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Griffith Solar Farm

Soil and Water Management Plan

Report

For: BOUYGUES CONSTRUCTION AUSTRALIA

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1. INTRODUCTION

1.1. Project Background

As part of the proposed Griffith Solar Farm (GSF) development, SMEC Australia Pty Ltd was commissioned by Bouygues to develop a Soil and Water Management Plan (SWMP) for the foundations of the solar panel arrays, associated structures and access roads within the proposed development site.

The proposed Griffith Solar Farm is located on the corner of Irrigation Way and Mirrool Branch Canal Road, approximately 8 km south-east of the town-centre of Griffith. The construction is understood to include solar panel arrays, a control building and associated access pavements and fences covering the 122 ha site.

1.2. Scope of this Package

The purpose of the SWMP and report is to outline and communicate the Erosion and Sediment Control (ESC) and water management measures required during the construction phase of the project works. Permanent drainage design is also addressed in Section 3.7 of this report.

1.3. Description of this Package

This report covers the development of the ESC and drainage design.

1.3.1. Design Documentation

This package consists of the following documentation:

- This report;
- Appendix A – Reference Documents;
- Appendix B – Relevant Drawings;
- Appendix C – Typical Detail Drawings;
- Appendix D – R-Factor Calculations;
- Appendix E – Erosion Hazard Assessment;
- Appendix F – Catchment and Slope Calculations;
- Appendix G – Monthly Erosion Losses;
- Appendix H – General Risk Erosion Control Measures;
- Appendix I – Adopted XP-RAFTS Parameters;
- Appendix J – Permanent Drainage Catchments;
- Appendix K – Site Planning Checklist.

2. TECHNICAL STANDARDS AND DOCUMENTS

This design report should be read in conjunction with the technical standards and documents detailed in Appendix A.

Table 2.1 – Technical Standards and Documents

Document
Best Practice Erosion and Sedimentation Control Guidelines, 2008 – International Erosion Control Association
Soils and Construction, Volume 1, 2004 – Landcom

3. DESIGN DESCRIPTION

3.1. Objectives

This SWMP has been developed in accordance with the *Best Practice Erosion and Sedimentation Control* (IECA, 2008). The objective of this SWMP is to minimise the impact of erosion and sediment discharge on the downstream receiving waters during the construction period of the solar farm.

The following targets if achieved are expected to meet:

- Coarse Sediment (>0.02mm) Retain all course sediment on site;
- Fine Sediment (<0.02mm) Drain all disturbed areas on site to sedimentation basins;
- In storms greater than the design event take all reasonable and practicable measures to minimise erosion and sediment discharge; and

3.2. Proposed Site Disturbance

The development site works include providing solar panels to a work area approximately 122 hectares in size. Other proposed works include constructing a substation and control room and warehouse.

3.2.1. Construction Staging

Construction staging is proposed to limit the overall disturbance of works within the development site to less than 1 ha. Construction staging is critical to reducing the overall volume of erosion and sediment control measures required to negate the disturbance on site. The clear water diversion drains shall be constructed prior to works on the solar table. Refer to the relevant design drawings attached in Appendix B for details.

Construction shall be planned across twenty-one (21) stages, breaking the largest 20.6 ha catchment into <1 ha areas. Staging construction as proposed minimises the disturbed area and eliminates the requirement for sediment basins while resulting in an overall reduction to erosion potential.

3.3. Existing Site Details

3.3.1. Topography

The site features a very shallow grade (<1%) draining towards the west/north-west. Topography on the construction site varies minimally from RL 127.62 m to RL 126.77 m in the south-east and north-west corners of the site respectively. An existing irrigation drainage network is evident.

Maps of the existing site contours are shown in Appendix B.

3.3.2. Groundwater

Geotechnical investigations noted that one bore exists within 1 km of the site. At this bore groundwater was encountered at depths approximately 10-15m below ground surface. It was also noted that perched water tables may be present across the site. However, it is assumed that groundwater will not impact on this SWMP.

3.3.3. Cultural Heritage

No information has been provided to date regarding cultural heritage sites. It is recommended that the contractor liaise with the client and local authorities regarding potential cultural heritage sites.

3.3.4. Contaminated Land and Acid Sulphate Soils

According to the geotechnical desk study conducted by Macquarie Geotech in October 2015, the majority of the site has a low probability of Acid Sulphate Soils (ASS) being present. Therefore, for the purpose of this SWMP, it has been assumed that no ASS are located on site. However, further geotechnical studies may need to be undertaken to determine the presence of ASS and the implications this may have on the construction.

3.3.5. Rainfall IFD Data

Intensity Frequency Duration (IFD) data for the site was taken from the Bureau of Meteorology (BoM) website for Griffith (34.325 S, 146.125 E) as shown in the following table.

Table 5.1 – Rainfall Intensity Frequency Duration Data for Griffith, NSW

Duration	Average Recurrence Interval						
	1 year (mm/h)	2 year (mm/h)	5 year (mm/h)	10 year (mm/h)	20 year (mm/h)	50 year (mm/h)	100 year (mm/h)
5Mins	53	70.2	97.1	114	137	168	193
6Mins	49.1	65.2	90.1	106	127	155	178
10Mins	39.8	52.8	72.8	85.6	102	125	143
20Mins	28.9	38.2	52.6	61.7	73.6	90.1	103
30Mins	23.3	30.8	42.2	49.5	59	72.1	82.5
1Hr	15.3	20.1	27.5	32.2	38.2	46.5	53.2
2Hrs	9.5	12.5	16.9	19.7	23.3	28.3	32.2
3Hrs	7.1	9.32	12.5	14.5	17.1	20.7	23.5
6Hrs	4.28	5.59	7.41	8.55	10	12.1	13.7
12Hrs	2.59	3.37	4.42	5.08	5.93	7.09	8
24Hrs	1.57	2.05	2.67	3.06	3.56	4.24	4.77
48Hrs	0.935	1.21	1.59	1.81	2.1	2.49	2.8
72Hrs	0.669	0.86	1.12	1.27	1.48	1.74	1.97

3.4. Erosion Risk Assessment

3.4.1. Methodology

The erosion risk assessment described below acts as an indicator to determine what levels of erosion and sedimentation control measures should be applied to the project.

The estimated soil loss from a range of slopes was calculated using the RUSLE. This equation aims to predict the long term soil loss rate from a given site based on the site characteristics.

$A = K * R * Ls * P * C$ $(Equation\ 1\ (IECA, 2008))$

Where:

$A = predicted\ soil\ loss\ per\ hectare\ per\ year$

$K = soil\ erodibility\ factor$

$R = rainfall\ erosivity\ facto$

$Ls = slope\ length/gradient\ factor$

$P = erosion\ control\ factor$

$C = ground\ cover\ and\ management\ factor$

Erosion risk assessment results have been provided in Appendix E.

3.4.2. Soil Erodibility Factor

Laboratory testing on soil samples recovered during the field investigation have been completed with a summary of test results presented in the accompanying geotechnical report. Geotechnical investigations have revealed that the development site consists of a soft, organic, silty-clay topsoil layer approximately 0.1 - 0.2 m deep. A corresponding typical K-factor of **0.033** has been adopted based on the Unified Soil Classification System soil code of OL (IECA Book 2 Table E5).

3.4.3. Rainfall Erosivity Factor

The rainfall erosivity factor (R-factor) is a measure of the ability of rainfall to cause erosion. It is the product of the total energy and the intensity of the rainfall event. The calculated R-factor for the site is **929.545**. Attached in Appendix D are the calculations on the R-factor.

3.4.4. C and P-Factors

Within the Revised Universal Soil Loss Equation (RUSLE), the C and P factors are used to describe the management of the site with respect to reducing soil loss. The C-factor measures the combined effect of all the interrelated cover and management characteristics adopted over the site. It also reflects the covering applied to the site with the use of matting, chemical stabilisers and or by products. The P-factor measures the combined effect of all support practices and management variables. By reducing the velocity of runoff and the tendency of runoff the P-factor will reduce. As such the industry accepted defaults for C and P have been adopted and values of **1.0** and **1.3** will be used respectively.

3.4.5. Ls Factor

The slope length (Ls) factor varies between different slope lengths and different slope gradients. Table 3.2 shows the range of Ls factors for RUSLE. In absence of factors for slopes less than 1%, the 1% Ls factors were used.

Table 3.2 – Ls Factors

Slope		Slope Length (m)							
Grade	%	10	20	30	40	50	60	70	80
1 in 100	1	0.11	0.13	0.15	0.16	0.17	0.18	0.19	0.19
1 in 50	2	0.18	0.24	0.28	0.31	0.34	0.36	0.39	0.41
1 in 33	3	0.24	0.34	0.41	0.47	0.52	0.57	0.61	0.65
1 in 25	4	0.3	0.44	0.54	0.63	0.71	0.78	0.85	0.91
1 in 20	5	0.36	0.54	0.68	0.8	0.91	1.01	1.1	1.19
1 in 16.6	6	0.42	0.64	0.81	0.97	1.11	1.24	1.36	1.47
1 in 12.5	8	0.53	0.8	1.08	1.31	1.51	1.7	1.68	2.05
1 in 10	10	0.68	1.09	1.44	1.75	2.04	2.31	2.56	2.81
1 in 8.3	12	0.85	1.39	1.85	2.27	2.66	3.02	3.37	3.7
1 in 7.1	14	1.02	1.69	2.26	2.79	3.28	3.74	4.18	4.61
1 in 6.3	16	1.19	1.98	2.67	3.31	3.9	4.46	5	5.52
1 in 5.5	18	1.35	2.27	3.07	3.82	4.51	5.17	5.81	6.42

1 in 5	20	1.5	2.55	3.47	4.32	5.12	5.88	6.61	7.32
1 in 4	25	1.88	3.23	4.43	5.54	6.59	7.6	8.57	9.51
1 in 3.3	30	2.23	3.86	5.32	6.69	7.99	9.23		
1 in 2.5	40	2.83	4.98	6.92	8.74				
1 in 2	50	3.33	5.89	8.22					

Source: Table E3 (IECA, 2008)

3.4.6. Annual Soil Loss Rates for Various Slopes

For the development of the infrastructure, various slopes and grades will change based on the construction staging. As a result the estimated soil loss rates (tonnes/ha/year) have been calculated using RUSLE for a range of slopes and lengths across the site.

Table 3.3 – Erosion Risk Categorisation and Annual Soil Loss (t/ha/yr) for Various Slopes and K = 0.033

Slope		Slope Length (m)							
Grade	%	10	20	30	40	50	60	70	80
1 in 100	1	4	5	6	6	7	7	8	8
1 in 50	2	7	10	11	12	14	14	16	16
1 in 33	3	10	14	16	19	21	23	24	26
1 in 25	4	12	18	22	25	28	31	34	36
1 in 20	5	14	22	27	32	36	40	44	47
1 in 16.6	6	17	26	32	39	44	49	54	59
1 in 12.5	8	21	32	43	52	60	68	67	82
1 in 10	10	27	43	57	70	81	92	102	112
1 in 8.3	12	34	55	74	91	106	120	134	148
1 in 7.1	14	41	67	90	111	131	149	167	184
1 in 6.3	16	47	79	106	132	156	178	199	220
1 in 5.5	18	54	91	122	152	180	206	232	256
1 in 5	20	60	102	138	172	204	234	264	292
1 in 4	25	75	129	177	221	263	303	342	379
1 in 3.3	30	89	154	212	267	319	368	0	0
1 in 2.5	40	113	199	276	349	0	0	0	0
1 in 2	50	133	235	328	0	0	0	0	0

3.4.7. Soil Loss Classes

Soil loss classes in accordance with Table 3.1 of IECA (2008) are shown in the following table.

Table 3.4 – Soil Loss Classes

Soil loss class	Soil Loss Rate (t/ha/yr)	Erosion Risk
1	0 to 150	Very Low
2	151 to 225	Low
3 to 4	226 to 500	Moderate
5 to 6	501 to 1500	High
7	above 1500	Extremely High

3.4.8. Erosion Risk Categorisation

Utilizing the seasonal rainfall for the Albury, which is located approximately 207 km south-east of the site, a breakdown of monthly erosion risk is presented in the following table. Note the R-factor used in the calculation of this table are taken from Table E1 of (IECA, 2008) and hence may not be as accurate as measured data, however represented the closest match for the site location. Table 3.5 is for the maximum slope length of 80 m.

Table 3.5 – Erosion Risk Categorisation and Annual Soil Loss for Monthly Erosivity

Slope		Month											
Grade	(%)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
1 in 100	1	12	14	14	12	11	12	10	10	9	15	12	13
1 in 50	2	26	29	31	26	24	27	21	21	20	33	26	29
1 in 33	3	42	47	49	41	38	42	33	33	32	52	42	46
1 in 25	4	59	65	68	58	53	59	47	47	45	73	59	64
1 in 20	5	77	85	89	75	69	77	61	61	59	96	77	83
1 in 16.6	6	95	105	110	93	86	95	75	75	73	118	95	103
1 in 12.5	8	132	147	153	130	119	133	105	105	102	165	132	144
1 in 10	10	181	201	210	178	163	182	144	144	139	226	181	197
1 in 8.3	12	238	265	276	234	215	240	189	189	184	297	238	259
1 in 7.1	14	297	330	344	292	268	299	236	236	229	370	297	323
1 in 6.3	16	355	395	412	350	321	358	282	282	274	443	355	386
1 in 5.5	18	413	459	479	407	373	416	328	328	319	516	413	449
1 in 5	20	471	524	546	464	426	475	374	374	363	588	471	512
1 in 4	25	612	681	710	602	553	617	486	486	472	764	612	666

The grades present on site are all equal to or less than 1%. The erosion risk is classified as “Low Risk” throughout the entire year resulting in no prioritisation for construction scheduling.

The monthly erosivity factors and more detailed calculations are included in Appendix G.

3.4.9. Best Practice Erosion Management Techniques

A summary of best practice erosion management techniques is shown in the following table.

Table 3.6 – Best Practice Land Clearing and Rehabilitation Requirements

Erosion Risk Rating	Soil Loss Rate (t/ha/yr)	Advanced Land Clearing Allowed (weeks work)	Maximum Number Of Days for Stabilisation	Minimum Cover (%)	Stage Construction of Batters > 6H:1V	Stabilisation of Stockpiles
Very Low	0 to 150	8	30	60		
Low	151 to 225	8	30	70		
Moderate	226 to 500	6	20	70	Yes	
High	501 to 1500	4	10	75	Yes	Yes
Extremely High	Above 1500	2	5	80	Yes	Yes

Source: Table 4.4.7 (IECA 2008)

3.4.10. Minimum Sediment Control Standards

The minimum sediment control standards based on the erosion risk rating and corresponding soil loss rate is shown in the following table.

Table 3.7 – Minimum Sediment Control Standards Based on Soil Loss

Area Limit (m^2)	Soil Loss Rate (t/ha/yr)			Soil Loss Rate (t/ha/month)		
	Type 1	**Type 2**	**Type 3**	**Type 1**	**Type 2**	**Type 3**
250	N/A	N/A	All	N/A	N/A	All
1000	N/A	N/A	All	N/A	N/A	All
2500	N/A	>75	75	N/A	>6.25	6.25
>2500	>150	150	75	>12.5	12.5	6.25

Type 1, 2 and 3 soil loss rates based upon soil loss in t/ha/yr are outlined in the following table.

Table 3.8 – Minimum Sediment Control Standards Based on Soil Loss

Soil Loss Rate (t/ha/yr)	Control Type	Default / Example Treatment Measure
0 to 75	Type 3	Sediment fence, sediment trap
75 to 150	Type 2	Filter tube dam, rock filter dam, sediment weir, compost mulch berm
>150	Type 1	Sediment Basin sized accordingly

Source: Table 4.5.1 Extract (IECA 2008)

3.5. Road Work Activities

The proposed site works include potential disturbances to the internal road network for access onto the solar farm. As the erosion risk across the development site is relatively low, it is expected that the ESC measures required to be utilised in this location will be Type 2 and 3 only. A summary of the following ESC measures required for external road activities is as follows:

- Catch drains should be located down-slope of any proposed road works activities to ensure that any site disturbance runoff is collected and sediment is contained before discharging off-site.
- Type 3 check dam sediment traps (i.e. sandbags/fibre rolls) are required in unsealed table drains less than 500mm deep at appropriate spacing. Type 3 rock check dams are required where drain depths exceed 500mm at appropriate spacing.
- Vibration grid and/or wash bays are required at all construction exits.
- Type 3 filter / sediment fences required to control sediment down-slope of any batters where sedimentation may present in “sheet” flow conditions during rain events.
- Dust control measures such as watering may be required where stockpiles, demolition areas and any clearing and excavation take place.
- Level spreaders are required at any locations where concentrated flow would otherwise discharge off the site to ensure that runoff is returned to its existing “sheet flow” condition before leaving the site.

3.6. Sediment Control

Sediment fences or similar Type 3 measures are to be installed immediately downstream of the disturbed areas to treat sheet-flow while Clearwater diversion drains shall be installed upstream of the disturbed areas. Suitable Type 3 control measures for sheet flow include sediment fences, straw bale barrier and fabric wrap field inlet sediment traps. Type 3 concentrated flow measures shall be included to treat runoff conveyed by internal drainage. Suitable Type 3 concentrated flow treatment measures include “U shaped” sediment traps, Modular sediment traps and Coarse sediment traps. Some diversion bunds/whoa-boys may extend across internal access tracks, in this instance the bunds shall be trafficable and well maintained.

Vibration grids are also implemented at the entry/exit to the site to help remove some potential dust collected on vehicles.

A plan showing the proposed layout of sediment control measures is included in Appendix B while typical details of the mitigation measures is included in Appendix C.

3.6.1. Sedimentation Basin Design

Construction staging is proposed to limit the overall disturbance of works within the development site to less than 1 ha. The proposed construction staging aims to reduce the disturbed areas to <1 ha, eliminating the need for sedimentation basins. Sediment basins shall be required if more than 1 ha of land is disturbed at any one time.

3.7. Permanent Local Drainage

The permanent drainage aims to coincide with the temporary drainage layout as much as possible to reduce total construction required. The predominant design is maintained between ESC and permanent drainage stages.

3.7.1. Internal Drainage

The client provided a typical cross section of the preferred trapezoidal drainage option. The option consists of:

- A 300mm deep trapezoidal channel;
- Bed width of 1.1m;
- Batter slopes of 1:4;
- Total Width of 3.5m

Based on a longitudinal slope of 1%, this channel would result in a capacity of 0.77 m^3/s with a hydraulic roughness of a weedy-earth channel (n = 0.03). The same channel at a longitudinal slope of 0.5% results in a capacity of 0.54m^3/s as the capacity varies as the longitudinal slope varies.

Rock protection shall be required where drainage is diverted at 90-degree bends to ensure that erosion does not occur. D_{50} rock of diameter 150mm shall be adopted at a depth of 230mm and geotextile support. This is adequate for uniform stream velocities of up to 2.3m/s at a longitudinal slope of 1%.s

No freeboard has been included for this channel. The proposed drainage layout can be seen in DWG-02 in Appendix B.

3.7.2. Design Capacity

The hydrologic analysis for the site's local catchments was carried out using the McDermott and Pilgrim Method, a regional peak flow estimation method for Western New South Wales. The method was used to calculate the peak discharge at the outlet of each drainage channel catchment and is the recommended technique for the region as specified in AR&R 1998. Catchment delineation can be viewed in DWG-02 of Appendix B. Delineation was undertaken based on site contours provided by the client.

A summary of the roadside channel capacity and maximum return periods is shown in Table 3-9. The capacity of the drainage varies throughout the site as the contributing catchment area increases. A capacity of 0.54 m^3/s has been assumed for the proposed trapezoidal cross section discussed in Section 3.7.1 at a grade of 0.5%. Peak discharge calculations demonstrate that in post-developed conditions, the proposed drainage channels achieve 50 year ARI capacity, with the exception of DD-03 which only achieves 20 year ARI capacity making it the critical drain.

Table 3-9– Summary of local contributing catchments against drainage capacity throughout the Griffith site.

	Qdesign (m3/s)						Critical Event ARI
Drain ID	1yr (ARI)	2yr (ARI)	5yr (ARI)	10yr (ARI)	20yr (ARI)	50yr (ARI)	
DD-01	0.04	0.08	0.14	0.21	0.30	0.45	50
DD-02	0.03	0.05	0.10	0.14	0.20	0.31	50
DD-03	0.04	0.04	0.06	0.13	0.43	2.15	20
DD-04	0.04	0.09	0.16	0.24	0.34	0.52	50
DD-05	0.04	0.08	0.14	0.21	0.30	0.46	50
DD-06	0.03	0.06	0.10	0.15	0.22	0.33	50

Due to limited topographical information for the area surrounding the site, runoff from on-site catchments has been calculated and used as reference for drainage capacity. On-site drainage will convey runoff generated on-site to two existing irrigation channels draining north. The capacity of the existing irrigation channel is unknown, however peak flow discharging into the channel is not expected to increase as a result of the development. This is discussed in Section 3.7.3.

3.7.3. Pre-Development vs Post-Development Flow

As the site currently drains into two existing irrigation channels (one in the middle of the site and one two the west), the proposed site maintains these channels and legal points of discharge to the north. No significant increase in impermeable area is proposed and routing of runoff will be similar in both pre and post developed scenarios.

No increase in flow capable of causing an actionable nuisance is expected due to the proposed solar farm development.

3.8. Regional Flood Model

A regional flood model encompassing the development area (*Griffith Main Drive J & Mirrool Creek Flood Study 2014* – BMT WBM) was provided by Griffith City Council and defined the area as flood prone land. For the 1% annual exceedance probability, the study portrayed flooding across the majority of the eastern side of the site and in a smaller section to the south. Levels of up to RL 127.54 m and RL 127.27 m were reported on in the eastern and southern corners respectively. The model and report can be viewed in Appendix J.

4. DESIGN STANDARDS

4.1. Proposed Project Program

ESC plans have been developed for the site and are presented in Appendix B.

Standard design drawings and factsheets for nominated erosion and drainage controls are not presented in this report but can be found in the IECA guidelines.

The application of best practice ESC is based upon the appropriate integration of three groups of control measures:

- Drainage control measures;
- Erosion control measures (including revegetation measures); and
- Sediment control measures.

Discussion is provided in the following section with regard to each group of control measures to be applied on-site. Wherever reasonable and practical, control measures from all three groups must be integrated in a total treatment system.

4.2. Drainage Control

Drainage standards adopted are shown below in the table below. Standards were adopted as per Table 4.3.1 of IECA (2008).

Table 4.1 – Design Standards Drainage

Structure	Flood Event (year ARI)	Notes
Temporary Drainage Structures (NSW)	1 in 5	<12 months
Temporary Drainage Structures located immediately up-slope of a property that would be adversely affected by the failure or overtopping of the structure	1 in 10	< 12 months
Temporary Culvert Structures	1 in 1 – minimum capacity	N/A

Temporary drain alignments are to be incorporated into the final drainage design layout as much as possible. Details of temporary drainage design are provided in the relevant appendices.

4.2.1. Spacing of Lateral Drains on Long Continuous Slopes

Long unstable slopes must be divided into manageable drainage areas to prevent the formation of rill erosion. Catch drains or flow diversion banks should be placed at regular intervals on the slope to collect and divert surface runoff to properly designed drains bounding the disturbance area. Given the varying batter slopes to be formed across the site, Table 6.2 is provided as a guide to the maximum drain or bench spacing down exposed slopes. The existing contour drains on the site could be used as an effective guide to inform spacing. These drains have not been shown on the design drawings, as actual location will need to be modified considering construction progress. Length of flow should not exceed 80m.

Table 6.2 – Maximum Drain or Bench Spacing on Non-Vegetated Slopes

Batter Slope		Horizontal Spacing (m)	Vertical Spacing (m)
Grade	(%)		
1 in 100	1	80	0.8
1 in 50	2	60	1.2
1 in 25	4	40	1.6
1 in 16.7	6	32	1.9
1 in 12.5	8	28	2.2
1 in 10	10	25	2.5
1 in 8.33	12.5	22	2.6
1 in 6.67	15	19	2.9
1 in 5	20	16	3.2
1 in 4	25	14	3.5
1 in 3.33	30	12	3.5
1 in 2.86	35	10	3.5
1 in 2.5	40	9	3.5
1 in 2	45	6	3.0

Source: Table 4.3.2 (IECA 2008)

4.3. Erosion Control

The revegetation and stabilisation measures below were considered for flat land (i.e. slopes less than 1 in 10) when proposing revegetation measures:

- Erosion control blankets;
- Gravelling;
- Mulching (i.e. mulch berms);
- Revegetation;
- Rock mulching;
- Soil binder; and
- Turfing.

Revegetation is to occur as soon as possible using techniques suitable for the size and area of the land being revegetated. Soil stabilisation techniques should be used on exposed land where implementing the revegetation process is not able to be completed in a timely manner or is not feasible at that stage of construction. It is proposed that disturbed land is to be limited to 1 ha at any one time, with the revegetation of land occurring as required.

4.4. Revegetation and Stabilisation

The erosion risk varies across the site however is generally very low. If works are likely to be suspended for an extended period, stabilisation of exposed areas will also be required within the specified timeframes. The erosion control measures mentioned previously can be utilised as stabilisation until vegetation has established.

5. TECHNICAL NOTES

5.1. General

Additional ESC measures must be implemented and a revised SWMP must be submitted for approval in the event that site conditions change significantly from those considered within the SWMP.

Where there is a high probability that serious or material environmental harm may occur as a result of sediment leaving the site, appropriate additional erosion and sediment control measures must be implemented such that all reasonable and practicable measures are being taken to prevent or minimise such harm. Only those works necessary to minimise or prevent environmental harm shall be conducted on-site prior to approval of the amended SWMP.

5.2. Land Clearing

Land clearing must be delayed as long as practicable and must be undertaken in conjunction with development of each stage of works, unless otherwise approved.

All reasonable and practicable efforts must be taken to delay the removal of, or disturbance to, existing ground cover (organic or inorganic) prior to land-disturbing activities.

Bulk tree clearing must occur in a manner that minimises disturbance to existing ground cover (organic or inorganic). Bulk tree clearing and grubbing of the site must be immediately followed by specified temporary stabilisation measures (e.g. temporary grassing, or mulching) prior to commencement of each stage of construction works.

Vegetation removed during tree clearing should be mulched on site and reused for erosion control.

Disturbance to natural watercourses (including bed and banks) and their associated riparian zones must be limited to the minimum practicable.

No land clearing shall be undertaken unless preceded by the installation of adequate drainage and sediment control measures, unless such clearing is required for the purpose of installing such measures, in which case, only the minimum clearing required to install such measures shall occur.

Land clearing must be limited to 5m from the edge of proposed constructed works, 2m of essential construction traffic routes, and a total of 10m width for construction access, unless otherwise approved.

Prior to land clearing, areas of protected vegetation, and significant areas of retained vegetation must be clearly identified (e.g. with high-visibility tape, or light fencing) for the purposes of minimising the risk of unnecessary land clearing.

All reasonable and practicable measures must be taken to minimise the removal of, or disturbance to, those trees, shrubs and ground covers (organic or inorganic) that are intended to be retained.

All land clearing must be in accordance with the Federal, State and Local Government Vegetation Protection/Preservation requirements and/or policies.

Land clearing is to be minimised where possible during periods when soil erosion due to wind, rain or surface water is possible.

5.3. Site Access

Site access must be restricted to the minimum practical number of locations. Site exit points must be appropriately managed to minimise the risk of sediment being tracked onto public roadways. Stormwater runoff from access roads and stabilised entry/exit points must drain to an appropriate

sediment control device. Site access shall be provided from Eumungerie Road to the north-east of the site.

5.4. Soil and Stockpile Management

All reasonable and practicable measures must be taken to obtain the maximum benefit from existing topsoil.

Stockpiles of erodible material that has the potential to cause environmental harm if displaced, must be:

- Appropriately protected from wind, rain, concentrated surface flow and excessive up-slope stormwater surface flows;
- Located at least 2m from any hazardous area, retained vegetation, or concentrated drainage line; and
- Located up-slope of an appropriate sediment control system.

A suitable flow diversion system must be established immediately up-slope of a stockpile of erodible material that has the potential to cause environmental harm if displaced.

5.5. Site Management

All office facilities and operational activities must be located such that any liquid effluent (e.g. process water, wash-down water, effluent from equipment cleaning, or plant watering), can be totally contained and treated within the site.

The construction schedule must aim to minimise the duration that any and all areas of soil are exposed to the erosive effects of wind, rain and surface water.

Land-disturbing activities must be undertaken in accordance with the SWMP and associated development conditions.

Land-disturbing activities must be undertaken in such a manner that allows all reasonable and practicable measures to be undertaken to:

- Allow stormwater to pass through the site in a controlled manner and at non- erosive flow velocities up to the specified design storm discharge;
- Minimise soil erosion resulting from rain, water flow and/or wind;
- Minimise adverse effects of sediment runoff, including safety issues;
- Prevent, or at least minimise, environmental harm resulting from work-related soil erosion and sediment runoff; and
- Ensure that the value and use of land/properties adjacent to the development (including roads) are not diminished as a result of the adopted ESC measures.

All ESC measures must conform to the standards and specifications contained in the SWMP and supporting documentation.

Any works that may cause significant soil disturbance and are ancillary to any activity for which regulatory body approval is required, must not commence before the issue of that approval.

Additional and/or alternative ESC measures must be implemented in the event that site inspections, the site's Monitoring and Maintenance Program, or the regulatory authority, identifies that unacceptable off-site sedimentation is occurring as a result of the work activities.

Land-disturbing activities must not cause unnecessary soil disturbance if an alternative construction process is available that achieves the same or equivalent outcomes at an equivalent cost.

Sediment (including clay, silt, sand, gravel, soil, mud, cement and ceramic waste) deposited off the site as a direct result of an on-site activity, must be collected and the area appropriately cleaned/rehabilitated as soon as reasonable and practicable, and in a manner that gives appropriate consideration to the safety and environmental risks associated with the sediment deposition.

Adequate waste collection bins must be provided on-site and maintained such that potential and actual environmental harm resulting from such material waste is minimised.

Concrete waste and chemical products, including petroleum and oil-based products, must be prevented from entering an internal water body, or an external drain, stormwater system, or water body.

All flammable and combustible liquids, including all liquid chemicals if such chemicals could potentially be washed or discharged from the site, are stored and handled on-site in accordance with relevant standards such as *The storage and handling of flammable and combustible liquids* (AS1940).

Trenches not located within roadways must be backfilled, capped with topsoil, and compacted to a level at least 75mm above adjoining ground level and appropriately stabilised.

All stormwater, sewer line and other service trenches, not located within roadways, must be mulched and seeded, other otherwise appropriately stabilised within 7 days after backfill.

No more than 150m of a stormwater, sewer line or other service trench must to be open at any one time.

Site spoil must be lawfully disposed of in a manner that does not result in ongoing soil erosion or environmental harm.

All fill material placed on site must comprise only natural earth and rock, and is to be free of contaminants and be compacted in layers not exceeding 300mm to 90% modified maximum dry density in accordance with AS1289.

5.6. Drainage Control

All drainage control measures must be applied and maintained in accordance with the SWMP.

Wherever reasonable and practical, stormwater runoff entering the site from external areas, and non-sediment laden (clean) stormwater runoff entering a work area or area of soil disturbance, must be diverted around or through that area in a manner that minimises soil erosion and the contamination of that water for all discharges up to the specified design storm discharge.

During the construction period, all reasonable and practical measures must be implemented to control flow velocities in such a manner than prevents soil erosion along drainage paths and at the entrance and exit of all drains and drainage pipes during all storms up to the relevant design storm discharge. Control of velocities down long slopes must be managed through the use of earth lined catch drains. These should be constructed as per *Catch Drains Part 2: Earth-lined* (IECA 2008), and with reference to spacing in Table 8 - Recommended “Maximum” Drain or Bench Spacing on Non-Vegetated Slopes. These temporary drains should have a fall of approximately 1% to the formally sized and stabilised drains.

To the maximum degree reasonable and practicable, all waters discharged during the construction phase must discharge onto stable land, in a non-erosive manner, and at a legal point of discharge.

Wherever reasonable and practicable, “clean” surface waters must be diverted away from sediment control devices and any untreated, sediment-laden waters.

5.7. Erosion Control

All erosion control measures must be applied and maintained in accordance with SWMP.

The application of liquid-based dust suppression measures must ensure that sediment-laden runoff resulting from such measures does not create a traffic or environmental hazard.

All temporary earth banks, flow diversion systems, and embankments associated with constructed sediment basins must be machine-compacted, seeded and mulched for the purpose of establishing a temporary vegetative cover within 10 days after grading.

A minimum 60% ground cover must be achieved on all non-completed earthworks exposed to accelerated soil erosion if further construction activities or soil disturbances are likely to be suspended for more than 30 days during those months when the expected rainfall is less than 30mm; minimum 70% cover within 30 days if between 30 and 45mm; minimum 70% cover within 20 days if between 45 and 100mm; minimum 75% cover within 10 days if between 100 and 225mm; and minimum 80% cover within 5 days if greater than 225mm.

5.8. Sediment Control

All sediment control measures must be applied and maintained in accordance with the SWMP.

Optimum benefit must be made of every opportunity to trap sediment within the work site, and as close as practicable to its source.

Sediment traps must be installed and operated to both collect and retain sediment.

The potential safety risk of a proposed sediment trap to site workers and the public must be given appropriate consideration, especially those devices located within publicly accessible areas.

All reasonable and practicable measures must be taken to prevent, or at least minimise, the release of sediment from the site.

Suitable all-weather maintenance access must be provided to all sediment control devices.

Sediment control devices must be de-silted and made fully operational as soon as reasonable and practical after a sediment-producing event, whether natural or artificial, if the device's sediment retention capacity falls below 75% of its design retention capacity.

Materials, whether liquid or solid, removed from sediment control devices during maintenance or decommissioning, must be disposed of in a manner that does not cause ongoing soil erosion or environmental harm.

As-Constructed plans must be prepared for all constructed sediment basins and associated emergency spillways. Such plans must appropriately verify the dimensions, levels and volume of each basin.

Constructed sediment basins must be maintained and be fully operational throughout the construction period and until the catchment area of each basin achieves the specified percentage of ground cover on all soil surfaces.

Settled sediment must be removed from sediment basins when the volume of the sediment exceeds the designated sediment storage volume, or the design maximum sediment storage elevation.

5.9. Site Rehabilitation

All disturbed areas must be suitably stabilised within 30 days from the day that soil disturbances on the area have been finalised.

A minimum 60% ground cover must be achieved on all completed earthworks exposed to accelerated soil erosion within 30 days during those months when the expected rainfall is less than 30mm; minimum 70% cover within 30 days if between 30 and 45mm; minimum 70% cover within 20 days if between 45 and 100mm; minimum 75% cover within 10 days if between 100 and 225mm; and minimum 80% cover within 5 days if greater than 225mm.

No completed earthwork surface must remain denuded for longer than 60 days.

The type of ground cover applied to completed earthworks is compatible with the anticipated long-term land use, environmental risk, and site rehabilitation measures.

Stockpile areas should be stabilised using hydromulch or an approved equivalent. Batters should be stabilised with mulch to a depth of 50mm (utilising mulched vegetation where feasible).

Unless otherwise directed by the approved revegetation plan, topsoil must be placed at a minimum depth of 75mm on slopes 4:1 (H:V) or flatter, and 50mm on slopes steeper than 4:1.

The pH of the topsoil must be between 6.5 and 8.5 prior to initiating the establishment of vegetation. The pH level of topsoil must be adequate to enable establishment and growth of the specified vegetation.

Temporary site stabilisation procedures must commence at least 30 days prior to the nominated site shutdown date. At least 70% stable cover of all unstable and/or disturbed soil surfaces must be achieved prior to the start of shutdown. The stabilisation works must not rely upon the longevity of non-vegetated erosion control blankets, or temporary soil binders.

All unstable or disturbed soil surfaces must be adequately stabilised against erosion (minimum 70%) prior to commencement of use.

5.10. Sedimentation Basin Rehabilitation

Required drainage and ESC measures during the decommissioning and rehabilitation of a sediment basin must comply with same standards specified for the normal construction works.

Upon decommissioning of a sediment basin, all water and sediment must be removed from the basin prior to removal of the embankment (if any). Any such material, liquid or solid, must be disposed of in a manner that will not create an erosion or pollution hazard.

A sediment basin must not be decommissioned until all up-slope site stabilisation measures have been implemented and are appropriately working to control soil erosion and sediment runoff in accordance with the specified ESC standard.

5.11. Site Monitoring

All water quality data including dates of rainfall, dates of testing, testing results and dates of water release, must be kept in an on-site register. The register is to be maintained up to date for the duration of the approved works and be available on-site for inspection.

At nominated in-stream water monitoring sites, a minimum of 3 water samples must be taken and analysed, and the average result used to determine quality. Sediment basin water quality samples must be taken at a depth no greater than 200mm above the level of settled sediment.

All environmentally relevant incidents must be recorded in a field log that must remain accessible to all relevant regulatory authorities.

5.12. Site Maintenance

All ESC measures, including drainage control measures, must be maintained in proper working order at all times during their operational lives.

All temporary ESC measures, including drainage control measures, must be fully operational and maintained in proper working order at all times during the maintenance period.

All drainage and ESC measures must be inspected as outline is Section 7.

Sediment removed from sediment traps and places of sediment deposition must be disposed of in a lawful manner that does not cause ongoing soil erosion or environmental harm.

Maintenance mowing (if required) of all road shoulders, table drains, batters and other surfaces likely to experience accelerated soil erosion must aim to leave the grass length no shorter than 50mm where reasonable and practicable. Maintenance mowing must be done in a manner that will not damage the profile of formed, soft edges, such as the crest of earth embankments.

5.13. Dust control

Dust producing activities shall be avoided or minimised wherever practical during windy conditions and a water truck shall be available and used on-site when construction activities are being undertaken.

6. ROLES AND RESPONSIBILITIES

The section below highlights the responsibilities of numerous parties with respect to the ESCP.

6.1. ESC Design Engineer

- Lead the development of the ESCP;
- Select and design ESC practices that suit the construction site / environmental conditions; and
- Review and approve of on-site design modifications.

6.2. Contractor

- Control the implementation and effectiveness of the ESCP;
- Install the ESC measures as specified in the ESCP;
- Operate and maintain the ESC measures;
- Communicate any concerns with proposed ESC measures;
- Communicate to project manager any failure of any ESC measures; and
- Respond promptly to any direction received from the ESC design engineer, project manager, or environmental manager.

6.3. Project Manager

- Overall responsibility of ESCP implementation, inspection, monitoring, maintenance, operation and decommissioning;
- Inform ESC design engineer about any changes to the construction staging and scheduling;
- Notify the quality and environment manager immediately of any non-compliance with the ESCP;
- Notify the quality and environment manager when runoff generating rainfall occurs;
- Maintain current records of rainfall, storage volumes, water quality, treatment practices, and discharge volumes.

6.4. Quality and Environment Manager

- Conduct site inspections and prepare inspection reports;
- Conduct in-situ monitoring and prepare monitoring reports;
- Authorise sedimentation basin discharge;
- Communicate recommendations and feedback regarding the applications of ESC measures to the project manager and contractor;

6.5. Erosion and Sediment Control Auditor / Advisor (CPESC)

- Conduct audits and prepare audit reports;
- Provide advice regarding ESC site improvement.

All Personnel - Report any damage to ESC devices and any potential or actual environmental harm.

7. SITE INSPECTIONS

7.1. Introduction

Site inspections are required to ensure that the ESCP is being appropriately implemented and that ESC measures comply with relevant standards. Site inspections are to be undertaken in accordance with the Site Inspection Checklist provided on pages 7.19 – 7.31 of the *Best Practice Erosion and Sediment Control Guidelines* (IECA 2008).

Best practice site management requires all ESC measures to be inspected by the site manager, responsible ESC officer or nominated representative:

- at least daily when rain is occurring;
- at least weekly (even if work is not occurring on-site);
- within 24 hours prior to expected rainfall; and
- within 18 hours of a rainfall event of sufficient intensity and duration to cause on-site runoff.

7.2. Inspection Requirements

Daily site inspections (during periods of runoff producing rainfall) must check:

- All drainage and ESC measures;
- Occurrences of excessive sediment deposition (whether on-site or off-site); and
- All site discharge points.

Weekly site inspections must check:

- All drainage and ESC measures;
- Occurrences of excessive sediment deposition (whether on-site or off-site);
- Occurrences of construction materials, litter or sediment placed, deposited, washed or blown from the site, including deposition by vehicle movements;
- Litter and waste receptors; and
- Oil, fuel and chemical storage facilities.

Site inspections prior to anticipated runoff producing rainfall must check:

- All drainage and ESC measures; and
- All temporary flow diversion and drainage works.

Site inspection following runoff producing rainfall must check:

- All drainage and ESC measures;
- Treatment and de-watering requirements of sediment basins;
- Sediment deposition within sediment basins and the need for its removal;
- Occurrences of excessive sediment deposition (whether on-site or off-site);
- Occurrences of construction materials, litter or sediment placed, deposited, washed or blown from the site, including deposition by vehicle movements; and
- Occurrences of excessive erosion, sedimentation, or mud generation around the site office, car park and/or material storage areas.

In addition to the above, **monthly site inspections** must check:

- Surface coverage of finished surfaces;
- Health of recently established vegetation; and
- Proposed staging of future land clearing, earthworks and site/soil stabilisation.

8. AUDITS

In accordance with the *Best Practice Erosion and Sediment Control Guidelines* (IECA 2008), audits are to be conducted at intervals of not more than one (1) calendar month commencing from the day of site disturbance until all disturbed areas have been adequately stabilised against erosion to the acceptance of the relevant regulatory authority. Such audits must be:

- Undertaken by a person suitably qualified and experienced in ESC (i.e. CPESC) that can be verified by an independent third party (this person must not be an employee or agent of the principal contractor); and
- Conducted on the next business day following a rainfall event in which greater than 10mm of rainfall has been recorded by the Bureau of Meteorology rain gauge nearest to the site.

ESC audits must include, as a minimum:

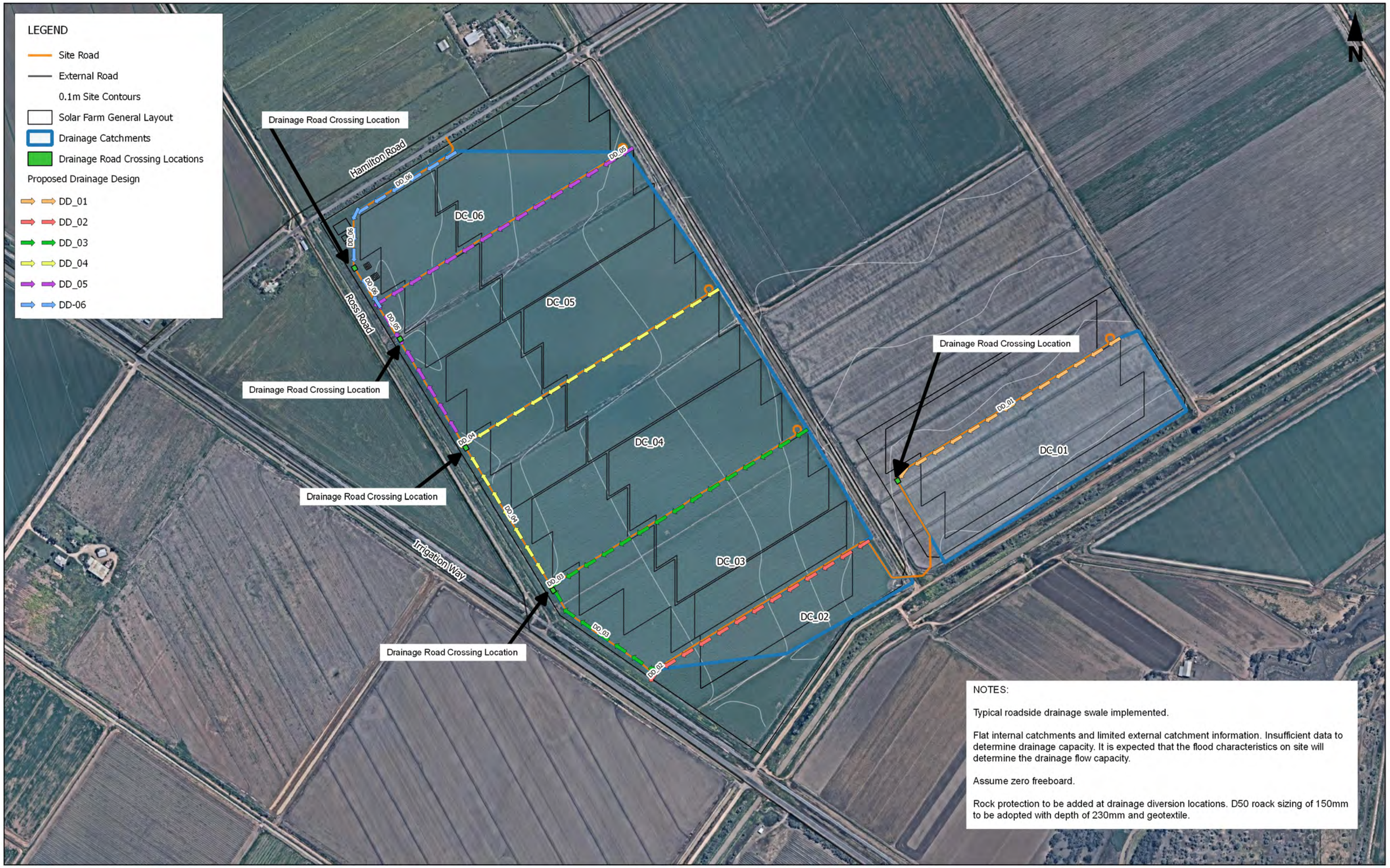
- Copies of all original completed site inspection checklists,
- Non-conformance and corrective action reports;
- Sediment basin water quality and site discharge water quality monitoring results;
- An ESCP showing the areas of completed soil stabilisation; and
- Rainfall records including date and rainfall depth.

Audit reports are to be compiled within 5 business days of completion of the site inspection and forwarded to the relevant stakeholder.

APPENDIX A REFERENCE DOCUMENTS

Item	Title / Description	Author / Publisher	Version / Date
1	Bridge and Culvert Construction	IECA Book 4 – Design Fact Sheets	2010
2	Catch Drains Part-1 General	IECA Book 4 – Design Fact Sheets	2010
3	Catch Drains Part-2 Earth	IECA Book 4 – Design Fact Sheets	2010
4	Catch Drains Part-2 Grass	IECA Book 4 – Design Fact Sheets	2010
5	Check Dam Sediment Traps	IECA Book 4 – Design Fact Sheets	2010
6	Construction Access Roads	IECA Book 4 – Design Fact Sheets	2010
7	Construction Exits Part-3 – Vibration Grids	IECA Book 4 – Design Fact Sheets	2010
8	Construction Exits Part-4 – Wash Bays	IECA Book 4 – Design Fact Sheets	2010
9	Diversion Channels	IECA Book 4 – Design Fact Sheets	2010
10	Dust Control	IECA Book 4 – Design Fact Sheets	2010
11	Excavated Sediment Traps	IECA Book 4 – Design Fact Sheets	2010
12	Filter Fence	IECA Book 4 – Design Fact Sheets	2010
13	Flow Diversion Bank Part-1 General	IECA Book 4 – Design Fact Sheets	2010
14	Flow Diversion Bank Part-1 Grass	IECA Book 4 – Design Fact Sheets	2010
15	Flow Diversion Bank Part-2 Earth	IECA Book 4 – Design Fact Sheets	2010
16	Installation of Services	IECA Book 4 – Design Fact Sheets	2010
17	Level Spreaders	IECA Book 4 – Design Fact Sheets	2010
18	Mulch Filter Berms	IECA Book 4 – Design Fact Sheets	2010
19	Pipe & Culvert Inlet Sediment Traps	IECA Book 4 – Design Fact Sheets	2010
20	Sediment Basin Overview	IECA Book 4 – Design Fact Sheets	2010
21	Sediment Basin Spillways	IECA Book 4 – Design Fact Sheets	2010
22	Sediment Fence	IECA Book 4 – Design Fact Sheets	2010
23	Sediment Weirs	IECA Book 4 – Design Fact Sheets	2010
24	Site Management	IECA Book 4 – Design Fact Sheets	2010
25	Soil Management	IECA Book 4 – Design Fact Sheets	2010
26	Stockpile Management	IECA Book 4 – Design Fact Sheets	2010
27	Temporary Culvert Crossings	IECA Book 4 – Design Fact Sheets	2010
28	Vegetation Management	IECA Book 4 – Design Fact Sheets	2010

APPENDIX B RELEVANT DRAWINGS



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PAGE SIZE: A3 SCALE: 1:7,000

REVISION: 0 STATUS: FINAL SOURCES: NEARMAP
DRAWING NO: DWG 01 AUTHOR: B.S. DATE: 08/02/17

PROJECT NO: 30031744 PROJECT TITLE: GRIFFITH SOLAR FARM

FIGURE TITLE: DRAINAGE PLAN

CLIENT: BOUYGUES CONSTRUCTION AUSTRALIA

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LEGEND

- Solar Farm General Layout
- Drainage Catchments
- Clear Water Diversion
- Dirty Water Diversion
- Type 3 Sediment Control Measure
- Drainage Road Crossing Locations
- Site Road
- External Road
- 0.1m Site Contours

N

Drainage Road Crossing Location

Hamilton Road

Existing irrigation drain implemented as clear water diversion.

Drainage Road Crossing Location

Ross Road

Drainage Road Crossing Location

Drainage Road Crossing Location

Irrigation Way

Drainage Road Crossing Location

C06

C05

C04

C03

C02

C01

NOTES:

Flat internal catchments and limited external catchment information. Insufficient data to determine drainage capacity. It is expected that the flood characteristics on site will determine the drainage flow capacity.

The disturbed area in each catchment is to be limited to <1 ha at any one time to eliminate the requirement for sedimentation basins. By staging the development as proposed, ESCP measures can be minimised.

Rock protection to be added at drainage diversion locations. D50 rock sizing of 150mm to be adopted with depth of 230mm and geotextile.

Refer to IECA Best Practice Erosion and Sediment Control regarding implementation and maintainance of ESC measures.

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PAGE SIZE: A3	SCALE: 1:7,000	DRAWING NO: DWG-02	AUTHOR: S.C. DATE: 08/02/17
PROJECT NO: 30031744	PROJECT TITLE: GRIFFITH SOLAR FARM	FIGURE TITLE: EROSION AND SEDIMENT CONTROL PLAN	

CLIENT: BOUYGUES CONSTRUCTION AUSTRALIA

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APPENDIX C TYPICAL DETAIL DRAWINGS

NOTES

1. THE PURPOSE OF THESE EROSION AND SEDIMENT CONTROL PLANS IS TO COMMUNICATE A REASONABLE STARTING POINT FOR TENDERING AND DEVELOPMENT OF SITE SPECIFIC EROSION AND SEDIMENT CONTROL PLANS. THESE EROSION AND SEDIMENT CONTROL PLANS ARE NOT INTENDED TO BE COMPLETE OR COMPREHENSIVE.
2. THESE EROSION AND SEDIMENT CONTROL PLANS DO NOT DICTATE THE STAGING OF THE WORKS, AND ARE A DIAGRAMMATIC REPRESENTATION ONLY. CONTRACTOR TO DECIDE STAGING OF THE CONSTRUCTION WORKS.
3. ALL ENVIRONMENTAL MANAGEMENT REQUIREMENTS SHALL COMPLY WITH STATUTORY AUTHORITY REQUIREMENTS.
4. FOR STORMWATER DRAINAGE DETAILS REFER TO THE STORMWATER DRAINAGE DRAWINGS.
5. SEDIMENT CONTROL DEVICES AT DISCHARGE POINTS FROM SITE SHALL REMAIN IN PLACE UNTIL PRACTICAL COMPLETION.
6. ALL EROSION AND SEDIMENT CONTROL MEASURES ARE TO BE INSTALLED PRIOR TO COMMENCING EARTHWORKS IN AN AREA AVAILABLE FOR CONSTRUCTION.
7. NO EROSION AND SEDIMENT CONTROLS SHALL BE CONSTRUCTED ON ADJACENT PROPERTIES.
8. ALL ONSITE STAFF INCLUDING SUB-CONTRACTORS WILL BE MADE AWARE OF THEIR ENVIRONMENTAL RESPONSIBILITIES AND THE ENVIRONMENTAL ISSUES ASSOCIATED WITH THIS PROJECT PRIOR TO COMMENCEMENT OF CONSTRUCTION.
9. ANY ACCESS TO THE SITE SHALL INCORPORATE A STABILISED RUMBLE GRID IN ACCORDANCE WITH STATUTORY AUTHORITY REQUIREMENTS.
10. VEGETATED AREAS NOT PLANNED FOR CLEARING OR CONSTRUCTION ACTIVITIES SHALL BE KEPT FENCED OR TAPED OFF TO PREVENT VEHICLE ACCESS.
11. ALL AREAS OF THE SITE NOT SUBJECT TO EROSION, CONTAMINATION OR DISTURBANCE SHALL HAVE PROVISION FOR ALL RUNOFF TO BE DIVERTED AWAY FROM THE STORMWATER QUALITY DEVICES IN A MANNER WHICH DOES NOT CAUSE SCOURING OR EROSION.
12. MONITORING OF PREVENTION MEASURES SHALL GENERALLY BE:-
    * AT LEAST DAILY WHEN WORK IS OCCURRING ONSITE OR WEEKLY WHEN WORK IS NOT OCCURRING ONSITE;
    - WITHIN 24 HOURS OF EXPECTED RAIN;
    - WITHIN 12 HOURS OF A RAINFALL EVENT OF SUFFICIENT INTENSITY TO MOBILISE SEDIMENT ONSITE.
13. PRIOR TO ANY EXCAVATION OR FILLING, THE AREA SHALL BE STRIPPED OF TOPSOIL AND STOCKPILED. SUITABLE LOCATIONS FOR STOCKPILES SHALL BE NOMINATED BY THE CONTRACTOR. STOCKPILING SHALL COMPLY WITH THE REGULATORY AUTHORITIES REQUIREMENTS.
14. SEDIMENT FENCES/DETAILS
15. * FILTER FABRIC ANCHORED INTO A 200MM DEEP TRENCH;
16. * MAXIMUM HEIGHT OF FENCE ABOVE GROUND: 750MM;
17. * MAXIMUM POST SPACING: 2M WITHOUT WIRE MESH BACKING ALLOW AT LEAST 2M BETWEEN FENCE AND A STOCKPILE;
18. * ALLOW AT LEAST 2M BETWEEN FENCE AND A STOCKPILE.
19. * SEDIMENT FENCES SHALL NOT BE LOCATED ACROSS STREAMS, DITCHES, CHANNELS OR GULLIES.
20. THROUGHOUT CONSTRUCTION, BIODEGRADABLE SOCKS SHALL BE PLACED AROUND STORMWATER INLETS AND GRATES.
21. TO AVOID THE CONTAMINATION OF CLEAN RUNOFF, UPSTREAM RUNOFF SHALL BE DIVERTED AWAY FROM AREAS OF EXPOSED EARTH.
22. DISTURBED AREAS SHALL BE REHABILITATED AS SOON AS PRACTICABLE FOLLOWING THE COMPLETION OF THE PROPOSED WORKS. REHABILITATION AND REVEGETATION SHALL INCLUDE THE USE OF LOCAL HABITAT SPECIES IN REVEGETATION WORKS. MAINTENANCE OF THE REHABILITATED AREAS SHALL OCCUR ON A REGULAR BASIS WITH LOCAL VEGETATION. VEGETATION BUFFERS IN THE RIPARIAN ZONES OF ALL WATERCOURSES SHALL BE MAINTAINED TO FILTER SEDIMENTS AND POTENTIAL POLLUTANTS.
23. EXCAVATION WORKS ARE TO BE CARRIED OUT AS QUICKLY AS PRACTICABLE TO ENSURE MINIMAL INTERFERENCE. BANKS ARE TO BE STABILISED AND AUGMENTED, WHERE NECESSARY TO PREVENT EROSION AND SCOURING.
24. DUST PRODUCING ACTIVITIES SHALL BE AVOIDED OR MINIMISED WHEREVER PRACTICAL DURING WINDY CONDITIONS AND A WATERING TRUCK SHALL BE AVAILABLE AND USED ONSITE WHEN CONSTRUCTION ACTIVITIES ARE BEING UNDERTAKEN.
25. ANY ONSITE REFUELLING OPERATIONS SHALL NEED TO BE UNDERTAKEN BY A LICENSED MOBILE FACILITY. NO REFUELLING SHALL OCCUR WITHIN 20 METRES OF DRAINAGE LINES OR WATERCOURSES AND PREFERABLY IN THE SITE COMPOUND. ALL CARE SHALL NEED TO BE TAKEN DURING ONSITE REFUELLING ACTIVITIES TO PREVENT ANY SPILLS. ALL REFUELLING SHALL INCORPORATE THE USE OF DRY-BREAK COUPLINGS. ALL LICENSED MOBILE REFUELLING FACILITIES SHALL CARRY SPILL KITS. ADDITIONAL SPILL KITS SHALL BE LOCATED ON SITE FOR ALL STAFF TO UTILISE AND ALL STAFF SHALL BE TRAINED IN THE USE OF MATERIALS FOR SPILL INCIDENTS.
26. CONCRETE WASTES OR WASHINGS FROM CONCRETE MIXERS MUST NOT BE DEPOSITED IN ANY LOCATION WHERE THEY MAY FLOW OR BE WASHED INTO WATERS OR DRAINAGE LINES.
27. ALL GENERATED WASTE MATERIALS SHALL BE REGULARLY REMOVED FROM THE SITE AND DISPOSED OF OFFSITE IN ACCORDANCE WITH RELEVANT REGULATORY REQUIREMENTS.
28. NO INCINERATION OR OPEN BURNING SHALL BE CARRIED OUT ONSITE.
29. THIS EROSION AND SEDIMENT CONTROL PLAN HAS BEEN CREATED UNDER THE ASSUMPTION THAT 'INITIAL CLEARING' WILL COMPRISE OF REMOVAL OF TREES, SHRUBS AND OTHER VEGETATION AND THAT EXISTING GRASS COVER WILL BE MAINTAINED UNTIL CONSTRUCTION BEGINS.
30. FOR FURTHER INFORMATION ON INSTALLATION, MAINTENANCE AND REMOVAL OF EROSION AND SEDIMENT CONTROL DEVICES, REFER TO "BEST PRACTICE EROSION AND SEDIMENT CONTROL, BOOK 4 - DESIGN FACT SHEETS AND BOOK 6 - STANDARD DRAWINGS" IECA AUSTRALASIA AND ALSO, SOILS AND CONSTRUCTION, VOLUME 1, LANDCOM 2004.
31. SITE SPECIFIC EROSION AND SEDIMENT CONTROL PLANS ARE TO BE DEVELOPED BY THE CONTRACTOR TO SUPPORT THE ACTUAL CONSTRUCTION SEQUENCING, CONSTRUCTION METHODOLOGIES AND LOCAL SITE CONDITIONS, DETAIL ACTUAL REQUIRED EROSION AND SEDIMENT CONTROL MEASURES.
32. THE CONTRACTOR IS RESPONSIBLE FOR ENSURING THE ADEQUACY OF THE ACTUAL EROSION AND SEDIMENT CONTROL MEASURES AND ACHIEVING THE LEGAL REQUIREMENTS, INCLUDING DISCHARGE LIMITS TO ADJOINING WATERWAYS.
33. ALL STORMWATER INLETS WITHIN 100M DOWNSTREAM OF CLEARING LIMITS ARE TO BE PROTECTED FROM SEDIMENTATION WITH APPROPRIATE MEASURES.

RELATED DOCUMENTS

1. THE CONTRACTOR IS TO HAVE AT LEAST ONE COPY ONSITE OF THE "BEST PRACTICE EROSION AND SEDIMENT CONTROL" 2008, IECA AUSTRALASIA BOOKS 1 TO 4 AND "BOOK 6 -STANDARD DRAWINGS" AND THE SOILS AND CONSTRUCTION, VOLUME 1, LANDCOM 2004.
2. DETAILS OF EROSION AND SEDIMENT CONTROL MEASURES SUCH AS SEDIMENT FENCES AND ROCK CHECK DAMS ARE INCLUDED IN THE "BEST PRACTICE EROSION AND SEDIMENT CONTROL" 2008, IECA AUSTRALASIA BOOKS 1 TO 4 AND "BOOK 6 - STANDARD DRAWINGS".

STORMWATER DRAINAGE

1. ALL PERIMETER DRAINS AND BANKS ARE TO BE INSTALLED WITH EROSION AND SEDIMENT CONTROL MEASURES PRIOR TO COMMENCING EARTHWORKS IN AN AREA AVAILABLE FOR CONSTRUCTION.
2. IMPLEMENTATION OF EROSION AND SEDIMENT CONTROL MEASURES SHALL BE SEQUENCED IN ORDER TO OPTIMISE EFFECTIVENESS.
3. THE CLEAR WATER DIVERSION DRAIN SHALL BE CONSTRUCTED PRIOR TO WORK COMMENCING AT THE CONSTRUCTION SITE.
4. FOLLOWING THE CONSTRUCTION OF THE CLEAR WATER DIVERSION DRAIN, THE SEDIMENT FENCE SHALL BE PLACED DOWN STREAM OF THE PROPOSED WORKS.

SITE ACCESS

1. SITE ACCESS MUST BE RESTRICTED TO THE MINIMUM PRACTICAL NUMBER OF LOCATIONS.
2. SITE EXIT POINTS MUST BE APPROPRIATELY MANAGED TO MINIMISE THE RISK OF SEDIMENT BEING TRACKED ONTO PUBLIC ROADWAYS. STORMWATER RUNOFF FROM ACCESS ROADS AND STABILISED ENTRY/EXIT POINTS MUST DRAIN TO AN APPROPRIATE SEDIMENT CONTROL DEVICE.

SITE REHABILITATION

1. ALL DISTURBED AREAS MUST BE SUITABLY STABILISED WITHIN 30 DAYS FROM THE DAY THAT SOIL DISTURBANCES ON THE AREA HAVE BEEN FINALISED. STOCKPILE AREAS SHOULD BE STABILISED USING HYDROMULCH. BATTERS SHOULD BE STABILISED WITH MULCH TO A DEPTH OF 50MM OR USING HEAVY MULCH (UTILISING MULCHED VEGETATION). UNLESS OTHERWISE DIRECTED BY THE APPROVED REVEGETATION PLAN, TOPSOIL MUST BE PLACED AT A MINIMUM DEPTH OF 75MM ON SLOPES 4:1 (H:V) OR FLATTER, AND 50MM ON SLOPES STEEPER THAN 4:1.
2. TEMPORARY SITE STABILISATION PROCEDURES MUST COMMENCE AT LEAST 30 DAYS PRIOR TO THE NOMINATED SITE SHUTDOWN DATE. AT LEAST 70% STABLE COVER OF ALL UNSTABLE AND/OR DISTURBED SOIL SURFACES MUST BE ACHIEVED PRIOR TO THE START OF SHUTDOWN. THE STABILISATION WORKS MUST NOT RELY UPON THE LONGEVITY OF NON-VEGETATED EROSION CONTROL BLANKETS, OR TEMPORARY SOIL BINDERS.

SITE MONITORING

1. ALL WATER QUALITY DATA, INCLUDING DATES OF RAINFALL, DATES OF TESTING, TESTING RESULTS AND DATES OF WATER RELEASE, MUST BE KEPT IN AN ON-SITE REGISTER. THE REGISTER IS TO BE MAINTAINED UP TO DATE FOR THE DURATION OF THE APPROVED WORKS AND BE AVAILABLE ON-SITE FOR INSPECTION.
2. AT NOMINATED IN-STREAM WATER MONITORING SITES, A MINIMUM OF 3 WATER SAMPLES MUST BE TAKEN AND ANALYSED, AND THE AVERAGE RESULT USED TO DETERMINE QUALITY. SEDIMENT BASIN WATER QUALITY SAMPLES MUST BE TAKEN AT A DEPTH NO GREATER THAN 200MM ABOVE THE LEVEL OF SETTLED SEDIMENT.
3. ALL ENVIRONMENTALLY RELEVANT INCIDENTS MUST BE RECORDED IN A FIELD LOG THAT MUST REMAIN ACCESSIBLE TO ALL RELEVANT REGULATORY AUTHORITIES.
4. MONITORING TO BE UNDERTAKEN IN ACCORDANCE WITH THE EROSION AND SEDIMENT CONTROL PLANS.

SITE MAINTENANCE

1. ALL ESC MEASURES, INCLUDING DRAINAGE CONTROL MEASURES, MUST BE MAINTAINED IN PROPER WORKING ORDER AT ALL TIMES DURING THEIR OPERATIONAL LIVES.
2. ALL DRAINAGE, ESC MEASURES MUST BE INSPECTED:
   - AT LEAST DAILY (WHEN WORK IS OCCURRING ON-SITE);
   - AT LEAST WEEKLY (WHEN WORK IS NOT OCCURRING ON-SITE);
   - WITHIN 24 HOURS OF EXPECTED RAINFALL; AND
   - WITHIN 18 HOURS OF A RAINFALL EVENT OF SUFFICIENT INTENSITY AND DURATION TO CAUSE RUNOFF ONSITE.

DRAIN SIZING

1. CLEAN AND DIRTY WATER DRAINS TO BE CONSTRUCTED IN ACCORDANCE WITH DESIGN CALCULATIONS PROVIDED IN ESC REPORT AND APPENDICES.

DRAIN GRADING

1. CONTRACTOR TO ENSURE THAT ALL CLEAN AND DIRTY WATER DIVERSION DRAINS ARE POSITIVELY GRADED TO DISCHARGE LOCATIONS AS SHOWN ON LAYOUT PLAN.

150 mm ON ORIGINAL
A1

DRAWING FILE LOCATION / NAME: V:_Vault\Projects\30031740\Solar_Farm_Intersections\CAD\DWG\00_GRIFFITH\30031744-GR-0062.dwg
PLOT DATE: 09 Feb 2017 TIME: 15:33:56

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01	8.02.2017	100% ISSUE FOR CLIENT APPROVAL		
02	9.02.2030	100% REISSUE FOR CLIENT APPROVAL		

TITLE	NAME
DRAFTER	D. JACKSON
DRAFTING CHECK	D. PHILLIPS
DESIGNER	R. YOUNG
DESIGN CHECK	K. NARAYAN
PROJECT MANAGER	K. NARAYAN
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SMEC PROJECT No 30031740

CLIENT
BOUYGUES CONSTRUCTION

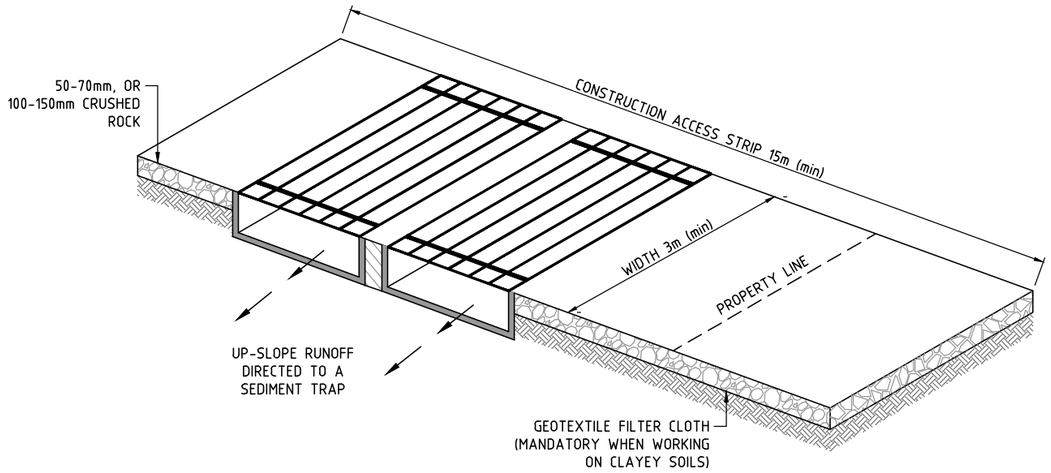
PRELIMINARY

PROJECT / REFERENCE No. NEON-GR-SM-GDW-DR-3012-02

PROJECT TITLE: GRIFFITH SOLAR FARM

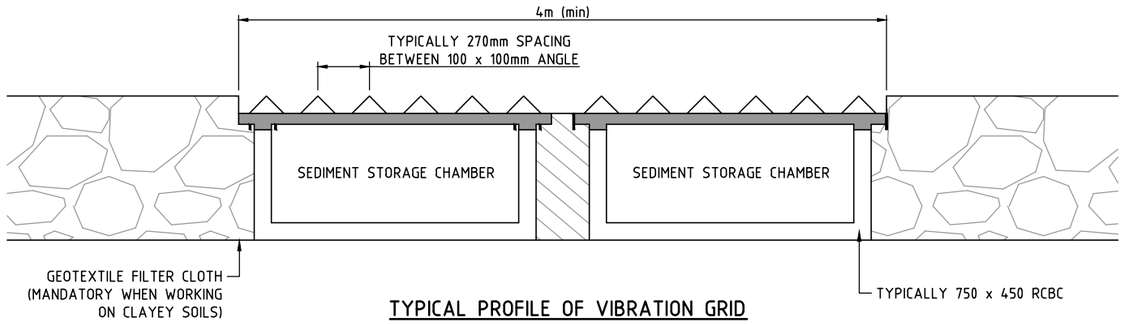
EROSION AND SEDIMENT CONTROL DETAILS SHEET 3 OF 6

SCALE	PHASE	PROJECT / DRAWING No.	REVISION
AS SHOWN	DETAILED DESIGN	30031744-GR-0062	02



TYPICAL LAYOUT OF A VIBRATION GRID (SHAKE DOWN)

N.T.S



TYPICAL PROFILE OF VIBRATION GRID

N.T.S

CONSTRUCTION EXIT - VIBRATION GRID (SHAKE DOWN) NOTES:

INSTALLATION

1. REFER TO APPROVED PLANS FOR LOCATION AND DIMENSIONAL DETAILS. IF THERE ARE QUESTIONS OR PROBLEMS WITH THE LOCATION, DIMENSIONS, OR METHOD OF INSTALLATION, CONTACT THE APPOINTED ENGINEER OR RESPONSIBLE ON-SITE OFFICER FOR ASSISTANCE.
2. CLEAR THE LOCATION OF THE VIBRATION GRID, REMOVING STUMPS, ROOTS AND OTHER VEGETATION TO PROVIDE FIRM FOUNDATION SO THAT THE ROCK IS NOT PRESSED INTO SOFT GROUND. CLEAR SUFFICIENT WIDTH TO ALLOW PASSAGE OF LARGE VEHICLES, BUT CLEAR ONLY THAT NECESSARY FOR EXIT. DO NOT CLEAR ADJACENT AREAS UNTIL THE REQUIRED EROSION AND SEDIMENT CONTROL DEVICES ARE IN PLACE.
3. GRADE THE LOCATION OF THE VIBRATION GRID SO THAT RUNOFF FROM THE UNIT WILL NOT FLOW INTO THE STREET OR ADJOINING PROPERTIES, BUT WILL FLOW TOWARDS AN APPROPRIATE-TRAPPING DEVICE.
4. ENSURE THAT INSTALLATION OF THE VIBRATION GRID HAS ADEQUATE SEDIMENT STORAGE VOLUME UNDER THE GRID. WHERE NECESSARY, INSTALL SUITABLE PRECAST SEDIMENT COLLECTION CHAMBERS.
5. PLACE A ROCK PAD/RAMP FORMING A MINIMUM 200mm THICK LAYER OF CLEAN, OPEN-VOID ROCK OVER THE ROADWAY BETWEEN THE VIBRATION GRID AND THE SEALED STREET TO PREVENT TYRES FROM PICKING UP MORE SOIL AFTER THEY HAVE BEEN CLEANED.
6. THE TOTAL LENGTH OF THE VIBRATION GRID AND ROCK RAMPS SHOULD BE AT LEAST 15m WHERE PRACTICABLE, AND AS WIDE AS THE FULL WIDTH OF THE ENTRY OR EXIT AND AT LEAST 3m. THE ROCK RAMP SHOULD COMMENCE AT THE EDGE OF THE OFF-SITE SEALED ROAD OR PAVEMENT.
7. FLARE THE END OF THE ROCK PAD WHERE IT MEETS THE PAVEMENT SO THAT THE WHEELS OF TURNING VEHICLES DO NOT TRAVEL OVER UNPROTECTED SOIL.

MAINTENANCE

1. INSPECT VIBRATION GRID PRIOR TO FORECAST RAIN, DAILY EXTENDED PERIODS OF RAINFALL AND AFTER SIGNIFICANT RUNOFF-PRODUCING RAINFALL OR OTHERWISE AFTER FORTNIGHTLY INTERVALS.
2. IF SAND, SOIL, SEDIMENT OR MUD IS TRACKED OR WASHED ONTO THE ADJACENT SEALED ROADWAY, THEN SUCH MATERIAL MUST BE PHYSICALLY REMOVED, FIRST USING A SQUARE-EDGED SHOVEL, AND THEN A STIFF-BRISTLED BROOM.
3. IF NECESSARY FOR SAFETY REASONS, THE ROADWAY SHALL ONLY BE WASHED CLEAN AFTER ALL REASONABLE EFFORTS HAVE BEEN TAKEN TO SHOVEL AND SWEEP THE MATERIAL FROM THE ROADWAY.
4. WHEN THE VOIDS BETWEEN THE ROCK BECOMES FILLED WITH MATERIAL AND THE EFFECTIVENESS OF THE ROCK RAMPS ARE REDUCED TO A POINT WHERE SEDIMENT IS BEING TRACKED OFF THE SITE, A NEW 100mm LAYER OF ROCK MUST BE ADDED AND/OR THE ROCK PAD MUST BE EXTENDED.
5. ENSURE ALL ASSOCIATED DRAINAGE CONTROL MEASURES ARE MAINTAINED IN ACCORDANCE WITH THEIR DESIRED OPERATIONAL CONDITION.
6. DISPOSE OF SEDIMENT AND DEBRIS IN A MANNER THAT WILL NOT CREATE AN EROSION OR POLLUTION HAZARD.

REMOVAL

1. THE VIBRATION GRID SHOULD BE REMOVED ONLY AFTER IT IS NO LONGER NEEDED AS A SEDIMENT CONTROL DEVICE.
2. REMOVE MATERIALS AND COLLECTED SEDIMENT AND DISPOSE OF IN A SUITABLE MANNER THAT WILL NOT CAUSE AN EROSION OR POLLUTION HAZARD.
3. RE-GRADE AND STABILISE THE DISTURBED GROUND AS NECESSARY TO MINIMISE THE EROSION HAZARD.

DRAWING FILE LOCATION / NAME: V:_Vault\Projects\30031740\Solar_Farm_Intersections\CAD\DWG\00_GRIFFITH\30031744-GR-0063.dwg
PLOT DATE: 09 Feb 2017 TIME: 15:34:06

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	02	9.02.2031	100% REISSUE FOR CLIENT APPROVAL		

TITLE	NAME
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DESIGN CHECK	K. NARAYAN
PROJECT MANAGER	K. NARAYAN
PROJECT DIRECTOR	A. MACLEOD

SCALES AT A1 SIZE DRAWING: N.T.S.

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CLIENT: BOUYGUES CONSTRUCTION

PROJECT / REFERENCE No.: NEON-GR-SM-GDW-DR-3013-02
PROJECT TITLE: GRIFFITH SOLAR FARM

EROSION AND SEDIMENT CONTROL DETAILS
SHEET 4 OF 6

SCALE	PHASE	PROJECT / DRAWING No.	REVISION
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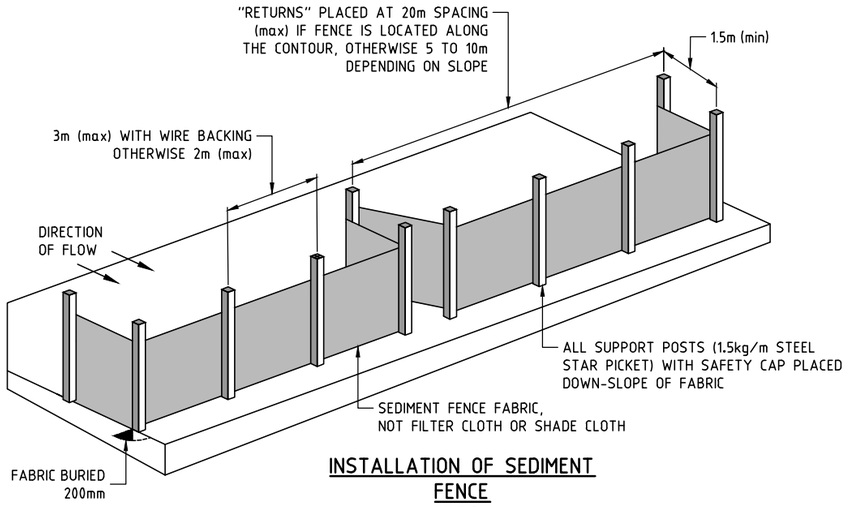
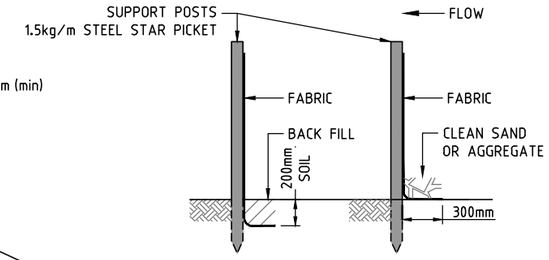


INSTALLATION OF SEDIMENT FENCE
N.T.S



ANCHORING BASE OF FABRIC
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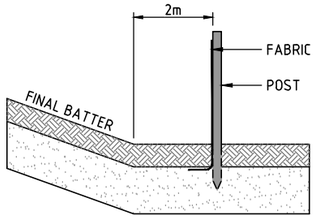

LOCATION OF FENCE RELATIVE TO BASE OF SLOPE
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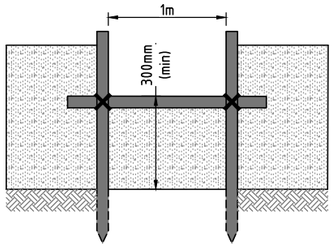

SPILL THROUGH WEIR
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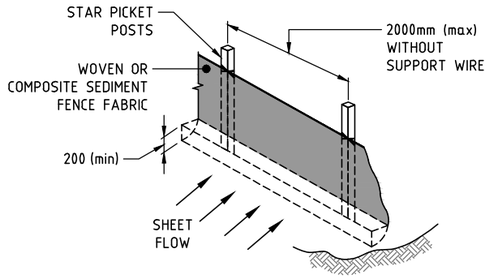
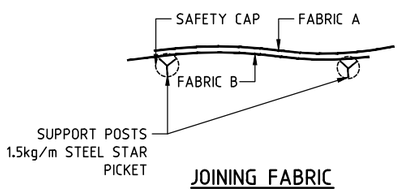


INSTALLATION WITHOUT BACKING SUPPORT
N.T.S



JOINING FABRIC
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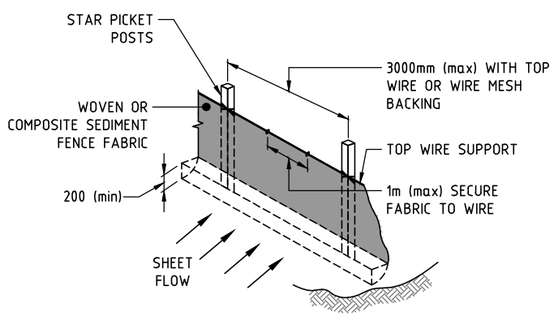

INSTALLATION OF TOP WIRE SUPPORT
N.T.S

SEDIMENT FENCE :

MATERIALS

1. FABRIC: POLYPROPYLENE, POLYAMIDE, NYLON, POLYESTER, OR POLYETHYLENE WOVEN OR NON-WOVEN FABRIC, AT LEAST 700mm IN WIDTH AND A MINIMUM UNIT WEIGHT OF 140GSM. ALL FABRICS TO CONTAIN ULTRAVIOLET INHIBITORS AND STABILISERS TO PROVIDE A MINIMUM OR 6 MONTHS OF USEABLE CONSTRUCTION LIFE (ULTRAVIOLET STABILITY EXCEEDING 70%).
2. FABRIC REINFORCEMENT: WIRE OR STEEL MESH MAXIMUM 14-GAUGE WITH A MAXIMUM MESH SPACING OF 200mm.
3. SUPPORT STAKES: 1.5kg/m (MIN) STEEL STAR PICKETS SUITABLE FOR ATTACHING FABRIC.

INSTALLATION

1. REFER TO APPROVED PLANS FOR LOCATION, EXTENT, AND REQUIRED TYPE OF FABRIC (IF SPECIFIED). IF THERE ARE QUESTIONS OR PROBLEMS WITH THE LOCATION, EXTENT, FABRIC TYPE, OR METHOD OF INSTALLATION CONTACT THE ENGINEER OR RESPONSIBLE ON-SITE OFFICER FOR ASSISTANCE.
2. TO THE MAXIMUM DEGREE PRACTICAL AND WHERE THE PLANS ALLOW, ENSURE THE FENCE IS LOCATED:
   (i) TOTALLY WITHIN THE PROPERTY BOUNDARY;
   (ii) ALONG A LINE OF CONSTANT ELEVATION WHEREVER PRACTICAL;
   (iii) AT LEAST 2m FROM THE TOE OF ANY FILLING OPERATIONS THAT MAY RESULT IN SHIFTING SOIL/FILL DAMAGING FENCE.
3. INSTALL RETURNS WITHIN THE FENCE AT MAXIMUM 20m INTERVALS IF THE FENCE IS INSTALLED ALONG THE CONTOUR, OR 5 TO 10m MAXIMUM SPACING (DEPENDING ON SLOPE) IF THE FENCE IS INSTALLED AT AN ANGLE TO THE CONTOUR THE 'RETURNS' SHALL CONSIST OF EITHER:
   (i) V-SHAPED SECTION EXTENDING AT LEAST 1.5m UP THE SLOPE; OR
   (ii) SANDBAG OR ROCK/AGGREGATE CHECKDAM A MINIMUM 1/3 AND MAXIMUM 1/2 FENCE HEIGHT, AND EXTENDING AT LEAST 1.5m UP THE SLOPE.
4. ENSURE THE EXTREME ENDS OF THE FENCE ARE TURNED UP THE SLOPE AT LEAST 1.5m, OR AS NECESSARY, TO MINIMISE WATER BYPASSING AROUND THE FENCE.
5. ENSURE THE SEDIMENT FENCE IS INSTALLED IN A MANNER THAT AVOIDS THE CONCENTRATION OF FLOW ALONG THE FENCE, AND THE UNDESIRABLE DISCHARGE OF WATER AROUND THE END OF THE FENCE.
6. IF THE SEDIMENT FENCE IS TO BE INSTALLED ALONG THE EDGE OF EXISTING TREES, ENSURE CARE IS TAKEN TO PROTECT THE TREES AND THEIR ROOT SYSTEMS DURING INSTALLATION OF THE FENCE. DO NOT ATTACH THE FABRIC TO THE TREES.
7. UNLESS DIRECTED BY THE SUPERVISOR OR THE APPROVED PLANS, EXCAVATE A 200mm WIDE BY 200mm DEEP TRENCH ALONG THE PROPOSED FENCE LINE, PLACING THE EXCAVATED MATERIAL ON THE UP SLOPE SIDE OF THE TRENCH.
8. ALONG THE LOWER SIDE OF THE TRENCH, APPROPRIATELY SECURE THE POSTS INTO THE GROUND NO GREATER THAN 3m IF SUPPORTED BY A TOP SUPPORT WIRE OR WEIR MESH BACKING, OTHERWISE NO GREATER THAN 2m.
9. IF SPECIFIED, SECURELY ATTACH THE SUPPORT WIRE OR MESH TO THE UP-SLOPE SIDE OF THE POSTS WITH THE MESH EXTENDING AT LEAST 200mm INTO THE EXCAVATED TRENCH. ENSURE THE MESH AND FABRIC IS ATTACHED TO THE UP-SLOPE SIDE OF THE POSTS EVEN WHEN DIRECTING A FENCE AROUND THE CORNER OF A SHARP CHANGE OF DIRECTION.
10. WHEREVER POSSIBLE, CONSTRUCT THE SEDIMENT FENCE FROM A CONTINUOUS ROLL OF FABRIC. TO JOIN FABRIC EITHER:
    (i) ATTACH EACH END TO TWO OVERLAPPING POSTS WITH FABRIC FOLDING AROUND THE ASSOCIATED POST ONE TURN, AND WITH THE TWO POSTS TIED TOGETHER WITH WIRE OR
    (ii) OVERLAP THE FABRIC TO THE NEXT ADJACENT SUPPORT POST.
11. SECURELY ATTACH THE FABRIC TO THE SUPPORT POSTS USING TIE WIRE AT MAXIMUM 150mm SPACING.
12. ENSURE THE COMPLETED SEDIMENT FENCE IS AT LEAST 450mm, BUT NOT MORE THAN 700mm HIGH. IF A SPILL-THROUGH WEIR IS INSTALLED, ENSURE THE CREST OF THE WEIR IS AT LEAST 300mm ABOVE THE GROUND LEVEL.
13. BACKFILL THE TRENCH AND TAMP THE FILL TO FIRMLY ANCHOR THE BOTTOM OF THE FABRIC AND MESH TO PREVENT WATER FROM FLOWING UNDER THE FENCE.

ADDITIONAL REQUIREMENTS FOR THE INSTALLATION OF A SPILL-THROUGH WEIR

1. LOCATE THE SPILL-THROUGH WEIR SUCH THAT THE WEIR CREST WILL BE LOWER THAN THE GROUND LEVEL AT EACH END OF THE FENCE.
2. ENSURE THE CREST OF THE SPILL-THROUGH WEIR IS AT LEAST 300mm THE GROUND ELEVATION.
3. SECURELY TIE A HORIZONTAL CROSS MEMBER (WEIR) TO THE SUPPORT POSTS EACH SIDE OF THE WEIR. CUT THE FABRIC DOWN THE SIDE OF EACH POST AND FOLD THE FABRIC OVER THE CROSS MEMBER AND APPROPRIATELY SECURE THE FABRIC.
4. INSTALL A SUITABLE SPLASH PAD AND/OR CHUTE IMMEDIATELY DOWN-SLOPE OF THE SPILL-THROUGH WEIR TO CONTROL SOIL EROSION AND APPROPRIATELY DISCHARGE THE CONCENTRATED FLOW PASSING OVER THE WEIR.

MAINTENANCE

1. INSPECT THE SEDIMENT FENCE AT LEAST WEEKLY AND AFTER ANY SIGNIFICANT RAIN. MAKE NECESSARY REPAIRS IMMEDIATELY.
2. REPAIR ANY TORN SECTIONS WITH A CONTINUOUS PIECE OF FABRIC FROM POST TO POST.
3. WHEN MAKING REPAIRS, ALWAYS RESTORE THE SYSTEM TO ITS ORIGINAL CONFIGURATION UNLESS AN AMENDED LAYOUT IS REQUIRED OR SPECIFIED.
4. IF THE FENCE IS SAGGING BETWEEN POSTS, INSTALL ADDITIONAL SUPPORT POSTS.
5. REMOVE ACCUMULATED SEDIMENT IF THE SEDIMENT DEPOSIT EXCEEDS A DEPTH OF 1/3 THE HEIGHT OF THE FENCE.
6. DISPOSE OF SEDIMENT IN A SUITABLE MANNER THAT WILL NOT CAUSE AN EROSION OR POLLUTION HAZARD.
7. REPLACE THE FABRIC IF THE SERVICE LIFE OF THE EXISTING FABRIC EXCEEDS 6-MONTHS.

REMOVAL

1. WHEN DISTURBED AREAS UP-SLOPE OF THE SEDIMENT FENCE ARE SUFFICIENTLY STABILISED TO RESTRAIN EROSION, THE FENCE MUST BE REMOVED.
2. REMOVE MATERIALS AND COLLECTED SEDIMENT AND DISPOSE OF IN A SUITABLE MANNER THAT WILL NOT CAUSE AN EROSION OR POLLUTION HAZARD.
3. REHABILITATE/REVEGETATE THE DISTURBED GROUND AS NECESSARY TO MINIMISE THE EROSION HAZARD.

SEDIMENT FENCE NOTES

1. SEDIMENT FENCE TO BE INSTALLED ALONG A LINE OF CONSTANT GROUND ELEVATION WHEREVER PRACTICAL.
2. BOTH END OF THE SEDIMENT FENCE TO EXTEND UP THE SLOPE AT LEAST 1m.
3. SUPPORT POST TO BE SPACED A MAXIMUM 2m UNLESS THE FENCE IS SUPPORTED BY A TOP WIRE OR WIRE MESH BACKING IN WHICH CASE 3m MAXIMUM SPACING.
4. FENCE 'RETURNS' SHALL BE INSTALLED AT MAXIMUM 20m SPACING IF FENCE IS INSTALLED ALONG THE CONTOUR, OTHERWISE 5 TO 10m MAXIMUM SPACING.
5. MINIMUM 4 TIE WIRES PER POST.

150 mm ON ORIGINAL
A1

DRAWING FILE LOCATION / NAME: V:_Vault\Projects\30031740\Solar_Farm_Intersections\CAD\DWG\00_GRIFFITH\30031744-GR-0064.dwg
PLOT DATE: 09 Feb 2017 TIME: 15:34:17

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TITLE	NAME
DRAFTER	D. JACKSON
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DESIGNER	R. YOUNG
DESIGN CHECK	K. NARAYAN
PROJECT MANAGER	K. NARAYAN
PROJECT DIRECTOR	A. MACLEOD

SCALES AT A1 SIZE DRAWING

PRELIMINARY

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SMEC PROJECT No 30031740

CLIENT: BOUYGUES CONSTRUCTION

PROJECT / REFERENCE No.: NEON-GR-SM-GDW-DR-3014-02
PROJECT TITLE: GRIFFITH SOLAR FARM
EROSION AND SEDIMENT CONTROL DETAILS SHEET 5 OF 6
SCALE: AS SHOWN | PHASE: DETAILED DESIGN | PROJECT / DRAWING No.: 30031744-GR-0064 | REVISION: 02

REMOVAL OF SEDIMENT BASIN NOTES

1. WHEN GRADING AND CONSTRUCTION IN THE DRAINAGE AREA ABOVE A TEMPORARY SEDIMENT BASIN IS COMPLETED AND THE DISTURBED AREAS ARE ADEQUATELY STABILISED, THE BASIN MUST BE REMOVED OR OTHERWISE INCORPORATED INTO THE PERMANENT STORMWATER DRAINAGE SYSTEM. IN EITHER CASE, SEDIMENT SHOUILD BE CLEARED AND PROPERLY DISPOSED OF AND THE AREA STABILISED.
2. BEFORE STARTING ANY MAINTENANCE WORK ON THE BASIN OR SPILLWAY, INSTALL ALL NECESSARY SHORT-TERM SEDIMENT CONTROL MEASURES DOWNSTREAM OF THE SEDIMENT BASIN.
3. ALL WATER AND SEDIMENT MUST BE REMOVED FROM THE BASIN PRIOR TO THE BASINS REMOVAL. DISPOSE OF SEDIMENT AND WATER IN A MANNER THAT WILL NOT CREATE AN EROSION OR POLLUTION HAZARD.
4. BRING THE DISTURBED AREA TO A PROPER GRADE, THEN SMOOTH, COMPACT, AND STABILISE AND/OR REVEGETATE AS REQUIRED TO ESTABLISHED A STABLE LAND SURFACE.

EROSION AND SEDIMENT CONTROL MAINTENANCE NOTES

1. CONTRACTOR TO INSTALL TEMPORARY CONTOUR BERMS ACROSS WORK SITE AT MAXIMUM 50m INTERVALS PRIOR TO PREDICTED RAINFALL.
2. CONTRACTOR TO ENSURE STOCKPILES ARE STABILISED, ESPECIALLY PRIOR TO RAINFALL.
3. ALL SEDIMENT AND EROSION CONTROL MEASURES TO BE MONITORED FOR FUNCTIONALITY WEEKLY AND AFTER RAINFALL EVENTS, AND PRIOR TO, AND IMMEDIATELY AFTER, PERIODS OF "STOP WORK" OR SITE "SHUTDOWN".
4. SEDIMENT BASINS, MAINTAINED, INSPECTED AND REPAIRED WITHIN 5 DAYS AFTER RAINFALL.
5. MONITOR AND MAINTAIN SEDIMENT ACCUMULATION TO MAINTAIN SEDIMENT BASIN CAPACITY. PROVIDE MARKER 200mm FROM BASE OF BASIN AND CLEAN OUT ACCUMULATED SEDIMENT WHEN IT REACHES THE MARKER POST, AND RESTORE THE ORIGINAL STORAGE VOLUME. PLACE SEDIMENT IN A DISPOSAL AREA OR, IF APPROPRIATE, MIX WITH DRY SOIL ON THE SITE.
6. REMOVE ALL RUBBISH/TRASH AND OTHER DEBRIS.
7. DO NOT DISPOSE OF SEDIMENT IN A MANNER THAT WILL CREATE AN EROSION OR POLLUTION HAZARD.
8. ALL WATER DISCHARGED FROM THE SITE MUST BE TESTED PRIOR TO MEET DESIGNATED WATER QUALITY CRITERIA.
9. CHECK FILL MATERIAL IN THE BASIN FOR EXCESSIVE SETTLEMENT, SLUMPING OF THE SLOPES; MAKE ALL NECESSARY REPAIRS.
10. BEFORE STARTING ANY MAINTENANCE WORK ON THE BASIN OR SPILLWAY, INSTALL ALL NECESSARY SHORT-TERM SEDIMENT CONTROL MEASURES DOWNSTREAM OF THE SEDIMENT BASIN ARE INSTALLED.
11. CONTRACTOR IS REQUIRED TO UNDERTAKE APPROPRIATE FLOCCULATION OF SEDIMENT BASINS AS REQUIRED IF THE CONTAINED WATER DOES NOT ACHIEVE A SPECIFIED WATER QUALITY STANDARD (BY TESTING), USUALLY 50mg/L. FLOCCULATION MAY CONSIST OF A VARIETY OF CHEMICAL AGENTS, SUCH AS GYPSUM APPLICATION AT A TYPICAL RATE OF 130kg/100000L OF WATER. CONTRACTOR TO CONFIRM ON-SITE.

EROSION AND SEDIMENT CONTROL CONSTRUCTION NOTES

1. WHERE PRACTICAL, LOCATE SEDIMENT BASINS ABOVE THE 1 IN 5 YEAR ARI FLOOD LEVEL. WHERE THIS IS NOT PRACTICAL, THEN ALL REASONABLE EFFORTS SHOULD BE TAKEN TO MAXIMISE THE FLOOD IMMUNITY OF THE BASIN.
2. TOPSOIL TO BE STRIPPED, STOCKPILED AND FENCED AT DESIGNATED LOCATION.
3. TOPSOIL STOCKPILES TO BE STABILISED WHEN NOT BEING WORKED.
4. REHABILITATION/LANDSCAPE SHALL BE IN ACCORDANCE WITH LANDSCAPE DESIGN AND EROSION AND SEDIMENT CONTROL OPERATIONAL DRAWINGS (PROGRESSIVELY INSTALLED AS WORKS COMPLETE).
5. FINAL REVEGETATION WORKS TO COMMENCE WITHIN 10 DAYS, 75% COVER AFTER COMPLETION OF WORKS.
6. CONTRACTOR TO INSTALL TEMPORARY CONTOUR BERMS ACROSS WORK SITE AT MAXIMUM 50m INTERVALS PRIOR TO PREDICTED RAINFALL.
7. PROVIDE TURF TREATMENT TO THE BASE AND SIDES OF ALL DIVERSION DRAINS.
8. TEMPORARY CONTOUR BERMS TO BE INSTALLED AT 50 m INTERVALS ONLY IN THE EVENT OF CONSTRUCTION DELAYS OR IF RAIN IS PREDICTED OR PRESENT.
9. DEFAULT OPERATIONAL CONTROLS PROPOSED ARE SEDIMENT FENCES AND/OR MULCH BERMS, HOWEVER THESE ARE TO BE REGULARLY REVIEWED AND AMENDED IN ACCORDANCE WITH SEASONAL CONDITIONS.
10. WIND EROSION IS NORMALLY CONTROLLED USING ONE OR MORE OF THE FOLLOWING TECHNIQUES:

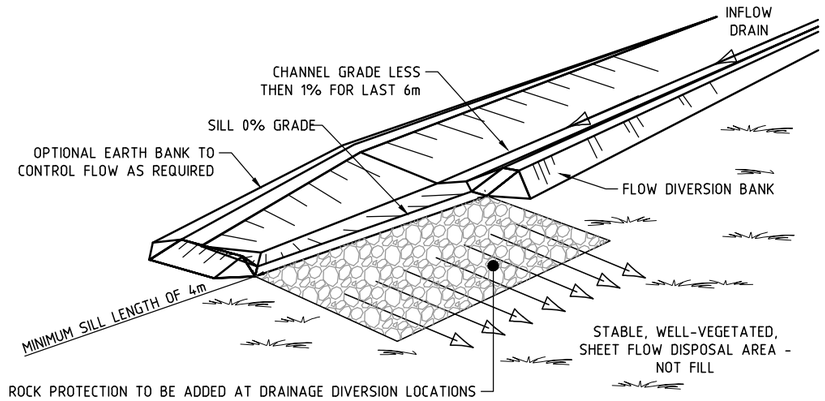
- MAINTAINING MOIST SOIL CONΔITIONS
- CHEMICAL SEALANTS PLACEΔ OVER THE SOIL SURFACE (SOILBINΔERS)
- SURFACE ROUGHENING
- WINΔBREAKS

ΔUST PROBLEMS CAN ALSO BE REΔUCEΔ BY THESE ACTIVITIES:

a. LIMITING THE AREA OF SOIL ΔISTURBANCE AT ANY GIVEN TIME.
b. PROMPTLY REPLACING TOPSOIL.
c. PROGRAMMING WORKS TO MINIMISE THE LIFE OF SOIL STOCKPILES.
d. TEMPORARILY STABILISING (E.G. WITH VEGETATION OR MULCHING) OF LONG-TERM STOCKPILES.
e. USING A WELL-GRAΔEΔ GRAVEL-SANΔ MIXTURE WITH A SMALL QUANTITY OF CLAY AS A WEAR SURFACE ON UNSEALEΔ CONSTRUCTION ROAΔS.
f. MINIMISING TRAFFIC MOVEMENT ON EXPOSEΔ SURFACES.
g. LIMITING VEHICULAR TRAFFIC TO LESS THAN 15kph (POSSIBLY SLOWER IN HIGH WINΔ PERIOΔS).
h. MAINTAINING EXPOSEΔ SOIL SURFACES IN A MOIST CONΔITION.
i. PROVIΔING OR RETAINING VEGETATIVE WINΔ BREAKS.
j. APPLYING SOIL BINΔERS TO THE SOIL SURFACE.
k. PROMPTLY REVEGETATING EXPOSEΔ SOILS.
l. INSTALLING WINΔBREAKS (60% SHAΔE CLOTH, 40% POROUS).

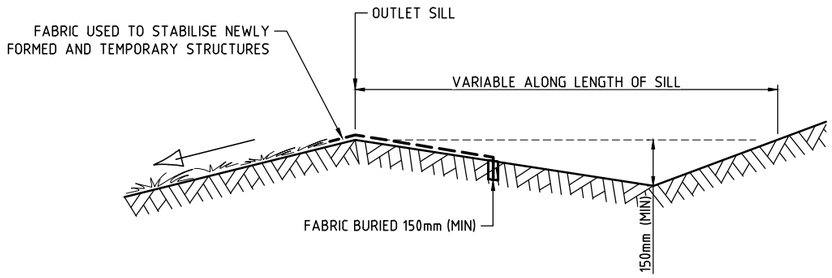
11. ΔEWATERING IS NORMALLY CONTROLLEΔ USING ONE OR MORE OF THE FOLLOWING TECHNIQUES:

- ΔEWATERING - GOAL MITIGATE SEΔIMENT RELATEΔ ENVIRONMENTAL HARM ANΔ/OR IMPACT TO STORMWATER INFRASTRUCTURE RESULTING FROM ΔEWATERING ACTIVITIES.
- FLOW ΔIVERSION BARRIERS, OR OTHER APPROPRIATE SYSTEMS, WILL BE USEΔ TO MINIMISE THE QUANTITY OF WATER ENTERING EXCAVATIONS ANΔ TRENCHES.
- ΔEWATERING CONTROL MAY INCLUΔE. GEOFABRIC FILTERS, NON-WOVEN FILTER FENCING.
- SEΔIMENT LAΔEN WATER WILL NOT BE ΔISCHARGEΔ TO THE STORMWATER SYSTEM WITHOUT FIRST BEING TREATEΔ SATISFACTORILY (TO THE REQUIREMENTS OF RELEVANT AUTHORITY).



TYPICAL LEVEL SPREADER DETAIL

N.T.S



TYPICAL PROFILE OF OUTLET WEIR

N.T.S

LEVEL SPREADER INSTALLATION

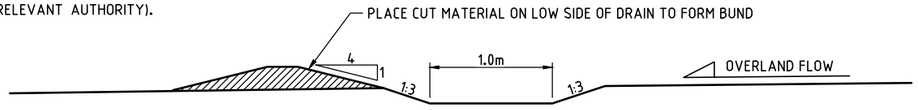
1. REFER TO APPROVED PLANS FOR LOCATION, DIMENSIONS AND CONSTRUCTION DETAILS. IF THERE ARE QUESTIONS OR PROBLEMS WITH THE LOCATION, DIMENSIONS, OR METHOD OF INSTALLATION CONTACT THE ENGINEER OR RESPONSIBLE ON-SITE OFFICER FOR ASSISTANCE.
2. WHEREVER PRACTICAL, LOCATE THE LEVEL SPREADER ON UNDISTURBED, STABLE SOIL.
3. ENSURE FLOW DISCHARGING FROM THE LEVEL SPREADER WILL DISPERSE ACROSS A PROPERLY STABILISED SLOPE NOT EXCEEDING 10:1 (H:V)AND SUFFICIENTLY EVEN IN GRADE ACROSS THE SLOPE TO AVOID CONCENTRATING THE OUTFLOW.
4. THE OUTLET SILL OF THE SPREADER SHOULD BE PROTECTED WITH EROSION CONTROL MATTING TO PREVENT EROSION DURING THE ESTABLISHMENT OF VEGETATION. THE MATTING SHOULD BE A MINIMUM OF 1200mm WIDE EXTENDING AT LEAST 300mm UPSTREAM OF THE EDGE OF THE OUTLET CREST AND BURIED AT LEAST 150mm IN A VERTICAL TRENCH. THE DOWNSTREAM EDGE SHOULD BE SECURELY HELD IN PLACE WITH CLOSELY SPACED HEAVY-DUTY WIRE STAPLES AT LEAST 150mm LONG.
5. ENSURE THAT THE OUTLET SILL (CREST) IS LEVEL FOR THE SPECIFIED LENGTH.
6. IMMEDIATELY AFTER CONSTRUCTION, TURF, OR SEED AND MULCH WHERE APPROPRIATE, THE LEVEL SPREADER.

LEVEL SPREADER MAINTENANCE

1. INSPECT THE LEVEL SPREADER AFTER EVERY RAINFALL EVENT UNTIL VEGETATION IS ESTABLISHED.
2. AFTER ESTABLISHMENT OF VEGETATION OVER THE LEVEL SPREADER, INSPECTIONS SHOULD BE MADE ON A REGULAR BASIS AND AFTER RUNOFF-PRODUCING RAINFALL.
3. ENSURE THAT THERE IS NO SOIL EROSION AND THAT SEDIMENT DEPOSITION IS NOT CAUSING THE CONCENTRATION OF FLOW.
4. ENSURE THAT THERE IS NO SOIL EROSION OR CHANNEL DAMAGE UPSTREAM OF THE LEVEL SPREADER, OR SOIL EROSION OR VEGETATION DAMAGE DOWNSTREAM OF THE LEVEL SPREADER.
5. INVESTIGATE THE SOURCE OF ANY EXCESSIVE SEDIMENTATION.
6. MAINTAIN GRASS IN A HEALTH CONDITION WITH NO LESS THAN 90% COVER UNLESS CURRENT WEATHER CONDITIONS REQUIRE OTHERWISE.
7. GRASS HEIGHT SHOULD BE MAINTAINED AT A MINIMUM 50mm BLADE LENGTH WITHIN THE LEVEL SPREADER AND DOWNSTREAM DISCHARGE AREA, AND A MAXIMUM BLADE LENGTH NO GREATER THAN ADJACENT GRASSES.

LEVEL SPREADER REMOVAL

1. TEMPORARY LEVEL SPREADERS SHOULD BE DECOMMISSIONED ONLY
2. AFTER AN ALTERNATIVE STABLE OUTLET IS OPERATIONAL, OR WHEN THE INFLOW CHANNEL IS DECOMMISSIONED.
3. REMOVE COLLECTED SEDIMENT AND DISPOSE OF IN A SUITABLE MANNER THAT WILL NOT CAUSE AN EROSION OR POLLUTION HAZARD.
4. REMOVE AND APPROPRIATELY DISPOSE OF ANY EXPOSED GEOTEXTILE.
5. GRADE THE AREA AND SMOOTH IT OUT N PREPARATION FOR STABILISATION.
6. STABILISE THE AREA AS SPECIFIED ON THE APPROVED PLAN.



TYPICAL DETAIL

TYPICAL DIVERSION DRAIN AND BUND

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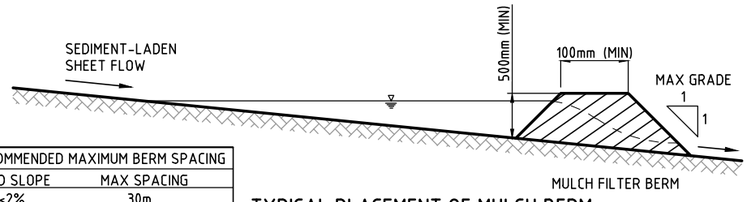
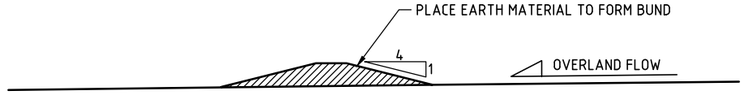


RECOMMENDED MAXIMUM BERM SPACING	
LAND SLOPE	MAX SPACING
<2%	30m
5%	25m
10%	15m
20%	8m

TYPICAL PLACEMENT OF MULCH BERM

(50m SPACING)



TYPICAL DETAIL

TYPICAL BUND

N.T.S

DRAWING FILE LOCATION / NAME: V:_Vault\Projects\30031740\Solar_Farm_Intersections\CAD\DWG\00_GRIFFITH\30031744-GR-0065.dwg					PLOT DATE: 09 Feb 2017	TIME: 15:34:27	PRELIMINARY
EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL	TITLE / NAME	SCALES AT A1 SIZE DRAWING
	01	8.02.2017	100% ISSUE FOR CLIENT APPROVAL			DRAFTER: D. JACKSON	
	02	9.02.2033	100% REISSUE FOR CLIENT APPROVAL			DRAFTING CHECK: D. PHILLIPS	
						DESIGNER: R. YOUNG	
						DESIGN CHECK: K. NARAYAN	
						PROJECT MANAGER: K. NARAYAN	
						PROJECT DIRECTOR: A. MACLEOD	

DESIGNER: SMEC AUSTRALIA PTY LTD © ABN 47 065 475 149 LEVEL 1 154 MELBOURNE STREET SOUTH BRISBANE QLD. 4101 PH 07 3029 6600 FAX 07 3029 6650 SMEC PROJECT No 30031740

CLIENT: BOUYGUES CONSTRUCTION

PROJECT / REFERENCE No.: NEON-GR-SM-GDW-DR-3015-02

PROJECT TITLE: GRIFFITH SOLAR FARM

EROSION AND SEDIMENT CONTROL DETAILS SHEET 6 OF 6

SCALE	PHASE	PROJECT / DRAWING No.	REVISION
AS SHOWN	DETAILED DESIGN	30031744-GR-0065	02

150 mm ON ORIGINAL A1

X_30031740_SMEC_01

APPENDIX D R-FACTOR CALCULATIONS

Rainfall Factor

Determined from E3.2 in IECA guidelines

R= 164.74 x 1.1177^sxs^0.6444

S= 2 year 6 hour storm

S=	5.59
R=	929.545

APPENDIX E EROSION HAZARD ASSESSMENT

Project Number: 30031744
Project Address: Griffith NSW
Designer: SC
Date: 23/01/2017

Erosion and Hazard Assessment Form

Condition	Points	Score	Trigger Value
Average Slope of Disturbance Area			
• not more than 3%	0		
• more than 3% but not more than 5%	1	0	4
• more than 5% but not more than 10%	2		
• more than 10% but not more than 15%	4		
• more than 15%	6		
Soil Classification Group (AS1726)			
• GW, GP, GM, GC	0		
• SW, SP, OL, OH	1	1	
• SM, SC, MH, CH	2		
• ML, CL, or if imported fill is used, or if soils are untested	3		
Emerson (Dispersion) Class Number			
• Class 4, 5, 7, or 8	0		
• Class 5	2	4	6
• Class 3 (default value if soils are untested)	4		
• Class 1 or 2	6		
Duration of Soil Disturbance			
• not more than 1 month	0		
• more than 1 month but not more than 4 months	2	6	6
• more than 4 months but not more than 6 months	4		
• more than 6 months	6		
Area of Disturbance			
• not more than 1000 m²	0		
• more than 1000 m² but not more than 5000 m²	1		
• more than 5000 m² but not more than 1 ha	2	6	4
• more than 1 ha but not more than 4 ha	4		
• more than 4 ha	6		
Waterway Disturbance			
• No disturbance to a watercourse, open drain or channel	0		
• Involves disturbance to a constructed open drain or channel	1	0	2
• Involves disturbance to a natural watercourse	2		
Rehabilitation Method			
Percentage of area (relative to total disturbance) revegetated by seeding without light mulching (ie. worst-case revegetation method).			
• not more than 1%	0		
• more than 1% but not more than 5%	1	4	
• more than 5% but not more than 10%	2		
• more than 10%	4		
Receiving Waters			
• Saline waters only	0	0	
• Freshwater body (eg. Creek or freshwater lake or river)	2		
Subsoil Exposure			
• No subsoil exposure except of service trenches	0	0	
• Subsoils are likely to be exposed	2		
External Catchments			
• No external catchment	0		
• External catchment diverted around the soil disturbance	1	0	
• External catchment not diverted around the soil disturbance	2		
Road Construction			
• No road construction	0	2	
• Involves road construction works	2		
pH of Soils to be Revegetated			
• more than pH 5.5 but less than pH 8	0	1	
• other pH values, or if soils are untested	1		
	Total Score	24	

APPENDIX F CATCHMENT AND SLOPE CALCULATIONS

Site Specific Catchments

Catchment ID	Catchment Size		Catchment Grade	Max length of overland flow	Comments
	m²	ha	%	m	
C01	167650	16.77	0.06	80	Catchment overland flow length to be minimised by site contouring and ESC devices to 80m max
C02	58362	5.84	0.10	80	Catchment overland flow length to be minimised by site contouring and ESC devices to 80m max
C03	147220	14.72	0.08	80	Catchment overland flow length to be minimised by site contouring and ESC devices to 80m max
C04	205460	20.55	0.06	80	Catchment overland flow length to be minimised by site contouring and ESC devices to 80m max
C05	205026	20.50	0.05	80	Catchment overland flow length to be minimised by site contouring and ESC devices to 80m max
C06	106838	10.68	0.06	80	Catchment overland flow length to be minimised by site contouring and ESC devices to 80m max

APPENDIX G MONTHLY EROSION LOSSES

K factor 0.033

R Determined from Table E1 in IECA guidelines - Albury NSW

P 1.3

C 1

Slope Length

Slope		Month											
(H:V)	(%)	JAN	FEB	MAR	APR	MAY	JUN	JULY	AUG	SEP	OCT	NOV	DEC
1 in 100	1	12	14	14	12	11	12	10	10	9	15	12	13
1 in 50	2	26	29	31	26	24	27	21	21	20	33	26	29
1 in 33	3	42	47	49	41	38	42	33	33	32	52	42	46
1 in 25	4	59	65	68	58	53	59	47	47	45	73	59	64
1 in 20	5	77	85	89	75	69	77	61	61	59	96	77	83
1 in 16.6	6	95	105	110	93	86	95	75	75	73	118	95	103
1 in 12.5	8	132	147	153	130	119	133	105	105	102	165	132	144
1 in 10	10	181	201	210	178	163	182	144	144	139	226	181	197
1 in 8.3	12	238	265	276	234	215	240	189	189	184	297	238	259
1 in 7.1	14	297	330	344	292	268	299	236	236	229	370	297	323
1 in 6.3	16	355	395	412	350	321	358	282	282	274	443	355	386
1 in 5.5	18	413	459	479	407	373	416	328	328	319	516	413	449
1 in 5	20	471	524	546	464	426	475	374	374	363	588	471	512
1 in 4	25	612	681	710	602	553	617	486	486	472	764	612	666
1 in 3.3	30	0	0	0	0	0	0	0	0	0	0	0	0
1 in 2.5	40	0	0	0	0	0	0	0	0	0	0	0	0
1 in 2	50	0	0	0	0	0	0	0	0	0	0	0	0

From Table 3.1 - Soil Loss Classes (IECA 2008)

Soil loss class	Soil Loss Rate (t/ha/yr)	Erosion Risk
1	0 to 150	Very Low
2	151 to 225	Low
3 to 4	226 to 500	Moderate
5 to 6	501 to 1500	High
7	above 1500	Extremely High

Note:
Slope length taken as 80 m

Book 2 Appendix E Table E1 Site specific
Monthly R Factor Values

JAN	FEB	MAR	APR	MAY	JUN	JULY	AUG	SEP	OCT	NOV	DEC
125	139	145	123	113	126	99.3	99.3	96.4	156	125	136

APPENDIX H EROSION RISK ASSESSMENT RESULTS

K factor	0.033
R	929.545
P	1.3
C	1

Slope Ratio	Slope Gradient (%)	Slope Length (m)							
		10	20	30	40	50	60	70	80
1 in 100	1	4	5	6	6	7	7	8	8
1 in 50	2	7	10	11	12	14	14	16	16
1 in 33	3	10	14	16	19	21	23	24	26
1 in 25	4	12	18	22	25	28	31	34	36
1 in 20	5	14	22	27	32	36	40	44	47
1 in 16.6	6	17	26	32	39	44	49	54	59
1 in 12.5	8	21	32	43	52	60	68	67	82
1 in 10	10	27	43	57	70	81	92	102	112
1 in 8.3	12	34	55	74	91	106	120	134	148
1 in 7.1	14	41	67	90	111	131	149	167	184
1 in 6.3	16	47	79	106	132	156	178	199	220
1 in 5.5	18	54	91	122	152	180	206	232	256
1 in 5	20	60	102	138	172	204	234	264	292
1 in 4	25	75	129	177	221	263	303	342	379
1 in 3.3	30	89	154	212	267	319	368	0	0
1 in 2.5	40	113	199	276	349	0	0	0	0
1 in 2	50	133	235	328	0	0	0	0	0

From Table 3.1 - Soil Loss Classes (IECA 2008)

Soil Loss Class	Soil Loss Rate (t/ha/yr)	Erosion Risk
1	0 to 150	Very Low
2	151 to 225	Low
3 to 4	226 to 500	Moderate
5 to 6	501 to 1500	High
7	above 1500	Extremely High

R	929.54	**RUSLE = K x R x P x C x LS**
P	1.3	
C	1.0	

Catchment ID	Catchment Size		Slope	Length	K Factor	Ls	Soil Loss Rate	Soil Erosion Hazard	Soil Loss Class
	m²	ha	%	m			(t/ha/yr)		
C01	167650	16.8	0.1	80	0.033	0.2	8	Very Low	1
C02	58362	5.8	0.1	80	0.033	0.2	8	Very Low	1
C03	147220	14.7	0.1	80	0.033	0.2	8	Very Low	1
C04	205460	20.5	0.1	80	0.033	0.2	8	Very Low	1
C05	205026	20.5	0.1	80	0.033	0.2	8	Very Low	1
C06	106838	10.7	0.1	80	0.033	0.2	8	Very Low	1
		89.1							

Note:
LS table limits: 5-80m length

Does this site require a sedimentation basin refer Table 4.5.1 (IECA 2008)

Catchment ID	Catchment Size	Soil Loss Rate	Area Limit	Is Sediment Basin Required	Controls Required	Comments
	m²	(t/ha/yr)	m²			
C01	167650	8	>2500	No	Type 3	Sedimentation basin not required as disturbed area will be confined to <1 ha during construction phases.
C02	58362	8	>2500	No	Type 3	Sedimentation basin not required as disturbed area will be confined to <1 ha during construction phases.
C03	147220	8	>2500	No	Type 3	Sedimentation basin not required as disturbed area will be confined to <1 ha during construction phases.
C04	205460	8	>2500	No	Type 3	Sedimentation basin not required as disturbed area will be confined to <1 ha during construction phases.
C05	205026	8	>2500	No	Type 3	Sedimentation basin not required as disturbed area will be confined to <1 ha during construction phases.
C06	106838	8	>2500	No	Type 3	Sedimentation basin not required as disturbed area will be confined to <1 ha during construction phases.

From Table 3.1 - Soil Loss Classes (IECA 2008)

Soil Loss Class	Soil Loss Rate (t/ha/yr)	Erosion Risk
1	0 to 150	Very Low
2	151 to 225	Low
3 to 4	226 to 500	Moderate
5 to 6	501 to 1500	High
7	above 1500	Extremely High

APPENDIX I SITE PLANNING CHECKLIST

Site Planning Checklist

LOCATION .....

PLANNING OFFICER ..... **DATE** .....

SIGNATURE .....

Legend: ✗ OK ✗ Not OK N/A Not applicable

Part A: Data collection and review

Item	Consideration	Assessment
1	*Erosion Risk Mapping* or *Erosion Hazard Assessment* completed on the site.	.....
2	Critical on-site and off-site environmental values identified.	.....
3	Potential impacts of the development on environmental values identified.	.....
4	Potential site constraints with respect to soils, topography, water supply and vegetation have been identified.	.....
5	Appropriate soil testing and soil mapping has been completed.	.....
6	Site contour map prepared and provided with application.	.....
7	All on-site and receiving water identified, including creeks, ponds, lakes, wetlands and waterways.	.....
8	Fish passage requirements of affected waterways identified.	.....
9	Vegetation mapping completed on the site.	.....
10	Vegetation subject to statutory protection identified.	.....

Part B: Site layout

Item	Consideration	Assessment
11	Site layout and construction footprint has been appropriately integrated into the site's topography, soil types, protected vegetation, environmental values and constraints.	.....
12	Site layout does not interfere with the construction and operation of the major sediment traps.	.....
13	Site layout provides sufficient useable land for stockpiling construction materials (e.g. topsoil, spoil, mulch).	.....

Part C: Environmental considerations

Item	Consideration	Assessment
14	Areas of potential acid sulfate soils identified.	.....
15	Areas of highly dispersive soils identified.	.....
16	Active coastal erosion zone and/or coastal protection zone identified.	.....
17	Areas likely to be subject to wave action (e.g. trafficable waterways, lake shores, coastal zones) identified.	.....
18	Protected waterway buffer zones identified.	.....
19	Potential drainage problem areas identified.	.....
20	Existing watercourse and gully erosion identified.	.....
21	Potential flood-prone land identified.	.....
22	Areas subject to potential mass movement (e.g. landslipe) identified.	.....
23	Critical environmental habitats (e.g. habitats of threatened species) identified.	.....

Part D: Consideration of ESC issues

Item	Consideration	Assessment
24	Appropriate procedures have been established to ensure all erosion and sediment control and associated environmental requirements are suitably costed and funded.	.....
25	Location and size of major sediment traps (e.g. *Sediment Basins*) has been identified and sufficient useable land made available for their construction and operation.	.....
26	Location and operation of major construction site sediment traps takes account of expected changes in site topography and overland flow paths (e.g. sediment traps are able to capture and treat all necessary sediment-laden runoff throughout the full construction phase.	.....
27	Site layout does not interfere with the construction and operation of the major sediment traps.	.....
28	Site layout allows "clean" up-slope stormwater to be temporarily diverted around construction activities.	.....

APPENDIX J GRIFFITH REGIONAL FLOOD STUDY

FLOOD REPORT

LOT / DP No:	**Lot 59, 60, 61, 62, 81, 82, DP 751728 (Receipt no. 1079949/2017)**
STREET / ROAD	**262 Poletta Road**
SUBURB / LOCALITY	**Yoogali**

According to Griffith Main Drain J & Mirrool Creek Flood Study 2014 (BMT WBM):

- This is Flood Prone Land.
- Estimated **100 year** Flood Level is 127.54 m AHD (Lot 82) – 127.27 m AHD (Lot 59), Low Hazard.
- Estimated **200 year** Flood Level is 127.55 m AHD (Lot 82) – 127.03 m AHD (Lot 61), Low Hazard.

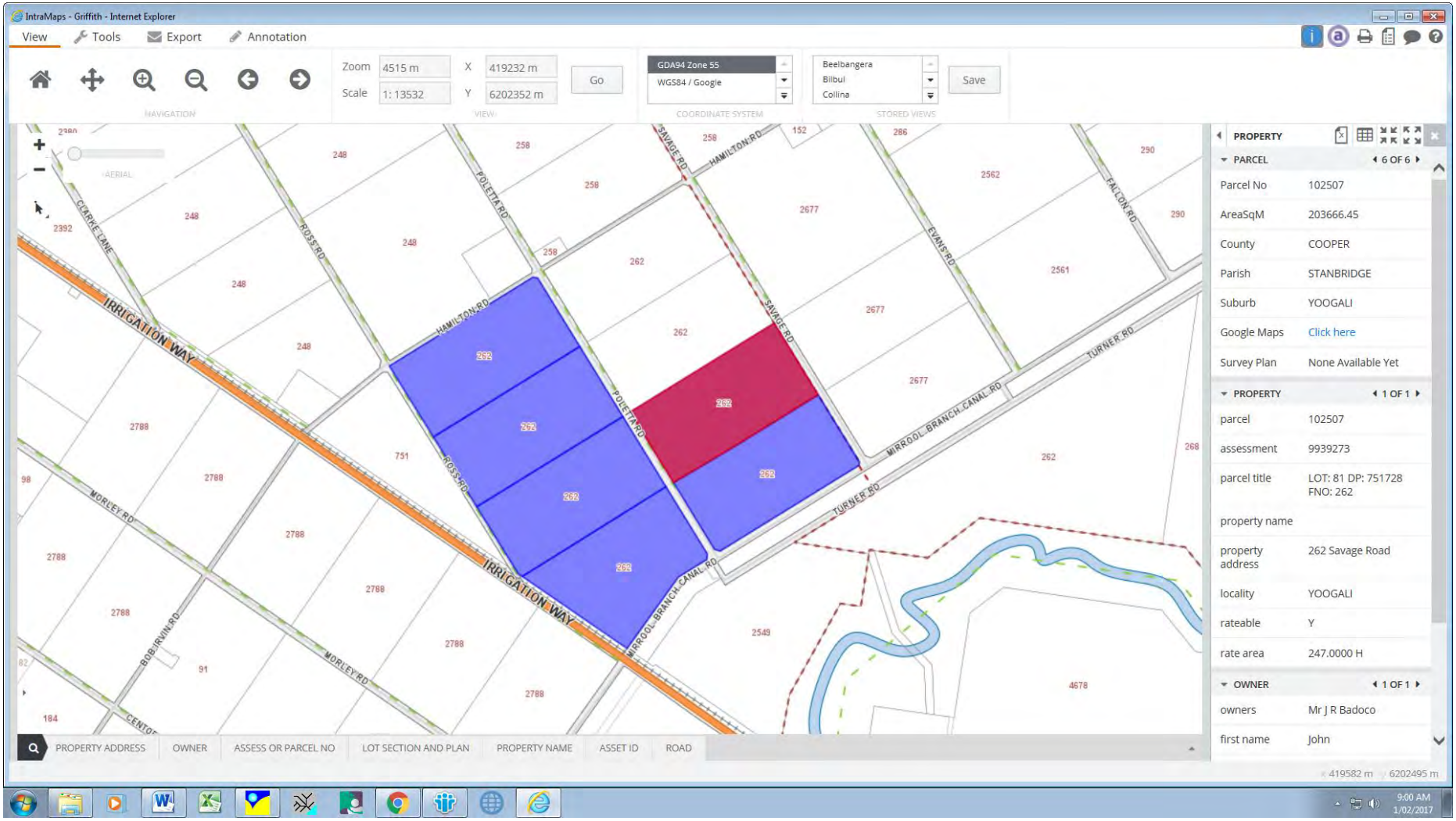
NB: Floor levels are subject to Council's Floor Heights Policy. The floor level for habitable room areas is to be 500 mm above the 1 in 100 year flood level, i.e. 128.04 m AHD (Lot 82), or 410 mm above the existing natural ground level, whichever is higher.

To establish the exact depth of flood waters on any part of an allotment, the applicant is advised to obtain a survey plan of the allotment.

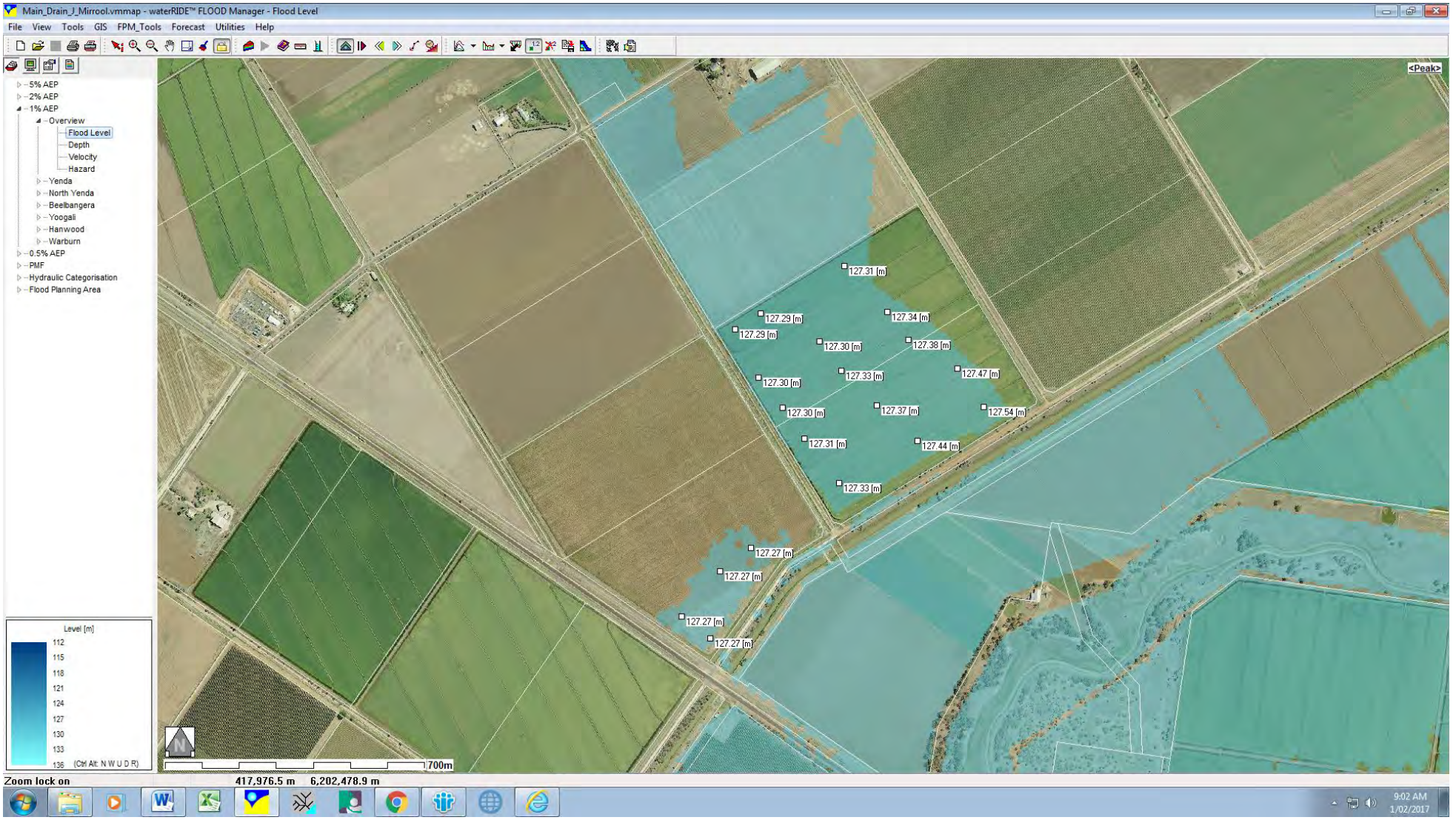
Durgananda Chaudhary
Senior Engineering Coordinator
1-02-2017.

MAP

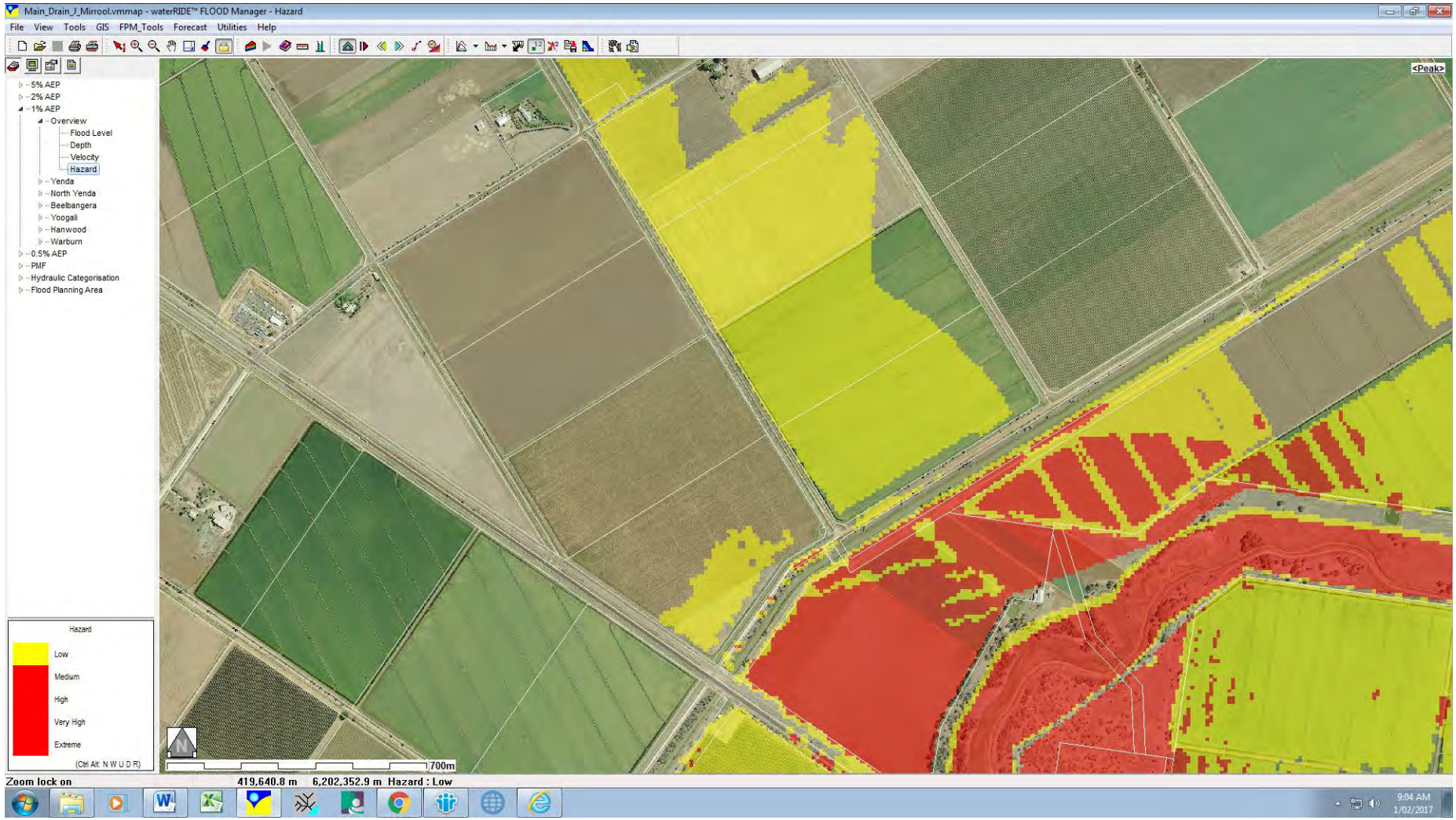
Lot 59-82, DP 751728, 262 Poletta Road, Yoogali



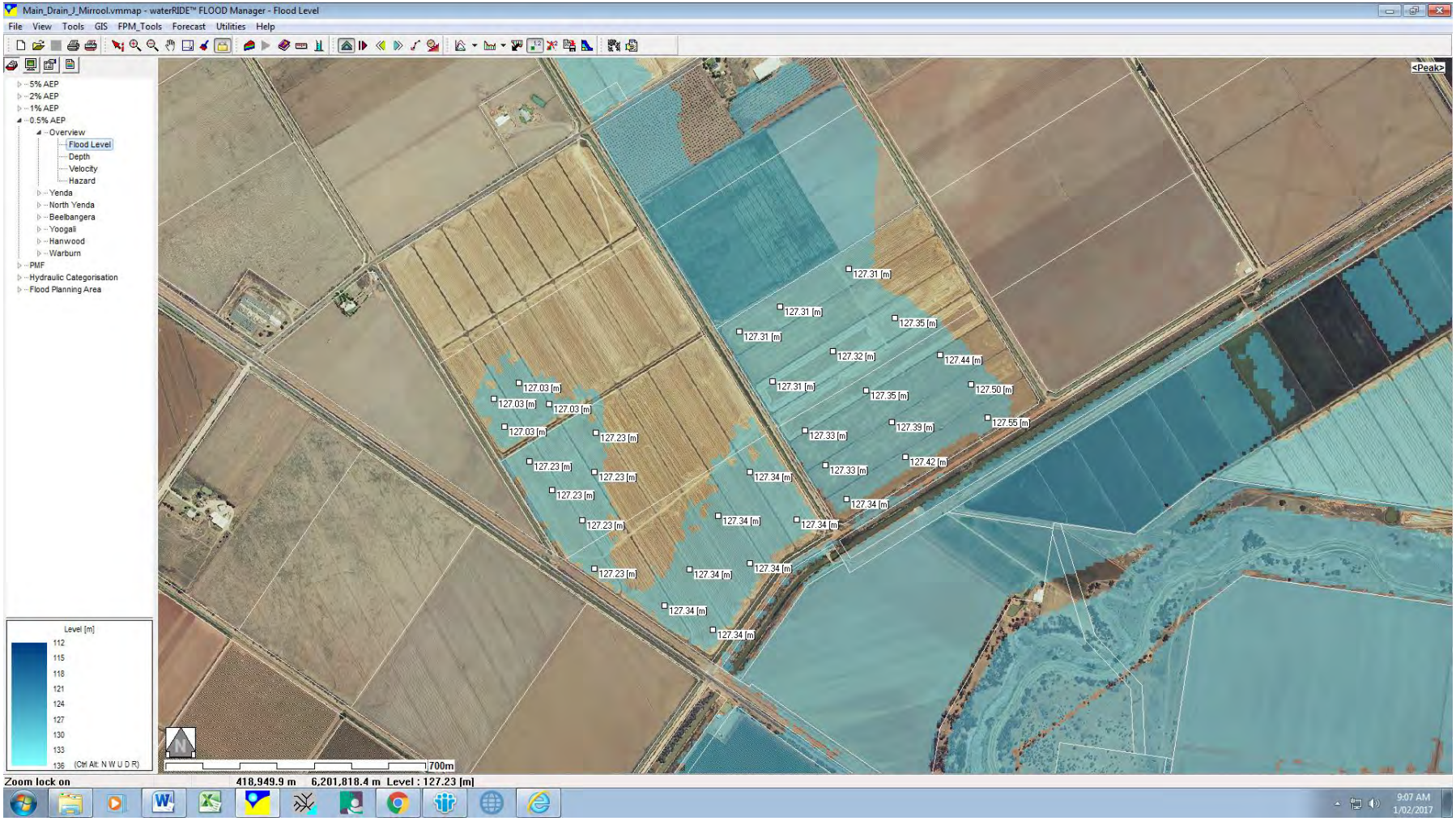
FLOOD LEVEL – 100 Year : Lot 59-82, DP 751728, 262 Poletta Road, Yoogali
(127.54 m AHD (Lot 82) – 127.27 m AHD (Lot 59))



FLOOD HAZARD – 100 Year: Lot 59-82, DP 751728, 262 Poletta Road, Yoogali (Low Hazard)



FLOOD LEVEL– 200 Year: Lot 59-82, DP 751728, 262 Poletta Road, Yoogali
(127.55 m AHD (Lot 82) – 127.03 m AHD (Lot 61))



FLOOD HAZARD– 200 Year: Lot 59-82, DP 751728, 262 Poletta Road, Yoogali (Low Hazard)