Objective

To estimate sediment yield from typical land disturbing activities included within the scope of the Southland Wind Farm development. The typical scenarios/catchments assessed include:

- Formation of wind turbine platforms.
- Formation of new access tracks.
- Formation of ancillary platforms.
- Surplus fill disposal site in head of gully
- Surplus fill disposal site – shoulder fill.

Methodology

The Universal Soil Loss Equation (USLE) has been adopted to assess the 'pre-development', 'unmitigated', and 'mitigated' sediment yield.

USLE Equation: A = R x K x LS x C x P

A = Estimate of Sediment Generation (tonnes/ha/yr)

Where:

R = Rainfall Erosion Index (J/ha)
K = Soil Erodibility Factor (tonnes/unit of R)
LS = Slope Length and Steepness Factor
C = Ground Cover Factor
P = Roughness Factor

Design calculations and parameters are generally based on the *Auckland Regional Council landfacts S-05: Estimating Sediment Yield Using the Universal Soil Loss Equation.*

Rainfall Erosion Index (R)

R is calculated based on the 50% AEP 6-hour rainfall depth.

$$\mathbf{R = 0.00828 \times p^{2.2} \times 1.7}$$

Where:

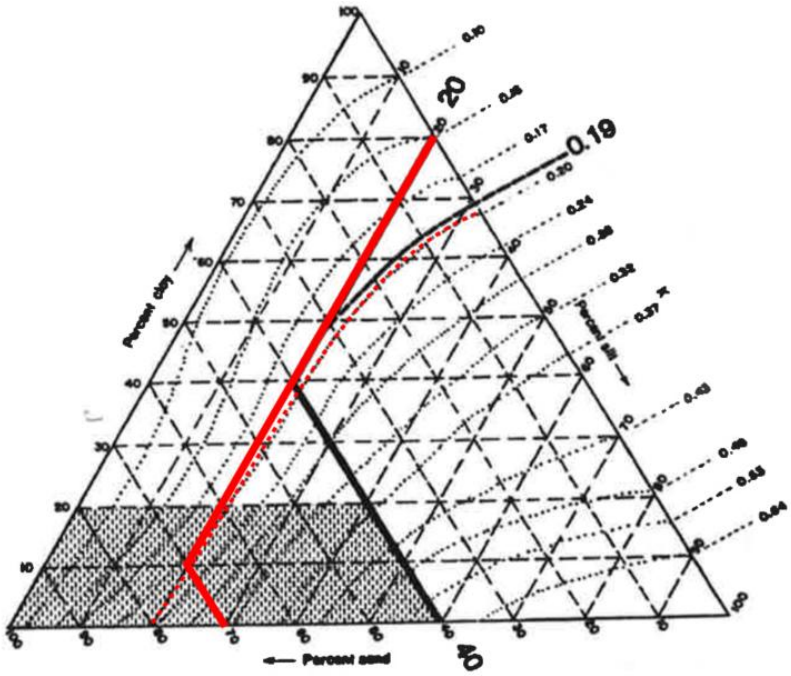
p = 28.90mm (Hirds)
R = 23.04 J/ha

Soil Erodibility Factor (K)

K is based on a typical soil composition which has been assumed as uniform across the site. Soil logs presented in the Geotechnical Report (refer to Riley Report: 220372-B) indicate an estimated 10% clay, 20% silt, and 70% sand. The nomograph shown in Figure 1 is used to determine the K value which is then multiplied by 1.32 to convert units. 4% and 0% organic content is assumed for pre-development and earthworks, respectively.

$K_{pre\text{-}dev}$ = (0.20 - 0.10) x 1.32 = 0.13 (adjusted for 4% organic matter)
$K_{earthworks}$ = (0.20 + 0.10) x 1.32 = 0.40 (0% organic matter)

Figure 1: Triangular Nomograph for Estimating K Values (red mark-up)



Goldman et al. 1986

Slope Length and Steepness Factor (LS)

LS has been assessed based site topography and corresponding values presented in S-05 Appendix 1 – LS Values. For the earthwork's construction phase, the average slope of the pre and post earthworks landform has been calculated. For the re-establishment phase the post earthworks slope has been calculated.

Figure 2: LS Values

APPENDIX 1: LS VALUES

Slope Ratio s,%	Slope Length, m												
	10.00	25.00	50.00	75.00	100.00	125.00	150.00	175.00	200.00	225.00	250.00	275.00	300.00
0.50	0.08	0.09	0.11	0.11	0.12	0.13	0.13	0.14	0.14	0.14	0.15	0.15	0.15
1.00	0.09	0.12	0.15	0.17	0.18	0.20	0.21	0.22	0.23	0.23	0.24	0.25	0.26
2.00	0.14	0.19	0.23	0.26	0.29	0.31	0.32	0.34	0.35	0.37	0.38	0.39	0.40
3.00	0.21	0.27	0.33	0.38	0.41	0.44	0.46	0.48	0.50	0.52	0.54	0.56	0.57
4.00	0.26	0.37	0.49	0.57	0.64	0.70	0.76	0.80	0.85	0.89	0.93	0.96	1.00
5.00	0.31	0.48	0.69	0.84	0.97	1.08	1.19	1.28	1.37	1.45	1.53	1.61	1.68
6.00	0.39	0.61	0.86	1.06	1.22	1.36	1.49	1.61	1.72	1.83	1.93	2.02	2.11
7.00	0.47	0.75	1.06	1.29	1.49	1.67	1.83	1.98	2.11	2.24	2.36	2.48	2.59
8.00	0.57	0.90	1.27	1.56	1.80	2.01	2.20	2.38	2.54	2.70	2.84	2.98	3.11
9.00	0.67	1.06	1.50	1.84	2.13	2.38	2.60	2.81	3.01	3.19	3.36	3.53	3.68
10.00	0.78	1.24	1.75	2.15	2.48	2.77	3.04	3.28	3.51	3.72	3.92	4.11	4.30
11.00	0.91	1.43	2.02	2.48	2.86	3.20	3.51	3.79	4.05	4.29	4.53	4.75	4.96
12.50	1.10	1.74	2.46	3.02	3.48	3.89	4.26	4.61	4.92	5.22	5.51	5.77	6.03
15.00	1.47	2.32	3.28	4.02	4.64	5.19	5.68	6.14	6.56	6.96	7.34	7.69	8.04
16.70	1.74	2.76	3.90	4.77	5.51	6.16	6.75	7.29	7.79	8.27	8.71	9.14	9.55
20.00	2.34	3.70	5.23	6.40	7.39	8.26	9.05	9.78	10.45	11.09	11.69	12.26	12.80
22.00	2.73	4.32	6.11	7.49	8.65	9.67	10.59	11.44	12.23	12.97	13.67	14.34	14.98
25.00	3.38	5.34	7.55	9.25	10.68	11.94	13.08	14.12	15.10	16.01	16.88	17.70	18.49
30.00	4.56	7.21	10.19	12.48	14.41	16.12	17.65	19.07	20.39	21.62	22.79	23.90	24.97
33.30	5.41	8.55	12.09	14.80	17.09	19.11	20.93	22.61	24.17	25.64	27.03	28.34	29.61
35.00	5.86	9.26	13.10	16.05	18.53	20.71	22.69	24.51	26.20	27.79	29.30	30.73	32.09
40.00	7.25	11.47	16.22	19.86	22.93	25.64	28.09	30.34	32.43	34.40	36.26	38.03	39.72
45.00	8.71	13.78	19.48	23.86	27.55	30.80	33.74	36.45	38.96	41.33	43.56	45.69	47.72
50.00	10.22	16.15	22.84	27.98	32.31	36.12	39.57	42.74	45.69	48.46	51.08	53.57	55.95
55.00	11.74	18.56	26.25	32.15	37.13	41.51	45.47	49.12	52.51	55.69	58.71	61.57	64.31
57.00	12.35	19.53	27.62	33.83	39.06	43.67	47.84	51.68	55.24	58.60	61.77	64.78	67.66
60.00	13.27	20.98	29.67	36.34	41.96	46.91	51.39	55.51	59.34	62.94	66.35	69.59	72.68
66.70	15.29	24.18	34.20	41.88	48.36	54.07	59.23	63.98	68.40	72.55	76.47	80.20	83.77
70.00	16.27	25.73	36.39	44.57	51.46	57.53	63.03	68.08	72.78	77.19	81.37	85.34	89.13
75.00	17.72	28.03	39.63	48.54	56.05	62.67	68.65	74.15	79.27	84.08	88.62	92.95	97.08
80.00	19.13	30.25	42.78	52.39	60.50	67.64	74.10	80.03	85.56	90.75	95.66	100.33	104.79
85.00	20.49	32.39	45.81	56.11	64.78	72.43	79.34	85.70	91.62	97.18	102.43	107.43	112.21
90.00	21.79	34.45	48.72	59.67	68.90	77.03	84.38	91.14	97.43	103.35	108.94	114.25	119.33
95.00	23.03	36.41	51.50	63.07	72.83	81.42	89.19	96.34	102.99	109.24	115.15	120.77	126.14
100.00	24.21	38.28	54.14	66.31	76.57	85.61	93.78	101.29	108.29	114.85	121.07	126.98	132.62

Calculated From:

$$LS = \left(\frac{65.41 \times s^2}{s^2 + 10{,}000} + \frac{4.56 \times s}{\sqrt{s^2 + 10{,}000}} + 0.065\right) \times \left(\frac{l}{72.5}\right)^m$$

22.1

LS= topographic factor
l = Slope length, m
s = Slope steepness
m = Exponent dependent on slope steepness
0.2 for slopes<1%, 0.3 for slopes 1-3%. 0.4 for slopes 3.5-4.5%, and 0.5 for slopes > 5%)

Ground Cover (C) and Roughness (P)

C and P Factors have been adopted from S-05 based on the surface type.

Figure 3: C & P Values

Treatment	C factor	P factor
Bare Soil		
- compacted and smooth	1.0	1.32
- track walked on contour	1.0	1.2
- rough irregular surface	1.0	0.9
- disked to 250 mm depth	1.0	0.8
Native vegetation (undisturbed)	0.01	1.0
Pasture (undisturbed)	0.02	1.0
Establishing grass	0.1	1.0
Mulch – on subsoil[2]	0.15 (3 month period only)	1.0
Mulch – on topsoil[3]	0.05 (3 month period only)	1.0

Ground cover for re-establishment phase (mulch on topsoil) only relates to surplus fill disposals, plus platform/road earthworks batters/berms. Platforms and roads will be stabilised with hardfill – so those areas are excluded from the re-establishment areas.

E&SC Measures

E&SC factors will be incorporated into the USLE calculation to determine mitigation effectiveness before entering the receiving environment. These factors include:

Sediment Delivery Ratio (%)

Regarding the sediment delivery ratio, S-05 identifies 50% as generally accepted. However, this should be increased for steep sites (e.g., 70% where site slopes exceed 10°).

Sediment Control Measure Efficiency (%)

The effectiveness of E&SC devices. S-05 identifies 50% as a conservative value for most devices, except for Sediment Retention Pond (SRP) – where typically a min 75% efficiency is used. However, for coarse grained soils a higher efficiency can be assumed. In the case of SWF geology, the silts/sand and weathered rock matrix would constitute a coarse grained soil, therefore we have adopted the following assumptions for treatment efficiencies:

- Decanting Earth Bund (DEB) = 70%
- SRP = 85%
- Other Devices = 60%

Higher treatment efficiencies would apply for chemically treated SRPs and DEBs installed in accordance with Auckland Regional Council GD05.

Time (estimate only – to be confirmed by Contractor)

The USLE equation calculates annual sediment yield whereas, we have broken this down to months and estimated construction periods for land disturbing activities. We have assumed:

- Turbine and ancillary platforms will require up to 3-months each to form.
- New access tracks will likely be progressively constructed and covered but assume sections could be exposed for up to 3-months at a time.
- Fill disposal sites may remain active (i.e., exposed) for up to 8-months.
- Stabilisation of backfilled disposal sites and/or slopes will take 3-months.

Calculations

Calculations and catchments plans have been appended for each case study.

Commentary on Proposed Sediment Controls

For access tracks in cut or minor fill, and remote from sensitive receiving environments (such as wetlands), it is envisaged that a cut and cover technique can be applied. I.e. the trimmed subgrades will be stabilised progressively and prior to rain events, such that no

specific sediment control devices will be required for those areas. Therefore, the cut and cover scenario has not been assessed further in terms of sediment yield calculations.

It is envisaged that Sediment Retention Ponds (SRP's) will be the primary treatment device for the Surplus Fill Disposal sites (SFD's), given the longer earthworks duration associated with the SFD's, and sloping nature of the SFD sites (particularly in the case of gully fills).

It is envisaged that the decanting earth bunds (DEB's) will be suitable as primary treatment devices for wind turbine platforms and access track fill earthworks. The turbine platforms will be formed as gently sloping/ near flat platforms, therefore these favours splitting the platforms catchment into smaller sub-catchments draining to multiple DEB's.

The ancillary platforms (site compound/ batching plant/substation etc) may utilise SRP's or DEB's, dependant on site constraints and catchment properties.

Other sediment control measures may be utilised where appropriate within the site e.g.:

- silt fences in constrained areas where these is limited space for diversion channels/DEB's, subject to wind loading conditions.
- turkeys' nests - for dewatering (pump discharge) from bunded/low lying areas. Silt fences and turkeys nests are recognised treatment devices in GD05.

As per GD05, the DEB volumes must be min 2% of the catchment area, with recommended maximum catchment area of 3,000m2. However, given large extent of the proposed earthworks, some flexibility can be applied to allow increased catchment area for each DEB (and proportionally increase the DEB volume) and thus reduce the total number of DEB's.

The use of rain-activated chemical treatment should be considered to increase the sediment yield efficiency of sediment control devices which are in proximity (nominally within 50m) of downstream water bodies – such as bogs/wetlands, and streams. This will be subject to bench testing of site soils and preparation of Chemical Treatment Management Plan. However, for the purposes of this USLE assessment, chemical treatment has not been applied in terms of the sediment control efficiencies used.

Universal Soil Loss Equation (USLE)

Project No: 220372 **Design:** AR **Date:** 15/08/2025

Project: Southland Wind Farm **Check:** LG **Date:** 15/08/2025

Catchment: **Exemplar Catchment - Gully Type Fill Disposal (SFD-G04)**

Rainfall Depth: 28.90 mm

R = 23.04 J/ha

USLE: **A = R*K*LS*C*P**

A = Annual Estimated Sediment Generation, T/ha/yr

R = Rainfall Erosion Index, J/ha

K = Soil Erodability Factor, T/Unit of R

LS = Slope Length and Steepness Factor

C = Ground Cover Factor

P = Roughness Factor

Typ. Soil Composition:

Clay = 10%

Silt = 20%

Sand = 70%

$K_{pre-dev}$ = 0.13 4% organic

$K_{earthworks}$ = 0.40 0% organic

Typ. E&SC Devices:

		Efficiency
N/A	Unmitigated	0%
1	Chemically Treated Sediment Retention Pond	95%
2	Standard Sediment Retention Pond	85%
3	Chemically Treated T-bar Decanting Earth Bunds	85%
4	Standard T-bar Decanting Earth Bunds	70%
5	Other (e.g., silt fencing, mulch etc.)	60%

Area/Activity	R	K	Slope Length (m)	Slope Grade (%)	LS	Surface Type	C	P	Exposed Area (ha)	Duration (months)	A (T)	Sediment Delivery Ratio (%)	E&SC Device	Sediment Control Efficiency (%)	Estimated Sediment Yield (T)
Pre-development															
Existing Site	23.04	0.13	160	12.5%	4.45	Native vegetation (undisburbed)	0.01	1.00	1.20	11	0.149	50%	N/A	0%	0.074
														Subtotal =	**0.074**
Unmitigated Earthworks (Construction Period)															
Gully filling	23.04	0.40	160	12.5%	4.45	Bare Soil -rough irregular surface	1.00	0.90	1.20	8	29.231	50%	N/A	0%	14.615
Gully stabilisation	23.04	0.13	160	12.5%	4.45	Mulch on topsoil	0.05	1.00	1.20	3	0.200	50%	N/A	0%	0.100
														Subtotal =	**14.715**
Mitigated Earthworks (Construction Period)															
Gully filling	23.04	0.40	160	12.5%	4.45	Bare Soil -rough irregular surface	1.00	0.90	1.20	8	29.231	50%	2	85%	2.192
Gully stabilisation	23.04	0.13	160	12.5%	4.45	Mulch on topsoil	0.05	1.00	1.20	3	0.200	50%	2	85%	0.015
														Subtotal =	**2.207**

Notes:

1) Rainfall Erosion Index is calculated based on HIRDS V4 50% AEP 6-hour rainfall depth.
2) Soil Erodability Factor determined based on observed soil composition and Triangular Nomograph for Estimating K values (refer to Auckland Regional Council S-05 - Figure 1).
3) Slope Length and Steepness Factor based on site topography and corresponding values presented in Auckland Regional Council S-05 - Appendix 1.
4) Ground Cover and Roughness Factors based on surface cover type and corresponding values presented in Auckland Regional Council S-05 - Table 2.
5) 50% Sediment Delivery Ratio is generally acceptable except where sites are steep (i.e., 70% for sites where slopes exceed 10-degrees (or 17.5%)).

Universal Soil Loss Equation (USLE)

Project No: 220372 **Design:** AR **Date:** 15/08/2025

Project: Southland Wind Farm **Check:** LG **Date:** 15/08/2025

Catchment: **Exemplar Catchment - Shoulder Fill Disposal (SFD-21)**

Rainfall Depth: 28.90 mm

R = 23.04 J/ha

USLE: **A = R*K*LS*C*P**

Typ. Soil Composition:

A = Annual Estimated Sediment Generation, T/ha/yr

R = Rainfall Erosion Index, J/ha

K = Soil Erodability Factor, T/Unit of R

LS = Slope Length and Steepness Factor

C = Ground Cover Factor

P = Roughness Factor

Clay = 10%

Silt = 20%

Sand = 70%

$K_{pre-dev}$ = 0.13 4% organic

$K_{earthworks}$ = 0.40 0% organic

Typ. E&SC Devices:

		Efficiency
N/A	Unmitigated	0%
1	Chemically Treated Sediment Retention Pond	95%
2	Standard Sediment Retention Pond	85%
3	Chemically Treated T-bar Decanting Earth Bunds	85%
4	Standard T-bar Decanting Earth Bunds	70%
5	Other (e.g., silt fencing, mulch etc.)	60%

Area/Activity	R	K	Slope Length (m)	Slope Grade (%)	LS	Surface Type	C	P	Exposed Area (ha)	Duration (months)	A (T)	Sediment Delivery Ratio (%)	E&SC Device	Sediment Control Efficiency (%)	Estimated Sediment Yield (T)
Pre-development															
Existing Site	23.04	0.13	125	9.0%	2.38	Native vegetation (undisburbed)	0.01	1.00	1.43	11	0.095	50%	N/A	0%	0.047
														Subtotal =	**0.047**
Unmitigated Earthworks (Construction Period)															
Shoulder filling	23.04	0.40	125	9.0%	2.38	Bare Soil - compacted and smooth	1.00	1.32	1.43	8	27.324	50%	N/A	0%	13.662
Shoulder stabilisation	23.04	0.13	125	9.0%	2.38	Mulch on topsoil	0.05	1.00	1.43	3	0.127	50%	N/A	0%	0.064
														Subtotal =	**13.726**
Mitigated Earthworks (Construction Period)															
Shoulder filling	23.04	0.40	125	9.0%	2.38	Bare Soil - compacted and smooth	1.00	1.32	1.43	8	27.324	50%	2	85%	2.049
Shoulder stabilisation	23.04	0.13	125	9.0%	2.38	Mulch on topsoil	0.05	1.00	1.43	3	0.127	50%	2	85%	0.010
														Subtotal =	**2.059**

Notes:

1) Rainfall Erosion Index is calculated based on HIRDS V4 50% AEP 6-hour rainfall depth.
2) Soil Erodability Factor determined based on observed soil composition and Triangular Nomograph for Estimating K values (refer to Auckland Regional Council S-05 - Figure 1).
3) Slope Length and Steepness Factor based on site topography and corresponding values presented in Auckland Regional Council S-05 - Appendix 1.
4) Ground Cover and Roughness Factors based on surface cover type and corresponding values presented in Auckland Regional Council S-05 - Table 2.
5) 50% Sediment Delivery Ratio is generally acceptable except where sites are steep (i.e., 70% for sites where slopes exceed 10-degrees (or 17.5%)).

Universal Soil Loss Equation (USLE)

Project No: 220372 **Design:** AR **Date:** 15/08/2025

Project: Southland Wind Farm **Check:** LG **Date:** 15/08/2025

Catchment: **Exemplar Catchment - Turbine Platform (JED 19)**

Rainfall Depth: 28.90 mm

R = 23.04 J/ha

USLE: **A = R*K*LS*C*P**

A = Annual Estimated Sediment Generation, T/ha/yr

R = Rainfall Erosion Index, J/ha

K = Soil Erodability Factor, T/Unit of R

LS = Slope Length and Steepness Factor

C = Ground Cover Factor

P = Roughness Factor

Typ. Soil Composition:

Clay = 10%

Silt = 20%

Sand = 70%

$K_{pre\text{-}dev}$ = 0.13 4% organic

$K_{earthworks}$ = 0.40 0% organic

Typ. E&SC Devices:

		Efficiency
N/A	Unmitigated	0%
1	Chemically Treated Sediment Retention Pond	95%
2	Standard Sediment Retention Pond	85%
3	Chemically Treated T-bar Decanting Earth Bunds	85%
4	Standard T-bar Decanting Earth Bunds	70%
5	Other (e.g., silt fencing, mulch etc.)	60%

Area/Activity	R	K	Slope Length (m)	Slope Grade (%)	LS	Surface Type	C	P	Exposed Area (ha)	Duration (months)	A (T)	Sediment Delivery Ratio (%)	E&SC Device	Sediment Control Efficiency (%)	Estimated Sediment Yield (T)
Pre-development															
Existing Site	23.04	0.13	85	20.0%	7.00	Native vegetation (undisburbed)	0.01	1.00	1.14	6	0.121	50%	N/A	0%	0.061
														Subtotal =	**0.061**
Unmitigated Earthworks (Construction Period)															
Platform construction	23.04	0.40	50	2.0%	0.23	Bare Soil - compacted and smooth	1.00	1.32	0.75	3	0.519	50%	N/A	0%	0.260
Slope construction	23.04	0.40	35	20.0%	4.30	Bare Soil -rough irregular surface	1.00	0.90	0.39	3	3.442	50%	N/A	0%	1.721
Slope stabilisation	23.04	0.13	35	33.0%	9.15	Mulch on topsoil	0.05	1.00	0.39	3	0.134	70%	N/A	0%	0.094
														Subtotal =	**2.074**
Mitigated Earthworks (Construction Period)															
Platform construction	23.04	0.40	50	2.0%	0.23	Bare Soil - compacted and smooth	1.00	1.32	0.75	3	0.519	50%	4	70%	0.078
Slope construction	23.04	0.40	35	20.0%	4.30	Bare Soil -rough irregular surface	1.00	0.90	0.39	3	3.442	70%	4	70%	0.723
Slope stabilisation	23.04	0.13	35	33.0%	9.15	Mulch on topsoil	0.05	1.00	0.39	3	0.134	70%	4	70%	0.028
														Subtotal =	**0.829**

Notes:

1) Rainfall Erosion Index is calculated based on HIRDS V4 50% AEP 6-hour rainfall depth.
2) Soil Erodability Factor determined based on observed soil composition and Triangular Nomograph for Estimating K values (refer to Auckland Regional Council S-05 - Figure 1).
3) Slope Length and Steepness Factor based on site topography and corresponding values presented in Auckland Regional Council S-05 - Appendix 1.
4) Ground Cover and Roughness Factors based on surface cover type and corresponding values presented in Auckland Regional Council S-05 - Table 2.
5) 50% Sediment Delivery Ratio is generally acceptable except where sites are steep (i.e., 70% for sites where slopes exceed 10-degrees (or 17.5%)).

Universal Soil Loss Equation (USLE)

Project No: 220372 **Design:** AR **Date:** 15/08/2025

Project: Southland Wind Farm **Check:** LG **Date:** 15/08/2025

Catchment: Exemplar Catchment - Turbine Platform within Wetland (JED-23)

Rainfall Depth: 28.90 mm

R = 23.04 J/ha

USLE: **A = R*K*LS*C*P**

A = Annual Estimated Sediment Generation, T/ha/yr
R = Rainfall Erosion Index, J/ha
K = Soil Erodability Factor, T/Unit of R
LS = Slope Length and Steepness Factor
C = Ground Cover Factor
P = Roughness Factor

Typ. Soil Composition:

Clay = 10%
Silt = 20%
Sand = 70%
$K_{pre\text{-}dev}$ = 0.13 4% organic
$K_{earthworks}$ = 0.40 0% organic

Typ. E&SC Devices:

		Efficiency
N/A	Unmitigated	0%
1	Chemically Treated Sediment Retention Pond	95%
2	Standard Sediment Retention Pond	85%
3	Chemically Treated T-bar Decanting Earth Bunds	85%
4	Standard T-bar Decanting Earth Bunds	70%
5	Other (e.g., silt fencing, mulch etc.)	60%

Area/Activity	R	K	Slope Length (m)	Slope Grade (%)	LS	Surface Type	C	P	Exposed Area (ha)	Duration (months)	A (T)	Sediment Delivery Ratio (%)	E&SC Device	Sediment Control Efficiency (%)	Estimated Sediment Yield (T)
Pre-development															
Existing Site	23.04	0.13	77	7.0%	1.30	Native vegetation (undisburbed)	0.01	1.00	0.44	6	0.009	50%	N/A	0%	0.004
														Subtotal =	**0.004**
Unmitigated Earthworks (Construction Period)															
Platform construction	23.04	0.40	52	2.0%	0.23	Bare Soil - compacted and smooth	1.00	1.32	0.44	3	0.305	50%	N/A	0%	0.152
														Subtotal =	**0.152**
Mitigated Earthworks (Construction Period)															
Platform construction	23.04	0.40	52	2.0%	0.23	Bare Soil - compacted and smooth	1.00	1.32	0.44	3	0.305	50%	4	70%	0.046
														Subtotal =	**0.046**

Notes:

1) Rainfall Erosion Index is calculated based on HIRDS V4 50% AEP 6-hour rainfall depth.
2) Soil Erodability Factor determined based on observed soil composition and Triangular Nomograph for Estimating K values (refer to Auckland Regional Council S-05 - Figure 1).
3) Slope Length and Steepness Factor based on site topography and corresponding values presented in Auckland Regional Council S-05 - Appendix 1.
4) Ground Cover and Roughness Factors based on surface cover type and corresponding values presented in Auckland Regional Council S-05 - Table 2.
5) 50% Sediment Delivery Ratio is generally acceptable except where sites are steep (i.e., 70% for sites where slopes exceed 10-degrees (or 17.5%)).

Universal Soil Loss Equation (USLE)

Project No: 220372 **Design:** AR **Date:** 15/08/2025

Project: Southland Wind Farm **Check:** LG **Date:** 15/08/2025

Catchment: **Exemplar Catchment - Access Track**

Rainfall Depth: 28.90 mm

R = 23.04 J/ha

USLE: **A = R*K*LS*C*P**

A = Annual Estimated Sediment Generation, T/ha/yr

R = Rainfall Erosion Index, J/ha

K = Soil Erodability Factor, T/Unit of R

LS = Slope Length and Steepness Factor

C = Ground Cover Factor

P = Roughness Factor

Typ. Soil Composition:

Clay = 10%

Silt = 20%

Sand = 70%

$K_{pre\text{-}dev}$ = 0.13 4% organic

$K_{earthworks}$ = 0.40 0% organic

Typ. E&SC Devices:

		Efficiency
N/A	Unmitigated	0%
1	Chemically Treated Sediment Retention Pond	95%
2	Standard Sediment Retention Pond	85%
3	Chemically Treated T-bar Decanting Earth Bunds	85%
4	Standard T-bar Decanting Earth Bunds	70%
5	Other (e.g., silt fencing, mulch etc.)	60%

Area/Activity	R	K	Slope Length (m)	Slope Grade (%)	LS	Surface Type	C	P	Exposed Area (ha)	Duration (months)	A (T)	Sediment Delivery Ratio (%)	E&SC Device	Sediment Control Efficiency (%)	Estimated Sediment Yield (T)
Pre-development															
Existing Site	23.04	0.13	26	20.0%	3.70	Native vegetation (undisburbed)	0.01	1.00	0.25	6	0.014	50%	N/A	0%	0.0070
														Subtotal =	**0.0070**
Unmitigated Earthworks (Construction Period)															
Batter construction	23.04	0.40	26	20.0%	3.70	Bare Soil -rough irregular surface	1.00	0.90	0.25	3	1.899	50%	N/A	0%	0.9494
Batter stabilisation	23.04	0.13	26	33.0%	8.55	Mulch on topsoil	0.05	1.00	0.25	3	0.080	70%	N/A	0%	0.0560
														Subtotal =	**1.005**
Mitigated Earthworks (Construction Period)															
Batter construction	23.04	0.40	26	20.0%	3.70	Bare Soil -rough irregular surface	1.00	0.90	0.25	3	1.899	50%	4	70%	0.2848
Batter stabilisation	23.04	0.13	26	33.0%	8.55	Mulch on topsoil	0.05	1.00	0.25	3	0.080	70%	4	70%	0.0168
														Subtotal =	**0.302**

Notes:

1) Rainfall Erosion Index is calculated based on HIRDS V4 50% AEP 6-hour rainfall depth.
2) Soil Erodability Factor determined based on observed soil composition and Triangular Nomograph for Estimating K values (refer to Auckland Regional Council S-05 - Figure 1).
3) Slope Length and Steepness Factor based on site topography and corresponding values presented in Auckland Regional Council S-05 - Appendix 1.
4) Ground Cover and Roughness Factors based on surface cover type and corresponding values presented in Auckland Regional Council S-05 - Table 2.
5) 50% Sediment Delivery Ratio is generally acceptable except where sites are steep (i.e., 70% for sites where slopes exceed 10-degrees (or 17.5%)).

Universal Soil Loss Equation (USLE)

Project No: 220372 **Design:** AR **Date:** 15/08/2025

Project: Southland Wind Farm **Check:** LG **Date:** 15/08/2025

Catchment: Exemplar Catchment - Site Facility (Overflow Storage Area)

Rainfall Depth: 28.90 mm

R = 23.04 J/ha

USLE: **A = R*K*LS*C*P**

A = Annual Estimated Sediment Generation, T/ha/yr

R = Rainfall Erosion Index, J/ha

K = Soil Erodability Factor, T/Unit of R

LS = Slope Length and Steepness Factor

C = Ground Cover Factor

P = Roughness Factor

Typ. Soil Composition:

Clay = 10%

Silt = 20%

Sand = 70%

$K_{pre\text{-}dev}$ = 0.13 4% organic

$K_{earthworks}$ = 0.40 0% organic

Typ. E&SC Devices:

		Efficiency
N/A	Unmitigated	0%
1	Chemically Treated Sediment Retention Pond	95%
2	Standard Sediment Retention Pond	85%
3	Chemically Treated T-bar Decanting Earth Bunds	85%
4	Standard T-bar Decanting Earth Bunds	70%
5	Other (e.g., silt fencing, mulch etc.)	60%

Area/Activity	R	K	Slope Length (m)	Slope Grade (%)	LS	Surface Type	C	P	Exposed Area (ha)	Duration (months)	A (T)	Sediment Delivery Ratio (%)	E&SC Device	Sediment Control Efficiency (%)	Estimated Sediment Yield (T)
Pre-development															
Existing Site	23.04	0.13	75	21.0%	6.40	Native vegetation (undisburbed)	0.01	1.00	0.75	6	0.073	70%	N/A	0%	0.051
														Subtotal =	**0.051**
Unmitigated Earthworks (Construction Period)															
Platform construction	23.04	0.40	50	10.0%	1.75	Bare Soil - compacted and smooth	1.00	1.32	0.40	3	2.107	50%	N/A	0%	1.054
Slope construction	23.04	0.40	25	20.0%	3.70	Bare Soil -rough irregular surface	1.00	0.90	0.35	3	2.658	50%	N/A	0%	1.329
Slope stabilisation	23.04	0.13	25	33.0%	8.55	Mulch on topsoil	0.05	1.00	0.35	3	0.112	70%	N/A	0%	0.078
														Subtotal =	**2.461**
Mitigated Earthworks (Construction Period)															
Platform construction	23.04	0.40	50	10.0%	1.75	Bare Soil - compacted and smooth	1.00	1.32	0.40	3	2.107	50%	4	70%	0.316
Slope construction	23.04	0.40	25	20.0%	3.70	Bare Soil -rough irregular surface	1.00	0.90	0.35	3	2.658	50%	4	70%	0.399
Slope stabilisation	23.04	0.13	25	33.0%	8.55	Mulch on topsoil	0.05	1.00	0.35	3	0.112	70%	4	70%	0.024
														Subtotal =	**0.738**

Notes:

1) Rainfall Erosion Index is calculated based on HIRDS V4 50% AEP 6-hour rainfall depth.
2) Soil Erodability Factor determined based on observed soil composition and Triangular Nomograph for Estimating K values (refer to Auckland Regional Council S-05 - Figure 1).
3) Slope Length and Steepness Factor based on site topography and corresponding values presented in Auckland Regional Council S-05 - Appendix 1.
4) Ground Cover and Roughness Factors based on surface cover type and corresponding values presented in Auckland Regional Council S-05 - Table 2.
5) 50% Sediment Delivery Ratio is generally acceptable except where sites are steep (i.e., 70% for sites where slopes exceed 10-degrees (or 17.5%)).

EXEMPLAR CATCHMENT - GULLY TYPE FILL DISPOSAL

EXISTING:

AREA = 1.2ha
LENGTH = 160m
GRADIENT = 12.5%

PROPOSED:

AREA = 1.2ha
LENGTH = 160m
GRADIENT = 12.5%

*SRP INSTALLED IN ACCORDANCE WITH GD05

LEGEND

- CLEAN WATER DIVERSION BUND
- DIRTY WATER DIVERSION BUND/ CHANNEL
- SILT FENCE
- EARTHWORKS CATCHMENT AREA
- DECANTING EARTH BUND
- DROP-OUT PIT
- CUT AND COVER METHODOLOGY
- PERMANENT SW CULVERTS
- TEMPORARY E&SC CULVERTS
- SUBSOIL DRAINS
- TRACK SIDE V-DRAIN- RAPIDLY STABILISE WITH HYDROSEED OR ROCK
- WETLAND CONNECTIVITY CULVERTS

NOTES:

1. RAIN-ACTIVATED CHEMICAL TREATMENT TO BE CONSIDERED FOR SRP'S AND DEB'S WHEN LOCATED WITHIN 50m OF WATER BODIES.
2. SILT FENCES MAY BE UTILISED IN CONSTRAINED AREAS IN LIEU OF DEB AND DIVERSION BUNDS (SUBJECT TO WIND EXPOSURE).
3. FILL DISPOSAL AREAS AND GENERAL FILL BATTERS TO BE STABILISED WITH TOPSOIL AND GRASS SEED FOLLOWING FILL COMPLETION. STEEP CUT SLOPES TO BE STABILISED WITH HYDROSEED.
4. ALL E&SC DEVICES TO BE INSTALLED IN ACCORDANCE WITH GD05.

5 10 20m
SCALE 1:500

RESOURCE CONSENT

REV	DATE	ISSUE	BY
B	14.08.25	RESOURCE CONSENT	JM
A	11.07.25	RESOURCE CONSENT	JM

PREP. BY	REVD. BY
JM	LG

APPROVED FOR ISSUE: L GORDON

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CLIENT	CONTACT ENERGY
ADDRESS	VENLAW ROAD 794, SLOPEDOWN, SOUTHLAND
PROJECT	SOUTHLAND WIND FARM
SHEET TITLE	TYPICAL EROSION AND SEDIMENT CONTROL PLAN - GULLY SFD

CADFILE	220372-1151to1156.dwg
SCALE (A1)	ORIG. SHEET SIZE
1:500	A1
DRAWING No.	REV.
220372-1151	B

NOTES:

1. RAIN-ACTIVATED CHEMICAL TREATMENT TO BE CONSIDERED FOR SRP'S AND DEB'S WHEN LOCATED WITHIN 50m OF WATER BODIES.

2. SILT FENCES MAY BE UTILISED IN CONSTRAINED AREAS IN LIEU OF DEB AND DIVERSION BUNDS (SUBJECT TO WIND EXPOSURE).

3. FILL DISPOSAL AREAS AND GENERAL FILL BATTERS TO BE STABILISED WITH TOPSOIL AND GRASS SEED FOLLOWING FILL COMPLETION. STEEP CUT SLOPES TO BE STABILISED WITH HYDROSEED.

4. ALL E&SC DEVICES TO BE INSTALLED IN ACCORDANCE WITH GD05.

EXEMPLAR CATCHMENT - SHOULDER FILL DISPOSAL

EXISTING:

AREA = 1.43ha
LENGTH = 125m
GRADIENT = 9%

PROPOSED:

AREA = 1.43ha
LENGTH = 125m
GRADIENT = 9%

*SRP INSTALLED IN ACCORDANCE WITH GD05

SEDIMENT RETENTION POND.
CATCHMENT AREA = 1.43ha
24m LENGTH BY 12m WIDTH (TOP DIMENSIONS)
DEAD STORAGE VOLUME = 112m³
LIVE STORAGE VOLUME = 224m³

INTERNAL BAFFLE TO ACHIEVE 3:1 LENGTH TO WIDTH RATIO FOR FLOW PATH

PRIMARY AND EMERGENCY OUTLETS (INDICATIVE)

585

DIRTY WATER DIVERSION BUND

TOTAL CATCHMENT
1.43ha
SFD-S21

SUBSOIL DRAIN

EX / PROPOSED FLOW PATH

TRANSMISSION LINE TRACK TO BE USED AS CONSTRUCTION HAUL ROAD TO SFD TOE

DECANTING EARTH BUND
CATCHMENT AREA = 0.18ha

DROP OUT PIT

DIRTY WATER DIVERSION BUND

SUBSOIL DRAIN

SFD-S21

DECANTING EARTH BUND -
CATCHMENT AREA = 1,530 m²

TEMPORARY CULVERT

DIRTY WATER DIVERSION BUND

DECANTING EARTH BUND
CATCHMENT AREA = 3,485 m²

SFD-B41

SUBSOIL DRAIN

JED-28

620

5 10 20m
SCALE 1:500

LEGEND

- CLEAN WATER DIVERSION BUND
- DIRTY WATER DIVERSION BUND/ CHANNEL
- SILT FENCE
- EARTHWORKS CATCHMENT AREA
- DECANTING EARTH BUND
- DROP-OUT PIT
- CUT AND COVER METHODOLOGY
- PERMANENT SW CULVERTS
- TEMPORARY E&SC CULVERTS
- SUBSOIL DRAINS
- TRACK SIDE V-DRAIN- RAPIDLY STABILISE WITH HYDROSEED OR ROCK
- WETLAND CONNECTIVITY CULVERTS

RESOURCE CONSENT

REV	DATE	ISSUE	BY
B	14.08.25	RESOURCE CONSENT	JM
A	11.07.25	RESOURCE CONSENT	JM

PREP. BY	REVD. BY
JM	LG

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CLIENT	CONTACT ENERGY
ADDRESS	VENLAW ROAD 794, SLOPEDOWN, SOUTHLAND
PROJECT	SOUTHLAND WIND FARM
SHEET TITLE	TYPICAL EROSION AND SEDIMENT CONTROL PLAN - SHOULDER AND BLANKET SFD

CADFILE	220372-1151to1156.dwg
SCALE (A1)	ORIG. SHEET SIZE
1:500	A1
DRAWING No.	REV.
220372-1152	B

LEGEND

- CLEAN WATER DIVERSION BUND
- DIRTY WATER DIVERSION BUND/ CHANNEL
- SILT FENCE
- EARTHWORKS CATCHMENT AREA
- DECANTING EARTH BUND
- DROP-OUT PIT
- CUT AND COVER METHODOLOGY
- PERMANENT SW CULVERTS
- TEMPORARY E&SC CULVERTS

NOTES:

1. RAIN-ACTIVATED CHEMICAL TREATMENT TO BE CONSIDERED FOR SRP'S AND DEB'S WHEN LOCATED WITHIN 50m OF WATER BODIES.
2. SILT FENCES MAY BE UTILISED IN CONSTRAINED AREAS IN LIEU OF DEB AND DIVERSION BUNDS (SUBJECT TO WIND EXPOSURE).
3. FILL DISPOSAL AREAS AND GENERAL FILL BATTERS TO BE STABILISED WITH TOPSOIL AND GRASS SEED FOLLOWING FILL COMPLETION. STEEP CUT SLOPES TO BE STABILISED WITH HYDROSEED.
4. ALL E&SC DEVICES TO BE INSTALLED IN ACCORDANCE WITH GD05.

EXEMPLAR CATCHMENT - TURBINE PLATFORM

EXISTING:

AREA = 1.14ha
LENGTH = 85m
GRADIENT = 20%

PROPOSED:

AREA = 0.75ha (PLATFORM) & 0.39ha (BATTERS)
LENGTH = 50m (PLATFORM) & 35m (BATTERS)
GRADIENT = 2% (PLATFORM) & 33% (BATTERS)

*3x DEB'S INSTALLED IN ACCORDANCE WITH GD05

NOTE: ASSUME 2% AND 20% GRADE ON PLATFORM AND BATTERS DURING CONSTRUCTION FOR CALCULATIONS.

DECANTING EARTH BUND
CATCHMENT AREA = 3,930 m²

DROP-OUT PIT , WRAP CULVERT INLET WITH GEOTEXTILE

DECANTING EARTH BUND
CATCHMENT AREA = 5,100 m²

DECANTING EARTH BUND
CATCHMENT AREA = 2,425 m²

CATCHMENT AREA
0.51ha

SLOPE FLOW
35.5 m

PLATFORM FLOW
49.5 m

EX. FLOW
84.5 m

JED-19

DIRTY WATER DIVERSION BUND

CLEAN WATER DIVERSION BUND

Total catchment area= 1.14ha

385 390 395 400 420

5 10 20m
SCALE 1:500

RESOURCE CONSENT

REV	DATE	ISSUE	BY
B	14.08.25	RESOURCE CONSENT	JM
A	11.07.25	RESOURCE CONSENT	JM

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JM	LG

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CLIENT	CONTACT ENERGY
ADDRESS	VENLAW ROAD 794, SLOPEDOWN, SOUTHLAND
PROJECT	SOUTHLAND WIND FARM
SHEET TITLE	TYPICAL EROSION AND SEDIMENT CONTROL PLAN - WTG HARDSTANDS

CADFILE	220372-1151to1156.dwg
SCALE (A1)	1:500
ORIG. SHEET SIZE	A1
DRAWING No.	220372-1153
REV.	B

NOTES:

1. RAIN-ACTIVATED CHEMICAL TREATMENT TO BE CONSIDERED FOR SRP'S AND DEB'S WHEN LOCATED WITHIN 50m OF WATER BODIES.

2. SILT FENCES MAY BE UTILISED IN CONSTRAINED AREAS IN LIEU OF DEB AND DIVERSION BUNDS (SUBJECT TO WIND EXPOSURE).

3. FILL DISPOSAL AREAS AND GENERAL FILL BATTERS TO BE STABILISED WITH TOPSOIL AND GRASS SEED FOLLOWING FILL COMPLETION. STEEP CUT SLOPES TO BE STABILISED WITH HYDROSEED.

4. ALL E&SC DEVICES TO BE INSTALLED IN ACCORDANCE WITH GD05.

SEDIMENT RETENTION POND.
CATCHMENT AREA = 0.87ha
70m LENGTH BY 10m WIDTH (TOP DIMENSIONS)
DEAD STORAGE VOLUME = 60m³
ACTIVE STORAGE VOLUME = 148m³

PRIMARY AND EMERGENCY OUTLETS (INDICATIVE)

INTERNAL BAFFLE TO ACHIEVE 3:1 LENGTH TO WIDTH RATIO FOR FLOW PATH

DIRTY WATER DIVERSION BUND

DECANTING EARTH BUND - CATCHMENT AREA = 3,965 m²

DIRTY WATER DIVERSION BUND

DROP-OUT PIT

DECANTING EARTH BUND - CATCHMENT AREA = 2,920 m²

PLATFORM FLOW 0.44ha

EX. FLOW 0.17ha

HARDSTAND AREA 0.44ha

JED-23

DECANTING EARTH BUND - CATCHMENT AREA = 1,490 m²

Total catchment area= 0.44ha

EXEMPLAR CATCHMENT - TURBINE PLATFORM WITHIN WETLAND

EXISTING:

AREA = 0.44ha
LENGTH = 77m
GRADIENT = 7%

PROPOSED:

AREA = 0.44ha (PLATFORM)
LENGTH = 52m (PLATFORM)
GRADIENT = 2% (PLATFORM)

*2x STANDARD DEB'S INSTALLED IN ACCORDANCE WITH GD05

NOTE: ASSUME 2% GRADE ON PLATFORM DURING CONSTRUCTION FOR CALCULATIONS.

5 10 20m
SCALE 1:500

RESOURCE CONSENT

REV	DATE	ISSUE	BY
B	14.08.25	RESOURCE CONSENT	JM
A	11.07.25	RESOURCE CONSENT	JM

PREP. BY	REVD. BY
JM	LG

APPROVED FOR ISSUE: L GORDON

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CLIENT	CONTACT ENERGY
ADDRESS	VENLAW ROAD 794, SLOPEDOWN, SOUTHLAND
PROJECT	SOUTHLAND WIND FARM
SHEET TITLE	TYPICAL EROSION AND SEDIMENT CONTROL PLAN - WTG HARDSTANDS WITHIN WETLANDS

CADFILE	220372-1151to1156.dwg
SCALE (A1)	1:500
ORIG. SHEET SIZE	A1
DRAWING No.	220372-1154
REV.	B

LEGEND

- CLEAN WATER DIVERSION BUND
- DIRTY WATER DIVERSION BUND/ CHANNEL
- SILT FENCE
- EARTHWORKS CATCHMENT AREA
- DECANTING EARTH BUND
- DROP-OUT PIT
- CUT AND COVER METHODOLOGY
- PERMANENT SW CULVERTS
- TEMPORARY E&SC CULVERTS

NOTES:

1. RAIN-ACTIVATED CHEMICAL TREATMENT TO BE CONSIDERED FOR SRP'S AND DEB'S WHEN LOCATED WITHIN 50m OF WATER BODIES.

2. SILT FENCES MAY BE UTILISED IN CONSTRAINED AREAS IN LIEU OF DEB AND DIVERSION BUNDS (SUBJECT TO WIND EXPOSURE).

3. FILL DISPOSAL AREAS AND GENERAL FILL BATTERS TO BE STABILISED WITH TOPSOIL AND GRASS SEED FOLLOWING FILL COMPLETION. STEEP CUT SLOPES TO BE STABILISED WITH HYDROSEED.

4. ALL E&SC DEVICES TO BE INSTALLED IN ACCORDANCE WITH GD05.

EXEMPLAR CATCHMENT - ACCESS TRACK

EXISTING:

AREA = 0.25ha
LENGTH = 26m
GRADIENT = 20%

PROPOSED:

AREA = 0.25ha(BERM/SLOPE)
LENGTH = 26m (BERM/SLOPE)
GRADIENT = 33% (BERM/SLOPE)

*1x DEB INSTALLED IN ACCORDANCE WITH GD05

DECANTING EARTH BUND - CATCHMENT AREA = 1,330 m²

DECANTING EARTH BUND - CATCHMENT AREA = 2,560 m²

SLOPE FLOW 26.17 m

DROP OUT PIT

SILT FENCE

5 10 20m
SCALE 1:500

RESOURCE CONSENT

REV	DATE	ISSUE	BY
B	14.08.25	RESOURCE CONSENT	JM
A	11.07.25	RESOURCE CONSENT	JM

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JM	LG

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CLIENT	CONTACT ENERGY
ADDRESS	VENLAW ROAD 794, SLOPEDOWN, SOUTHLAND
PROJECT	SOUTHLAND WIND FARM
SHEET TITLE	TYPICAL EROSION AND SEDIMENT CONTROL PLAN - ACCESS TRACK

CADFILE	220372-1151to1156.dwg
SCALE (A1)	1:500
ORIG. SHEET SIZE	A1
DRAWING No.	220372-1155
REV.	B

LEGEND

- CLEAN WATER DIVERSION BUND
- DIRTY WATER DIVERSION BUND/ CHANNEL
- SILT FENCE
- EARTHWORKS CATCHMENT AREA
- DECANTING EARTH BUND
- DROP-OUT PIT
- CUT AND COVER METHODOLOGY
- PERMANENT SW CULVERTS
- TEMPORARY E&SC CULVERTS

NOTES:

1. RAIN-ACTIVATED CHEMICAL TREATMENT TO BE CONSIDERED FOR SRP'S AND DEB'S WHEN LOCATED WITHIN 50m OF WATER BODIES.
2. SILT FENCES MAY BE UTILISED IN CONSTRAINED AREAS IN LIEU OF DEB AND DIVERSION BUNDS (SUBJECT TO WIND EXPOSURE).
3. FILL DISPOSAL AREAS AND GENERAL FILL BATTERS TO BE STABILISED WITH TOPSOIL AND GRASS SEED FOLLOWING FILL COMPLETION. STEEP CUT SLOPES TO BE STABILISED WITH HYDROSEED.
4. ALL E&SC DEVICES TO BE INSTALLED IN ACCORDANCE WITH GD05.

SRP INSTALLED IN ACCORDANCE WITH ARC GD05

SEDIMENT RETENTION POND
CATCHMENT AREA = 0.86ha .
27m LENGTH BY 9m WIDTH (TOP DIMENSIONS).
DEAD STORAGE VOLUME = 64m³
LIVE STORAGE VOLUME = 177m³

PRIMARY AND EMERGENCY OUTLETS (INDICATIVE)

TOTAL CATCHMENT
0.86ha

SLOPE FLOW
25.2m

EX. FLOW
25.2m

HARDSTAND AREA
0.40ha

OVERFLOW STORAGE AREA

PLATFORM FLOW
50.0m

catchment area= 0.75ha

DECANTING EARTH BUND -
CATCHMENT AREA = 1,730 m²

DROP-OUT PIT

CLEAN WATER DIVERSION BUND

295 305 320 325 330

EXEMPLAR CATCHMENT - SITE FACILITY

EXISTING:

AREA = 0.75ha
LENGTH = 75m
GRADIENT = 21%

PROPOSED:

AREA = 0.40ha (PLATFORM) & 0.35ha (SLOPE)
LENGTH = 50m (PLATFORM) & 25m (SLOPE)
GRADIENT = 2% (PLATFORM) & 33% (SLOPE)

*1x SRP INSTALLED IN ACCORDANCE WITH GD05

NOTE: ASSUME 10% AND 20% GRADE ON PLATFORM AND SLOPE DURING CONSTRUCTION FOR CALCULATIONS.

5 10 20m
SCALE 1:500

RESOURCE CONSENT

REV	DATE	ISSUE	BY
B	14.08.25	RESOURCE CONSENT	JM
A	11.07.25	RESOURCE CONSENT	JM

PREP. BY	REVD. BY
JM	LG

APPROVED FOR ISSUE: L GORDON

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CLIENT	CONTACT ENERGY
ADDRESS	VENLAW ROAD 794, SLOPEDOWN, SOUTHLAND
PROJECT	SOUTHLAND WIND FARM
SHEET TITLE	TYPICAL EROSION AND SEDIMENT CONTROL PLAN - SITE FACILITY PLATFORM

CADFILE	220372-1151to1156.dwg
SCALE (A1)	1:500
ORIG. SHEET SIZE	A1
DRAWING No.	220372-1156
REV.	B

Sediment Pond Design: (in general accordance with Council GD05)

Job Name:	Southland Wind Farm						
Job Number:	220372						
Prepared by:	AR						
Reviewed by:	LG						
Date:	07.08.2025						
Location	SFD-G04 Fill disposal						
Catchment Area	1.2	ha					
Slope of earthworks	9.5	%		Slope < 10%	minimum volume of	2 %	of the contributing catchment
				Slope > 10%	minimum volume of	3 %	of the contributing catchment
Minimum Volume of Pond	240	m^3					
Dead Storage Volume	72	m^3	30% of minimum volume of pond				
Live Storage Volume	168	m^3	70% of minimum volume of pond				
Shape of pond							
Inlet side slope (Spreader)	3	: 1					
General side slopes	2	: 1	2:1 typically				
Length to Width ratio	2	: 1	Should range between 3:1 and 5:1 or utilise internal baffles				
Depth of Pond	2	m	Should range between 1 to 2m depth				
Depth of Dead Storage	1	m	min 0.4m				
Depth of Live Storage	1	m					
Width (top)	11	m	Width (junc btw top & bottom)	7	m		
Length (top)	22	m	Length (junc btw top & bottom)	18	m		
Width (bottom)	3	m					
Length (bottom)	14	m					
Freeboard dimensions							
Freeboard depth	0.3	m					
Width (top)	12.2	m					
Length (top)	23.5	m					
Calculated Storage							
Dead Storage Volume	84	m^3	**PASS**				
Live Storage Volume	184	m^3	**PASS**				
Total Storage Volume	268	m^3	**PASS**				
Forebay Design							
Width	11	m	= width in accordance with GD05				
Depth	1	m	in accordance with GD05				
Length	2	m	in accordance with GD05				
Decants							
Max outflow rate	3	l/sec/ha					
Max flow for each decant	4.5	l/sec	(200 holes per decant)				
Number of decants required	0.80		160 holes				
Emergency Spillway							
Base width	3	m	3m min				
Depth	0.3	m	0.3m minimum				
Side slopes	3	: 1	gradient				
Flow Capacity (Qw)	1.03	m^3/sec	**PASS**				

$Q_{(100)}$ Design Flows

$Q_{(100)}$	0.25	m^3/sec	(From TP108 Calcs - upstream catchment with CN value of 91 for bare earth)

Sediment Pond Design: (in general accordance with Council GD05)

Job Name:	Southland Wind Farm		
Job Number:	220372		
Prepared by:	AR		
Reviewed by:	LG		
Date:	07.08.2025		
Location	SFD-21 catchment 1		
Catchment Area	1.43	ha	
Slope of earthworks	9.5	%	Slope < 10% minimum volume of 2 % of the contributing catchment Slope > 10% minimum volume of 3 % of the contributing catchment
Minimum Volume of Pond	286	m^3	
Dead Storage Volume	85.8	m^3	30% of minimum volume of pond
Live Storage Volume	200.2	m^3	70% of minimum volume of pond
Shape of pond			
Inlet side slope (Spreader)	3	: 1	
General side slopes	2	: 1	2:1 typically
Length to Width ratio	2	: 1	Should range between 3:1 and 5:1 or utilise internal baffles
Depth of Pond	2	m	Should range between 1 to 2m depth
Depth of Dead Storage	1	m	min 0.4m
Depth of Live Storage	1	m	
Width (top)	12	m	Width (junc btw top & bottom) 8 m
Length (top)	24	m	Length (junc btw top & bottom) 20 m
Width (bottom)	4	m	
Length (bottom)	16	m	
Freeboard dimensions			
Freeboard depth	0.3	m	
Width (top)	13.2	m	
Length (top)	25.5	m	
Calculated Storage			
Dead Storage Volume	112	m^3	PASS
Live Storage Volume	224	m^3	PASS
Total Storage Volume	336	m^3	PASS
Forebay Design			
Width	12	m	= width in accordance with GD05
Depth	1	m	in accordance with GD05
Length	2	m	in accordance with GD05
Decants			
Max outflow rate	3	l/sec/ha	
Max flow for each decant	4.5	l/sec	(200 holes per decant)
Number of decants required	0.95		191 holes
Emergency Spillway			
Base width	3	m	3m min
Depth	0.3	m	0.3m minimum
Side slopes	3	: 1	gradient
Flow Capacity (Qw)	1.03	m^3/sec	PASS

$Q_{(100)}$ Design Flows

$Q_{(100)}$	0.3	m^3/sec	(From TP108 Calcs - upstream catchment with CN value of 91 for bare earth)

Sediment Pond Design: (in general accordance with Council GD05)

Job Name:	Southland Wind Farm						
Job Number:	220372						
Prepared by:	AR						
Reviewed by:	LG						
Date:	07.08.2025						
Location	SFD-21 catchment 2						
Catchment Area	0.71	ha					
Slope of earthworks	9.5	%		Slope < 10%	minimum volume of	2 %	of the contributing catchment
				Slope > 10%	minimum volume of	3 %	of the contributing catchment
Minimum Volume of Pond	142	m^3					
Dead Storage Volume	42.6	m^3	30% of minimum volume of pond				
Live Storage Volume	99.4	m^3	70% of minimum volume of pond				
Shape of pond							
Inlet side slope (Spreader)	3	: 1					
General side slopes	2	: 1	2:1 typically				
Length to Width ratio	2	: 1	Should range between 3:1 and 5:1 or utilise internal baffles				
Depth of Pond	2	m	Should range between 1 to 2m depth				
Depth of Dead Storage	1.1	m	min 0.4m				
Depth of Live Storage	0.9	m					
Width (top)	9	m	Width (junc btw top & bottom)	5.4	m		
Length (top)	18	m	Length (junc btw top & bottom)	14.4	m		
Width (bottom)	1	m					
Length (bottom)	10	m					
Freeboard dimensions							
Freeboard depth	0.3	m					
Width (top)	10.2	m					
Length (top)	19.5	m					
Calculated Storage							
Dead Storage Volume	48	m^3	PASS				
Live Storage Volume	108	m^3	PASS				
Total Storage Volume	156	m^3	PASS				
Forebay Design							
Width	9	m	= width in accordance with GD05				
Depth	1	m	in accordance with GD05				
Length	2	m	in accordance with GD05				
Decants							
Max outflow rate	3	l/sec/ha					
Max flow for each decant	4.5	l/sec	(200 holes per decant)				
Number of decants required	0.47		95 holes				
Emergency Spillway							
Base width	3	m	3m min				
Depth	0.3	m	0.3m minimum				
Side slopes	3	: 1	gradient				
Flow Capacity (Qw)	1.03	m^3/sec	**#REF!**				

$Q_{(100)}$ Design Flows

$Q_{(100)}$	0.146	m^3/sec	(From TP108 Calcs - upstream catchment with CN value of 91 for bare earth)

Sediment Pond Design: (in general accordance with Council GD05)

Job Name:	Southland Wind Farm			
Job Number:	220372			
Prepared by:	AR			
Reviewed by:	LG			
Date:	07.08.2025			
Location	SFD near JED 23 Hardstand			
Catchment Area	0.87	ha		
Slope of earthworks	9.5	%	Slope < 10% minimum volume of 2 % of the contributing catchment Slope > 10% minimum volume of 3 % of the contributing catchment	
Minimum Volume of Pond	174	m^3		
Dead Storage Volume	52.2	m^3	30% of minimum volume of pond	
Live Storage Volume	121.8	m^3	70% of minimum volume of pond	
Shape of pond				
Inlet side slope (Spreader)	3 : 1			
General side slopes	2 : 1		2:1 typically	
Length to Width ratio	2 : 1		Should range between 3:1 and 5:1 or utilise internal baffles	
Depth of Pond	2	m	Should range between 1 to 2m depth	
Depth of Dead Storage	1	m	min 0.4m	
Depth of Live Storage	1	m		
Width (top)	10	m	Width (junc btw top & bottom) 6 m	
Length (top)	20	m	Length (junc btw top & bottom) 16 m	
Width (bottom)	2	m		
Length (bottom)	12	m		
Freeboard dimensions				
Freeboard depth	0.3	m		
Width (top)	11.2	m		
Length (top)	21.5	m		
Calculated Storage				
Dead Storage Volume	60	m^3	PASS	
Live Storage Volume	148	m^3	PASS	
Total Storage Volume	208	m^3	PASS	
Forebay Design				
Width	10	m	= width in accordance with GD05	
Depth	1	m	in accordance with GD05	
Length	2	m	in accordance with GD05	
Decants				
Max outflow rate	3	l/sec/ha		
Max flow for each decant	4.5	l/sec	(200 holes per decant)	
Number of decants required	0.58		116 holes	
Emergency Spillway				
Base width	3	m	3m min	
Depth	0.3	m	0.3m minimum	
Side slopes	3 : 1		gradient	
Flow Capacity (Qw)	1.03	m^3/sec	PASS	

$Q_{(100)}$ Design Flows

$Q_{(100)}$	0.182	m^3/sec	(From TP108 Calcs - upstream catchment with CN value of 91 for bare earth)

Sediment Pond Design: (in general accordance with Council GD05)

Job Name:	Southland Wind Farm					
Job Number:	220372					
Prepared by:	AR					
Reviewed by:	LG					
Date:	07.08.2025					
Location	Overflow storage area					
Catchment Area	0.8614	ha				
Slope of earthworks	9.5	%		Slope < 10% minimum volume of	2 %	of the contributing catchment
				Slope > 10% minimum volume of	3 %	of the contributing catchment
Minimum Volume of Pond	172.28	m^3				
Dead Storage Volume	51.684	m^3		30% of minimum volume of pond		
Live Storage Volume	120.596	m^3		70% of minimum volume of pond		
Shape of pond						
Inlet side slope (Spreader)	3	: 1				
General side slopes	2	: 1		2:1 typically		
Length to Width ratio	3	: 1		Should range between 3:1 and 5:1 or utilise internal baffles		
Depth of Pond	2	m		Should range between 1 to 2m depth		
Depth of Dead Storage	1	m		min 0.4m		
Depth of Live Storage	1	m				
Width (top)	9	m		Width (junc btw top & bottom)	5 m	
Length (top)	27	m		Length (junc btw top & bottom)	22 m	
Width (bottom)	1	m				
Length (bottom)	17	m				
Freeboard dimensions						
Freeboard depth	0.3	m				
Width (top)	10.2	m				
Length (top)	28.5	m				
Calculated Storage						
Dead Storage Volume	64	m^3	PASS			
Live Storage Volume	177	m^3	PASS			
Total Storage Volume	240	m^3	PASS			
Forebay Design						
Width	9	m		= width in accordance with GD05		
Depth	1	m		in accordance with GD05		
Length	2	m		in accordance with GD05		
Decants						
Max outflow rate	3	l/sec/ha				
Max flow for each decant	4.5	l/sec		(200 holes per decant)		
Number of decants required	0.57			115 holes		
Emergency Spillway						
Base width	3	m		3m min		
Depth	0.3	m		0.3m minimum		
Side slopes	3	: 1		gradient		
Flow Capacity (Qw)	1.03	m^3/sec	PASS			

$Q_{(100)}$ Design Flows

$Q_{(100)}$	0.18	m^3/sec	(From TP108 Calcs - upstream catchment with CN value of 91 for bare earth)