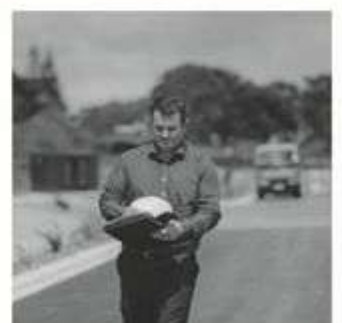


Draft Erosion and Sediment Control Plan

Twizel Solar Project

for Nova Energy



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Reviewed

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09/04/2025

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1 INTRODUCTION

This Erosion and Sediment Control Plan has been prepared for Nova Energy (Nova) to assess, avoid and minimise the adverse effects of erosion and sedimentation associated with the proposed earthworks for the Twizel Solar Plant construction.

This Erosion and Sediment Control Plan provides a summary of a general methodology and controls to be implemented to mitigate the effects of the works on the environment.

The report and associated plans are living documents which are expected to be updated as the project progresses towards construction and more information is gathered.

1.1 Site Description

The project site is located near Twizel, it is on the eastern side of State Highway 8 (SH 8) at the southern end of the Twizel township. The 868 ha site is bordered by SH 8, the Twizel River to the north and the Ōhau River to the south. The project site is shown in Figure 1.1.

Much of the site is flat with a gradual down slope in an east to southeasterly direction. The site is terraced at the northern end where there is a significant drop in elevation of 7 to 10 m across the site, an existing quarry operates above the precipice on the eastern boundary with an existing access track. At various locations along the boundary with the Twizel and Ōhau Rivers there are cliffs that elevate the site well above the riverbeds.

The site is situated in the General Rural Zone in the Mackenzie District Plan. The site is presently used for dry stock grazing farming operations, current surface cover is approximately 85% of grasslands, red clover, and ryecorn.

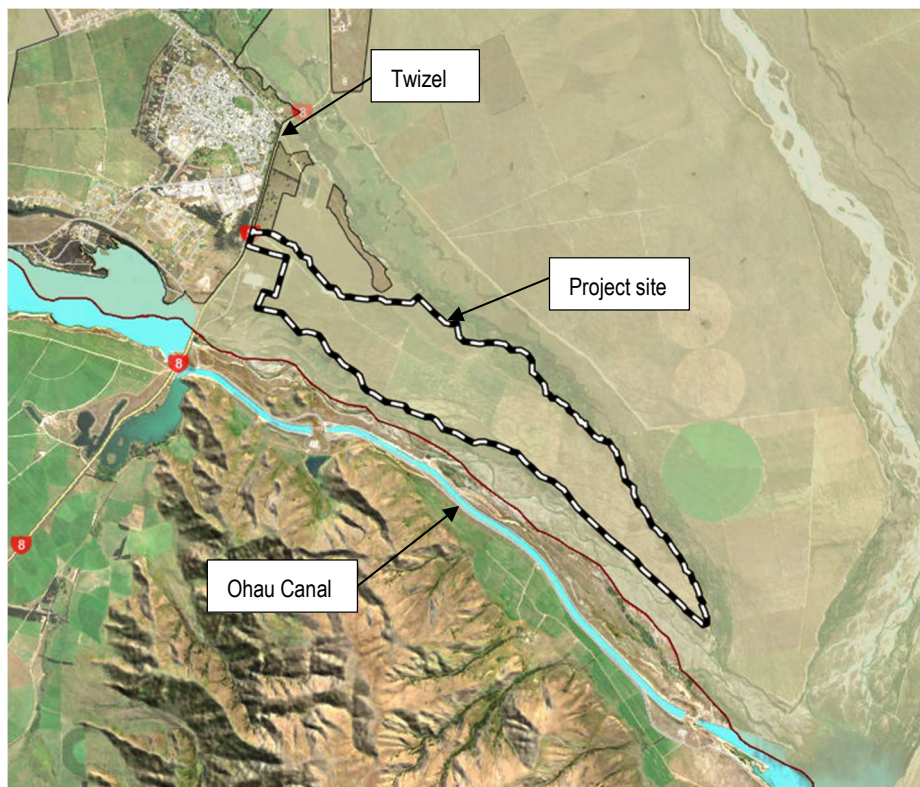


Figure 1.1: Project site location near Twizel

1.2 Proposed Development

The proposed development is for a 300 megawatts (MW) solar plant. The development is planned to be a 3 year construction project including an early enabling works stage. Earthworks associated with solar plant construction can be broken down into key activity areas;

- SH8 Vehicle accessway construction
- Internal access track construction
- Site construction facilities and laydown area
- Cut and fill activity to optimise panel layout capacity
- Trenching for electrical and communications cabling

A concept plan for the proposed development is provided in Figure 1.2 below.

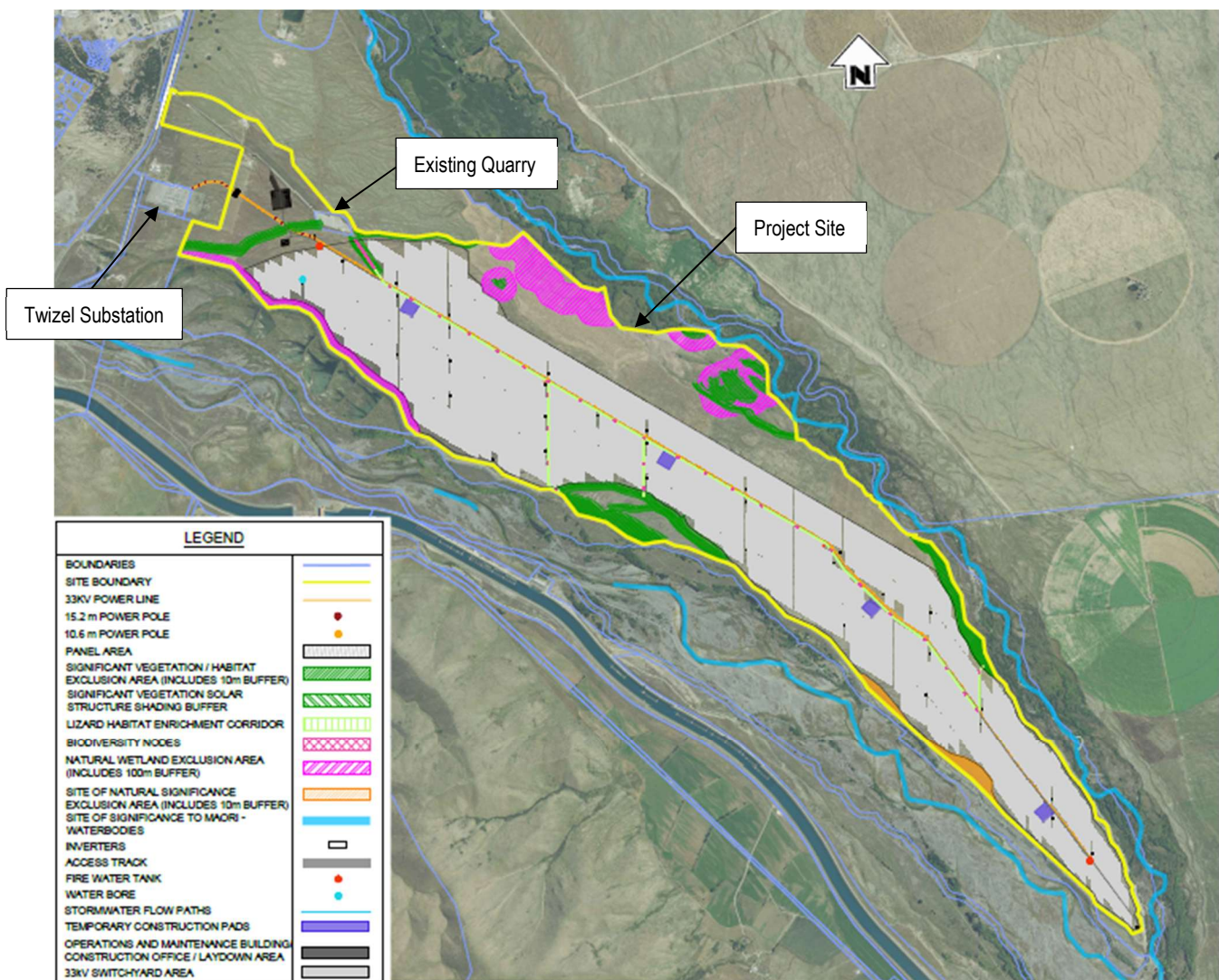


Figure 1.2: Concept plan of the proposed development

1.3 Description of Works

The proposed solar project development generally utilises the natural landform to minimise earthworks and land modifications.

The development does however require some earthworks including the activities summarised below:

- New main vehicle accessway off State Highway 8.
 - Road widening work on the east side of State Highway 8 including vegetation salvage, topsoil stripping, bank trimming, minor cut / fill to design levels, construction of table drains, placement and compaction of imported subbase, base course and pavement surfaces.
 - Road widening and vehicle accessway work on the west side of State Highway 8 including topsoil stripping, minor cut / fill to design grades, construction of table drains, construction of cut off drain, placement and compaction of imported subbase, base course and pavement surfaces.
- Laydown Area.
 - Establishment of an area for storing of plant and equipment, site staff facilities and carparking, including stripping of topsoil to bund or dump area (to be nominated onsite). Cut and fill to design grades, subgrade soil may be adequate for all weather access or improvement layers from locally sourced materials or imported hardfill, where specified as well as construction of erosion and sedimentation controls for this specific area.
- Establish internal access track.
 - Divert the internal track access to the lower plateau thereby bypassing around the existing quarry to separate and maintain their operational access.
 - Internal access track construction, including stripping of topsoil, scraping and clearing of existing track surface, construction of swale drains, minor cut / fill to design grades, placement and compaction of metal or hardfill. Installation of drainage diversions where required.
- Undertake earthworks to create building platforms, smooth gradients for the inverters and solar array panels, switchyard, workshop and operations and maintenance buildings, adjust ephemeral channels to match.
 - Install cut and fill activity sedimentation and erosion controls
 - Site clearance including the stripping of topsoil to allocated stockpile area and wind rows
 - Channel earthworks and other general earthworks
- Staged solar plant installation, including cable trenching and piling, reconfiguration of dry stock farming operations.
 - Stabilisation of disturbed areas.
 - Placement of topsoil, applying grass seed or hydroseed, and maintenance of erosion and sediment control measures.
- Staged dis-establishment of site.

1.4 Erosion and Sediment Control General

The methodology included in this report has been designed in general accordance with the principles that provide best practicable design approach as outlined in the Environment Canterbury Regional Council (ECan) Erosion and Sediment Control toolbox.

- Minimise disturbance
- Complete construction in stages
- Protect slopes and waterways
- Stabilisation of disturbed areas
- Weather consideration
- Install perimeter controls and diversions
- Use sediment controls – mix and match the tools available
- Continually monitor and adjust controls

The aim is to provide a robust, practical and effective erosion and sediment control plan with the intent being to enable the on-site implementation, monitoring and maintenance of controls which will protect the environment. These erosion and sediment controls will require ongoing monitoring and maintenance to ensure the controls installed on-site are providing the appropriate mitigation and protection to the receiving environment.

The following areas are a key focus;

- Wetland/vegetation and exclusion zones.
- Prevention of sedimentation discharge into waterways and exclusion zones.
- Dust management
- Earthworks contoured to maintain existing overland flow paths

1.5 Risk Assessment

A risk matrix has been developed to guide this report and associated plans; to focus mitigation and management efforts to the most sensitive areas and activities with the highest impact, over the site. The key considerations when assessing erosion and sediment risk were:

- Downstream environment significance and sensitivity
- Ability to remediate affected areas
- Scale of works and length of construction programme for each work package
- ECan specific requirements, considerations and guidelines
- Topography of affected area

The Risk Matrix can be found in Appendix B.

2 GEOLOGY AND GEOTECHNICAL CONSIDERATIONS

Published geological information as shown on GNS Geology Maps shows that the site is underlain by two geological units throughout:

- Late Pleistocene outwash deposits of Tekapo formation (stratigraphic age Q2a) comprise of generally unweathered; variable mixtures of gravel/sand/silt/clay forming the extensive terraces or plains.
- Holocene riverbed deposits (stratigraphic age Q1a) comprising of generally unweathered; variable loose gravel/sand/silt in active flood plains.

Client supplied photos (Figure 2.1), contained in a Due Diligence Geotechnical Report by EDC¹ show the Q2a soils in the banks of the quarry confirming the gravelly nature of the soils with areas of frequent cobbles and boulders.



Figure 2.1: Cut banks at site quarry location (Source: EDC Due Diligence Geotechnical Report)

¹ Engineering Design Consultants Ltd. (EDC) 6591 State Highway 8, Twizel, MacKenzie District Due Diligence Geotechnical Report. Reference 50197 – Rev. 0 dated 21 September 2021.

3 CONTAMINATED SOILS MANAGEMENT

BTW has completed a Preliminary Site Investigation (PSI) to assess the potential human health risk from soil contamination of the land for the proposed Twizel Solar Project and associated soil disturbance. If soil contamination exists, this would be a further consideration for the Erosion and Sediment Control Plan.

The following Hazardous Activities and Industries List (HAIL) were assessed during this investigation and were concluded to not being applied for this site for the following reasons:

- HAIL B4 – Power stations, substations or switchyards: The power sub-station area located adjacent to the site is listed on the ECAN's Listed Land Use Register. The activity conducted in the power sub-station is categorised under HAIL B4. It was concluded highly unlikely the power sub-station adjacent to the site would have impacted the site from soil contamination.
- Potential HAIL I – Superphosphate application to land: There were no intensive agricultural activities identified on the site prior to 2015. Some areas of the site were used for dairy farming from 2016, which is after the limit on the use of cadmium was applied by the fertilizer association indicating that any presence of cadmium in the site soils is highly unlikely, and even more unlikely to be a risk considering the possible change of the site to a less sensitive land use.

This investigation concluded there are **No** HAIL activities being undertaken, have been undertaken or more likely than not been undertaken on the site therefore a resource consent under the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NESCS) is not required for the proposed development of a solar farm.

4 PROPOSED EARTHWORKS AND MANAGEMENT

The proposed solar project generally utilises the natural landform to minimise earthworks and land modifications.

Although minor landform modifications are generally proposed, reasonable earthworks quantities are required due to the size and scale of the site. BTW has estimated earthwork quantities required to achieve the works outlined in Section 3. Estimated earthworks quantities are summarised in Table 4.1. The earthworks sites referenced in the table above can be found in the drawing in Appendix A.

Table 4.1: Estimated Earthworks Volumes

Zone	Cut	Fill	Area of Disturbance
Access Track	5700 m ³	8500 m ³	65000 m ²
Construction Office / Laydown Area	2000 m ³	3150 m ³	20700 m ²
O&M Building	250 m ³	600 m ³	1850 m ²
33kV Switchyard	300 m ³	1000 m ³	2000 m ²
E/W Site 1	1300 m ³	1300 m ³	82400 m ²
E/W Site 2	6000 m ³	6000 m ³	
E/W Site 3	20000 m ³	20000 m ³	
Total	35550 m ³	40550 m ³	171950 m ²

Noting that the actual area to be disturbed will likely be less than this depending on the final detailed design. Topsoil stripped is estimated at 100 mm, from geotechnical assessments.

All fill material to create design levels will be sourced from excavated/cut areas within the site. Imported materials, at this stage is expected to be only required if the materials sourced from on-site are deemed unsuitable.

Topsoil will be salvaged and stockpiled on-site for later use, for re-spreading and preparation for re-grassing. Topsoil and grass seed can be used to stabilise finished surfaces that are flatter than 4H:1V. Hydroseeding or other means of stabilisation will be required to stabilise worked slopes that are steeper than 4H:1V.

Unsuitable material encountered shall be stockpiled in allocated areas, as set out in plans, and disposed of within a suitable disposal area on or off site.

4.1 Earthworks Philosophies and Principles

Earthworks have the potential to generate sediment runoff and dust emissions until the site has been stabilised (i.e. through placement of mulch, aggregate or topsoil/grass). Careful planning and design of the proposed earthworks has been undertaken to ensure all potential adverse environmental effects are mitigated. This will be achieved by timing and sequencing of the earthworks activities with the inclusion of specifically designed erosion and sediment control devices.

The general principles that will be adopted during the earthworks activities and incorporated into this Erosion and Sediment Control Plan are as follows:

- Avoid sediment laden/contaminated water reaching the watercourses adjacent to the site
- Minimise earthworks activities as much as possible while satisfying all requirements for establishment of the site.
- Divert all clean water runoff away from exposed earthworks areas with diversion channels to established grassed areas adjacent to site.
- Capture sediment laden runoff from exposed earthworks areas with diversion channels and direct to the sediment retention ponds/decanting earth bunds.
- Implement measures to prevent construction traffic exiting the construction area onto public roads with sediment and other materials attached to the undercarriage and tyres.
- Ensure the exposed earthwork areas remain in damp conditions, utilising water trucks as necessary to minimise dust disturbance until exposed surfaces have been stabilised.
- Regularly assess the erosion and sediment control measures to ensure the controls are operating effectively and make adjustments as the work progresses, if required.
- Regularly inspect the erosion and sediment control measures and undertake any maintenance, if necessary, to maximise the potential retention of sediment on the site.
- Monitor the weather forecast and if heavy rain is forecast, ensure the site has been stabilised as much as practicable.
- Ensure site staff are aware of the requirements of this plan and any relevant Resource Consents, prior to commencing works.

These principles are generally in accordance with the ECan Erosion and Sediment Control Toolbox.

5 CONSTRUCTION METHODOLOGY

The proposed construction methodology has been designed to minimise effects on the environment. This will be achieved by carefully staging works and ensuring that sediment controls are designed appropriately to prevent the discharge of sediment laden runoff from site at these differing stages of work, from current state to design level topography.

Construction methodology and staging of the proposed works will be provided in a Construction Environmental Management Plan to be developed during detailed design and pre-construction in accordance with proposed conditions of consent.

5.1 Construction Staging

Siteworks will commence as soon as possible following resource consent approval, it is anticipated there will be a continuous construction phase that is expected to last up to 2 years. Due to the size of the site and length of construction programme it is expected that winter works are likely, therefore mitigation measures have been designed accordingly.

If the site is to be shutdown, for any reason, the installed sediment controls will be maintained throughout, in order to limit runoff from the site. Exposed surfaces should be kept to a minimum, where required, surfaces will be stabilised through re-vegetation.

The cable trenches will be progressively opened and backfilled with appropriate sand bedding and then fill and topsoil, therefore will not create any discharge beyond the site.

Sediment control measures will be kept in place until all surfaces are stabilised, at which time, they will be disestablished.

5.2 Sequencing of Works

The proposed (general) sequencing of earthworks activities on the site will generally be as follows:

5.2.1 Laydown pad construction

- Diversion of up gradient clean water from site via constructed wind rows, diversion berms or cut off drains.
- Construct the sediment retention pond and other specified control measures. Treated water from the sediment retention ponds will be discharged to ground. Secondary discharge measures would be via an emergency spillway to a safe and controlled down gradient location.
- Stripping of topsoil to wind rows or dump area (to be nominated onsite).
- Cut and fill to design grades and construction of swale drains.
- Placement and compaction of sourced metal or hardfill.

5.2.2 New site vehicle accessway

- Install cut and fill activity erosion and sediment controls.
- Road widening work on the east side of State Highway 8 including topsoil stripping, bank trimming, minor cut / fill to design levels, construction of table drains, placement and compaction of imported subbase, basecourse and pavement of local hardfill where required.

- Road widening and accessway work on the west side of State Highway 8 including topsoil stripping, minor cut / fill to design grades, construction of table drains, construction of cut off drain, placement and compaction of imported subbase, base course and placement of local hardfill where required.
- Sealing of pavement to new road widening areas and access track a minimum distance of 60 m from entrance onto State Highway 8.
- Once sealing of the pavement is completed the works area will be tidied up and made good, then all exposed soil faces will be stabilised via hydroseeding. All installed erosion and sediment controls will remain in place until exposed soil faces are stabilised.

5.2.3 Internal access track

- Install cut and fill activity erosion and sediment controls.
- Diversion of up gradient clean stormwater runoff from site via constructed wind rows, diversion berms or cut off drains.
- Scraping and clearing of existing track surface.
- Construction of swale drains as required.
- Minor cut / fill to design grades.
- Installation of culverts (if required) to channel surface water.
- Placement and compaction of sourced metal or hardfill.
- Overland flow path crossings (upgrades to existing surface treatment only).

5.2.4 Earthworks and site grading

- Diversion of upstream clean stormwater runoff from site via constructed wind rows, diversion berms or cut off drains.
- Construct the sediment retention pond and other specified control measures. Treated water from the sediment retention ponds will be discharged to ground. Secondary discharge measures would be via an emergency spillway to a safe and controlled downstream location.
- Stripping of topsoil to wind rows or dump area (to be nominated onsite).
- Cut and fill to design grades and construction of swale drains.
- Placement and compaction of sourced metal or hardfill.
- Topsoil respread, grass seed and stabilisation of disturbed surfaces.

5.2.5 Solar panel installation

Working parallel with the earthworks will be the installation of the panel pile foundations, framing and the panels themselves.

- Strip topsoil and store at nominated topsoil stockpile.
- Construction of cable trenches, cut to stockpile for backfilling. Import sand fill to design levels.
- Diversion of upstream clean stormwater runoff from site via constructed wind rows or diversion berms.
- Progressive stabilisation of cut and fill, and stockpile areas.

5.2.6 Workshop, Operations and Maintenance Building and Switchyard Pad and Infrastructure Construction

- Diversion of upstream clean water from site via constructed wind rows, diversion berms or cut off drains.
- Stripping of topsoil to wind rows or dump area (to be nominated onsite).
- Cut and fill to design grades and construction of swale drains.
- Placement and compaction of sourced metal or hardfill.

It is likely construction of underground cabling will continue beyond completion of the bulk earthworks. Trenches for the services will be progressively opened and backfilled with sand and then fill.

The phasing of the construction will consider the stabilisation of the ground, to ensure the prevention of erosion in a rainfall event. This stabilisation may include grass seed, hydroseed or supported fabric application, depending on the time of year and slope of the ground. For further description on stabilisation mitigation measures, see Section 6.

6 EROSION AND SEDIMENT CONTROL MEASURES

The management and design of the erosion and sediment control measures have been assessed based on risk, area, and type of earthwork activities. The following outlines the methods to be used to avoid or mitigate the effects of the proposed land disturbing activities. Preliminary designs of the specific erosion and sediment control devices to be used are shown on the Erosion and Sediment Control Plan Drawings provided in Appendix A.

The final location, layout, size and details of the required controls should be developed by a suitably qualified practitioner and approved by regional council prior to commencement of works. Nova is proposing a condition of consent that a final version of this ESCP is submitted to ECan for certification prior to construction works commencing.

6.1 Mitigation Measures

The following erosion and sediment control practices will be used by the Contractor(s) to control sediment laden runoff and to prevent erosion of exposed ground.

The project has also identified setbacks/buffers of undisturbed land from sensitive areas including wetlands and rivers, which will provide for a further level of protection from erosion and sediment effects.

The combination of setbacks/buffers and the proposed control measures will ensure that sediment laden water discharge does not enter watercourses adjacent to the site.

These practices follow the ECan Erosion and Sediment Control Toolbox. Details and locations of the required controls are provided on the Erosion and Sediment Control Plan Drawings included in Appendix A.

6.1.1 Silt fences

Silt fences are required on small works close to waterways, that have minimal catchments and therefore do not require other more comprehensive mitigation solutions. An example of this is isolated stockpiles.

The silt fences will be prepared in accordance with the ECan Erosion and Sediment Control toolbox.

6.1.2 Diversion channels

Diversion drains are required to collect and convey surface runoff. Diversion drains are used both for the collection and conveyance of dirty and clean runoff. Dirty water diversion channels will be used to intercept sediment laden runoff and divert into the sediment retention ponds or appropriately stabilised areas, away from waterways. A clean water diversion channel will be used to intercept clean water and divert into existing stabilised vegetated ground. The desired intent is to keep the dirty and clean water separate to reduce the volume of surface runoff requiring treatment.

The diversion channels shall be constructed as trapezoidal or parabolic ditches with internal side slopes of no steeper than 3H:1V and external side slopes of no steeper than 2H:1V. If the longitudinal gradient exceeds 2% the ditch shall be armoured with geotextile and / or rock sufficient to prevent any erosion of the channel.

A 'wind row' can be constructed to collect dirty water on one side and clean water on the other side, where applicable. Figure 6.1 and Figure 6.2 below show cross sectional details of the diversion channels.

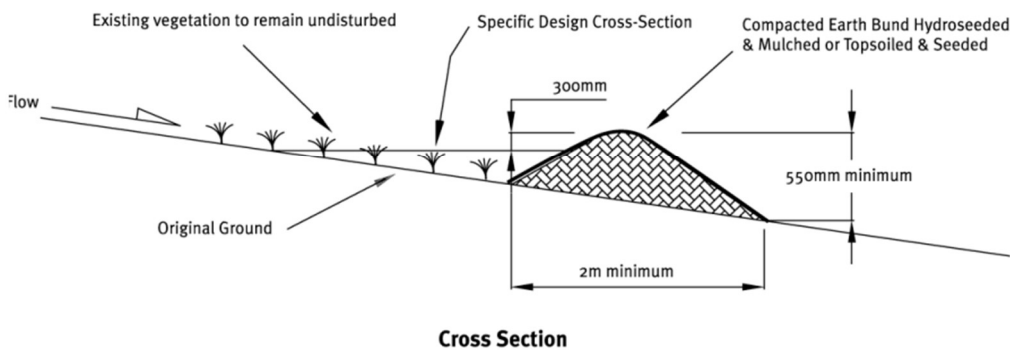


Figure 6.1: Clean water diversion channel (Source ECan)

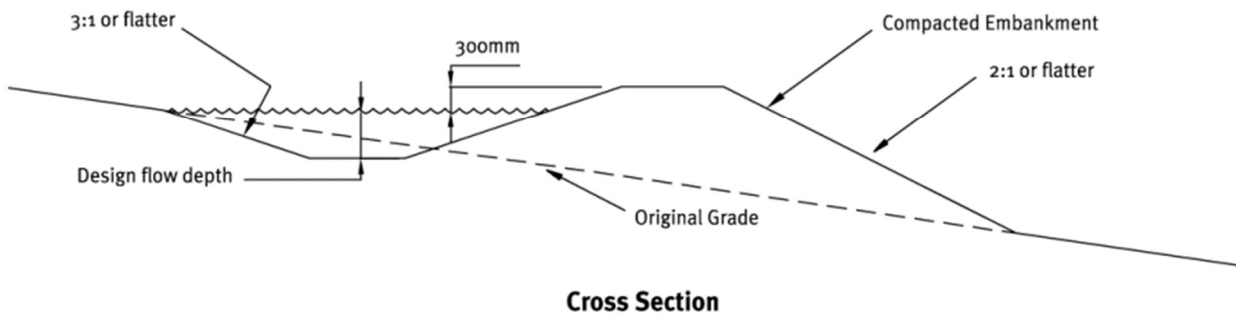


Figure 6.2: Dirty Water Diversion Channel (Source ECan)

6.1.3 Setbacks

Setbacks of 100 m for natural wetlands and 20 m for rivers/streams and all site boundaries are proposed which will be secured by way of consent conditions. These will be observed across the entire site.

6.1.4 Stabilisation of disturbed ground

Progressive Stabilisation

The total area of disturbed land should be minimised in order to minimise exposed ground and reduce the amount of sediment laden runoff requiring treatment. Following completion of works within an area, exposed surfaces should be stabilised.

This approach will be utilised in work areas with larger surface areas, such as identified earthworks areas, with gradual opening and stabilisation of the area as work progresses.

Topsoil and Grass Seeding

The surface of the cut area will be progressively stabilised by the placement of salvaged topsoil and application of grass seed.

The topsoil will provide a suitable soil medium for vegetative growth for erosion control while providing some short-term erosion control capability by protecting subsoils and absorbing water. The grass seed will stabilise the soil on disturbed areas and reduce the sediment and runoff to downstream areas.

Grass seed mix and application to be determined from site soil analysis as per the guidelines.

Hydroseeding

Hydroseeding should be used to stabilise any cut or fill slopes that are steeper than 4H:1V, or for faster stabilisation in winter conditions.

6.1.5 Sediment retention ponds

Estimated/conceptual locations of Sediment Retention Ponds (SRP's) can be seen on the Erosion and Sediment Control Plans in Appendix A. The exact locations will be confirmed at detailed design stage when the extents of the required earthworks and catchments are known.

The sediment retention ponds will allow the sediment to settle out from the sediment laden runoff. For each sedimentation pond, the clean treated water will be discharged via decants to grassed areas. Sediment will build up at the base of the pond and need to be cleaned out before the volume of accumulated sediment reaches 20% of the total sediment retention pond volume. The sediment should be cleaned out with a high-capacity sludge pump or excavator and deposited at on-site locations that avoids discharge into the receiving environment, as specified by the Engineer at the time of disposal.

An emergency spillway will direct overflow from the 100-year ARI rainfall storm event to areas of undisturbed paddocks.

The maximum depth of the pond from the base to primary spillway is 2.0 m. Total pond storage volume shall be determined based on the slope above the SRP and contributing catchment and its length. For earthworks on slopes < 18%, and length < 200 m, the minimum volume of the SRP shall be 2% of the contributing catchment. For earthworks on slopes > 18%, or length > 200 m, the minimum volume of the SRP shall be 3% of the contributing catchment.

6.1.6 Energy dissipation

Energy dissipation mitigations such as rock lining and/or check dams will be considered and utilised for ephemeral channels work. These structures will provide grade control, in case of a flood event, to protect channel(s) against erosion whilst works is being carried out.

6.1.7 Dust management

A benefit of a site of this scale, is the relative impact on the neighbours of some of the larger construction activities, as they are located at significant distances from boundaries, these include the laydown area and internal access track. This is predicted to have the added benefit of reduced dust nuisance to neighbouring properties.

Managing dust will avoid its impact on indigenous vegetation, invertebrates and lizards on the site.

Dust management will be achieved on site through multiple management measures, including minimising disturbance areas, internal roading specifications, construction management (slow speed on surfaces), as well as the use of water trucks for wetting down surface subject to construction traffic/activity.

The main internal access track will be established earlier in the project, to move equipment to site and link main traffic flows such as from the laydown area to the various construction stages. Arterial service roads and access across the site to install panels and for use during solar farm operation, is on unformed 'tracks' with smaller vehicles and lower usage predicted.

The hardfill access track specification and its construction shall aim to reduce dust emissions. Speed limits should be implemented and enforced on internal tracks to reduce dust creation. The speed limits should be based on dust levels caused by vehicles moving at different speeds.

Water trucks will be utilised by the contractor(s) during drier summer months, when dust generation is predicted. This is not anticipated to occur every day but will be particularly relevant during the drier months of November through to March. Avoid working during particularly dry weather if the dust management using other methods.

ECan's erosion and sediment control toolbox for dust control recommends that the minimum amount of water that should be available on site is 5 litres/m²/day. Due to the scale of the site higher usage may require the importing of water from an external source. Wetting agents applied to exposed surfaces will improve efficiencies and decrease the amount of water that may be required. Any chemical additive will need to be approved as being non-harmful to the environment.

Rapid stabilisation of worked areas will be completed to prevent erosion but additionally it will also reduce dust generation and need for suppression measures.

6.1.8 Stockpile and disposal site

The on-site stockpiles/disposal sites will require measures to minimise erosion and sediment generation. The stockpile sites should be covered with topsoil and grass seeded or hydroseeded immediately following completion of earthworks for that area. Dust generation may be an issue if the works are completed over the dry summer months and provisions to temporarily cover the disposal area with an erosion control blanket, soil binding agents, or regular watering of the fill surface may be required. Project setbacks from waterbodies apply to all construction works, including earthworks.

6.1.9 Dewatering

It is anticipated that dewatering will generally not be required due to the depth to groundwater table. Should dewatering be required during construction for the excavation of trenches and deeper cut areas, all discharge should be discharged through the sites treatment controls to ensure all water leaving working areas is appropriately treated before being discharged into the receiving environment.

6.1.10 Hazardous Materials – Refuelling

The handling and control of hazardous materials that may be harmful to the environment shall be strictly controlled. All refuelling activities of vehicles or machinery shall take place in bunded areas with the appropriate contingency plans in place to contain a spillage.

6.2 Monitoring and Maintenance

As part of the earthworks contract, the Contractor will be responsible for providing appropriate erosion and sediment control measures in accordance with Resource Consent conditions and the certified Erosion and Sediment Control Plan, to protect downstream environments from sedimentation and water quality degradation.

The Contractor completing the works will be responsible for carrying out the monitoring and maintenance of these erosion and sediment control measures, throughout construction to ensure they are operating effectively. This includes:

- Daily weather forecast monitoring and reporting
- Inspection of all controls as follows:
 - Weekly – during dry weather
 - Daily – during wet weather
 - Immediately prior to and following forecasted significant wet weather or wind events.

A record is to be maintained of the date and time of inspections and any works either undertaken or required by the Contractor. This shall be made available to the Engineer and/or ECan upon request.

During construction, inspections shall be completed by a suitably qualified Engineer on a fortnightly basis and following any large rainfall event (greater than 20 mm) or daily during periods of prolonged rainfall.

Inspections should include inspection for scour and signs of possible breach of devices, such as diversion channels. Signs of failure should be repaired immediately. Water quality should be tested up gradient and down gradient of treatment devices and down gradient of point of discharge in line with any conditions of consent that may be imposed. Accumulated sediment should be removed from channels and ponds to ensure the design capacity of the device is maintained. Devices should be maintained until the construction areas are secure and stabilised.

Dust management will be assessed daily, with mitigation measures available on site and with short notice. Assessment will include weather updates and review of wind direction, as well as management of cut depths and exposed surface areas, taking into account the soil profile in the particular area and the sites vicinity to neighbours.

Should there be a major failure or poor performance of any control, contingency measures are to be implemented. These may include:

- Increased storage volume.
- Installation of additional control measures within the catchment.
- Review of the Construction Environmental Management Plan.
- Immediate stabilisation of areas with hay mulch.

Implementation of these measures is to be determined by the Contractor on a case-by-case basis.

6.3 Decommissioning of Controls

All structures proposed in this report, and the supporting plans, are temporary and therefore will be decommissioned at the end of the construction programme and/or when catchment areas are suitably stabilised. In order to prevent adverse effects associated with the removal of these structures, the following methods will be adopted:

- Remaining water in sediment retention ponds and other control areas/devices, to be pumped to an area that is flat with well-established vegetation at a minimum of 20 m from rivers/stream and a minimum of 100 m from natural wetlands on site.

- Sediment build-up from control features such as sediment retention ponds, decanting earth bunds, diversion channels and silt fences, to be dug out and correctly disposed of as uncontrolled fill on-site, prior to refilling the areas.
- Control features, once the above has occurred, to be decommissioned as follows
 - Diversion channels to be filled and contoured to match surrounding areas and ensure sheet flow is maintained. Areas to be re-grassed, with grass strike and weeds to be monitored.
 - Ponds and bunds to be filled with clean fill from site, re-contoured to match finished levels and re-grassed. Grass strike and weeds to be monitored.
 - All additional control materials to be packed up and removed from site, including silt fences, decanting units, geotextile mats and hardfill.

7 CONCLUSION

This Erosion and Sediment Control Plan provides a methodology that aims to avoid and minimise the production of contaminants and put measures in place to capture and mitigate any effects on the environment. Preliminary engineering plans outlining the preliminary earthworks areas and required controls are included in Appendix A.

A disciplined construction methodology shall be adopted to control sediment generation through scheduling and staging of works for appropriate weather windows, limiting disturbed areas and prioritising stabilisation of disturbed surfaces.

A range of controls should be implemented to collect and capture runoff from disturbed land. The operation of these controls should be regularly inspected and monitored to ensure appropriate mitigation and management is being provided to protect the downstream environment.

It is recommended that this document is updated as detailed design progresses and more information is gathered about the site specifics and construction programme. Final plans detailing the proposed earthworks and specifying the required controls should be prepared with detailed design, with an updated Erosion and Sediment Control Plan submitted to ECan for certification prior to construction works commencing.

The following management plans will be developed to support this Erosion and Sediment Control Plan:

- Construction Environmental Management Plan
- Construction Traffic Management Plan

APPENDIX A EROSION AND SEDIMENT CONTROL PLAN DRAWINGS

LEGEND

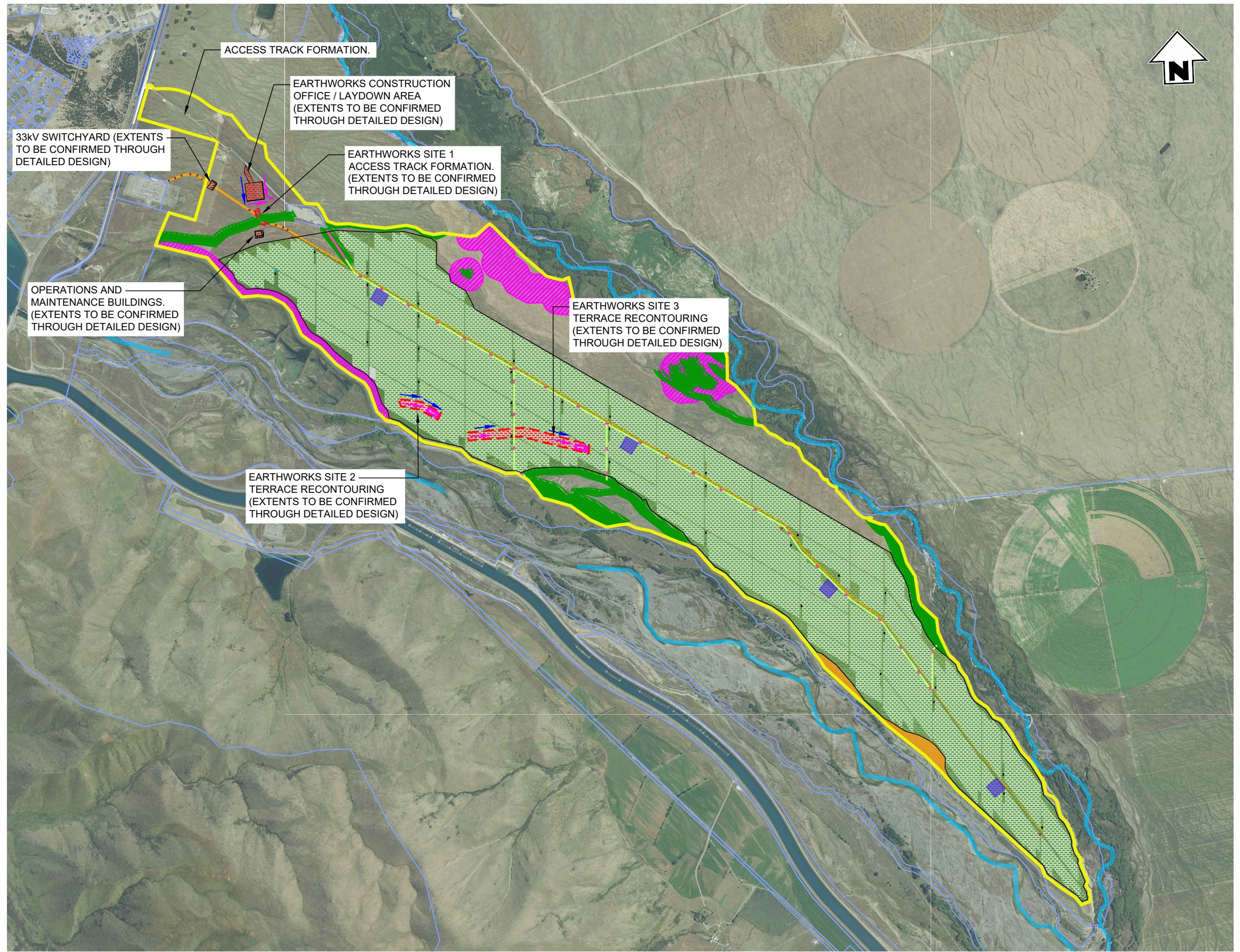
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SITE BOUNDARY	
33KV POWER LINE	
15.2 m POWER POLE	
10.6 m POWER POLE	
PANEL AREA	
SIGNIFICANT VEGETATION / HABITAT EXCLUSION AREA (INCLUDES 10m BUFFER)	
SIGNIFICANT VEGETATION SOLAR STRUCTURE SHADING BUFFER	
LIZARD HABITAT ENRICHMENT CORRIDOR	
BIODIVERSITY NODES	
NATURAL WETLAND EXCLUSION AREA (INCLUDES 100m BUFFER)	
SITE OF NATURAL SIGNIFICANCE EXCLUSION AREA (INCLUDES 10m BUFFER)	
SITE OF SIGNIFICANCE TO MAORI - WATERBODIES	
INVERTERS	
ACCESS TRACK	
FIRE WATER TANK	
WATER BORE	
STORMWATER FLOW PATHS	
TEMPORARY CONSTRUCTION PADS	
AREA OF MODERATE EARTHWORKS	
AREA OF MINOR / NIL EARTHWORKS	

LEGEND - EROSION SEDIMENT CONTROL

CLEAN WATER DIVERSION	
DIRTY WATER DIVERSION	
POND / DECANTING EARTH BUND	
EROSION SEDIMENT CONTROL AREAS	
SILT FENCE	

GENERAL NOTES

1. DRAWINGS TO BE READ IN CONJUNCTION WITH THE EROSION AND SEDIMENT CONTROL PLAN REPORT.
2. ALL EROSION AND SEDIMENT CONTROLS TO BE IN ACCORDANCE WITH ENVIRONMENTAL CANTERBURY REGIONAL COUNCIL EROSION AND SEDIMENT CONTROLS TOOLBOX.
3. ALL EXPOSED (CUT AND FILL) SLOPES AND EARTH BUNDS TO BE STABILISED UPON COMPLETION OF WORKS.
4. APPROPRIATE LOCAL AND REGIONAL COUNCIL CONSENTS ARE TO BE APPROVED PRIOR TO COMMENCEMENT OF WORKS UNLESS AGREED OTHERWISE WITH PROJECT ENGINEER.



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PLAN
SCALE 1:30000

Disclaimer:
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NO	DATE	BY	CHKD	APPR	OPER	DESCRIPTION	NUMBER	TITLE
WD1	19.02.26	GH	SH			ISSUED FOR CONSENT		
REVISIONS								
REFERENCE DRAWINGS								

GENERAL NOTES
1. Coordinates in terms of : New Zealand Transverse Mercator Projection
2. Elevations in terms of : NA
3. Contour interval is : NA

LOCATION	TWIZEL
PROJECT No	210982
A3 SCALE	1:30000
SURVEYED	-
DRAWN	J.STEPHENSON
CHECKED	-

TITLE		NOVA ENERGY LTD	
		SOLAR FARM - LOT 3 DP 422901	
		PRELIMINARY EROSION SEDIMENT CONTROL PLAN	
ORIGINAL SIZE	DRAWING No	SHEET	REVISION
A3	210982-02	ES1	WD

LEGEND

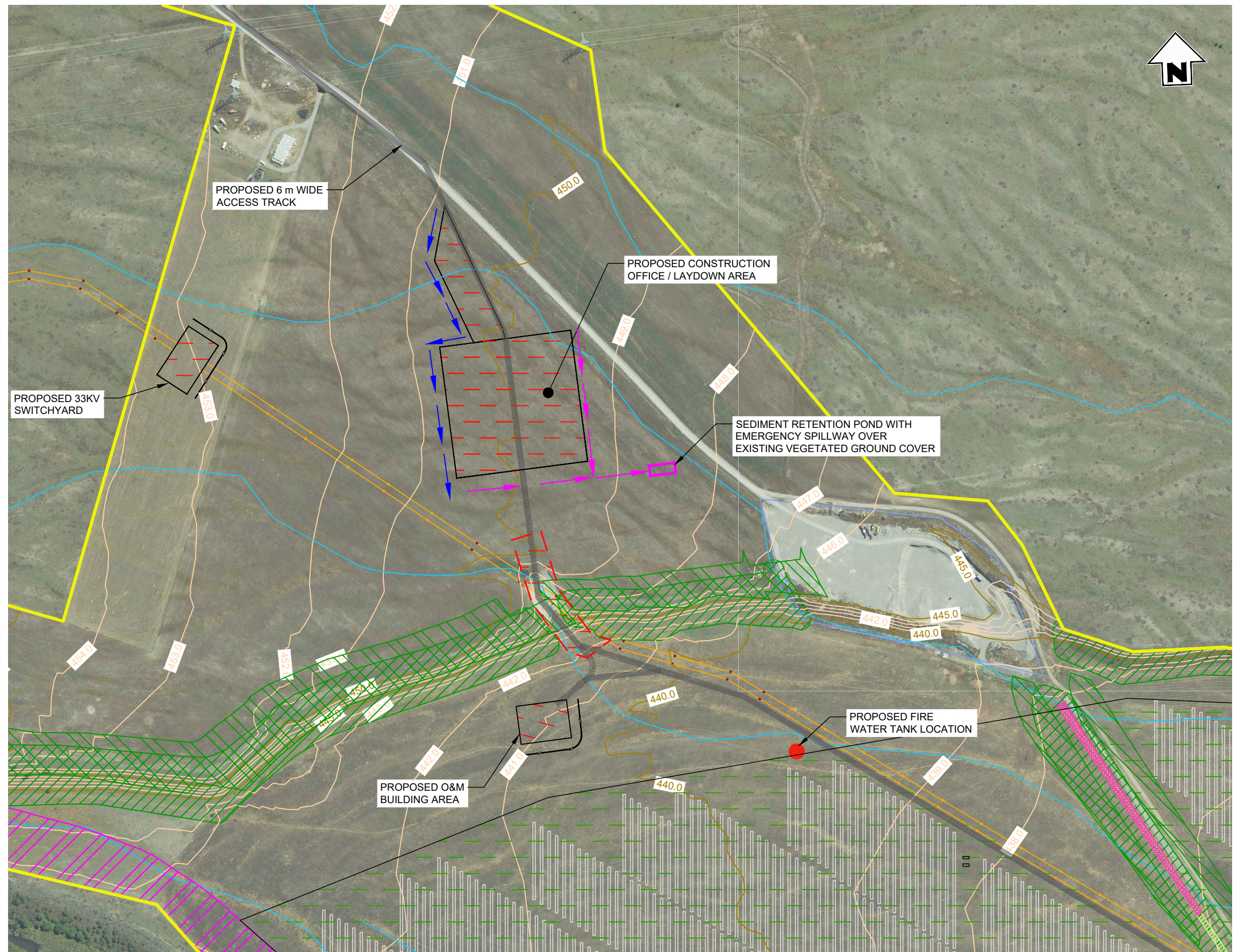
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SITE BOUNDARY	
33KV POWER LINE	
15.2 m POWER POLE	
10.6 m POWER POLE	
PANEL AREA	
SIGNIFICANT VEGETATION / HABITAT EXCLUSION AREA (INCLUDES 10m BUFFER)	
SIGNIFICANT VEGETATION SOLAR STRUCTURE SHADING BUFFER	
LIZARD HABITAT ENRICHMENT CORRIDOR	
BIODIVERSITY NODES	
NATURAL WETLAND EXCLUSION AREA (INCLUDES 100m BUFFER)	
SITE OF NATURAL SIGNIFICANCE EXCLUSION AREA (INCLUDES 10m BUFFER)	
INVERTERS	
ACCESS TRACK	
FIRE WATER TANK	
WATER BORE	
STORMWATER FLOW PATHS	
TEMPORARY CONSTRUCTION PADS	
AREA OF MODERATE EARTHWORKS	
AREA OF MINOR / NIL EARTHWORKS	

LEGEND - EROSION SEDIMENT CONTROL

CLEAN WATER DIVERSION	
DIRTY WATER DIVERSION	
SEDIMENT RETENTION POND	
EROSION SEDIMENT CONTROL AREAS	
SILT FENCE	

GENERAL NOTES

- DRAWINGS TO BE READ IN CONJUNCTION WITH THE EROSION AND SEDIMENT CONTROL PLAN REPORT.
- ALL EROSION AND SEDIMENT CONTROLS TO BE IN ACCORDANCE WITH ENVIRONMENTAL CANTERBURY REGIONAL COUNCIL EROSION AND SEDIMENT CONTROLS TOOLBOX.
- ALL EXPOSED (CUT AND FILL) SLOPES AND EARTH BUNDS TO BE STABILISED UPON COMPLETION OF WORKS.
- APPROPRIATE LOCAL AND REGIONAL COUNCIL CONSENTS ARE TO BE APPROVED PRIOR TO COMMENCEMENT OF WORKS UNLESS AGREED OTHERWISE WITH PROJECT ENGINEER.



PLAN
SCALE 1:4000

ISSUED FOR CONSENT

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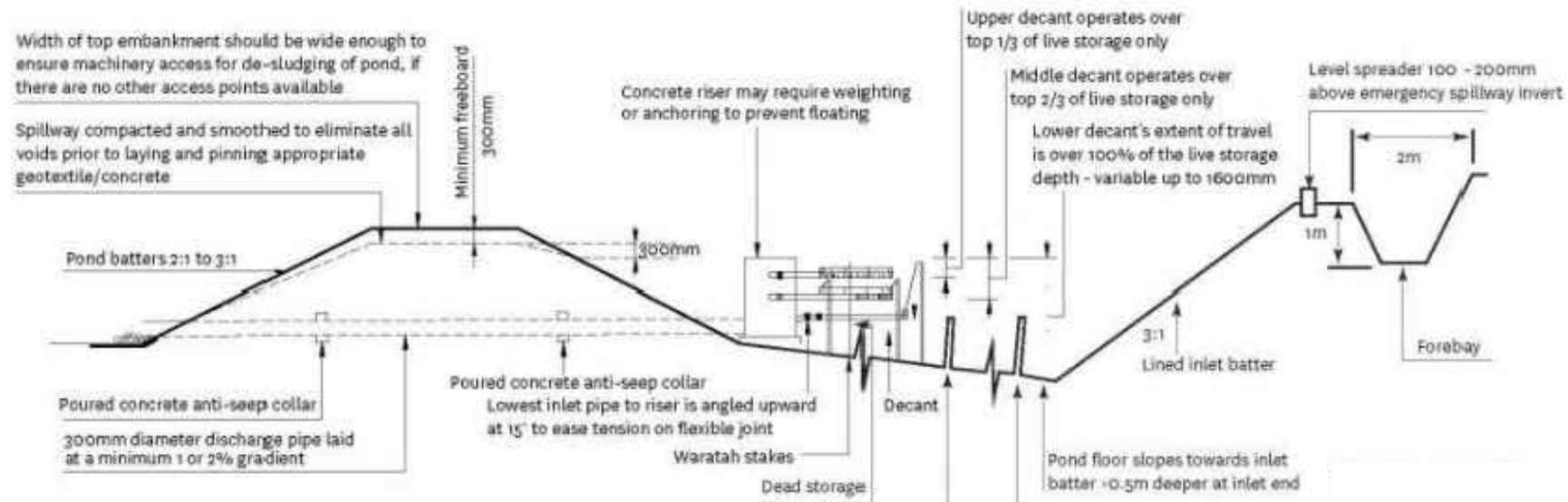
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REVISIONS								
REFERENCE DRAWINGS								

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2. Elevations in terms of : NZ Vertical Datum 2016
3. Contour interval is : 1m

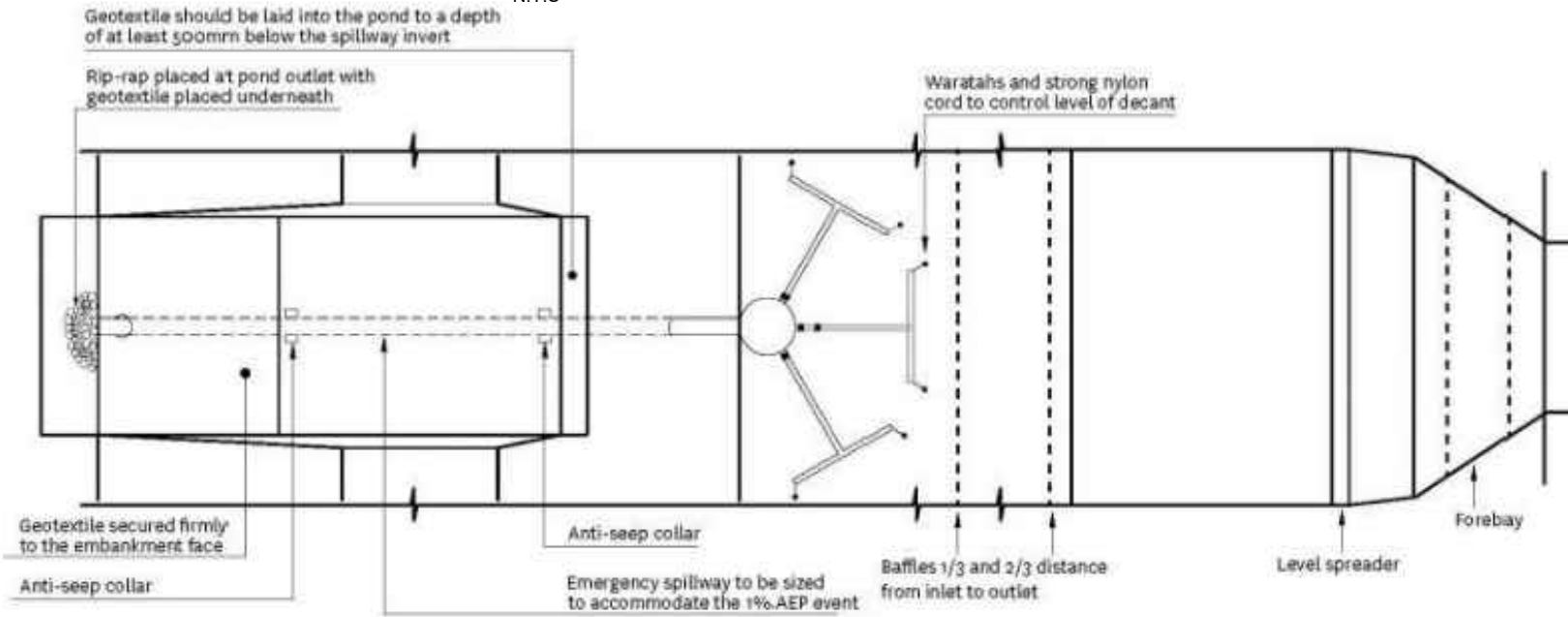
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PROJECT No	210982
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DRAWN	J.STEPHENSON
CHECKED	-

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		SOLAR FARM - LOT 3 DP 422901	
		PRELIMINARY ESCP - O&M / CONSTRUCTION LAYDOWN	
ORIGINAL SIZE	DRAWING No	SHEET	REVISION
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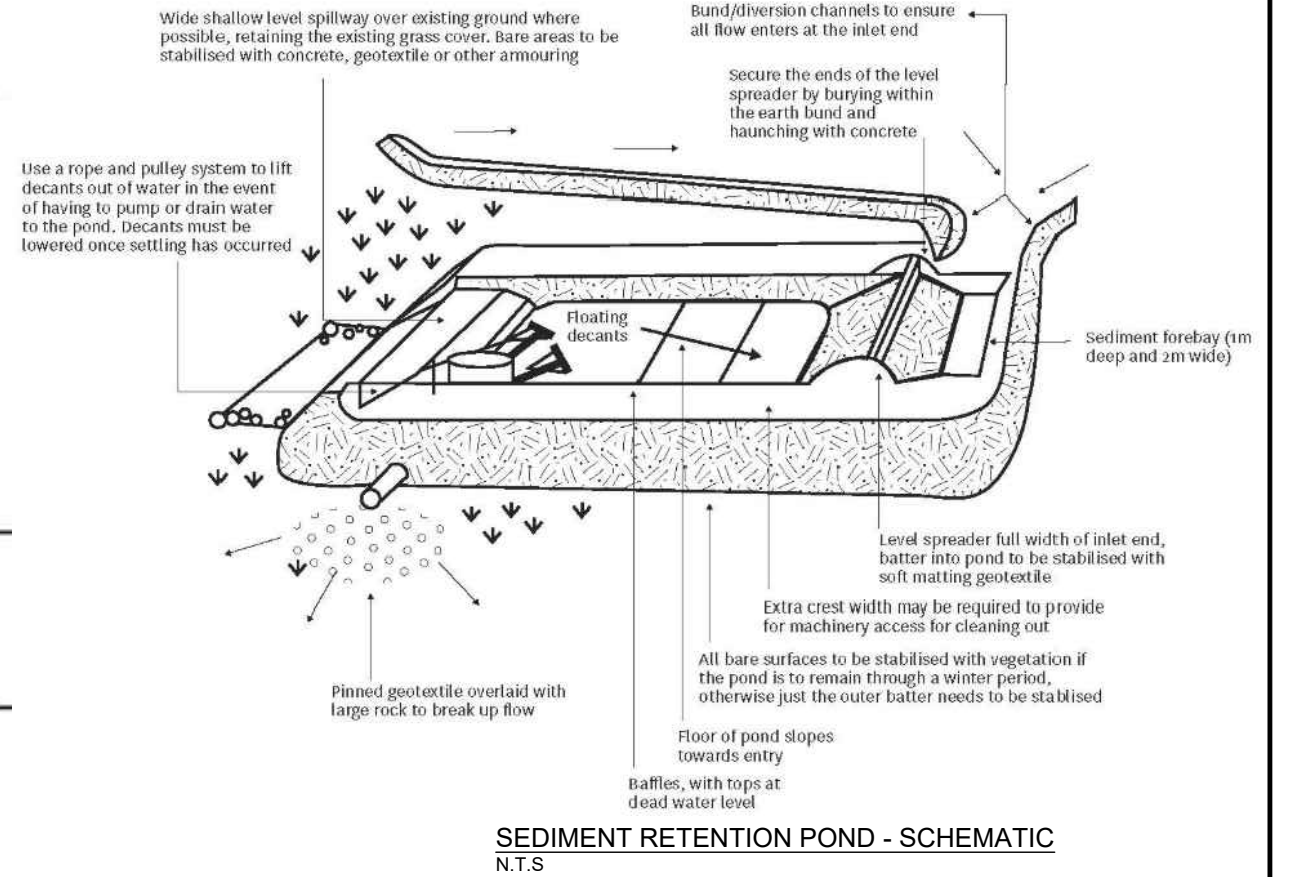
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SEDIMENT RETENTION POND 3 TO 5 HA - SECTION
N.T.S



SEDIMENT RETENTION POND 3 TO 5 HA - PLAN
N.T.S



SEDIMENT RETENTION POND - SCHEMATIC
N.T.S

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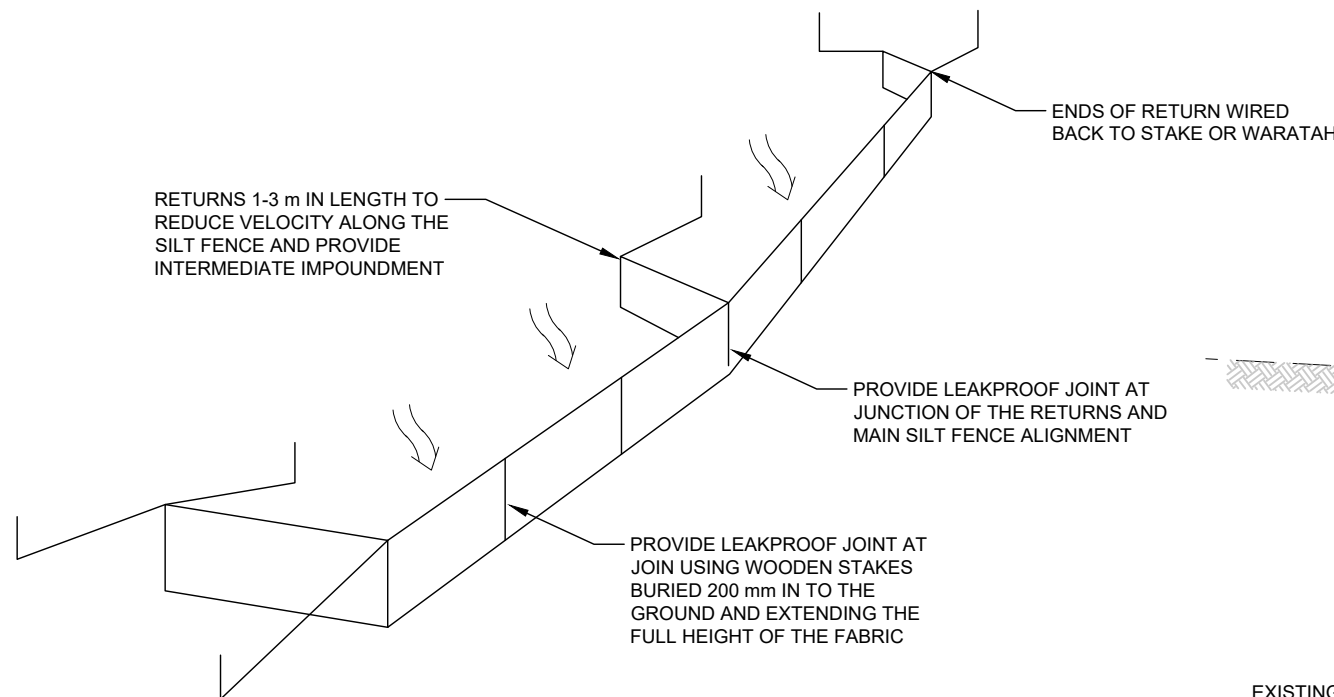
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REFERENCE DRAWINGS								

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2. Elevations in terms of : NA
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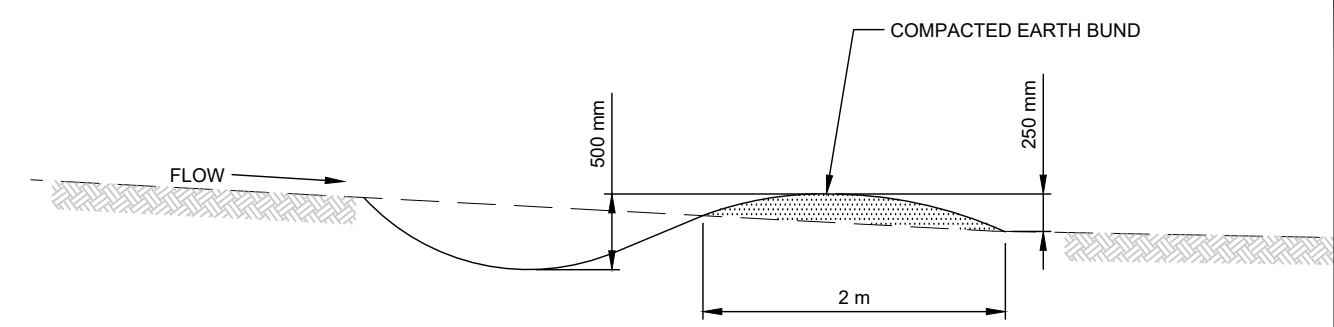
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SURVEYED	-
DRAWN	J.STEPHENSON
CHECKED	-

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		SOLAR FARM - LOT 3 DP 422901	
		ESCP - TYPICAL POND DETAILS FOR 5 HA CATCHMENT	
ORIGINAL SIZE	DRAWING No	SHEET	REVISION
A3	210982-02	ES3	WD

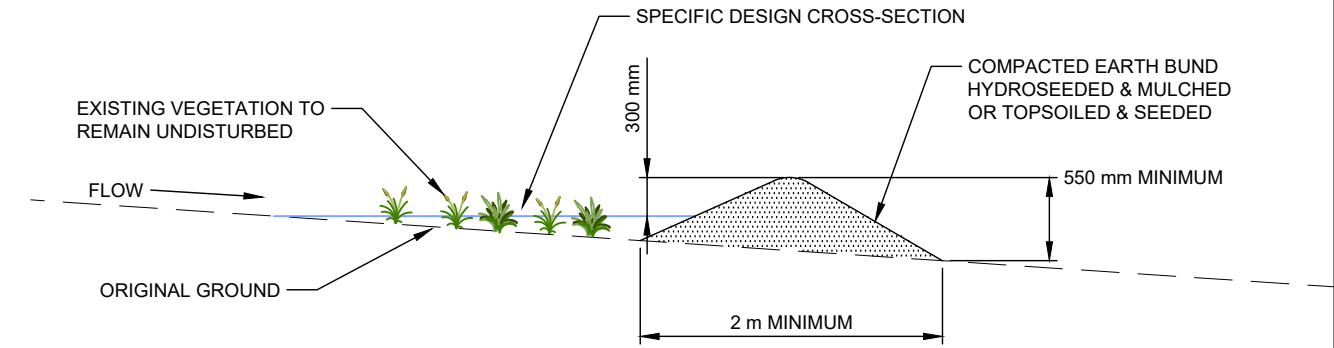
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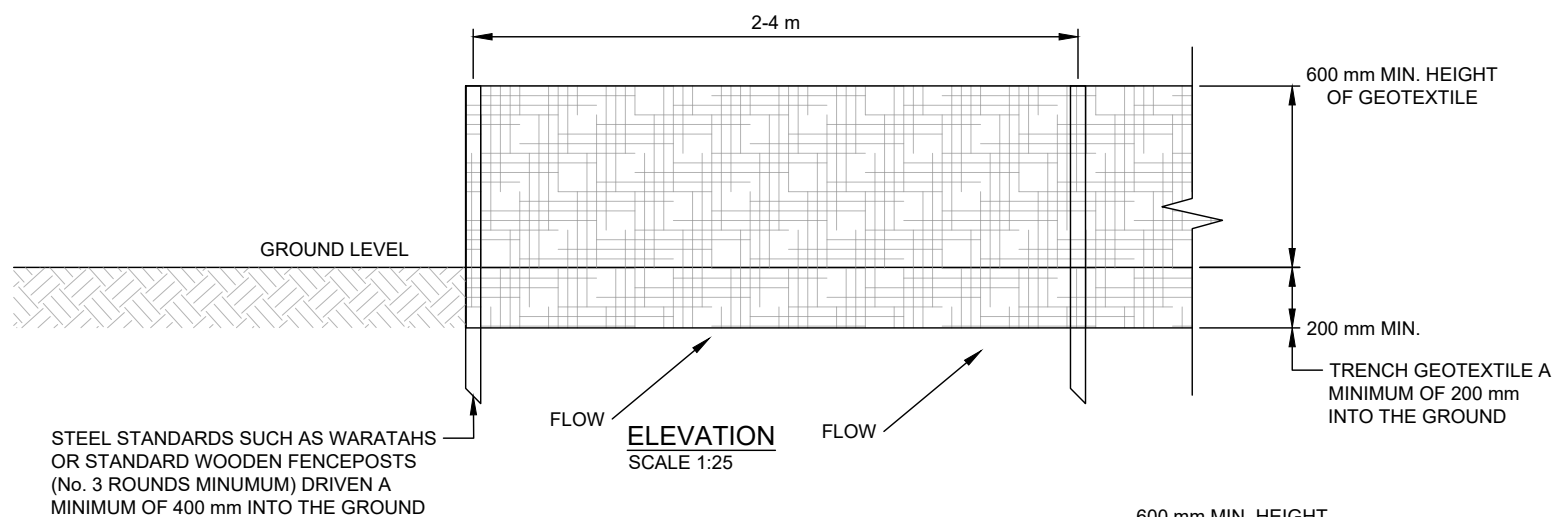
SILT FENCE WITH RETURNS AND SUPPORT WIRE
N.T.S



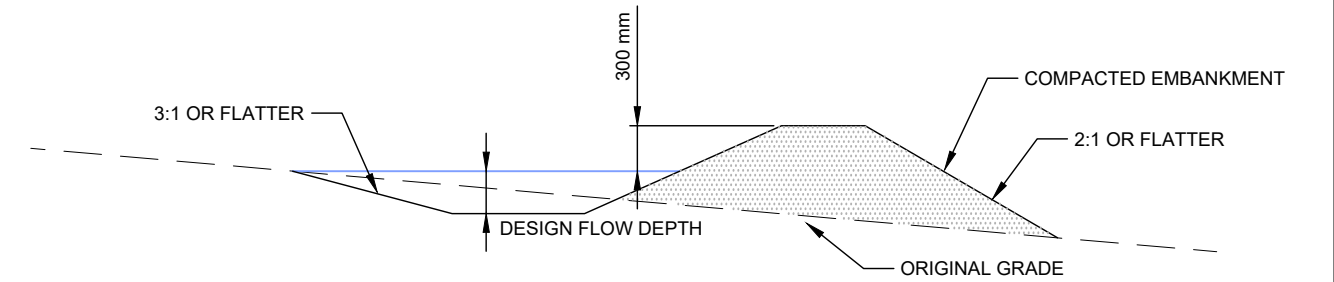
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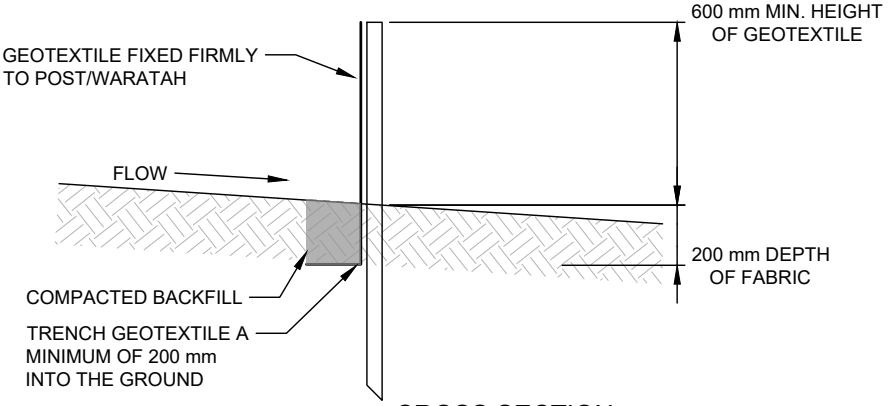
CLEAN WATER DIVERSION - TYPICAL SECTION
SCALE 1:50



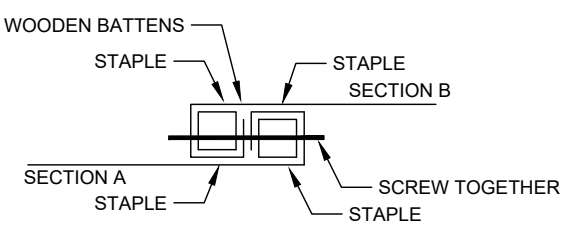
ELEVATION
SCALE 1:25



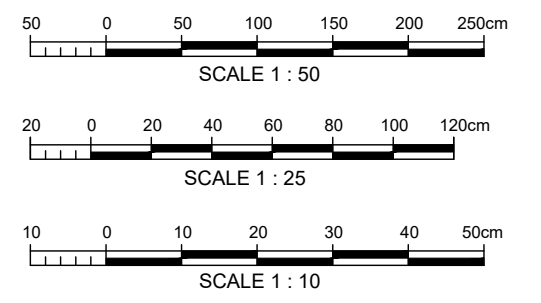
DIRTY WATER DIVERSION - TYPICAL SECTION
SCALE 1:50



CROSS SECTION
SCALE 1:25



STANDARD FABRIC JOINT
SCALE 1:10



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NO	DATE	BY	CHKD	APPR	OPER	DESCRIPTION	NUMBER	TITLE
1	19.02.26	GH	SH			ISSUED FOR CONSENT		
REVISIONS								
REFERENCE DRAWINGS								

GENERAL NOTES
1. Coordinates in terms of : NA
2. Elevations in terms of : NA
3. Contour interval is : NA

LOCATION	TWIZEL
PROJECT No	210982
A3 SCALE	AS SHOWN
SURVEYED	-
DRAWN	J.STEPHENSON 09/2024
CHECKED	-

TITLE		NOVA ENERGY LTD	
		SOLAR FARM - LOT 3 DP 422901	
		ESCP - TYPICAL SILT FENCE AND DIVERSION CHANNEL	
ORIGINAL SIZE	DRAWING No	SHEET	REVISION
A3	210982-02	ES4	WD

APPENDIX B RISK ASSESSMENT MATRIX

TWIZEL SOLAR FARM

RISK MATRIX: EROSION AND SEDIMENT CONTROL

Key Considerations:

- * Downstream environment significance and sensitivity
- * Ability to remediate effected areas
- * Scale of works and length of construction programme for each item
- * Environment Canterbury (Ecan) ESC specific requirements/considerations/guidelines
- * Topography of effected area

Main Civil Works	Programme	Hazard	Risk Assessment				Management/Mitigation Measures
	Phase		ESC Risk	Probability	Consequence	Effect	
1 New site entranceway to SH8	Enabling Works	1.1 Tracking of materials outside of site, onto SH8	Uncontained and untreated sedimentation discharge external to site	Medium	Low	Minor	ESC Plan management, Traffic Impact Assessment considerations and engagement with NZTA, reduced traffic leaving site once established.
		1.2 High vehicle traffic area	Dust	Medium	Low	Minor	Dust management plan, roading specifications to match high use area's
2 Internal Roothing network	Enabling Works and Construction	2.1 High vehicle traffic area	Dust	High	Medium	Significant	Dust management plan, roading specifications to match high use area's
		2.2 Widespread area of works, including works near waterways	Sedimentation discharge to waterways and other sensitive environments	Low	High	Minor	Setbacks set and permitting in place
		2.3 Use of unsealed / gravel as roading surface	Dust	Medium	Low	Minor	Dust management plan, roading specifications to match high use area's
3 Laydown Area	Enabling Works and Construction	3.1 Working in close proximity to stream environment	Sediment discharge to waterways	Medium	Medium	Minor	Setbacks set and permitting in place, ESC Plan including runoff treatment
		3.2 Large, busy, open area	Dust	Low	Low	Minor	Dust management plan, roading specifications to match high use area's
		3.3 Long construction programme	Increased amount of sedimentation, winter works	Medium	Medium	Minor	Mitigations designed for winter works in accordance with ECan ESC guidelines
4 Borrow (quarry) site use	Construction	4.1 Large open unstabilised area	Sloping area - channelised flow, slope failure, dust, erosion, sedimentation discharge	Medium	Medium	Minor	Construction Management plan, sequencing of works, ESC Plan management including sedimentation treatment and clean water diversion
		4.2 Highly erodible soils	Sloping area, dust, erosion, sedimentation discharge	High	Medium	Significant	ESC Plan that takes into account geology of soils, dust management plan
		4.3 Long construction programme	Increased amount of sedimentation, winter works	Medium	Medium	Minor	Regular review and update of mitigation and management measures, winter works consent and design considerations, maintained permanent sedimentation structures
		4.4 High vehicle traffic area	Dust, sedimentation tracked outside of construction area	Medium	Low	Minor	Vehicle management plan, construction management plan, turning areas and dedicated entrance, appropriately specified roading finish to reduce dust
5 Stream crossings and wetland areas	Construction	5.1 Working in and around identified sensitive environments	Sediment discharge to waterways, damage of stream environment, displacement of species, blocking/removal of fish passage	Low	High	Minor	ECan ESC Guidelines - diversion bunds during works, correctly designed crossings for permanent works
		5.2 Construction of roads near wetlands	Changes to hydrology of wetland due to sediment discharge into waterways	Low	High	Minor	ESC Plan and construction management plan, Vehicle management plan to cover cleaning of wheels and/or pest management plan
		5.3 Indigenous Vegetation clearance	Loss of biodiversity value	Low	Medium	Minor	Setbacks set and permitting in place
6 Channel earthworks and general contouring	Construction	6.1 Work in/on an ephemeral channel	Triggers conditions	Medium	Medium	Minor	Work with ECan ESC guidelines and planners/engineers to reduce risk in design
		6.2 sloping, large surface area	Sloping area - channelised flow, slope failure, dust, erosion, sedimentation discharge	Medium	Medium	Minor	Construction Management plan, sequencing of works, ESC Plan management including sedimentation treatment and clean water diversion
		6.3 Flow path in storm event	Channelised flow in storm event, exposure of materials and equipment to damage	Low	Medium	Minor	Design and location of equipment and plant to take into account flood modelling and assess risk regularly and update management plans accordingly
7 Cable Trenching	Construction	7.1 Earthworks with imported sand fill	Dust generation	Low	Low	Minor	Dust management plan
		7.2 Potential for water to pond in trechnes	De-watering	Low	Low	Minor	ECan ESC Guidelines - incorporate correct sediment controls to treat water discharge