less WTGs, the track is narrowed to 6.0m width, with localised widening on corners where required.

Access tracks to the transmission towers will have a 4.5m carriageway width designed for construction vehicles – including mobile crane and component deliveries.

A summary of the access track design parameters is provided in Table 1.

Table 1: Geometric Requirements for Wind Farm Access Tracks

Parameter	Max Longitudinal Gradient	Vertical Curve Radius	Min Horizontal Curve Radius	Minimum Trafficked Width
Site Entrances (to wind farm site)	13%[(1)]	550m	60m	6.5m
Internal Circulation tracks (between WTG's)	13%[(1)]	550m	60m	8m
End-of-line Tracks – two or less WTG's	13%[(1)]	550m	60m	6m
Tracks to Transmission Line Towers	16%	200m	50m[(1)]	4.5m

(1) Steeper sections are permitted if tractor pulling units are utilised, and/or metalled access tracks are stabilised – generally up to maximum of 16-18%.

The geometric design of the tracks has been optimised to reduce earthwork areas and volumes, and minimise footprint on indigenous vegetation, streams, and wetlands; in accordance with the following design criteria:

- Tracks to follow existing farm and forestry tracks where practicable;
- Where practicable, tracks to follow knolls, spurs or wide ridge features, and stay close to existing grade;
- Minimise the number of stream crossings;
- Avoid steep slopes where practicable and other geotechnically challenging features;

1.2 Turbine Hardstands

Align tracks to avoid, where practicable, water bodies and wetlands, and minimise to the extent practicable being located in areas of high value vegetation. The WTG supplier specifications determine the hardstand and laydown area dimensions to enable crane assembly and erection for the tower, nacelle, and blade components – refer **Figure 1**.

The temporary laydown areas (shown in green within Figure 1) are not required for the ongoing operations and maintenance phase of the SWF, and therefore these will be recontoured/re-vegetated at the end of construction)

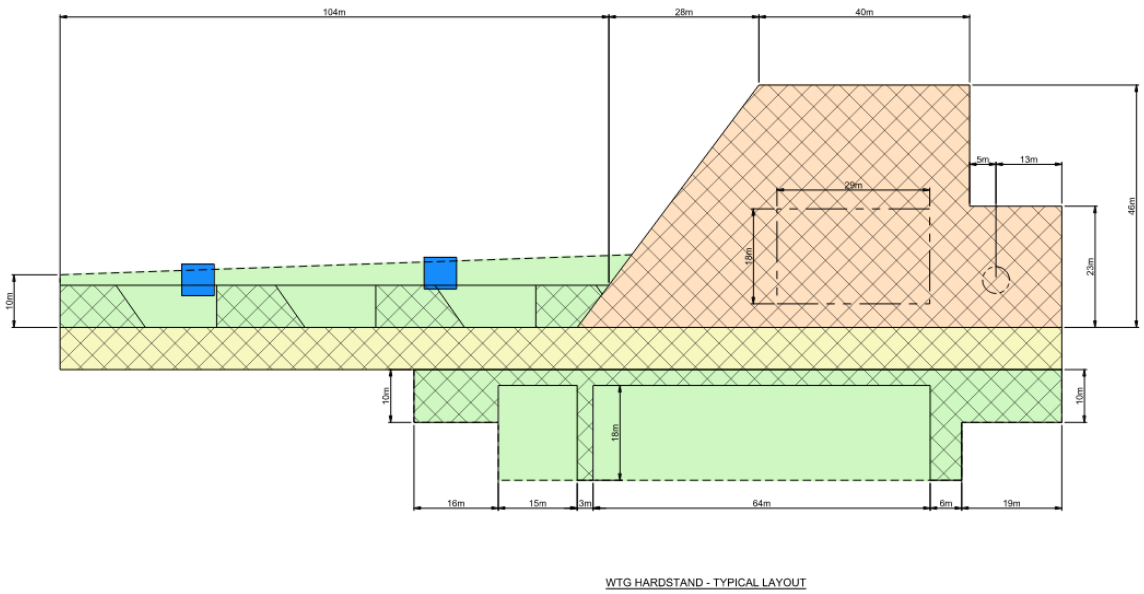


Figure 1: Indicative WTG Hardstand Configuration

Based on the predefined WTG coordinates and turbine supplier hardstand requirements, the geometric design of the WTG hardstands has been optimised to reduce earthwork areas and volumes, and minimise the footprint on indigenous vegetation, streams, and wetlands; in accordance with the following design criteria:

- Hardstands to follow the existing grade as closely as possible – to minimise cut/fill depths;
- Where practicable, position the hardstands on knolls, spurs or wide ridge features;
- Align (rotate/mirror) hardstands (including the temporary laydown areas) to avoid or minimise to the extent practicable being located within any areas identified as wetlands or high or very high ecological value vegetation and habitat types;
- Design as 'end-of-line' hardstands (with vehicle turnaround areas) where practicable – to avoid through-tracks through wetland areas.

1.3 Site Facilities

The following permanent and temporary site facilities will be constructed:

Permanent Facilities:

- 4,500m^2 platform for the permanent O&M Facilities, located off Thornhill Road (to be used as a temporary Site Compound during construction)
- 13,000m^2 platform for the permanent wind farm substation located on southern plateau region of Jedburgh Station.
- 8,000m^2 grid injection point (GIP or switching station) located to the north of the Wind Farm Site (within the wider Project Site).

Temporary Facilities:

- 2x 10,000m^2 platforms for 2x temporary batching plant facilities, located in Venlaw Forest and Jedburgh Station.
- 40,000m^2 platform for the temporary Site Compound near the Davidson Road West site entrance.
- A total of 53,000m^2 for temporary platforms for WTG supplier equipment storage areas, overflow parking, etc – located near the site entrances.

The above facilities are located on gently to moderately sloping land, and not located within:

- Wetlands
- Streams
- High-Value Vegetation, as discussed in the Terrestrial and Wetland Ecology Report by Wildlands.

1.4 Earthwork Quantities

A summary of the earthworks volumes and areas for the tracks and hardstands are shown in Table 2.

Table 2: Indicative Earthwork Quantities and Track Lengths

Description	Quantity
Wind Farm (incl. Access through Port Blakely Forest, incl Substation)	
Number of WTG's	55
Track Length (incl. length of tracks through WTG platforms)	72.8km
Topsoil Strip[1]	-590,000m^3
Cut Volume[2][3][4]	-1,734,000m^3
Fill Volume[2][3][4]	665,000m^3
WTG Foundation Excavation Volume[5]	-138,000m^3
WTG Foundation Backfill Volume[5]	96,000m^3
Overall Surplus Fill Volume (excl. topsoil strip)	-1,111,000m^3

Description	Quantity
Total Earthworks Area[6]	**161ha**
Transmission Line – (access tracks and construction pads, incl GIP)	
Track length	5.6km
Cut volume[2]	-44,000m^3
Fill Volume[2]	9,000m^3
Surplus Fill Volume (excl. topsoil)	-35,000m^3
Total Earthworks Area	**6.2ha**

(1) Topsoil depth varies between 0.1m and 0.7m. 0.4m average assumed for earthworks assessment, excludes overlap with existing farm/forestry roads.

(2) Volumes are calculated based on the difference between existing stripped ground surface (i.e. 0.4m topsoil – except overlap with tracks) and the finished subgrade surface (assuming average 0.25m new pavement thickness), i.e. excludes topsoil strip.

(3) Excludes excavations and backfill of WTG foundations.

(4) Earthworks includes WTG Access roads and platforms, O&M facilities, substation, contractors site compound, concrete batching plant facility, storage and parking. Excludes Overhead Transmission Line and associated earthworks, surplus fill disposal sites.

(5) Based on foundation designs developed for similar sizes WTG's on other wind farms – 2,500m^3 excavation volume per WTG, 1,750m^3 backfill volume.

(6) Earthworks Area includes overlap with existing access tracks, excludes surplus fill disposal sites.

2.0 Surplus Fill Disposal

Approximately 1.2M m^3 of excess material will be generated from the earthworks to form the Project Access Tracks and Hardstands. To minimise hauling distances and cost, this material will be deposited at Surplus Fill Disposal (SFD) sites located within the Wind Farm Site. The proposed SFD locations are shown on the site plans in Attachment B.

The following sections outline the design and construction control measures that will be implemented to minimise adverse effects of the SFD's on the environment.

2.1 SFD Exclusion Zones

SFDs are to be positioned close to areas of large surplus cut, and based on the following exclusion zones:

a) no disposal shall take place into any areas identified as wetlands or high or very high ecological value vegetation and habitat types (or within a 10m setback from wetlands or high or very high value vegetation);

b) no disposal shall take place into any permanent or intermittent rivers or streams; and;

c) no disposal shall place into very steep slopes (>45 degrees – gully side slope) or erosion prone land.[1]

[1] As shown on https://www.stats.govt.nz/indicators/highly-erodible-land/ as areas being "highly erodible land areas".

2.2 SFD Types

The proposed SFD's can generally be characterized into three types:

A. Blanket SFD: Non-engineered fill is spread over gently or moderately sloping ground, typically 1-3m thick, average ~1.5m thick. Situated on ground with slopes <15% (typical). Usually located in grass paddocks or cleared forestry areas, close to tracks and hardstands. The finished surface is contoured to follow pre-existing ground profile beneath. Refer Figure 2.

B. Shoulder SFD: Fill is placed butting up against tracks and hardstand fill embankments - located along ridgelines/spurs or knolls. Comprises a structural fill toe (for stability) with non-engineered fill placed behind. Situated on ground with slopes <15% (typical). Max fill depths vary, typically <5m but can be up to 10m. Refer **Figure 3**.

C. Gully SFD: Only proposed in Matariki Forest. Fill placed into heads of gullies (outside of exclusion areas noted above). Comprises a structural fill toe (for stability) with non-engineered fill placed behind. Max fill depths generally between 5-10m. Overland flow from upstream catchment (minor catchments) is directed around the perimeter of the SFD via a rock line channel – to be sized for the 1% Annual Exceedance Probability (AEP) rainfall event. Refer **Figure 4**.

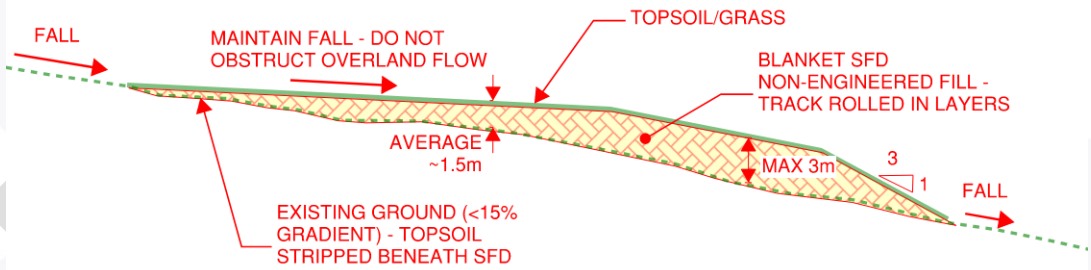


Figure 2: Blanket Type Surplus Fill Disposal Site – Typical Section

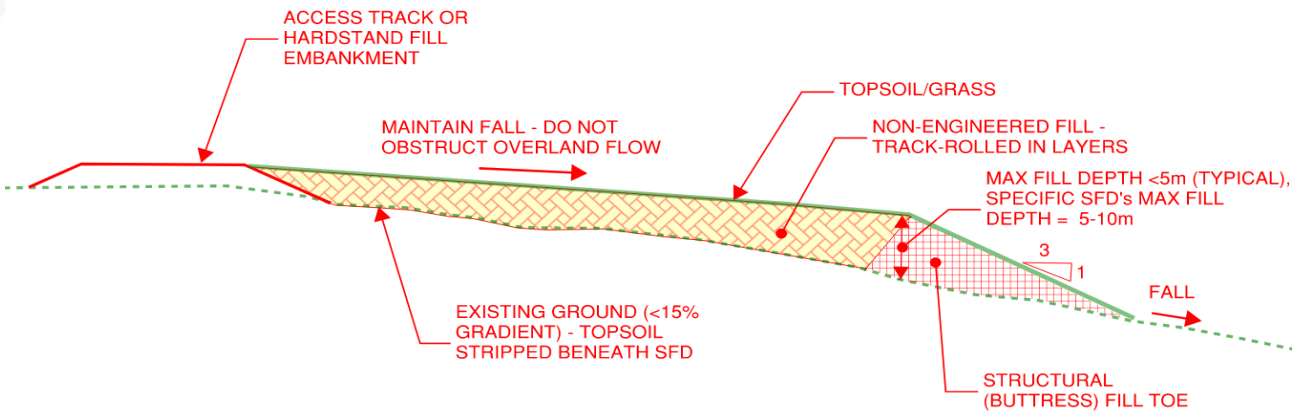


Figure 3: Shoulder Type Surplus Fill Disposal Site – Typical Section

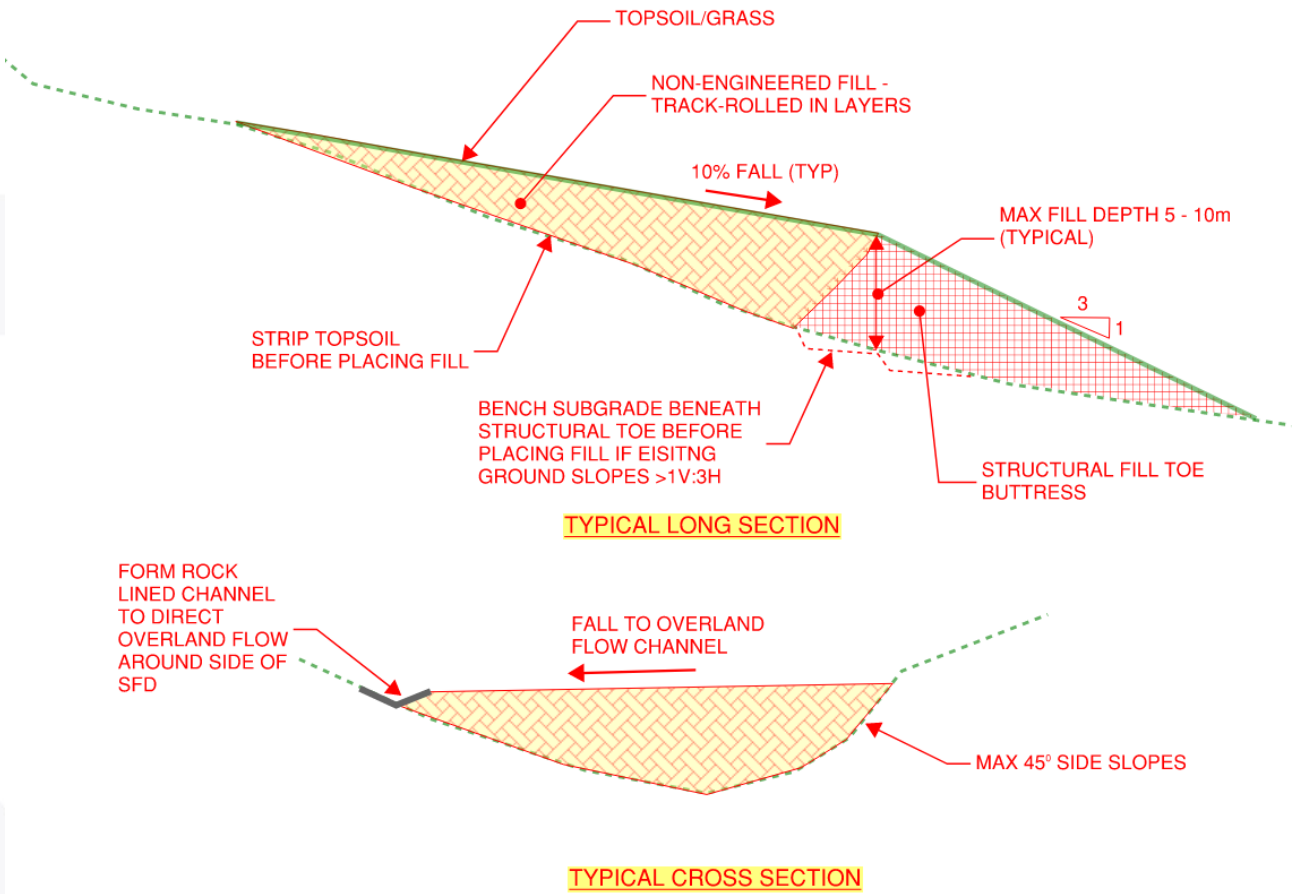


Figure 4: Gully Type Surplus Fill Disposal Site – Typical Sections

2.3 Establishment Phase

The SFD's shall be designed by a suitably qualified Civil or Geotechnical Engineer, in accordance with the above control measures, and the Conditions of Consent. The final design and location of the SFD's shall be detailed on the site plans which will form part of the Council approved SSMP's.

2.4 Construction Phase

Construction of SFD's shall be generally phased as follows:

1. Construct diversion bunds (in accordance with GD052) to direct clean stormwater runoff away from the fill disposal/stockpile sites as works progress. Where practicable, the diversion bunds will follow close to the existing contours to prevent significant channel erosion. Stormwater collected will be directed to safe discharge points and may require a haybale barrier/staggering at the outlets to dissipate flow rates.
2. Construct sediment retention ponds/earth decant bunds that will provide adequate retention of sediment laden runoff from the fill disposal/stockpile sites (including access tracks into the sites). The pond/earth decants shall be positioned to ensure the diversion bunds intercepting sediment laden runoff can be adequately graded into the structures. The sediment retention ponds/earth decants will be designed in accordance with GD05.
3. Construct diversion bunds (in accordance with GD05) to intercept sediment laden runoff and divert flows to the sediment retention pond. If the gradient of the diversion bunds exceeds 5%, the channel should be stabilised with suitable materials to provide erosion protection (i.e. lined with geotextile fabric).
4. At the entry/exit point of the fill disposal/stockpile sites, construct a rock lined stabilised construction entrance.
5. Undertake vegetation clearance, strip topsoil and organic material from the footprint of the SFD and place in stockpiles adjacent to the SFD. Cut benches into the subgrade (where ground slope > 1v:3h) and install subsoil drainage at the base of the gully features (where shown on the drawings).
6. Construct engineered-fill buttress toe (for shoulder and gully-type fills), under the supervision of a suitably qualified civil or geotechnical engineer. Once the structural bund is complete, commence bulk filling of the non-engineered fill behind the toe – placing material in layers starting from the toe and working back up the slope.
7. Once the SFD design level and finished surface profile is achieved, respread stockpiled topsoil and organic material, and like for like vegetation (seed selection to be in accordance with the Vegetation Management Plan and rehabilitation to occur in accordance with the Biosecurity Management Plan). No topsoil shall be introduced from outside the Project Site and if additional topsoil is required at a particular site it must come from a like for like ecosystem within the Project Site. This shall occur within 12 months of the SFD site strip, to make the use of the next planting season (in accordance with the Vegetation Management Plan).
8. Form the permanent rock lined overland flow channel around one side of the filled gully – to direct overland flow to the base of the fill toe (gully-type fills).
9. Remove sediment control measures once all disturbed areas have established 80% grass coverage. Additionally, all construction equipment and any debris from works shall be removed from disposal sites on completion of the works.

[2] Auckland Council's Guideline Document 2016/05 *"Erosion and Sediment Control Guidelines for Land Disturbing Activities in the Auckland Region"*:

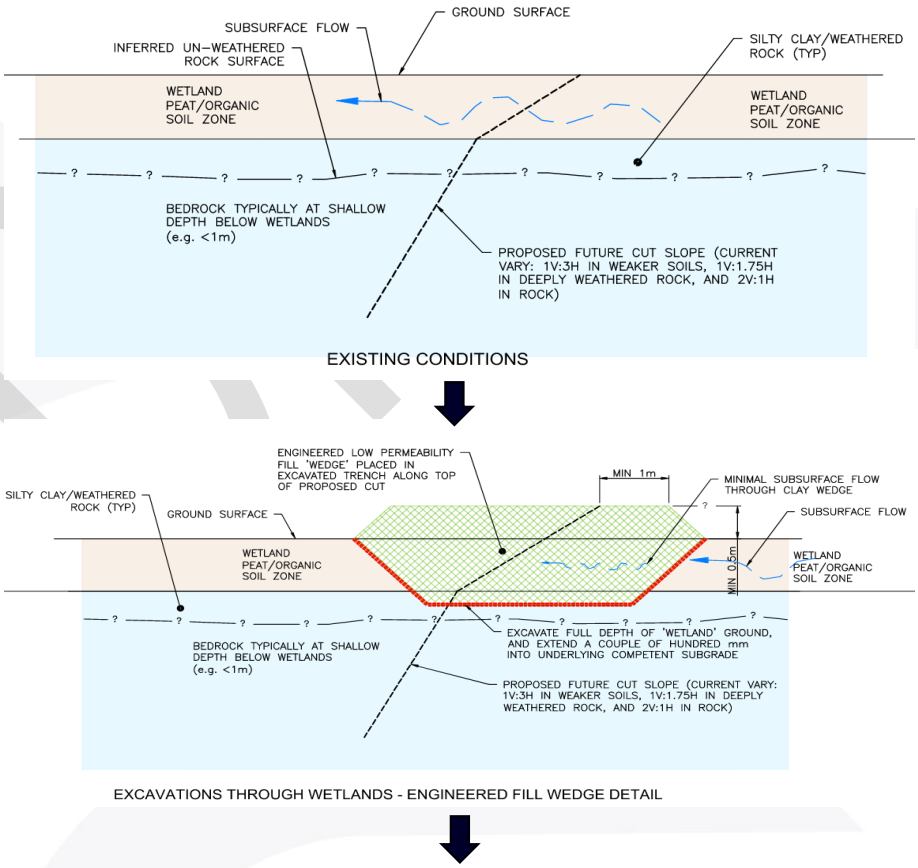
3.0 Impacts on Wetlands

The instances of access tracks and hardstands crossing wetlands has been minimised to the extent practicable. The following sections outline the design and construction control measures that will be implemented to minimise adverse effects of earthworks on wetlands for those areas where avoidance is not practicable.

3.1 Excavations within Wetlands

In this scenario a primary concern is seepage of water through the cut face, resulting in the partial dewatering of the wetland. To prevent this from happening a low permeability fill bund (using site won clays/silts) will be constructed prior to forming the cut face for the access track or hardstand. The clay bund will be keyed into the underlying competent ground. The proposed construction sequence is shown in **Figure 5**. This detail may also be employed where a cut face is located near (within 10m) a wetland, where it is assessed by the Engineer or Hydrogeologist, that the proximity of the cut could result in seepage from the wetland.

The bund shall be constructed from selected soils in accordance with the Project earthworks specification and to the compaction standards (air voids/dry densities) stipulated. Earthworks testing shall be carried out in accordance with the specification to demonstrate compliance with the compaction requirements.



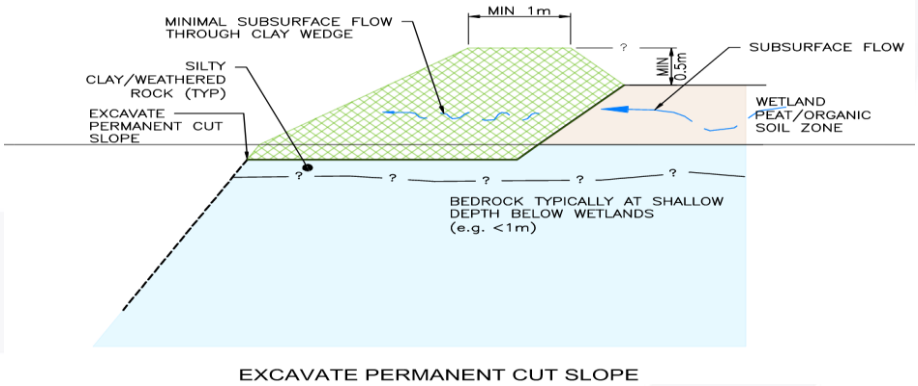


Figure 5: Construction Sequence – Excavations through Wetlands

The low permeability bund methodology is endorsed by the project hydrogeologist – Williamson Water Advisory (WWLA) – refer to their concept design report. To provide hydrological connectivity between the dissected areas of the wetland, a series of stormwater culverts will be installed beneath the access track or hardstands at existing flow paths, which will convey surface flow to the wetland downstream. The design methodology for such culverts is addressed in the WWLA report.

3.2 Fill Embankment Within Wetlands

In this scenario the fill embankment (which will be founded on the clay/weathered rock layer underlying the wetland organic soils) will effectively be acting as a dam. Therefore, the primary concern is to provide hydrological connectivity between the dissected areas of the wetland (or to maintain flow to wetlands located downstream). To achieve this, a series of stormwater culverts will be installed through the fill embankment at existing flow paths, which will convey surface flow to the downstream wetland. This design methodology for such culverts is addressed in the WWLA report. A diagrammatical example of the fill embankment through a wetland is included in the SWF Civil Drawing set and shown below in Figure 6.

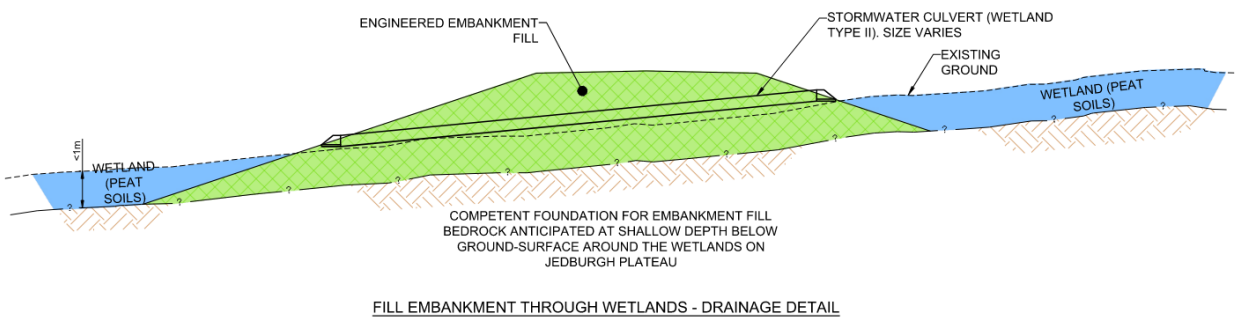


Figure 6: Wetland Culvert - Fill Embankment

3.3 Rock Excavation Close to Wetlands

In some locations excavations that are within or adjacent to wetlands, un-weathered rock will be encountered at shallow depths. Such rock will likely be removed with the aid of rock blasting

techniques. Therefore, specific mitigation measures will be employed to ensure the blasting does not affect the sub-soil drainage or permeability of the subsurface layers underlying the adjacent wetlands, and to limit the encroachment of the earthworks into the wetlands.

Several blasting methods have been considered in consultation with blasting specialists Redbull Powder Company (Redbull). There are a range of techniques that Redbull can employ to achieve a high degree of accuracy that will be required when blasting within or adjacent to wetlands.

GPS survey is to be used to allow accurate blast design and additional to this a GPS guided drilling rig will be used to ensure blast holes are drilled to target RL and as per design via electronic blast hole design uploaded to the drill. In addition to the standard procedure above, Redbull have identified the following additional control techniques that can be applied where a high degree of accuracy is required.

1. Cushion Blasting – adjusted blasting parameters towards the final batter.
    - Often with smaller blast hole diameter and adjusted timing and loading to limit energy. Drill holes don't have to match batter angle (so can be applied to low slope angle batters).
    - Lowest cost but usually requires competent rock mass.
2. Presplit – drill a row of blast holes approximately 1m spacing (0.6m – 1.5m depending on geology) along the cut batter at matching angle to the final batter, and load with a decoupled high velocity charge.
    - Depending on ground type, all or every second hole loaded.
    - Generally instantaneous initiation – or in panels.
    - Generally not stemmed (i.e. holes closed in at top), generally better result without stemming.
    - Reasonably significant noise and vibration effects – louder than general drill and blast due to venting.
    - Moderate cost – works well in moderate to competent ground.
3. Line Drilling – row(s) of holes drilled in close centres (200-300mm) along the batter at the matching angle to final batter.
    - No significant vibration or noise related effects
    - Best if significant noise vibration limitations
    - Most costly, most robust solution.

Blast trials shall be conducted away from final batters to define the most appropriate method for the required excavation tolerances. The procedures and locations for the blast trials, and subsequent selection of blasting methods, shall be detailed as part of the approved SSMP's.

3.4 Establishment Phase

The location and extents of the clay bunds shall be confirmed by a suitably qualified Civil Engineer and detailed on the site plans which will form part of the Council approved SSMP's.

The locations and details of the wetland culverts shall be determined by a suitably qualified Civil Engineer and specified on the stormwater drawings which will form part of the Council approved SSMP's.

Site controls to be implemented to physically delineate the wetland and exclusion areas – in accordance with the CEMP and SSMP. The earthwork batter extents are to be confirmed by a suitably qualified surveyor.

3.5 Construction Phase

Works within wetlands shall be undertaken in accordance with the planning carried out during the establishment phase and the approved drawings, specifications and SSMP, and generally following the methods outlined below:

Platforms or road cuts into or directly adjacent to wetlands:

1. Install erosion and sediment control measures in accordance with the SSMP.
2. Form the low permeability bund (using site won clays/silts), key the bund into the underlying competent ground, as shown in Figure 5.
3. During construction of the bund, coffer dams and/or dewatering pumps may be required to limit water ingress into the excavation. Any collected water within the excavation shall be returned (pumped) back to the adjacent wetland.
4. Once the clay bund is in place, excavations to form the road or hardstand can commence. Care will need to be taken if hard rock is encountered in excavations adjacent to wetlands, to avoid damage to the hard pan beneath the wetland from the vibrations caused by the rock breaking. Fracturing of the hard rock will be undertaken using the blasting techniques verified during the establishment phase and by the trial blasting. Following blasting, the fractured rock will be carefully removed via excavator bucket to the specified design line and levels.
5. During excavation works, clean water runoff that collects upstream of the clay bund shall be directed/pumped to downstream wetlands via flexible pipes.
6. Once excavation has reached the final line and level, install the permanent wetland culverts as detailed on the stormwater drawings.

Fill embankment through wetlands

1. Install erosion and sediment control measures in accordance with the SSMP.
2. Strip wetland organic material from the footprint of the embankment and remove to a fill disposal site.
3. During construction, coffer dams and/or dewatering pumps may be required to limit water ingress into the excavation. Any collected water within the excavation shall be returned (pumped) back to the adjacent wetland.
4. Commence construction of the fill embankment back up to original ground level.
5. Install the wetland culverts as detailed on the stormwater drawings.

6. Continue construction of the fill embankment.

3.6 Rehabilitation Phase

Until all construction works have been completed and ground stabilised and sediment control measures removed, the earthworks and stormwater control measures shall be monitored to ensure appropriate performance and/or to identify any signs of erosion, seepage etc. If it is evident that the control measures are not working appropriately, immediately undertake any necessary maintenance and/or other appropriate measures to ensure the ongoing and future effectiveness of the control measure.

As-built plans of the stormwater infrastructure and clay bunds shall be prepared by the Contractor and certified by a suitably qualified civil engineer of surveyor and submitted to Council for approval.

4.0 Works within Streams

The instances of access tracks crossing intermittent and perennial streams has been minimised to the extent practicable. The following sections outline the construction control measures that will be implemented to minimise adverse effects of earthworks on streams, for those areas where avoidance is not practicable. The design approval process for the stream culverts is addressed separately in the CEMP.

4.1 Establishment Phase

The design of culverts for stream crossings will be carried out by a suitably qualified Civil Engineer as part of the detailed design phase. The stream culverts will be detailed on the stormwater drawings and will form part of the Council approved SSMP's.

The extent of stream culverts and track fill embankments shall be clearly confirmed on-site by a suitably qualified surveyor.

4.2 Construction Phase

Refer stream diversion works drawings in Attachment A.

The expected duration of Phase 1 works for each culvert crossing is < 7 days.

Phase 1 (works within the stream):

1. As far as is practical undertake works during dry/low flow periods where no significant rain is forecasted.
2. Construct diversion bunds to divert cleanwater runoff away from the working area.
3. Excavate a diversion channel, ensuring each end of the channel does not encroach into the watercourse. Stabilise the diversion channel with suitable materials to provide erosion protection.

4. Construct non-erodible dams (using sand bags or similar) at the upstream end of the culvert to divert flows into the diversion channel.
5. Construct non-erodible dams (using sand bags or similar) at the downstream end of the culvert. Downstream dam to feature a T-bar decant to drain the works area if required to keep the area dry from groundwater/water leakage.
6. Construct permanent culverts, wingwalls, riprap aprons, place riprap within the culvert as per design.
7. Place and compact backfill material around the culvert to the soffit levels of the pipe/s.
8. Remove diversion bunds, and upstream and downstream dams, block off inlet and outlet to diversion channel - allowing flows to pass through the new culvert.

Where it is not practical or necessary to construct a diversion channel (i.e. limited stream flows), the diversion channel (step 3 above) can be replaced with a pump system - to over-pump impounded water (from upstream of the bund) and discharge downstream of the works area. Pump to be rated to convey normal low (summer) flow rates, pump setup to include suitable fish screen that comply with Appendix R of the Southland Water and Land Plan. The benefit of this option is it reduces the footprint of the works/disturbance area, through deletion of a diversion channel.

Phase 2 (Fill embankment):

1. Install silt fences around the base of the track fill embankment.
2. Continue with backfill over the culvert and forming of the fill embankment.
3. Form sediment control measures for approach tracks (e.g. drop out pits) and commence earthworks to form the tracks.
4. Stabilize the earthworks area and remove sediment controls.

5.0 Erosion and Sediment Control Plan

5.1 Introduction

The earthworks contractor personnel responsible for the operation and maintenance of all key erosion and sediment control devices are presented in Table 3. The personnel will be available to meet with the Regional Council monitoring personnel on a regular basis, or as otherwise agreed in writing with the Regional Council, to review any erosion and sediment control issues.

Table 3: Erosion and Sediment Control Personnel [Placeholder]

Name	Role	Email	Phone Number

The following procedures shall be followed to ensure the discharge of sediment into waterbodies is minimised through the provision of control and retention devices.

5.2 Establishment Phase

Establishment phase management procedures, which are to be completed prior to earthworks commencing for any new stage/area of the site are as follows:

A. Planning of erosion and sediment control measures shall occur prior to any earthworks commencing. The measures shall ensure that:
   - sediment mobilisation beyond the immediate earthworks site is minimised; and
   - all sediment from site earthworks, where mobilised by stormwater or vehicles, is managed and treated, prior to discharge to the environment.

B. Such planning is to be carried out for each stage/area of earthworks. Detailed Erosion and Sediment Control Plans shall be prepared and form part of the SSMP's – to be approved by Council.

C. Provide advance notice to Council of intended start dates for each staged component of earthworks. The Council officer(s) may wish to inspect the site to ensure the sediment control measures are located and constructed in accordance with the approved plans and are appropriate to the site/catchment conditions.

D. The following techniques are examples of the sediment control measures that are to be used, these techniques are in accordance with GD05. If a more suitable approach is identified during this planning phase, which is not identified below, it may be used provided it meets the purpose of this EMP and subject to Council approval. The criteria for selection of sediment control measures to be implemented for each stage of earthworks is identified in Table 4.

Cut and Cover

For sections of access tracks that follow close to existing grade, are in cut, and located >10m from a wetland; a cut and cover technique will be employed as follows:

A. As the track is formed, the excavated material will be loaded directly onto a dumper and transported to the nearest SFD as indicated on the drawings.

B. The trackside v-drains and cut batter will be rapidly stabilised with hydroseed or rock lined (for v-drain with gradient >5%).

C. The v-drain will then convey clean water runoff to culverts or discharge points.

The length of access track that is left exposed will depend on dry weather window and the timeframes for earthworks and stabilisation. Cuts shall be stabilised prior to significant wet weather.

Stabilised Construction Entrance

A stabilised pad of aggregate on a filter cloth base will be located at the entrance of site entrance/s (and entrances to the SFD's – dependent on construction staging) where construction traffic will be entering and leaving. This will prevent the entrance from becoming a sediment source and minimise dust generation and tracking of soil onto the adjacent environments.

Wheel Wash

A wheel wash adjacent to the stabilised site entrance may be provided if required (dependent on condition of internal tracks and cleanliness of vehicles exiting the Wind Farm site). If required, the wheel wash may consist of a temporary mobile chamber or a shallow pit (stabilised with roading aggregates or hotmix) and will be filled with water from on-site water sources. The purpose of the wash is to clean the earthmoving truck tyres, and therefore, reduce the amount of sediment being tracked over public roads. The wheel wash will maintain a pool depth of 400mm to 500mm, and water will be replenished regularly (dirty water to be pumped and removed from site or overflow directed to sediment pond/decanting structures).

Runoff Diversion Channels/Bunds and Clean Water Diversion Bunds

Runoff diversion channels or bunds will be used to intercept and detain silt laden runoff and divert into drop-out pits, earth decant structures, or sediment ponds where specified. The channels shall be sized for the 5% AEP rainfall storm event plus 300mm freeboard, in accordance with GD05. Dewatering (pumping) may also be required at times for runoff not draining away in low gradient dirty water diversion bunds, particularly around WTG hardstands. In this instance, a mobile turkey's nest can be constructed and used for dewatering if 100mm of clarity cannot be achieved.

Cleanwater diversion bunds are to be constructed to intercept overland flow from upper catchments and divert around the earthwork sites. The diversion bunds are sized to accommodate the 5% AEP rainfall storm event plus 300mm freeboard, in accordance with GD05

The channels and bunds, generally, have longitudinal gradients less than 2%. Where the grade exceeds this, or flow velocities are high, the channels may need to be lined with either rocks or geotextile fabric to prevent erosion of the underlying soils. The collected and diverted clean stormwater runoff will be disposed at safe locations to prevent erosion of the receiving environment.

Dropout Pits and Sumps

Drop out pits may be used on steep sections of access tracks to ensure sediment laden water is slowed down and silt is deposited out at regular intervals. Drop out pits may be installed within dirty water diversion channels to allow heavier sediment particles to drop out before they enter the sediment retention device, reducing the load on the device, or at termination points of roadside open drains – prior to discharge across grass fields. Drop out pits are approximately 500 to 1000mm deep and 1000m wide. The pits will be maintained regularly with contained sediment and disposed of appropriately.

Drop out pits may be used at the gently sloping WTG platforms in areas of cut. Runoff will be directed to and collected in the pit/sump where the heavier sediment will settle out before water is pumped (via floating offtake) to a turkeys nest and/or grassed area, which will provide further filtration.

Stormwater Inlet Protection

It is proposed to excavate around the inlet of the culverts in the track side open drains to form a sump (small drop-out pit) to allow settlement of suspended material. During construction, geotextile fabric may be wrapped around the inlet of the culvert to intercept sediment laden runoff collected by the drain.

Temporary Culverts

Temporary culverts are to be installed where required to maintain hydrological connectivity between segregated sections of wetlands, and/or to direct runoff to sediment control devices; until such time that the permanent culverts can be installed (generally relates to cut earthworks). These culverts have been sized for the 5% AEP rainfall event in accordance with GD05 – refer Table 3. The temporary culvert will be removed once the permanent culverts are in place.

Table 3: Temporary Culvert Sizing – Earthworks Phase

Culvert Sizes (mm)	Max Catchment Area (ha)
300dia	0.33
375dia	0.79
450dia	1.25
525dia	1.84
600dia	2.63

Silt Fences

Silt fences may be used at various areas and times during construction. The silt fences will detain flows from the construction area so deposition of transported silt can occur through settlement. Silt fences may be utilised at low gradient sites or for confined areas where the contributing catchment is small. Silt fences may be used to limit disturbance of a more sensitive area where diversion and earth bunds are not practical to construct, such as around watercourses and wetlands. 2m returns will require to be constructed on steeper slopes where the silt fence cannot follow the existing contours. Silt fences may, generally, be utilised for slope lengths up to 40m (for slopes less than 10%), or up to 15m for steeper fill batter slopes. Due to high wind conditions at the site, silt fences will not be suitable for exposed areas and therefore will only be utilised in spatially constrained areas where other controls are not practical to construct (e.g. stream crossings and adjacent to wetlands). Super silt fences may be required to withstand high winds in exposed areas.

Decanting Earth Bund

The Decanting Earth Bunds (DEB's) will be used to intercept sediment laden runoff and minimise the amount of sediment leaving the site through settlement. The DEB's will include forebays and be fitted with a floating T-bar decant structure, similar to that used in a sediment pond, to increase settlement time and improve sediment removal efficiency of the device.

The bund will be sized to have a volume of approximately 2 to 3% of the contributing catchment area and provide an adequately sized spillway to pass a 1% AEP storm event. The decant inlet will

be positioned to provide 50% live storage volume with a minimum distance of 5m from the inlet. The maximum catchment area contributing to the earth bund structures is typically 0.3ha in accordance with GD05 recommendations, however, decants can be enlarged to cater to a larger catchment size on a case by case basis, catchments of up to 0.5ha have been used on other wind farm projects.

DEB's may incorporate a rain activated chemical treatment system where specified (refer to Chemical Treatment section below).

Sediment Retention Ponds

Sediment retention ponds (SRP's) will be used to treat sediment laden runoff and reduce the volume of sediment leaving the site. SRP's may be used at the fill disposal sites or platforms, where large areas of earthworks will remain exposed to erosion during the construction period, i.e. where catchment sizes exceed the capacity of a DEB.

SRP's should be positioned at a convenient collection point for the sediment laden runoff. This position should also allow for easy access to carry out routine maintenance of the structure. SRP's shall be excavated into natural ground and embankments formed with engineered fill. The sediment retention ponds require specifically designed spillway arrangements to ensure overtopping of embankments does not occur during storm events.

The contributing catchment area for the sediment retention pond should be restricted to less than 3ha per pond. The minimum capacity of the pond should be 300m^3 for each hectare of contributing catchment (3% of the contributing catchment) where an additional 10% of this volume is used as a sediment forebay.

However, the minimum capacity may be reduced to 200m^3 for each hectare of contributing catchment where the earthwork slopes are less than 10%.

SRP's may incorporate a rain activated chemical treatment system where specified (refer to Chemical Treatment section below).

Chemical Treatment

Water treatment chemicals can be applied to increase the rate of sediment settling out of the water column and is commonly used in conjunction with DEB's and SRP's. This helps to achieve the permitted levels of Total Suspended Solids (TSS) prior to discharge.

The necessity for chemical treatment will be dependent on the proximity to downstream water bodies, topography, and the soil composition of the earthworks catchment – i.e. in relation to how quickly the TSS settle out with or without the chemical additives. Given the large size and variable ground conditions across the Wind Farm Site (including the presence of near surface bedrock in some areas) it is envisaged that the requirement for chemical treatment will be assessed on a catchment-by-catchment basis.

A Draft FMP has been prepared by Riley and is appended to the CEMP as Appendix B. The FMP outlines methodologies for the application of chemical treatment for the SRP's and DEB's – via

rain activated and passive systems. Coagulants (e.g. Alum/PAC) and Cationic PAM's (flocculants) will not be considered for the project, due to their toxic properties and risk of changes to pH levels in the receiving streams and wetlands. On the other hand, Anionic PAM's are widely used in New Zealand and are generally considered safe and non-toxic to aquatic life at approved doses.

Bench testing of representative soil samples collected from site is yet to be undertaken. Based on bench testing that have been prepared for other wind farm projects in the wider region, the application of Anionic PAM's was found to be a somewhat effective liquid treatment method for TSS removal, for colluvium soils. However, it has also been observed that the natural settlement of sediment (with no chemical treatment) is quite rapid for some colluvium soils.

Therefore, comprehensive bench testing will be undertaken to determine the appropriate chemical treatment regime for the project, on a catchment basis. Chemical treatment will be targeted (subject to soil conditions present) for sediment control devices which will be located within 50m of a wetland, or for sediment ponds servicing a catchment > 1.5ha.

Whether or not rain activate systems are deemed necessary, chemical treatment products shall be available onsite as a back up to facilitate flocculant dosed treatment and as a contingency in the event of spill or discharge of contaminants, and/or during dewatering processes.

Table 4: Application Criteria for Sediment and Erosion Control Devices

Order of Selection	Sediment and Erosion Control Method	Criteria for Application	General Purpose
1	Cut and Cover technique	For sections of access track that follow close to existing grade (earthworks area does not exceed 750m2/50m) and where the tracks are cut into existing banks and located >10m from a wetland.	Stabilise ground and v-drains rapidly – prior to significant rainfall
	Stabilised Construction Entrance	At the main entrance to the site and fill disposal sites	Prevent the entrance from becoming a sediment source, minimise dust generation and tracking of soil onto the adjoining environments.
	Wheel wash	At the main entrance	Prevent the entrance from becoming a sediment source, minimise dust generation and tracking of soil onto the adjoining environments – to be installed if trafficking of sediment onto public roads is likely to become an issue.

Order of Selection	Sediment and Erosion Control Method	Criteria for Application	General Purpose
	Cleanwater diversion bunds	Where the surrounding topography contributes to the catchment area of the earthworks.	Intercepts and diverts clean water and reduces the contributing catchment area affecting the earthworks.
3	Diversion bunds/channels, open drains	To intercept and detain sediment laden runoff from earthwork areas, and direct to sediment retention device where specified.	Intercept, attenuate sediment laden runoff from exposed earthwork surfaces. Promote settlement of suspended materials. A mobile 'turkeys nest as per figure 107 from GD05 can be constructed for dewatering if sediment laden runoff is not draining away in dirty water diversion bunds in flat areas.
4	Rock lined open drains	Where the gradient of the excavated v-drain exceeds 5%.	Provides erosion protection where increased flow velocities may cause erosion.
	Geotextile lined diversion channels/bunds	Where the gradients of the diversion channels/bunds exceed 2%.	Provides erosion protection where increased flow velocities may cause erosion.
5	Stormwater inlet protection and inlet sump	At the inlets of culverts collecting and diverting flows from the track open drains. Contributing catchment area of the exposed earthworks does not exceed 1,000m2.	Provide additional storage capacity where suspended materials can settle out and water can soak into the natural ground.
	Temporary Culverts	If /where required, to cross beneath earthworks - to temporarily convey cleanwater flow to downstream wetlands, or sediment laden runoff to retention devices.	Required until such time that the permanent stormwater culverts are constructed, to maintain hydrological connectivity

Order of Selection	Sediment and Erosion Control Method	Criteria for Application	General Purpose
	Drop-out pits	Installed at steep sites within diversion channels upslope of sediment retention devices or in track side open drains. WTG hardstands in cut – used as a sump for dewatering platforms – in combination with floating offtake pump and turkeys nest at discharge point.	Promote settlement of suspended materials prior to discharge to downstream receiving environment, through interception and attenuation. Silt fences shall be used in combination with drop-out pits where located near sensitive receiving environments – such as wetlands
6	Silt Fence	To limit disturbance of a sensitive area where diversion and earth bunds are not practical to construct. The slope angle of the surrounding topography exceeds 18. Length of fill batters is less than 15m and the chainage of fills are short.	Intercept sheet flows from fill batters and provide retention of sediment laden runoff prior to entering the downstream environment.
7	Decanting bunds (DEB)	To intercept sediment laden runoff from cut surfaces where the contributing catchment of the exposed earthworks exceeds 1,000m2 but is less than 3,000-5000m2. Where excessive quantities of sediment laden runoff will degrade the downstream receiving environment.	Intercept, attenuate and provide retention of sediment laden runoff from exposed earthwork surfaces.
8	Sediment Retention Pond (SRP)	At fill disposal sites. Generally, for contributing catchments areas ranging between 0.5ha and 3ha.	Provide attenuation and retention of sediment laden runoff from large areas of earthworks that may be exposed to erosion for long periods of time.
9	Chemical Treatment	Rain-activated or passive chemical treatment for inflows to DEB's and SRP's, if located within nominal 50m distance of a wetland, or SRP's treating a catchment > 1.5ha, subject to soil composition of the contributing catchment – in accordance with the FMP	Increase sediment removal efficiency in the water column – to meet permitted levels of TSS discharge.

5.3 Activity Phase

Activity phase management procedures, which are to take place throughout any earthworks activity, are as follows:

A. Establishment of a stabilised entrance and truck wash down station at the site entrance. This is to be established in conjunction with the stabilised construction entrance and include water spray units. All vehicles exiting the site are to be cleaned at this location in order to remove sediment.

B. Installation of the planned erosion and sediment control measures at the commencement of each staged component of the earthworks, in accordance with the SSMP. Once installed, the erosion and sediment control will need to be checked and certified by an engineer or other suitably qualified person. As-built plans of sediment retention devices (DEB's, SRP's) shall be provided to Council for approval.

C. Undertake regular Inspection of the control measures and monitor water quality of the receiving water bodies to confirm that the measures are operating effectively. Implement additional control measures ahead of significant rainfall event if appropriate. Refer Section 6.0.

D. If following any daily inspection, or at any other time, it is evident that the control measures are not working appropriately, immediately undertake any necessary maintenance and/or other appropriate remedial measures (refer Section 7.0).

5.4 Rehabilitation Phase

Rehabilitation phase management procedures are to be undertaken upon the completion of each stage earthwork activity. These procedures can be undertaken either progressively as each staged earthworks proceeds and/or at the completion of the staged earthworks, as appropriate, but in accordance with the establishment phase planning. The management procedures are:

A. Once vegetation cover is appropriately established, decommission and remove from the area all sediment control measures.

B. Ensure that the areas affected by the decommissioning of the sediment control measures are rehabilitated as appropriate.

6.0 Dust

To ensure dust does not become a nuisance beyond the site boundaries, the following procedures shall be followed:

6.1 Establishment Phase

Establishment phase management procedures, which are to be completed prior to any earthworks commencing are as follows:

A. Planning of dust control measures shall occur prior to any earthworks commencing. The measures shall ensure that all potential sources of dust nuisance are identified, and measures put in place and/or contingency measures identified, so that dust does not become a nuisance. Such planning is to be carried out for each staged component of the earthworks.

B. A supply of water and access to water trucks for dampening of potentially dusty surfaces has been identified with a maximum water take rate of 5l/s During periods of low stream flow, water take is to be significantly restricted and water storage tanks and ponds are proposed, such that if climatic conditions do result in a potential dust nuisance then water spraying can continue.

C. Water required for dust suppression will be sourced from one of two sites within the Mimihau Stream South Branch catchment, named site M1 and Site M2. Under no circumstances shall water be sourced from ponds identified as being ecologically sensitive. Such ponds will be identified on the relevant construction drawings.

6.2 Activity Phase

Activity phase management procedures, which are to take place throughout any earthworks activity, on an as necessary and appropriate basis, are as follows:

A. Ensure the track surface remains in a damp condition utilising water trucks as necessary until exposed earthworks are stabilised.

B. Limit site traffic speed to a level to reduce the production of dust into the atmosphere.

C. Stage earthworks during construction to isolate and reduce the area of exposed earthworks and re-vegetate exposed surfaces as soon as practical.

D. Stabilised entrance at the entry/exit points of the windfarm site and fill disposal sites and provide a wheel wash at the main entrance.

E. If necessary, earthwork activities may be limited in specific areas during periods of high wind.

Further, it should be noted that stockpiled material has the potential to create dust nuisance. Dust can also be generated when material is added to or excavated from a stockpile. The following methods, as appropriate, are proposed to control dust from stockpiles.

A. Wet suppression via water trucks.

B. Covered storage in more sensitive locations.

C. Reduced/controlling stockpile height and slopes (reduce wind entrainment).

D. In the extreme event that remedial measures are found to be ineffective for the control of dust, works are to be suspended as a precautionary measure until conditions are suitable for resumption.

6.3 Rehabilitation Phase

Rehabilitation phase management procedures are to be undertaken upon the completion of each stage earthwork activity. The management procedures are:

A. Until such time as vegetation cover is re-established on earthworked areas, these areas shall continue to be monitored for dust generation and control measures implemented as required and in accordance with Section 6.2 above.

7.0 Monitoring and Reporting

7.1 Site inspections

- Routine site inspections shall be undertaken during installation and post installation of ESC devices. There should be a specific focus on ensuring that anti-seep collars, level spreaders and T-bars have been installed and are operating correctly.
- Once rainfall-activated chemical treatment is in effect i.e. after the first rainfall event following construction of the ESC devices, inspections should be carried out to ensure that all ESC devices are performing well and that the chemical treatment is adequate based on the resulting quality discharged water.
- Following this, the inspection programme should consist of weekly site walkovers to inspect all ESC devices and measures, additional inspections prior to rainfall events, and inspections targeted at applying additional ESC measures prior to rainfall trigger events.
- Sediment retention devices (SRPs and DEBs) will be cleaned of sediment once accumulated sediment reaches 20% of the storage volume.
- Monitoring and maintenance of the chemical treatment system will be carried out in accordance with the FMP.
- Regular clarity, temperature, and pH monitoring should also be carried out for outflows from sediment retention devices (at the mixing points with natural water bodies), to confirm that the Mataura 3 receiving quality water standards are being met.
- Data from the continuous monitoring shall be collected at monthly intervals and be made available to council on request.

7.2 Reporting

An internal audit should be conducted weekly. This will identify any maintenance actions required, and where practical, these maintenance actions should be undertaken that day.

Following rainfall trigger events, a report should be produced that summarises how well the SRPs, DEBs and the overall Erosion and Sediment Control (ESC)system have performed during the rainfall event. This should include a summary of the total rainfall and intensity, and results from clarity, temperature and pH monitoring.

If it is identified that the water quality discharge thresholds were exceeded, the extent of this and the actions that were taken to mitigate the effects of this trigger event should be included in the report. If the overall ESC performance has been compromised, then this should also be recorded, along with the mitigation measures that were carried out to address this.

A monthly report should also be compiled that summarises the results of all the inspections and monitoring that was carried out.

7.3 Weather Monitoring and Response Measures

During construction, weather forecasts should be checked daily. If forecasts predict more rainfall or snowfall than a threshold rainfall trigger event, appropriate site works need to be implemented. A rainfall trigger event could be >20mm rainfall forecast over 24 hours.

Pre trigger event procedures may include:

- Inspections of the overall ESC system, with a particular focus on SRPs and DEBs to ensure that these devices are performing adequately to mitigate the negative effects of a trigger rainfall event. Additional ESC measures may also be required during these trigger events.
- Depending on the site-specific circumstances and ESC controls in place, consider limiting or ceasing earthwork activities ahead of trigger events.
- As far as practicable, stabilize disturbed areas. Employ additional short-term measures such as track rolling and install of temporary contour drains.

8.0 Erosion and Sediment Control Emergency Response Plan

There is potential for unforeseen events to occur resulting in urgent action being required. The types of events specific to the earthworks activities for the SWF are identified as follows:

- Natural hazards including floods and seismic events.
- Extreme rainfall and snow events.
- Extreme wind events.
- Operational errors.
- Failure of earthwork and sediment controls.

The potential outcomes of these events include:

- Discharges of sediment to surface water.
- Discharges to air of nuisance dust emissions or contaminants.
- Mud or silt on public roads.

8.1 Discharges of Sediment

The most likely reason for the discharge of sediment into surface water is the failure of DEBs, SRPs, clean water and dirty water diversion drains, or silt fences to operate correctly due to an extreme rainfall or snowfall event or lack of maintenance.

Should this occur, all practical steps to improve the quality of the discharge or to stop the discharge will be undertaken. This may include the following:

- Unblocking floating decant outlet structures from earth bunds and sediment ponds, which may be clogged from debris or snowfall.
- Blocking off the outlet pipe or raising floating decants to stop the discharge.
- Survey and assess the failed structure to determine if it requires repair or needs to be redesigned.
- If water is overtopping the earth bund, use pump truck to reduce the water level and discharge at an appropriate site.
- Increase the size of the decanting earth bunds.
- Implement chemical flocculation systems to inflows of DEBs and SRPs in accordance with the FMP.
- Improve diversion of clean water away from disturbed land.
- As far as practicable, stabilise exposed areas.

Furthermore, when decommissioning the DEBs and SRPs, the quality of any retained water shall be assessed by visual (or other means), prior to releasing downstream. If the quality is not deemed sufficient for release (e.g. water clarity is poor) then water quality shall be improved by means of flocculation, in accordance with the FMP.

Failures of sediment control measures shall be reported to the site's Environmental Officer in the first instance.

8.2 Dust Discharges

In the event of unacceptable levels of dust being discharged into the air beyond the project Site, the first option will be to stop or reduce the discharge. This will be achieved by wetting disturbed areas or covering the source of the dust (stockpiles). Where necessary, traffic movement will be stopped until a road is dampened down.

Once the discharge is stopped or reduced, action will be taken to avoid, mitigate or eliminate the risk or re-occurrence. Such actions may include limiting site traffic speeds or limiting areas of exposed earthworks during periods of high winds.

8.3 Mud and Silt on Roads

Should the tracking of mud and silt become a common occurrence and not adequately dealt with by the provisions of stabilised entrance and wheel wash, then additional controls may need to be implemented at the site entrance. Such controls may include manually washing down construction vehicles prior to exiting on to the public roads.

8.4 Review

Immediately following any event requiring contingency actions to be carried out, the Environmental Officer shall establish the causes of the event and review the effectiveness of the response. Based upon the outcome of the review, the EMP/SSMPs may be updated.

9.0 Other

[Placeholder for:

- Timing of scheduled earthworks and in-stream works activities and the location of the concrete batching facilities within the Project Site
- Timetable for the installation of erosion and sediment control devices and the soil disturbance activities proposed
- Specific measures to contain and manage contaminant runoff and stormwater runoff from the concrete batching plants
- Protocols for the recovery and translocation of any fish, tuna, koura and/or kakahi that may be disturbed by earthworks]

10.0 Limitation

This Earthworks Management Plan has been prepared for Contact Energy Limited (Contact), to inform the Expert Consenting Panel's consideration of Contact's application for approvals under the Fast-track Approvals Act 2024 and any subsequent regulatory processes.

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