



Turitea Wind Farm
Site Environmental Management Plan – Civil Area 1
T90-VAWT-PM-PL-0020

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1 PURPOSE

This Site Environmental Management Plan (SEMP) defines the specific environmental measures that are to be utilised during construction activities within Civil Work Area 1, including spoil disposal site 4 located between WTG 15 and WTG 11 to the east of South Range Road.

This plan is subordinate to the Construction Environmental Management Plan (CEMP).

This SEMP has been prepared in response to Condition 8, Schedule 1 of the Resource Consents.

The scope of this management plan applies to all construction activities undertaken on site by:

- Vestas
- Downer
- All subcontractors

Further details of scope of this SEMP are detailed in sections 1.3 and 2.1.

1.1 Relevant Consent Conditions

The consent conditions relevant to the Site Environmental Management Plan (“SEMP”) are summarised in Table 1 below.

Table 1: Summary of consent conditions relevant to the SEM

Condition Number	Condition Requirement	Section Referenced in the SEM
<i>SCHEDULE 1: Conditions relevant to Manawatu-Wanganui Regional Council, Palmerston North City Council, and Tararua District Council Consents</i>		
8	The Consent Holder shall prepare and submit to the Environmental Compliance Manager, at each respective Council, a SEM for each of the South Range Road, Water Catchment Access Road, Western Ridge, Browns Flat and Cross Valley Transmission and Out of Reserve (farmland) sub-catchment areas. The breakdown of the site into individual SEMs may be varied by the Consent Holder as necessary to reflect any change to the design and construction programmes.	Section 1.0 Section 1.2 Section 1.3
9	Each SEM shall be prepared by a group of suitably qualified experts (including input from the Consent Holder, contractor, designer, environmental specialist, erosion and sediment control specialist and (for the walkover only) the consent authority). The preparation of the SEM shall include, but not be limited to, an on-site meeting and walk-over of each sub-catchment area by this group of experts.	Section 1.2
10	Each SEM shall be submitted to the Environmental Compliance Managers for review, acting in a technical certification capacity, at least 30 working days prior to bulk earthworks commencing in each SEM area. A response should be provided within 30 working days of receipt. Construction activities must not commence in the relevant SEM area until written certification has been obtained. The purpose of the SEM is to indicate how the SEM will be applied on a site specific basis.	Section 1.2
11	Each SEM shall include the following as appropriate to each individual sub-catchment area:	
11.1	A location plan	Section 1.3
11.2	A description of the work to be undertaken	Section 2.1
11.3	Contact details for the contractor(s) undertaking the work;	Section 2.2
11.4	A work programme;	Section 2.3
11.5	A method statement covering construction method, monitoring and contingencies;	Section 2.5 Section 2.6 Section 2.7
11.6	Design for the works covered by the SEM, showing:	Section 3.0 Appendix A, B & C
11.6 a	Areas to be disturbed;	Section 3.1
11.6 b	Vegetation clearance methods and vegetation stockpiling;	Section 3.2
11.6 c	Fill areas;	Section 3.3
11.6 d	Spoil stockpile and disposal areas;	Section 3.4
11.6 e	Culverts and associated works in watercourses;	Section 3.5
11.6 f	Step by step criteria for determining the appropriate use of erosion and sediment control measures, including cut off drains, surface water control works, sediment ponds, flocculation measures (if required), and progressive rehabilitation of earthworks areas;	Section 3.6

Condition Number	Condition Requirement	Section Referenced in the SEMP
11.6 g	Stormwater management measures; including both temporary and permanent measures;	Section 3.7
11.6 h	Re-vegetation and rehabilitation (identification of re-vegetation to be undertaken and re-vegetation methods and any maintenance)	Section 3.8
11.6 i	Inspection and reporting schedule in particular in response to adverse weather conditions;	Section 3.9
11.6 j	Maintenance and monitoring activities;	Section 3.9
11.6 k	Storage and handling of fuels and hazardous material and contingency measures for containment of spills; and	Section 3.10
11.6 l	Decommissioning and re-stabilising of sediment ponds, and other erosion and sediment control measures, at the completion of construction.	Section 3.6.3
12	In addition to the requirements of condition 11 above, the SEMP for the Cross Valley Transmission sub-catchment area (between the Browns Flat and Plantation substations) shall include the following: 12.1 In areas where this is identified by a suitably qualified and experienced ecologist engaged by the Consent Holder as being necessary in order to minimise the impact on the surrounding vegetation, the footprint area for the transmission line support structures will be cleared by hand; and 12.2 All components for the identified transmission line support structures, including the reinforcement and concrete for the foundations, as well as the towers themselves, will be constructed with the use of helicopters to avoid the need for construction of access tracks.	Not Applicable to this SEMP

SCHEDULE 2: Conditions relevant to Manawatu-Wanganui Regional Council, Consents

1	The Consent Holder shall provide written notification to the Environmental Compliance Manager at least 5 working days prior to works commencing in each of the sub-catchment areas for which a SEMP has been prepared.	Section 1.2
3	Road or platform pavement construction (including basecourse) works, and tower foundations may be undertaken at any time of the year. During winter (defined as the months of 1 May to 30 September inclusive) the controls on other bulk earthworks in the areas detailed in Appendix 1 to this Schedule, are as follows:	
3.1	No seasonal restrictions on works in Area A: - Realignment and widening of South Range Road - Realignment and widening of Water Supply Catchment Access - Existing "Love Property" farm access road around the rim of Brown's Flat out to Zone 0116 - Existing site access on Part Section 276 Town of Fitzherbert (WN45A/638)	Section 2.4
3.2	No seasonal restrictions on works in Area A (Conditional): - Bulk filling at the Brown's Flat substation site Condition: Foundation works to be completed in summer, and erosion and sediment control systems to be fully operational and in place prior to winter.	Not applicable to this SEMP
3.3	Approval from the Environmental Compliance Manager is required on a week by week basis for works in Area B: - Access up to the Turitea (or "Love") Ridge - Turitea Ridge - Western (or "Game") Ridge in the Reserve - Farm land generally to the east of South Range Road - Farmland to the North West of South Range Road	Section 2.4

Condition Number	Condition Requirement	Section Referenced in the SEMP
3.4	Works are prohibited in Area C: - Farmland at the northern end of the site that falls inside the Upper Turitea Catchment - Works in Brown's Flat (other than filling works on the substation site (filling works subject to compliance with condition 3.1 above)).	Not applicable to this SEMP
26	All spoil disposal sites shall be designed, constructed and managed in accordance with the following	
26.1	The toe bund shall be structural and constructed of weathered rock;	Section 2.5.2
26.2	The amount of surface area within the spoil site that is exposed at any one time shall be minimised, and limited to a maximum of 3ha per sediment pond;	Section 2.5.2 Section 3.6.2.2
26.3	Exposed areas shall be stabilised to the greatest extent practicable at the end of each day, and temporarily covered if possible prior to any significant storm event;	Section 3.6.2.2
26.4	A 3% sediment pond (or ponds) (being 3m ³ volume for every 100m ² of catchment) shall be constructed to collect and treat run-off from each site;	Section 2.5.2 Section 3.6.2.2
26.5	All sediment ponds shall be constructed to provide for retrofitting of flocculation if needed;	Section 3.6.2.2
26.6	Flocculation shall be provided for each spoil site sediment pond where: a. The soils to be placed at the site do not settle to at least 80% removal in 30 minutes and at least 95% removal in 24 hours; and b. Laboratory testing shows that flocculation can result in at least 80% removal in 30 minutes and at least 95% removal in 24 hours;	Section 3.6.2.2
26.7	Compliance with condition 26.6 is to be established by sampling and testing of representative samples of the soils to be placed, both prior to preparation of the SEMP, and during placement in the spoil area;	Section 3.6.2.2
26.8	A clean water diversion shall be constructed around each site that is capable of diverting the 1% AEP storm event around the site without erosion;	Section 3.6.2.2
26.9	Each spoil site shall be stabilised and grassed over or re-vegetated, as soon as practicable after it has been fully utilised, in order to prevent scour and avoid sediment being washed into adjacent watercourses. Stabilisation may be staged, and stabilised areas diverted to a clean water diversion, to maintain a suitably small working catchment area; and	Section 3.6.2.2
26.10	For any spoil disposal sites within the Kahuterawa catchment, stormwater runoff discharged from the sediment pond or external pond batters shall, in addition to any other treatment measures, pass through at least 10m of rank grass buffer before reaching an ephemeral watercourse.	Not applicable to this SEMP

1.2 Preparation and Submission of SEMP

This SEMP has been prepared with input from (as appropriate for the scope of works) the Consent Holder, contractor, designer, environmental specialist, and erosion and sediment control specialist.

In accordance with Schedule 1 Condition 9 a site meeting was held on 15 August 2019 with the following attendees:

Consent Holder Mercury	Contractor / Designer Downer / Vestas	Erosion and Sediment Control Specialist	Horizons
Mason Jackson	Sunil Sharma	Mike McConnell	Hamish Sutherland

Stephanie Kirk	Craig Maloney		Georgia Baker
Gregor McLean	Ian Furness		Graeme Ridley

This SEMP is to be submitted to the Environmental Compliance Manager, at Manawatu-Wanganui Regional Council, Palmerston North City Council, and Tararua District Council for review, acting in a technical capacity.

Construction activities detailed within this SEMP will not commence until written certification has been received.

Following receipt of written certification, written confirmation of the commencement date of these works will be forwarded to the Environmental Compliance Manager of Manawatu-Wanganui Regional Council at least 5 working days prior to works commencing.

1.3 Extent of SEMP

Figure 1 below shows the extent of this SEMP, specifically Area 1 and Spoil Disposal Site 4

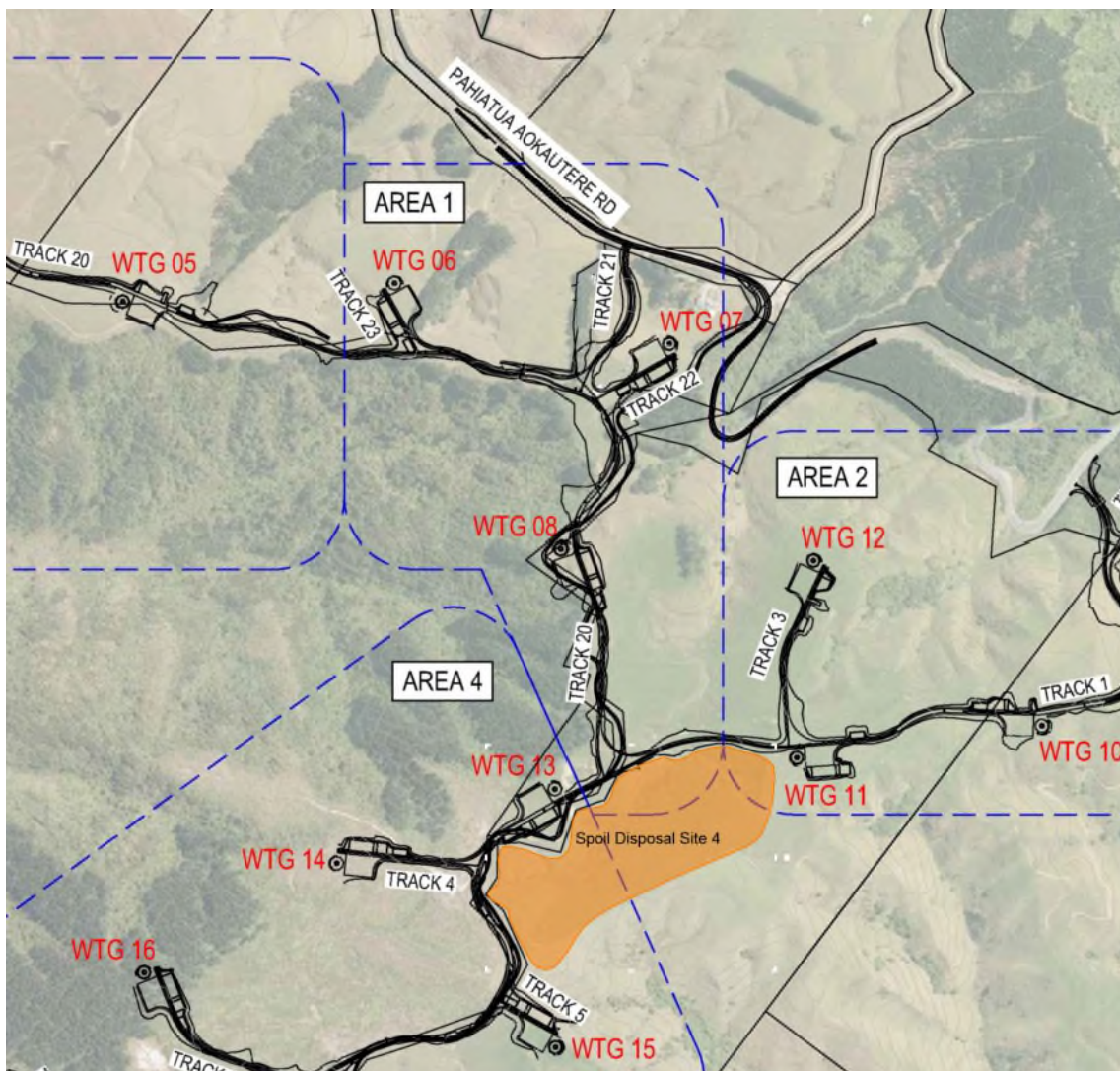


Figure 1 Location Plan of works covered by this SEMP

2 CIVIL AREA 1

2.1 Description of Work

Works within Civil Area 1 primarily provides access to the site to allow subsequent construction. The construction activities include:

- Construction of a new entrance to the site from Pahiatua Aokautere Road, approximately 200m north of the North Range Road intersection providing a safe entrance to the site.
- Establishment of Site Offices at 856 Pahiatua Aokautere Road.
- Construction of Track 21, from Pahiatua Aokautere Road to Track 20.
- Construction of Track 20 between Track 23 and Track 1.
- Construction of Track 23 and WTG 06 foundation.
- Construction of Track 22 and WTG 07 foundation.
- Construction WTG 08 foundation.
- Construction of the site laydown area.
- Development of the initial spoil disposal area.

These works will be undertaken as a traditional cut to fill and cut to waste operation; with waste material being placed in the spoil disposal area.

These works require approximately 70,000m³ of cut, 35,000m³ of fill and 14,000m³ of topsoil stripping over approximately 11ha, of which 6ha is Spoil Disposal Site 4.

2.2 Contact Details

The contact details for this section of the works are as follows:

Vestas Project Contact Numbers			
Name	Position	Phone	Email
Moran Stark	Construction Manager	027 885 5402	mopst@Vestas.com
Downer Contact Numbers			
Name	Position	Phone	Email
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Simon de Rose	Stringfellows Subcontractor	027 4165796	simon@stringfellows.co.nz

2.3 Work Programme

Civil Area 1	Duration
Construction of new entrance from Pahiatua Aokautere Road	3 Weeks
Establishment of Site Offices	2 Weeks
Construction of Track 21	5 Weeks
Construction of Track 20 between Track 23 and Track 1	28 Weeks
Construction of Track 23 and WTG 06 foundation	28 Weeks
Construction of Track 22 and WTG 07 foundation	26 Weeks
Construction WTG 08 foundation	25 Weeks
Construction of the Site Laydown Area	1 Week
Development of the initial spoil disposal area	6 Weeks

2.4 Seasonal Restrictions

A small section of Civil Area 1, track 20 chainage 400-550, is within the Area A, section of the site as defined by Schedule 2 Condition 3 & Appendix 1, and therefore is not subject to seasonal restrictions.

The majority of Civil Area 1 (including Spoil Disposal Site 4) is predominantly within the Area B, section of the site as defined by Schedule 2 Condition 3 & Appendix 1.

In accordance with condition 3.3 approval is required from the Environmental Compliance Manager (Horizons Regional Council), on a weekly basis for earthworks being undertaken between 1 May and 30 September (inclusive).

This approval will be sought (via email) on the Wednesday of each week for the following week.

2.5 Construction Methodology

The initial activity of the above works will be to set up the site offices at 856 Pahiatua Aokautere Road.

2.5.1 Site Office Establishment

These works require minor earthworks to form access, parking areas, foundations for portacoms, and an on-site sewerage storage tank.

The earthworks will involve approximately 650m³ of earthworks (600m³ topsoil, 50m³ cut to fill/waste) over 4,500m².

Heavy vehicle access to the site office area is not practical from the existing driveway. To facilitate this the existing farm track from South Range Road will be upgraded and a temporary access track formed from this farm track to the site office location.

These works are detailed in drawing 377-001 attached as Appendix A.

2.5.2 Spoil Disposal Site 4

In order to avoid temporary stockpiling on site, Spoil Disposal Site 4 will be established as soon as practical.

Spoil Disposal Site 4 covers an area of approximately 6ha and has the capacity to receive approximately 275,000m³ of surplus cut.

The location of this spoil disposal site has been selected to ensure compliance with Schedule 2 Condition 25, specifically:

25. All spoil disposal sites shall be located to ensure that:

25.1 The uphill boundary is located as close to the ridgeline as possible to reduce upstream catchment size;

- 25.2 Suitable locations for clean-water cut-off drains can be provided;*
- 25.3 The maximum possible fill volume to surface area ratio is achieved;*
- 25.4 Any indigenous vegetation clearance is minimised;*
- 25.5 They are a minimum of 25m from a permanent watercourse;*
- 25.6 A sediment pond can be located to treat all run-off from the site; and*
- 25.7 There is all weather vehicle (truck and 4x4 utility vehicle) access to sediment ponds for inspection and maintenance purposes.*

The location of this spoil disposal site meets the above requirements.

The lower extent of this spoil disposal area is an existing farm track, typically on the alignment of Track 1.

This existing bund will be retained as the downstream embankment of a 6ha SRP which will be formed above this bund. A 750mm culvert will be installed through this bund to ensure that the 1% AEP storm event from the spoil disposal area can be diverted through this culvert without over topping the alignment (and work area during construction) of Track 1.

Additionally, should the topography allow, an additional 450mm culvert will be installed to divert clean water flows from above the spoil disposal area.

Following the installation of this culvert a manhole will be installed forming the emergency spillway of the SRP. Floating decants will then be installed. The required footprint of the SRP will then be excavated and the level spreader and forebay constructed.

A 3ha area of the spoil disposal area will then be stripped including removal of any unsuitable material from the existing gullies. This stripped material will be stockpiled within the catchment area of the SRP to be respread progressively as areas of the fill are completed. Note this maximum 3ha exposed area is a requirement of Schedule 2 Condition 26.2.

Filling will typically commence from the upper extent of the spoil disposal area and progress downslope.

With the spoil disposal area operational earthworks in the other areas will commence.

At the completion of the filling works, as a final activity, a structural toe bund will be constructed of weathered rock. The extent and location of this will be determined by the final volume of fill placed.

2.5.3 Track 21 and New Entrance

The construction of track 21 and the new entrance are a simple traditional earthworks operation:

- Install erosion and sediment control measures
- Strip topsoil to stockpile.
- Undertake cut to fill earthworks to form new road subgrade, surplus cut material to be disposed of in the spoil disposal site.
- Place pavement aggregate to form road surface.

Works will typically be completed from the south towards Pahiatua Aokautere Road so that the majority of the intersection works can be undertaken isolated from traffic.

2.5.4 Site Laydown Area

As above, the construction of the site laydown area, in regard to earthworks, is a relatively simple and traditional earthworks operation:

- Install erosion and sediment control measures
- Strip topsoil to stockpile.
- Undertake cut to fill earthworks to form new road subgrade, surplus cut material to be disposed of in the spoil disposal site.
- Place pavement aggregate to form laydown area.

2.5.5 Track and WTG Foundations

The track and WTG foundation construction is also a traditional earthworks operation. In addition to the above activities these works also require the installation of the cables required by the project as an interim step in the earthworks.

- Install erosion and sediment control measures.
- Strip topsoil to stockpile.
- Undertake cut to fill earthworks to form new alignment of the cable trench, surplus cut material to be disposed of in the fill site.
- Install cables.
- Complete earthworks to form road alignment.
- Place pavement aggregate to form road surface.
- Complete earthworks to form WTG foundations.
- Place pavement aggregate to stabilise WTG foundation and provide a suitable work surface for subsequent construction.

2.5.6 General

The above works will be undertaken using the following plant and methodologies:

- Topsoil will be stripped using excavators with the initial topsoil being used to form diversion bunds as required by the SEMP for the area.
- Where practical these bunds will be of sufficient volume to allow respreading to the completed earthworks areas.
- Surplus topsoil will be loaded into off road dump trucks. In some locations on-road 6 wheelers will be used. This topsoil will then be transported to the various topsoil stockpile areas. The location of these stockpile areas are detailed in the SEMP's and are selected to minimise haul distances and to ensure sufficient topsoil is available for respread at the completion of works.
- Trenching works for the power cable installation is undertaken using a large chain trencher or traditional excavator. This excavated material is stockpiled adjacent to the trench for later backfill following cable and thermal backfill installation. Surplus material will be removed from the area to a suitable project certified fill site.
- Cut to fill operations will be undertaken using excavators and off-road trucks for longer haul distances (particularly to the fill disposal sites).
- Cut to fill over shorter distances may also be undertaken using tractor and scoops.
- Compaction of cut material in fill locations will be by a variety of plant to be selected subject to the compaction effort required and the location of the fill.
- Final trimming of the cut and fill areas will be by grader and or excavator, dozers will also be used in the fill disposal areas.
- Following completion of earthworks, roading aggregate will be imported to site and spread directly from the delivery truck and trailers where possible. For the majority of the site however this material will be stockpiled and loaded into site 6 wheelers for spreading.

2.6 Construction Monitoring

Construction Monitoring will be undertaken in accordance with Section 9.1 of the CEMP.

There are no specific activities within the scope of this SEMP which trigger additional or alternate monitoring requirements.

2.6.1 Pre-Construction Meeting

The Pre-construction meeting noted in section 9.1.4.1 of the CEMP will be undertaken prior to commencement of control installation. Horizons Monitoring Officer will be advised of the timing of this meeting.

2.6.2 As Built Inspection

As noted in section 9.1.4.2 of the CEMP, as erosion and sediment control devices are completed they will be inspected by the Environmental Manager (or Erosion and Sediment Control Specialist), the site foreman or site engineer to confirm that the controls have been constructed in accordance with the requirements of the SEMP.

The results of these inspections will be recorded on standard forms (Waikato Regional Council As-built Certification Sheet or similar) and maintained on site. These will be made available for Horizons inspection on request.

2.7 Contingency Measures

Contingency measures are detailed in section 8.6 of the CEMP.

There are no specific activities within the scope of this SEMP which trigger additional or alternate contingency measures.

3 DESIGN OF CIVIL AREA 1 WORKS

The works within Civil Area 1 are detailed in the drawings attached as Appendix B.

3.1 Areas to be Disturbed

The works in this SEMP require approximately 11ha of disturbance, including 6ha required by the spoil disposal area. These work areas are shown on the attached drawings.

3.2 Vegetation Clearance

3.2.1 General

The majority of the works in this area does not require the removal of vegetation.

The vegetation to be removed in these work areas is typically small and will be removed by mulching ahead of the topsoil stripping.

This mulched vegetation will be uplifted with and stockpiled with the stripped topsoil.

3.2.2 Herpetofauna

Mercury's lizard searching effort has shown that Herpetofauna within the wind farm footprint is at very low densities, with only three green geckos (barking gecko) found in horopito scrub vegetation near WTG 21, WTG 29 and WTG 32. No other species of skink, gecko or lizard have been found on site.

The Department of Conservation is yet to confirm the preferred lizard management methodology for this project in light of these lizard search results, however, removal of high value lizard habitat near WTG 21, WTG 29 and WTG 32 will likely require some form of pre-clearance lizard search and salvage.

There are no works within the scope of this SEMP that are within the above areas (near WTG 21, WTG 29 and WTG 32).

3.2.3 Powelliphanta Snails

Initial surveys of the site undertaken during development of the Powelliphanta Snail Management Plan, and subsequent searches (30/05/2019) have determined that the likelihood of Powelliphanta Snails being within the location of the WTGs, access roads or spoil disposal areas is low.

Notwithstanding the above low potential of discovery, an accidental discovery protocol will be implemented as follows:

As part of site inductions, all contractors and staff will be made aware of the possibility of Powelliphanta snails being present, and will be supplied with photographs so they know what they look like. Contractors and staff will also be briefed regarding the accidental discovery protocol below.

Upon accidental discovery of Powelliphanta snails or shells at sites where they have not already been identified:

- *Stop any work being undertaken in the area immediately.*
- *Inform supervisor/manager.*
- *Contact the Department of Conservation and ask for advice on how to proceed.*
- *Do not restart works until approval has been granted.*

3.3 Fill Areas

3.3.1 Contouring of earth worked areas

As an initial design criterion, the extent of the earthworks has been minimised. This extent has taken into account the required alignments, both vertical and horizontal, and the geotechnical conditions of the site dictating the maximum and minimum batter slopes.

In addition, fill areas have been avoided where practical, resulting in the surplus of cut material across Civil Area 1, in the order of 27,500m³.

Fill areas are shown on the drawings attached as Appendix B.

3.4 Stockpiles and Spoil Disposal

3.4.1 General

As noted above the early establishment of the spoil disposal area will limit the requirement for temporary stockpiling of excavated material.

Where any stockpiling of excavated material is required this will be as a temporary activity, typically associated with trenching where this material will be used as backfill. Any such stockpiles will be within the site perimeter controls.

Stripped topsoil will typically be used as perimeter control bunds to be respread once earthworks are completed. For larger earthwork areas, in particular the spoil disposal area, topsoil stockpiles will be formed and located within the perimeter controls.

3.4.2 Contouring of completed Spoil Disposal Site 4

The location of Spoil Disposal Site 4 is a series of moderate gullies that are to be filled typically to the extent of the ridges on either side of the gully system. This area is currently in pasture with reeds and other typically 'wetland' type vegetation in the bases of the gullies.

In order to ensure that the completed site will be able to be productively grazed, the final contours will be no steeper than the existing contours. Typically, as a result of filling the gullies the contours will be flatter. The contours of the completed fill will be as smooth as possible, the transition from the completed fill areas to the existing ground will be softened and rounded to create a 'natural' transition complimenting existing contours. The final vegetation in these areas will be a duplication of the existing pasture.

3.5 Culverts and Watercourse Works

In this area the earthworks are typically located on ridges and do not cross gullies.

The extent of the foundations of WTG 06 extend into the upper extents of an ephemeral watercourse. In these locations, sediment control devices will be installed at the extent of the works.

The spoil disposal area includes a number of ephemeral watercourses which will be filled. These are within the catchment of the SRP and do not require any diversions.

In accordance with Consent Condition 16 any fish that are stranded during the construction works will be recovered and placed in the clearest flowing water adjacent to the stranding site.

3.5.1 Culvert SW-20-1

Culvert SW-20-1 is located on Track 20 immediately east of the intersection with Track 23.

This culvert is not within any form of a watercourse.

This culvert diverts road runoff from Track 20 and Track 23 from the southern side of Track 20 to discharge overland north of Track 20. This culvert specifically diverts road runoff away from the PNCC Water Supply Catchment.

3.5.2 Culvert SW-21-1

See attached drawing Appendix C

Culvert SW-21-1 is located at the lower, northern end of Track 21.

Upstream of the inlet of the culvert is a defined flow path which discharges to a wide, boggy area with no defined channel.

Culvert SW-21-1 complies with the PA rules of Horizons 'One Plan' as follows:

Rule 17-10 Culverts - Permitted Activity Classification	
Conditions/Standards/Terms	Compliance Comment
(a) A new culvert must not be erected or placed in: <ul style="list-style-type: none"> (i) a <i>river</i> or <i>lake</i> regulated under Rule 17-3 (ii) a reach of a <i>river</i> with a Schedule B Value of Flood Control and Drainage, unless the work is undertaken by or on behalf of the Regional Council. 	<p>The location of the culvert is not regulated under rule 17-3.</p> <p>The location of the culvert is not within a reach of a <i>river</i> with a schedule B value.</p>
(b) Where multiple culverts are placed side by side, the total cross-sectional area of the multiple culverts must not be less than that of a single culvert which complies with this <i>rule</i> .	The culvert is a single barrel culvert.
(c) The culvert, associated fill and culvert placement must comply with the following dimensions: <ul style="list-style-type: none"> (i) a maximum culvert length of 20 m (ii) for circular culverts a culvert diameter of 0.3 m to 1.2 m (inclusive) (iii) for non-circular culverts a width and height of 0.3 m to 1.2 m each (inclusive) (iv) a maximum fill height of 2 m above the top of the culvert unless a spillway is constructed to enable the passage of a 200 year flood without the fill being overtopped (v) a minimum culvert installation depth below the <i>bed</i> of 20% of the width of the culvert. 	<p>The culvert is 20m long</p> <p>The culvert has a diameter of 525mm</p> <p>NA</p> <p>The maximum height of fill over the top of the culvert is less than 2m (typically 600mm at inlet).</p> <p>The culvert is to be installed with the invert 105mm lower than the existing bed of the stream.</p>
(d) The culvert must be positioned so that its alignment and gradient are the same as the <i>river</i> .	The culvert is replacing a boggy area with no defined channel, however the overall grade (1.5%) of the culvert will match the boggy area and the culvert will discharge to the existing channel beyond the boggy area.
(e) The culvert must be constructed to allow: <ul style="list-style-type: none"> (i) the flow from a 5% annual exceedance probability (20 year return period) flood event without overtopping, unless the overtopping flows to a specifically designed spillway (ii) the flow from a 2 year return period flood event without any flow impediment. 	<p>The contributing catchment of the culvert is approximately 2.26ha and will discharge approximately 0.48m³/s from the 5% AEP.</p> <p>The 525mm culvert has the capacity to convey 0.55m³/s.</p>
(f) The culvert inlet and outlet must be protected against erosion.	Yes to permanent design
(g) All practicable steps must be used to minimise the release of sediment during construction.	Culvert will be installed offline

(h) The culvert must be constructed and maintained to avoid any aggradation or erosion of the <i>bed</i> [^] .	Yes, appropriate erosion control is to be included at the inlet and outlet.
(i) The culvert must be kept clear of accumulated debris.	Yes on going maintenance will be undertaken in accordance with maintenance requirements for all public roads.
(j) The activity must comply with the general <i>conditions</i> [^] listed in Section 17.3.	The construction of the culvert complies with the general <i>conditions</i> [^] listed in Section 17.3.
(k) The activity must not take place in any <i>rare habitat</i> [*] , <i>threatened habitat</i> [*] or <i>at-risk habitat</i> [*] .	The culvert is not in any <i>rare habitat</i> [*] , <i>threatened habitat</i> [*] or <i>at-risk habitat</i> [*] .

The construction of Culvert SW-21-1 is programmed to take place in late September, early October. This is outside of the fish spawning period of April to June.

3.6 Erosion and Sediment Control

Erosion and Sediment Control measures will be implemented in accordance with section 8.5.2 of the CEMP. Specific details are shown on the drawings attached as Appendix B and as detailed in the following sections.

3.6.1 Risk Rating

In accordance with Section 8.2 of the CEMP a risk assessment has been undertaken for these works. The work areas have been assessed based on the catchment to which the earthworks will discharge.

3.6.1.1 PNCC Water Supply Catchment

This catchment will receive discharges from:

- Construction of Track 20, between Track 23 and Track 1.
- Construction WTG 08 foundation.

Value of Receiving Environment	High
Risk of Sediment Discharge	Medium
<ul style="list-style-type: none"> • Slope (between 5-10 percent) • Size of earthworks (1-3ha), • Universal Soil Loss Equation (USLE) estimates a sediment yield of greater than 2 tonnes over the duration of the proposed works • Earthworks are between 20-100 meters away from watercourse with a good vegetative buffer • Duration of earthworks or site exposure before stabilisation (1-4 weeks) • Contractor/consent holder performance/compliance history illustrates a very good compliance record 	
Overall Risk	High Risk

The high risk associated with the works within the PNCC Water Supply Catchment is largely influenced by the high value of the receiving environment. As this factor is a constant, to lower the overall risk to medium risk, the risk of a discharge would have to be lowered to Low Risk. To achieve this, the factors that can be modified are the duration of works and the extent of the earthworks. Neither of these can be practically reduced, however through the progressive nature of these works, the overall risk will reduce as the works are completed.

To further minimise the risk of discharges to the PNCC Water Supply Catchment all SRPs and Decanting Grit Traps which discharge to the PNCC Water Supply Catchment will be chemically treated in accordance with the Chemical Treatment Management Plan.

3.6.1.2 Lower Turitea Stream Catchment

This catchment will receive discharges from:

- Construction of a new entrance to the site from Pahiatua Aokautere Road, approximately 200m north of the North Range Road intersection providing a safe entrance to the site.
- Establishment of Site Offices at 856 Pahiatua Aokautere Road
- Construction of Track 21, from Pahiatua Aokautere Road to Track 20.
- Construction of Track 23 and WTG 06 foundation.
- Construction of Track 22 and WTG 07 foundation.
- Construction of the site laydown area.

Value of Receiving Environment	Medium High
Risk of Sediment Discharge	Medium
<ul style="list-style-type: none"> Slope (greater than 10 percent) Size of earthworks (1-3ha), Universal Soil Loss Equation (USLE) estimates a sediment yield of greater than 2 tonnes over the duration of the proposed works Earthworks are between 20-100 meters away from watercourse with a good vegetative buffer Duration of earthworks or site exposure before stabilisation (1-4 weeks) Contractor/ consent holder performance/compliance history illustrates a very good compliance record 	
Overall Risk	Medium Risk

The medium risk associated with the works within the Lower Turitea Stream Catchment is influenced by the medium high value of the receiving environment. As this factor is a constant, to lower the overall risk to a low risk, the risk of a discharge would have to be lowered to a Very Low Risk. To achieve this, the factors that can be modified are the duration of works and the extent of the earthworks. Neither of these can be practically reduced, however through the progressive nature of these works, the overall risk will reduce as the works are completed.

3.6.1.3 Matarua Creek Catchment

This catchment will receive discharges from:

- Construction of Track 22 and WTG 07 foundation.
- Development of the initial spoil disposal area.

Value of Receiving Environment	Low Medium
Risk of Sediment Discharge	High
<ul style="list-style-type: none"> Slope (between 5-10 percent) Size of earthworks (greater than 3ha), Universal Soil Loss Equation (USLE) estimates a sediment yield of greater than 2 tonnes over the duration of the proposed works Earthworks are between 20-100 meters away from watercourse with a good vegetative buffer Duration of earthworks or site exposure before stabilisation (> 1 month) Contractor/ consent holder performance/compliance history illustrates a very good compliance record 	
Overall Risk	High Risk

The high risk associated with the works within the Matarua Catchment is influenced by the low medium value of the receiving environment. This is a reflection of the immediate and near receiving environment which is heavily impacted by stock. As this factor is a constant, to lower the overall risk to a medium risk, the risk of a discharge would have to be lowered to a Medium Risk. To achieve this, the factors that can be modified are the duration of works and the extent of the earthworks. Neither of these can be practically reduced as the spoil disposal area will be in operation with an earthwork area of 3ha for the duration of the works.

These works will remain with a high risk rating and therefore will be a key area of inspection in pre and post rainfall inspections.

3.6.2 Specific Erosion and Sediment Control Measures

Note, haul roads are to remain with the perimeter controls detailed below. If haul roads are required outside of these areas a revised SEMP is to be prepared and submitted for approval.

3.6.2.1 Site Office Establishment

(See drawings 377-001RevA)

Note, the establishment of the site office works will be undertaken as an initial, separate activity before works are commenced on the construction of Tracks 20, 22 and WTG 07.

1. Form cleanwater diversion bunds above the main earthwork area using stripped topsoil.
2. Stabilise the outside of these bunds with stripped turf or geotextile.
3. Install the eastern super silt fence, note this is to be installed along the contour as closely as practicable.
4. Install the western super silt fence.
5. Form the short sections of dirty water diversion bunds with stripped topsoil.
6. Commence earthworks.
7. Any surplus topsoil and or excavated material is to be stockpiled within the perimeter controls and is to be stabilised with geotextile (note this will need to be well secured) before perimeter controls are removed.
8. Undertake as much of the carpark areas as possible as a cut and cover.
9. Upgrade existing access track by removing soft surface material (as required) and covering with aggregate.
10. This is to be undertaken as a 'cut and cover' where at the end of each day or prior to rain (whichever is first) all exposed surfaces are stabilised with geotextile or aggregate.
11. A silt fence is to be installed below a topsoil stockpile location to the north of the existing barn.
12. Any surplus stripped or excavated material from the access roads is to be stockpiled in the above stockpile.
13. Following upgrading of the existing access, form the new temporary access as a 'cut and cover'.

3.6.2.2 Spoil Disposal Area

(See drawings 377-SD4-1RevB)

1. Form cleanwater diversion bunds above the main earthwork area using stripped topsoil.
2. Stabilise the outside of these bunds with stripped turf or geotextile.
3. Install a temporary coffer dam above the following culvert installation area to ensure culvert works are undertaken in dry conditions.
4. Install a section of silt fence below the culvert works.
5. Install a 750mm culvert through the existing farm track, install geotextile and riprap erosion protection at the outlet, minimum 3m x 3m.
6. At the upper end of the 750mm culvert install a 1050mm manhole with 3 x floating decants.
7. Remove coffer dam and excavate 6.0ha SRP footprint (SRP SD4).
8. Construct forebay and level spreader.
9. As built SRP to confirm compliance.
10. Strip a 3ha area at the top of the spoil disposal area, stockpile stripped organic material including topsoil for respreading within the perimeter controls.
11. Commence fill placement.
12. As areas of fill are completed, topsoil and grass.
13. Once grass has achieved 80% strike, additional areas of disposal can be stripped (to the same area as the 80% grass strike) ensuring that at no time is the exposed area greater than 3ha.
14. Where the rate of grass strike does not allow the required opening of new areas, the grassed areas can be stabilised with hay mulch. Note, due to the exposed nature of the site this will likely require frequent reapplication.

It is noted that SRP SD4 has a contributing catchment of 6ha which is greater than the recommended maximum (*Erosion and Sediment Control Guidelines for the Wellington Region*) of 3ha, however as the exposed area within this contributing catchment will be restricted to 3ha (Schedule 2: Consent Condition 26.2) it is considered that this meets the requirements of industry best practice and is appropriate for this location. As noted below the implementation of chemical treatment is expected to ensure that the discharges from this 6ha SRP will have a sediment loading no greater than that from a 3ha SRP.

As an additional initial activity, representative soil samples will be taken from within the spoil disposal area and from the cut areas of Civil Area 1. These soils will be tested to determine if chemical treatment is required to achieve compliance with Schedule 2: Consent Condition 26.6:

26.6 Flocculation shall be provided for each spoil site sediment pond where:

- a. The soils to be placed at the site do not settle to at least 80% removal in 30 minutes and at least 95% removal in 24 hours; and*
- b. Laboratory testing shows that flocculation can result in at least 80% removal in 30 minutes and at least 95% removal in 24 hours;*

Soil testing has confirmed that the soils to be placed in the spoil disposal site will benefit from chemical treatment.

Chemical treatment will be undertaken in accordance with the Chemical Treatment Management Plan.

Testing of soils within the spoil disposal area have shown that the use of PAC with a dose rate of 6mg/L increases settlement over 1 hour from 30mm to 120mm.

A single Flocbox will be used to dose the runoff from the 3ha exposed area.

Device	Dosage Rate	Catchment Area	Tray size	Low Flow Volume	High flow Volume	Flocbox size
SRP SD4	6mg	3ha	3.36m ²	40L	80L	Large

During earthworks the exposed area of the fill is to be minimised as much as practical, with completed areas topsoiled and grassed as soon as practical. In particular, steep fill faces are to be avoided. Prior to heavy rain any completed, steep or uncompacted areas are to be compacted and stabilised if practical.

3.6.2.3 Track 21 and New Entrance

(See drawings 377-102RevB)

1. Form a cleanwater diversion bund along the eastern side of the works using stripped topsoil.
2. Stabilise the outside of this bund with stripped turf or geotextile.
3. Install a silt fence below the location of DGT 001.
4. Construct DGT 001 at the lower extent of the cut, approximate chainage 30.
5. Construct DEB 002 to the west of track 21 at the top of the main cut at approximate chainage 195.
6. As built DGT & DEB to confirm compliance
7. Install dirty water diversion bunds, formed from stripped topsoil to direct runoff to these devices.
8. Commence cut to fill and cut to waste earthworks with surplus material being disposed of in the spoil disposal area.
9. As the batters are complete respread topsoil and grass.
10. As the subgrade is completed and roadside drains formed, complete these works to permanent design.
11. The DEBs are to remain until all surfaces within the contributing catchments are stabilised by grass (strike > 80%) or aggregate.
12. Once track 21 has been constructed and stabilised south of chainage 30, specifically the cut area, DGT 001 will be removed and culvert SW-21-1 (see section 3.5) will be installed.
13. Once culvert 21-1 has been installed and the inlet and outlet stabilised with permanent rock rip rap, the flow path to the inlet will be opened, isolating the intersection area from these flows.
14. Silt fences will then be installed on either side of the intersection fill allowing these earthworks to be completed.
15. These silt fences are to remain until the intersection area is complete and stabilised.

3.6.2.4 Laydown Area

(See drawings 377-101RevB)

1. Install a silt fence below the laydown area, ensuring silt fence is installed along the contour.
2. Strip topsoil and commence cut to fill and cut to waste earthworks with surplus material being disposed of in the spoil disposal area.
3. As any batters are completed respread topsoil and grass.
4. As the platform is completed stabilise the surface with aggregate to final design.
5. The silt fence is to remain until all surfaces within the contributing catchments are stabilised by grass (strike > 80%) or aggregate.

3.6.2.5 Track and WTG Foundations

(See drawings 377-101RevB, 377-102RevB, 377-103RevB)

1. Construct DGT 005 on the western side of Track 20 at chainage 430.
2. Install Flocbox (see details below)
3. As built DGT 005 to confirm compliance.
4. Install dirty water diversion bunds, formed from stripped topsoil to direct runoff to DGT 005 from Track 22, note this will require a trafficable bund (or daily reinstatement) where this crosses the existing track at the intersection with South Range Road.
5. Install silt fences along the edge of South Range Road and above South Rage Road below the fills of Track 22 and Track 20.
6. Construct DGT 003.
7. As built DGT 003 to confirm compliance.
8. Install dirty water diversion bunds around the eastern and western sides of WTG 07, formed from stripped topsoil to direct runoff to DGT 003.
9. Commence cut to fill and cut to waste earthworks within the catchment of the above controls with surplus material being disposed of in the spoil disposal area. Note initial haul routes will utilise South Range Road.
10. Set out the location of SRP WTG13.
11. Install a silt fence below this work area
12. Construct SRP WTG13.
13. Install Flocbox (see details below)
14. As built SRP to confirm compliance.
15. Install dirty water diversion bunds, formed from stripped topsoil to direct runoff to SRP WTG13.
16. Commence cut to fill and cut to waste earthworks within the catchment of SRP WTG13 with surplus material being disposed of in the spoil disposal area.
17. Construct DEB 006 & DGT 007
18. As built DEB 006 & DGT 007 to confirm compliance.
19. Install dirty water diversion bunds around the eastern and western sides of WTG 08, formed from stripped topsoil to direct runoff to DEB 006 & DGT 007. Note these bunds will be relocated as works progress to minimise the catchment of the SSFs to the west of WTG 08.
20. Install silt fences on either side of Track 20 between chainages 130 & 180.
21. Commence cut to fill and cut to waste earthworks within the catchments of DEB 006 & DGT 007 with surplus material being disposed of in the spoil disposal area.
22. Install super silt fences below the fill to the west of WTG08.
23. Install a super silt fence below Track 20 fill at chainage 400 fill, ensure the super silt fence is a minimum of 10m long and follows the contour.
24. Commence placement of fill.
25. Install a silt fence at the low points along the south side of Track 20 works, between chainage 750 and 950.
26. Install dirty water diversion bunds between the silt fences at the high points.
27. Set out the location of SRP WTG06.
28. Construct SRP WTG06.
29. As built SRP to confirm compliance.
30. Install dirty water diversion bunds, formed from stripped topsoil to direct runoff to SRP WTG06.
31. Commence cut to fill and cut to waste earthworks within the catchment of SRP WTG06 with surplus material being disposed of in the spoil disposal area.
32. As the batters are complete respread topsoil and grass.

33. As the subgrade is completed and roadside drains formed complete these works to permanent design.
34. The SRPs, DGTs, DEBs, silt fences and super silt fences are to remain until all surfaces within the contributing catchments are stabilised by grass (strike > 80%) or aggregate.

Chemical Treatment requirements

Device	Dosage Rate	Catchment Area	Tray size	Low Flow Volume	High flow Volume	Flocbox size
DGT 005	6mg	0.4ha	0.45m ²	5.4L	10.8L	Small
SRP WTG13	6mg	1.25ha	1.40m ²	17L	34L	Medium

3.6.3 Decommissioning Erosion and Sediment Control Measures

As noted above all SRPs, DEBs, silt fences and super silt fences are to remain until all surfaces within the contributing catchments are stabilised by grass (strike > 80%), aggregate or other appropriate stabilisation measure.

Once the above stabilisation criteria have been met. The decommissioning of controls will meet the following standards:

- The decommissioning of sediment retention ponds or decanting earth bunds will be undertaken to achieve the appropriate geotechnical standard. This standard will define what material is to be used for backfill and what compaction standards are to be met.
- Prior to backfilling of any devices the silt fence or super silt fences that were utilised during the installation devices will be reinstated if required (particularly over the spillways), note this requirement will be subject to the duration of the backfilling.
- Any accumulated sediment is to be removed as part of this decommissioning and will be disposed of in one of the site spoil disposal areas.
- The exposed areas as a result of sediment retention pond or decanting earth bund decommissioning will be rapidly stabilised in accordance with the final landscaping for the area. Where this final landscaping requires grassing, additional stabilisation in the form of hay mulch may be appropriate.
- Any recyclable materials as the result of silt fence or super silt fence removal, waratahs, wire, tensioners, waratah caps etc will be retained and reused as practical.
- The geotextile from the silt fences or super silt fences is not (typically) suitable for reuse so will be removed from site as waste.
- As with the silt fence material, geotextile used for site stabilisation will be recycled if practical, where this is not practical it will be removed from site as waste.
- Though out the duration of the project, the ability to salvage and recycle silt fence and geotextile will continue to be investigated. Off-site recycling opportunities will also be investigated.

3.7 Stormwater Management

Temporary stormwater management will be achieved through compliance with the SEMP.

Permanent stormwater control will be achieved through the implementation of the final design details. These include traditional design objectives and physical control measures including:

- Minimising impervious areas
- Avoiding concentrated discharge flows where practical
- At concentrated discharge points:
 - Minimise outlet velocities
 - Provide erosion control in the form of riprap aprons
 - Consider the location of outlets to existing watercourses

3.8 Revegetation

Revegetation will be undertaken in accordance with the Wildlands Rehabilitation and Revegetation Plan for the Turitea Wind Farm.

3.9 Inspection and Reporting

Monitoring and Inspections will be undertaken as detailed in section 9.0 of the CEMP.

There are no specific activities within the scope of this SEMP which trigger additional or alternate monitoring requirements.

3.10 Storage of Fuels and Hazardous Materials

This project will involve the use of a variety of construction plant and machinery. The majority of this plant will be motorised and as such will require a regular supply of fuels and oils. These can become a pollutant if discharged to ground or water.

Other materials potentially used in the construction process including drilling muds, concrete, bonding agents, sealants, flocculants and degreasers can result in environmental impacts if they are not managed carefully and are discharged to the environment in an uncontrolled manner.

The following mitigation measures will be implemented to manage hazardous substance use, storage and transport during the project:

- Fuel for all construction plant will generally be delivered by mini-tanker and refuelling and lubrication of construction plant will only be carried out in areas separated from environmentally sensitive areas, wetlands, watercourses (including ephemeral watercourses) or overland flow path.
- Spill kits will be available for use in the event of a spill.
- Hydraulic oils, greases and other construction materials including small quantities of fuel required for hand tools and pumps may be stored at the site compound, in a secure area.
- Any hazardous substances kept on site will be stored under cover in accordance with the relevant regulations.
- No diesel storage tanks (other than those fitted to mobile plant) will be located within the PNCC water supply catchment.
- Containers of paint, adhesives etc are not to be left open unless being actively used.
- Specific concrete and grout wash-down areas shall be provided.
- Wastes will be disposed of in accordance with appropriate regulations.
- Spill kits will be maintained at appropriate locations around the site. These site locations will be detailed at all smoko sheds.
- Major plant maintenance will not be carried out onsite unless absolutely necessary. Minor repairs will be undertaken away from the watercourses or stormwater inlets.
- Hazardous substances are managed through the Health and Safety Management Plan. All MSDS information shall be available to site staff.

3.10.1 Emergency Procedures

Prompt and effective emergency response reduces losses and the consequences of natural and man-made disasters. The following are standard situational responses. Job/task specific emergencies will be included in relevant Construction Package Method Statements.

Additionally, both Vestas and Downer employ a range of procedures to ensure proper precautions are taken to mitigate any environmental emergencies. In the event of an incident, a full environmental investigation shall be carried out.

3.10.2 Emergency Plan

In a situation where the Health and Safety of the public or site personnel is at risk, this plan needs to be read in conjunction with the provisions in the project Safety Plan.

An emergency situation may require isolation of some, or all services, to the site to minimise damage to the environment.

Service Isolation points for electricity, water, gas and compressed air, are to be clearly identified on the Emergency Plan and marked in the field.

3.10.3 Fuel and Hazardous Substance Spills

A procedure for dealing with fuel and hazardous substance spills is outlined below:

1. Positively identify the material and then refer to Safety Data Sheet (SDS) information located in the Dangerous Goods or smoko room for Emergency Procedure Guides.
2. Assess whether or not you can safely deal with the spill. Do not under any circumstances attempt to contain any spills containing acids as these fumes are extremely dangerous. Immediately evacuate the building and call the Fire Service on 111 with details of the product and size of spill.
3. If safe to approach the spilled material, follow spill response chart/procedure and site spill response plan.
4. If not activate the alarms and follow the evacuation procedure

If large quantities of fuel, or a hazardous or unknown chemical is spilt:

1. Call the fire service and advise the nature of the spill and the quantity involved.
2. If there is a possible risk to people, evacuate the area, ensuring that people remain upwind and the spill area is closed to public access, as per information in the Emergency Procedure Guides.
3. Remove all sources of ignition to prevent an explosion of flammable vapours.
4. Only attempt to contain a spill if you have been trained in spill cleanup for the substance involved and have the proper protective equipment to do so. Otherwise, do not approach or come into contact with the substance.
5. If safe to do so, reposition leaking containers to prevent further leakage.
6. If there is a possibility of the spill entering the drainage system, or causing an environmental problem, create a temporary bund around any drainage sumps and contact Horizons Regional Council.
7. Should a diesel spill exceed the capabilities of local expertise, then the Fire Service should be called.

3.10.4 Categories of Spills

All spills will be categorised by the Site Supervisor.

Type 1 A minor spillage within the boundaries of the site that has been, or is able to be, cleaned up by staff from the company involved and no damage to the environment has occurred.

Site Supervisor shall:		
Initiate and oversee clean-up		
Notify Environmental Professional	Michelle Flawn	021 583347

Type 2 A spillage that has flowed off-site or has the potential to leave the site (this includes vapours of flammable liquids), or the company staff are not able to clean up the spill and its effects safely.

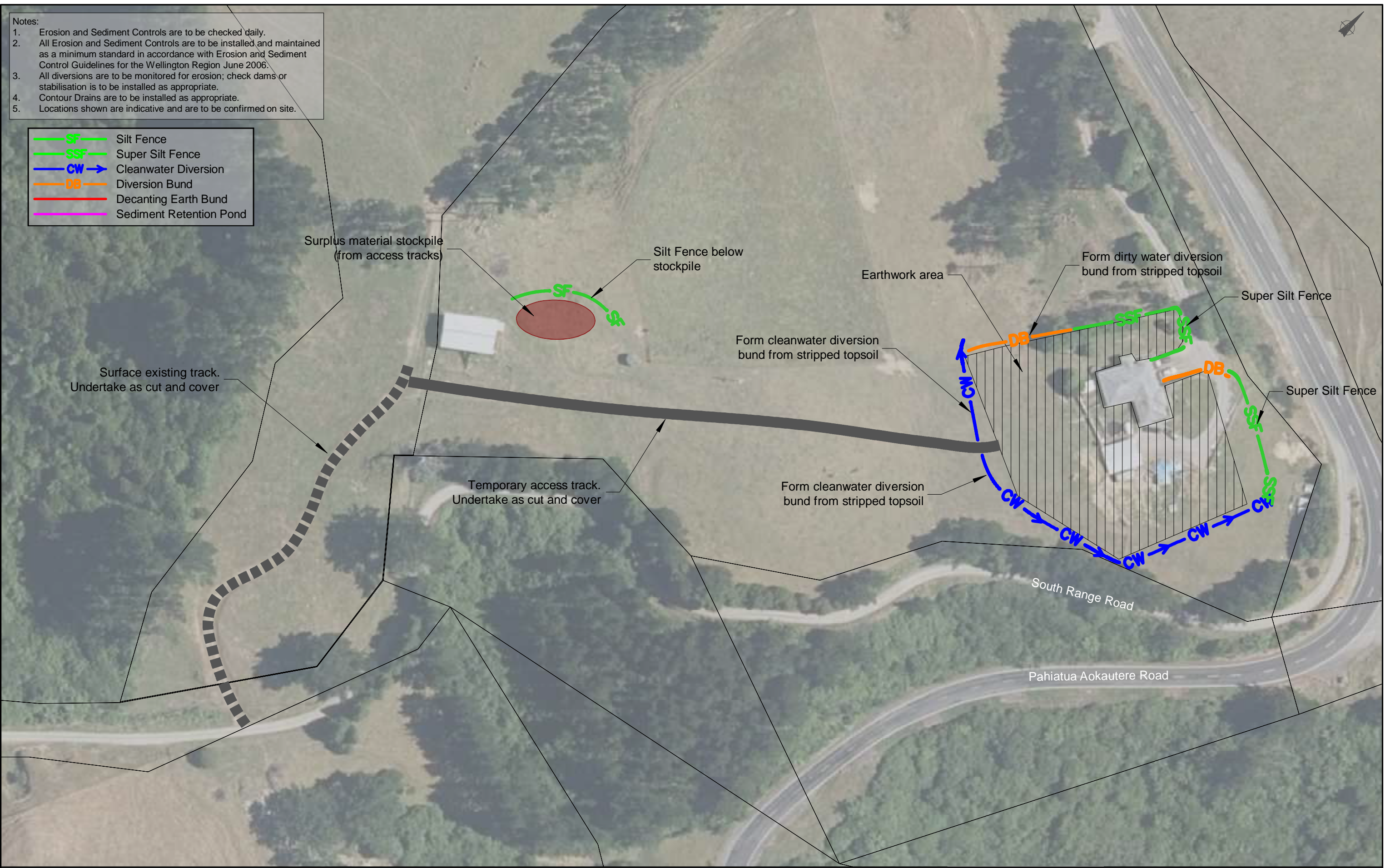
Site Supervisor notify:	
NZ Fire Service	1-111
Police (if appropriate)	1-111
Horizons Regional Council	0508 800 800
Project Manager (Marty Crail)	027 4067886
Environmental Professional (Michelle Flawn)	021583347

Appendix A

Site Office Establishment

- Notes:
1. Erosion and Sediment Controls are to be checked daily.
 2. All Erosion and Sediment Controls are to be installed and maintained as a minimum standard in accordance with Erosion and Sediment Control Guidelines for the Wellington Region June 2006.
 3. All diversions are to be monitored for erosion; check dams or stabilisation is to be installed as appropriate.
 4. Contour Drains are to be installed as appropriate.
 5. Locations shown are indicative and are to be confirmed on site.

	Silt Fence
	Super Silt Fence
	Cleanwater Diversion
	Diversion Bund
	Decanting Earth Bund
	Sediment Retention Pond



			BY	DATE
		DESIGNED		
		SURVEYED		
A	For Review	DMM	10-07-19	AUTOCAD
	AMENDMENT	APP'D	Date	APPROVED

TURITEA WIND FARM

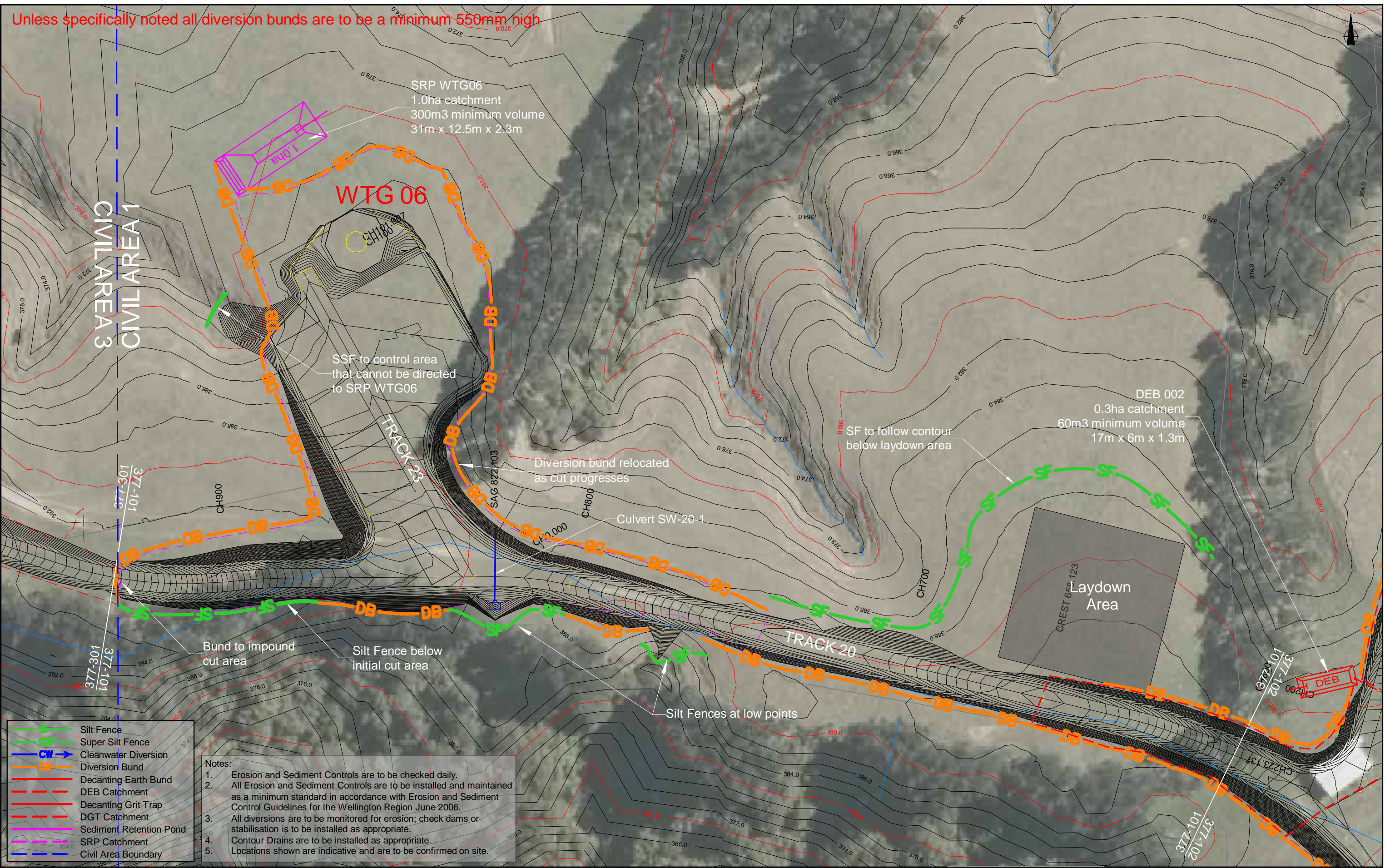
0274 8389230
info@mccconnell.nz
www.mccconnell.nz

Site Compound Establishment			
TITLE: Erosion and Sediment Control			
Client: Downer			
Plot Date	Scale: 1:1000 @ A3	Job No.: 2019 - 377	
File Number	Drawing No.	Rev. No.	Sheet No.
377	377 - 001	A	1

Appendix B

Erosion and Sediment Control Drawings

Unless specifically noted all diversion bunds are to be a minimum 550mm high



- Silt Fence
- Super Silt Fence
- Cleanwater Diversion
- Diversion Bund
- Decanting Earth Bund
- DEB Catchment
- Decanting Grit Trap
- DGT Catchment
- Sediment Retention Pond
- SRP Catchment
- Civil Area Boundary

Notes:

1. Erosion and Sediment Controls are to be checked daily.
2. All Erosion and Sediment Controls are to be installed and maintained as a minimum standard in accordance with Erosion and Sediment Control Guidelines for the Wellington Region June 2006.
3. All diversions are to be monitored for erosion; check dams or stabilisation is to be installed as appropriate.
4. Contour Drains are to be installed as appropriate.
5. Locations shown are indicative and are to be confirmed on site.

AMENDMENT	APP'D	Date	APPROVED	BY	DATE
				DESIGNED	DMM 26-07-19
C Civil Area Boundaries Added	DMM	09-09-19	SURVEYED		
B Track 20 & 21 Revised	DMM	02-09-19	AUTOCAD	DMM	26-07-19
A For Review	DMM	26-07-19			

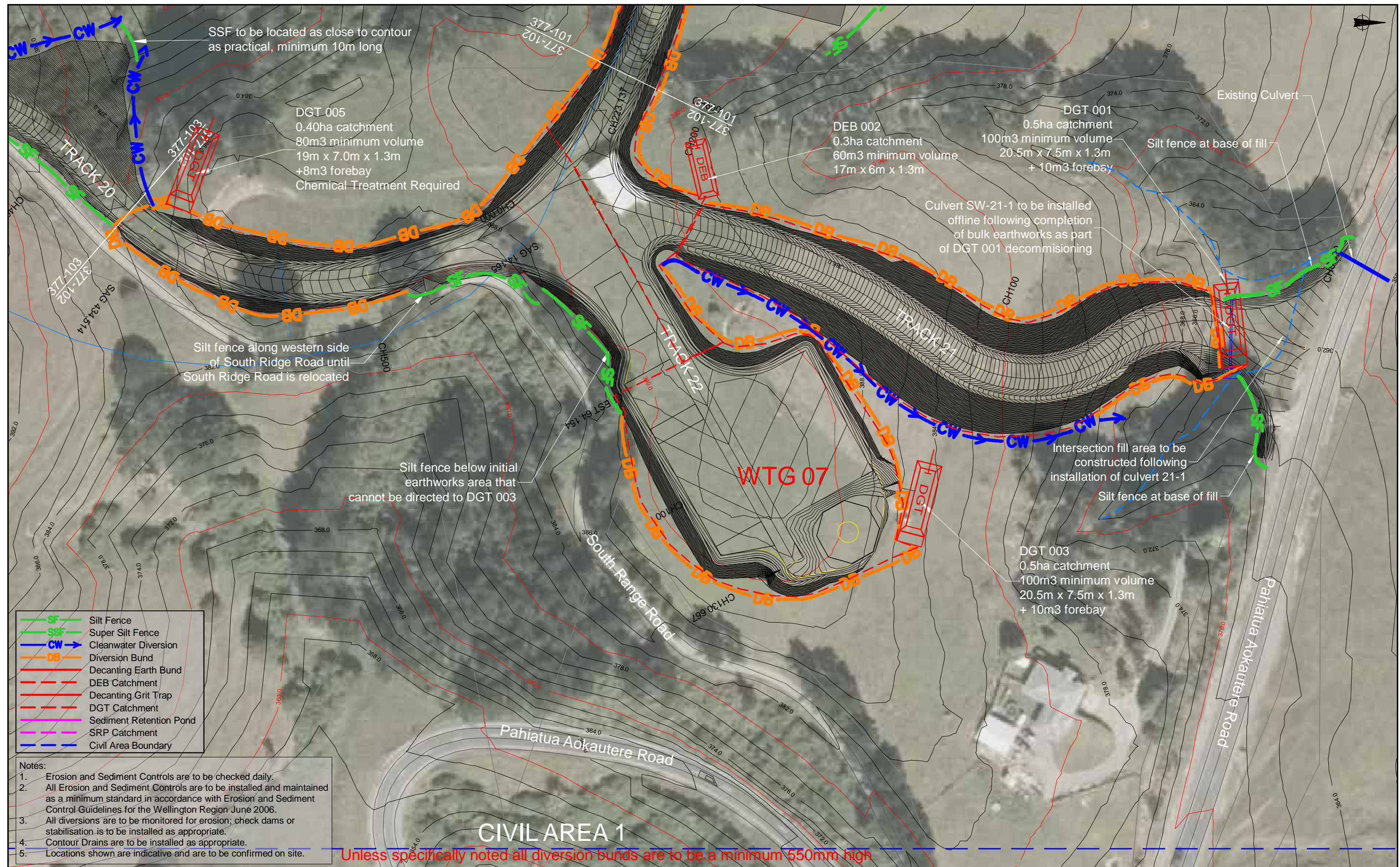
TURITEA WIND FARM

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www.mcconnell.nz

Erosion and Sediment Control			
TITLE: Civil Area 1			
Client: Downer			
Plot Date	Scale: 1:1000 @ A3	Job No.:	2019 - 377
File Number	Drawing No.	Rev. No.	Sheet No.
377	377 - 101	C	1



- Notes:
1. Erosion and Sediment Controls are to be checked daily.
 2. All Erosion and Sediment Controls are to be installed and maintained as a minimum standard in accordance with Erosion and Sediment Control Guidelines for the Wellington Region June 2006.
 3. All diversions are to be monitored for erosion; check dams or stabilisation is to be installed as appropriate.
 4. Contour Drains are to be installed as appropriate.
 5. Locations shown are indicative and are to be confirmed on site.

AMENDMENT	APP'D	Date	APPROVED	BY	DATE
				DESIGNED	DMM 26-07-19
C Civil Area Boundaries Added	DMM	09-09-19	SURVEYED		
B Track 20 & 21 Revised	DMM	03-09-19	AUTOCAD	DMM	26-07-19
A For Review	DMM	26-07-19			




TURITEA WIND FARM



Relationships creating success





0274 8389230
info@mcconnell.nz
www.mcconnell.nz

Erosion and Sediment Control
TITLE: Civil Area 1

Client: Downer

Plot Date	Scale: 1:1000 @ A3	Job No.:	2019 - 377
File Number	Drawing No.	Rev. No.	Sheet No.
377	377 - 102	C	1

Unless specifically noted all diversion bunds are to be a minimum 550mm high

SRP WTG13
1.25ha catchment
375m³ minimum volume
33.5m x 13.0m x 2.3m
Chemical Treatment Required

SSF along contour
below fill areas

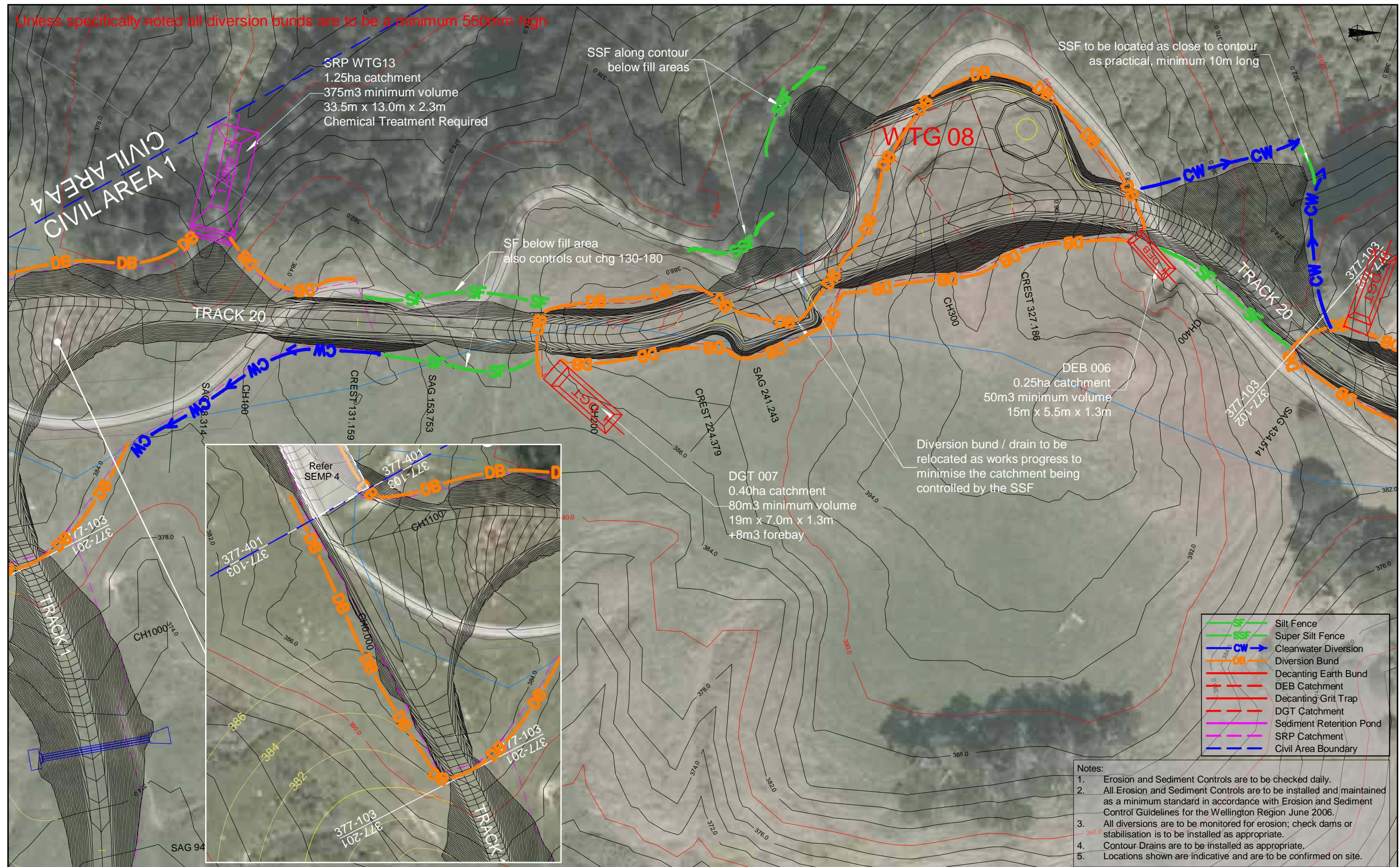
SSF to be located as close to contour
as practical, minimum 10m long

SF below fill area
also controls cut chg 130-180

Diversion bund / drain to be
relocated as works progress to
minimise the catchment being
controlled by the SSF

DGT 007
0.40ha catchment
80m³ minimum volume
19m x 7.0m x 1.3m
+8m³ forebay

DEB 006
0.25ha catchment
50m³ minimum volume
15m x 5.5m x 1.3m



- Silt Fence
- Super Silt Fence
- Cleanwater Diversion
- Diversion Bund
- Decanting Earth Bund
- Decanting Grit Trap
- DGT Catchment
- DEB Catchment
- Sediment Retention Pond
- SRP Catchment
- Civil Area Boundary

- Notes:
- Erosion and Sediment Controls are to be checked daily.
 - All Erosion and Sediment Controls are to be installed and maintained as a minimum standard in accordance with Erosion and Sediment Control Guidelines for the Wellington Region June 2006.
 - All diversions are to be monitored for erosion; check dams or stabilisation is to be installed as appropriate.
 - Contour Drains are to be installed as appropriate.
 - Locations shown are indicative and are to be confirmed on site.

	BY	DATE
DESIGNED	DMM	26-07-19
SURVEYED		
AUTOCAD	DMM	26-07-19
APPROVED		
AMENDMENT	APP'D	Date
C Civil Area Boundaries Added	DMM	09-09-19
B Track 20 Revised	DMM	03-09-19
A For Review	DMM	26-07-19

**TURITEA
WIND
FARM**

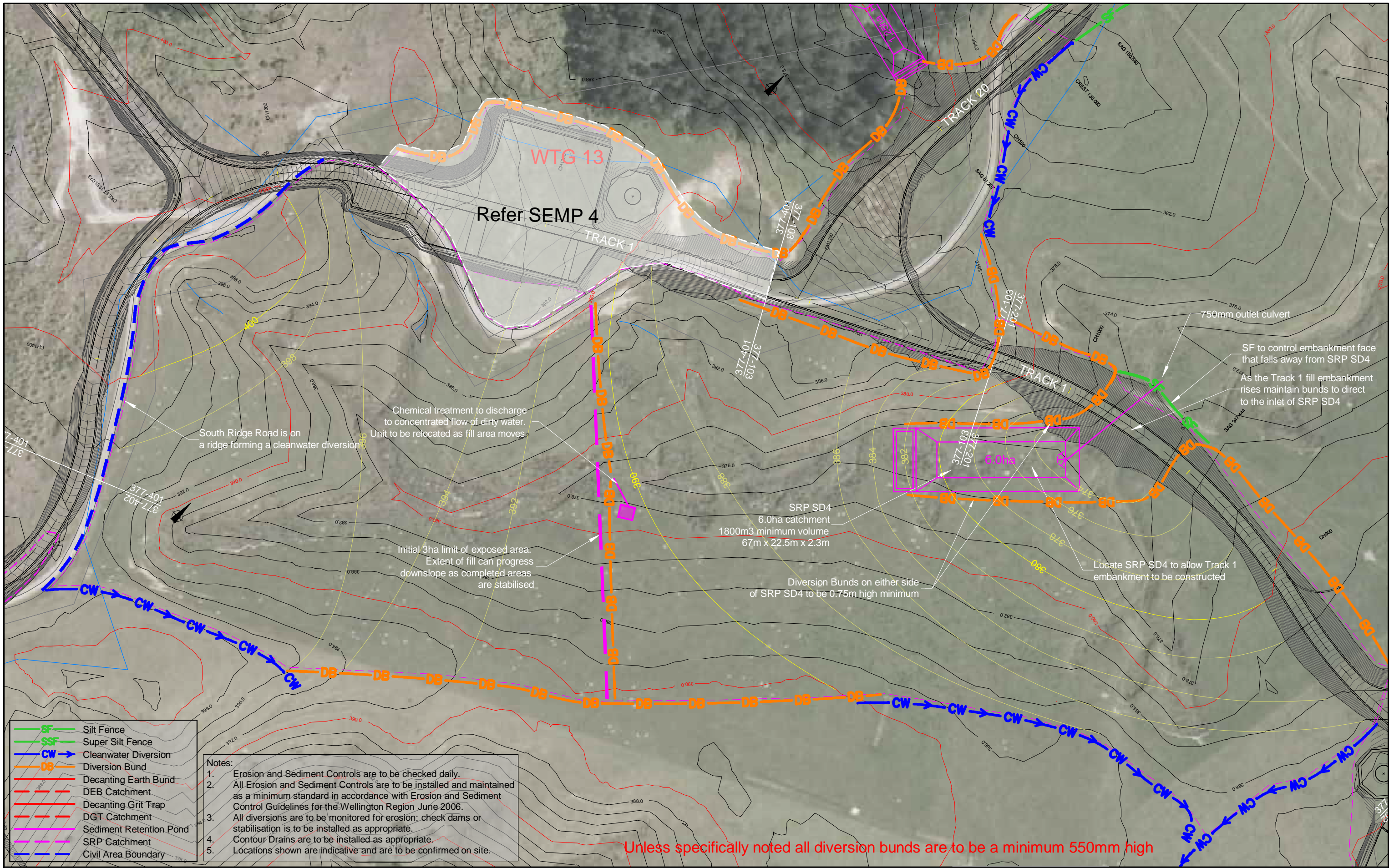
Relationships creating success

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Erosion and Sediment Control
TITLE: Civil Area 1

Client: Downer

Plot Date	Scale: 1:1000 @ A3	Job No.:	2019 - 377
File Number	Drawing No.	Rev. No.	Sheet No.
377	377 - 103	C	1



	Silt Fence
	Super Silt Fence
	Cleanwater Diversion
	Diversion Bund
	Decanting Earth Bund
	DEB Catchment
	Decanting Grit Trap
	DGT Catchment
	Sediment Retention Pond
	SRP Catchment
	Civil Area Boundary

- Notes:
1. Erosion and Sediment Controls are to be checked daily.
 2. All Erosion and Sediment Controls are to be installed and maintained as a minimum standard in accordance with Erosion and Sediment Control Guidelines for the Wellington Region June 2006.
 3. All diversions are to be monitored for erosion; check dams or stabilisation is to be installed as appropriate.
 4. Contour Drains are to be installed as appropriate.
 5. Locations shown are indicative and are to be confirmed on site.

			BY	DATE
		DESIGNED	DMM	26-07-19
C	Extent of works clarified	DMM	09-09-19	SURVEYED
B	Chemical treatment and bund details added	DMM	03-09-19	
A	For Review	DMM	26-07-19	AUTOCAD
	AMENDMENT	APP'D	Date	APPROVED

Relationships creating success

TURITEA WIND FARM

McConnell Consultancy Ltd			
0274 8389230 info@mcconnell.nz www.mcconnell.nz			
Erosion and Sediment Control TITLE: Spoil Disposal Area 4			
Client: Downer			
Plot Date	Scale: 1:1250 @ A3	Job No.: 2019 - 377	
File Number	Drawing No.	Rev. No.	Sheet No.
377	377 - SD4-1	C	1

Appendix C

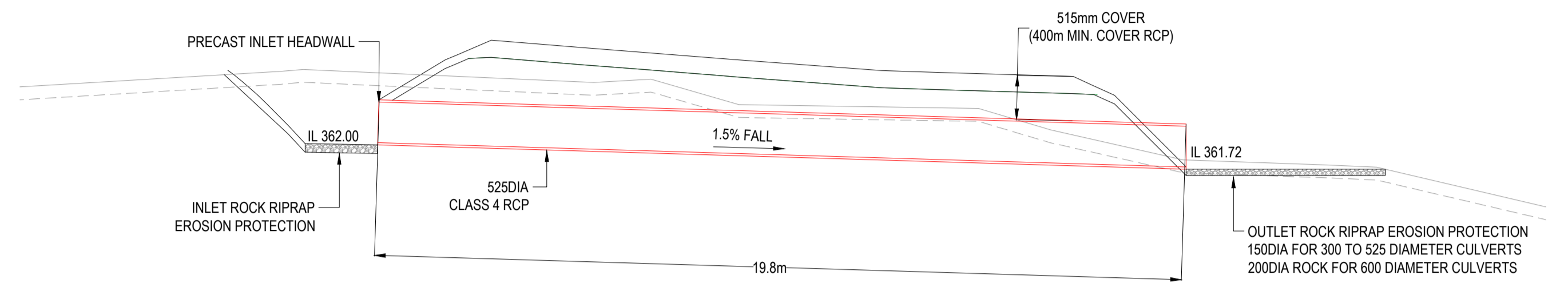
Culvert SW-21-1



WESTERN SITE ENTRANCE INTERSECTION LAYOUT PLAN

SCALE 1:250

CULVERTS									
CULVERT NAME	CATCHMENT	C_{10}	I_{20} (mm/h)	Q_{20} (m ³ /s)	CULVERT SIZE	CAPACITY	PERCENT FULL	FROUDE	VELOCITY
SW-21-1	2.264 ha	0.180	102.00	0.481	525DIA RCP - CLASS 4	0.550	88%	1.62	2.96



STORMWATER RCP CULVERT DETAIL

NTS

NOTE

EXISTING CONTOURS SHOWN ON PLAN ARE DERIVED FROM LIDAR DATA.