



Stormwater Management Plan

for

Solar Farm

Finley

NSW

Stormwater drainage and detention works.

REVISION A

Job Ref: 500090

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1. INTRODUCTION

This Stormwater Management Plan has been prepared for the proposed Finley Solar Farm located at Broughans Road, Finley.

This report will discuss conceptual stormwater quantity and stormwater quality requirements.

This report has been prepared for the Development Application and provides conceptual information in relation to identifying potential stormwater runoff for particular storm events and strategies to ensure that the proposed development will mitigate against any potential impacts on the neighbouring properties and environment.

2. PROPOSED DEVELOPMENT

The proposed development is located at 126 Broughans Road, Finley. The site is located on the north side of Broughans Road, Finley - DP752299.

The development proposed is a solar farm which will be located in the south east corner of the property. Refer Figure 1 for the property boundary and solar farm location on the property.



Figure 1 – Property boundary and solar farm location on the property.

The proposed solar farm layout is shown in Figure 2.

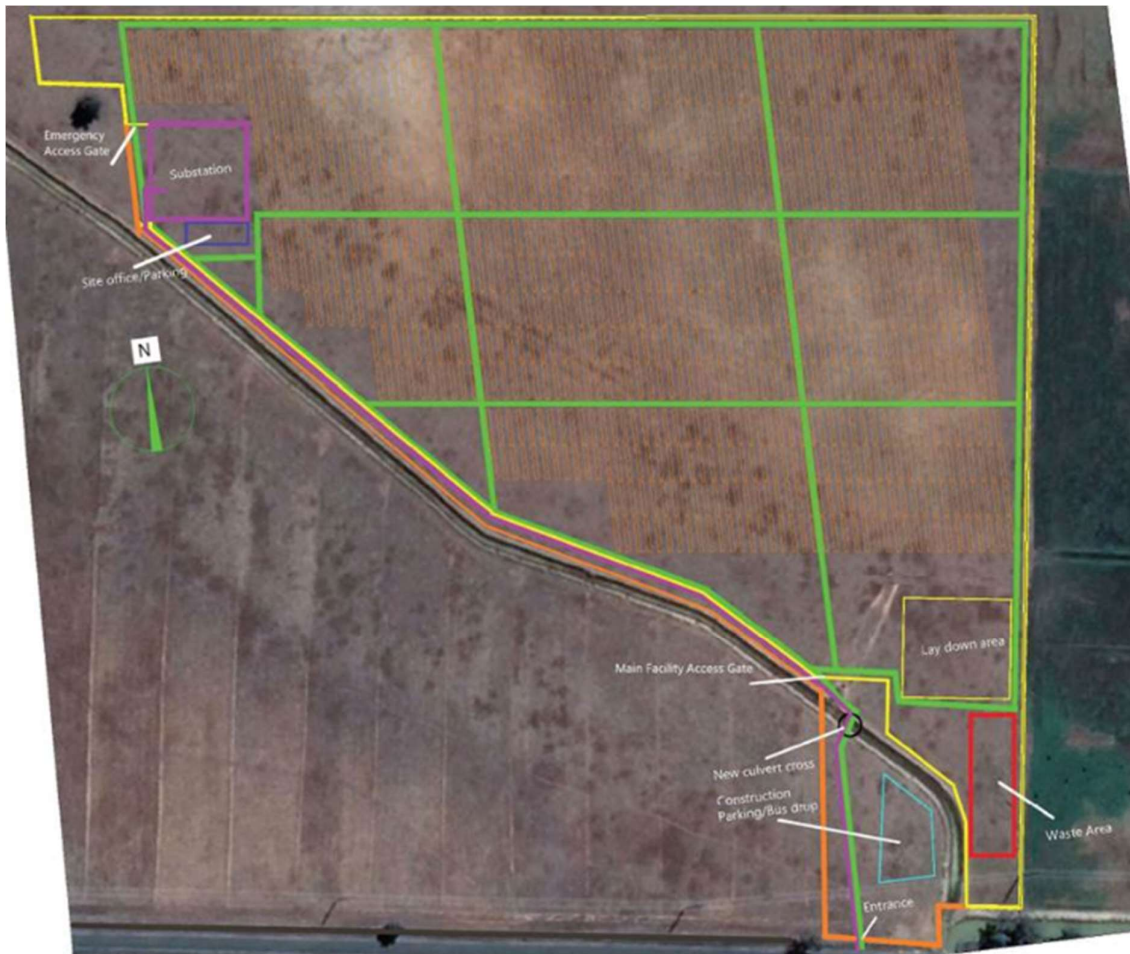


Figure 2 – Proposed solar farm layout.

3. WATER QUANTITY

To assess the stormwater runoff for the site an assessment has been carried out using Boyd's formula to determine the pre developed flow for the site and the post developed flow for the developed site.

The aim is to discharge the site to predeveloped flows.

The predeveloped flow has been calculated using the following parameters and based on the property as existing rural land.

$$A = 2.6\text{ha}$$

$$C = 0.30$$

$$T_c = 120\text{min}$$

| STORM EVENT | FLOW (m ³ /s) |
|-------------|--------------------------|
| 5 | 0.037 |
| 10 | 0.043 |
| 20 | 0.050 |
| 50 | 0.060 |
| 100 | 0.068 |

The post developed flows have been calculated based on the following parameters and the developed site containing impervious areas including solar panels and gravel access roads.

$$A = 2.6\text{ha}$$

$$C = 0.60$$

$$T_c = 110\text{min}$$

| STORM EVENT | FLOW (m ³ /s) |
|-------------|--------------------------|
| 5 | 0.079 |
| 10 | 0.091 |
| 20 | 0.107 |
| 50 | 0.128 |
| 100 | 0.144 |

The detailed design will provide additional design details and levels based off a survey.

4. WATER QUALITY

A stormwater quality analysis has been undertaken using the MUSIC software.

The aim is to discharge water quality to pre developed levels. The targets for this are based on 'best practice' Water Sensitive Design which are;

| Nutrient | Reduction Target (%) |
|------------------------|----------------------|
| Total suspended solids | 80 |
| Total phosphorus | 45 |
| Total nitrogen | 45 |
| Gross pollutants | 70 |

It is proposed for the solar panels to discharge to the natural ground and for runoff to be dissipated into the natural ground. The runoff from the gravel access roads will be collected in the swale drains that are along the gravel access roads. The swale drains will discharge into an onsite detention basin.

Refer Figure 3 for MUSIC Model which contains the swales and detention basin.

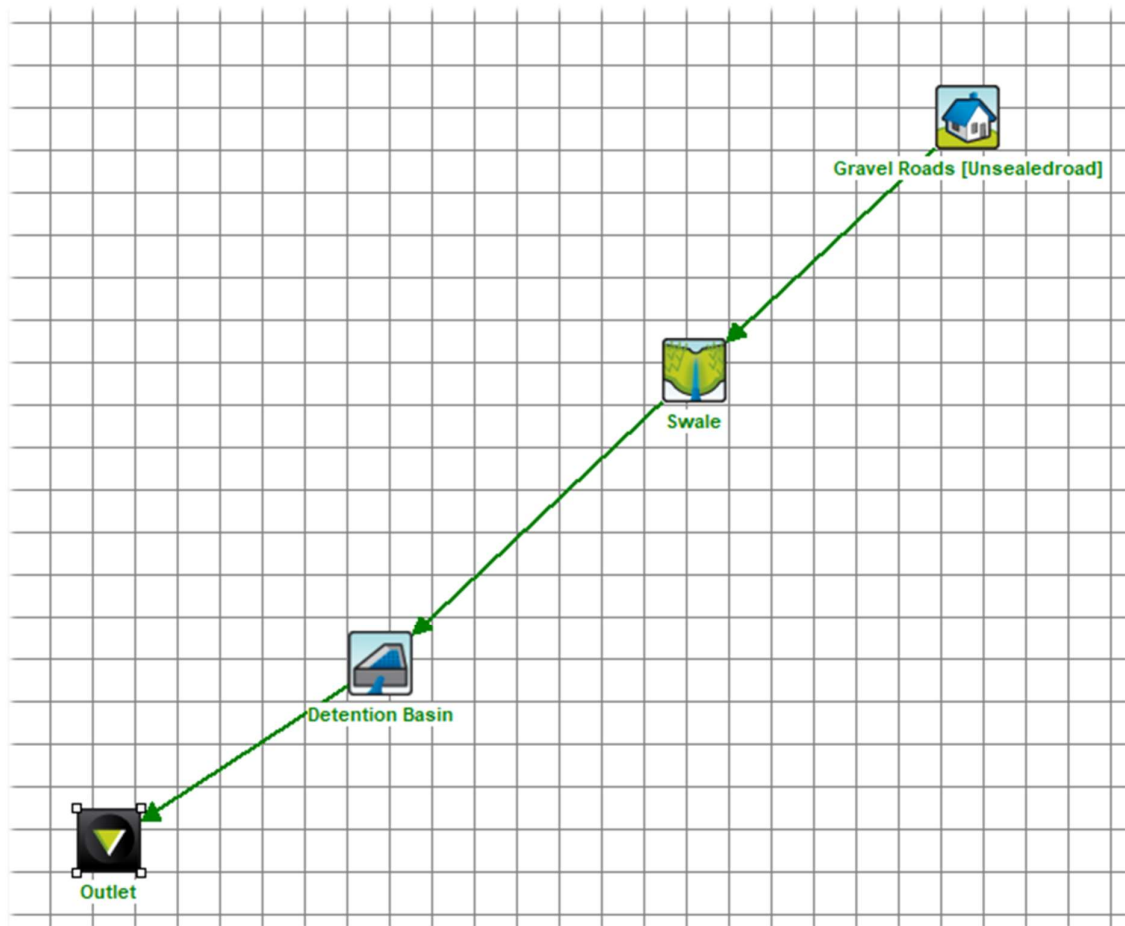


Figure 3 – MUSIC model

Inputs for the MUSIC model include detention basin and swales. Refer Figure 4 for MUSIC inputs.

Properties of Swale

Location: Swale

Inlet Properties

Low Flow By-Pass (cubic metres per sec): 0.000

Storage Properties

Length (metres): 3265.0
 Bed Slope (%): 0.20
 Base Width (metres): 0.0
 Top Width (metres): 5.0
 Depth (metres): 0.50
 Vegetation Height (metres): 0.250
 Exfiltration Rate (mm/hr): 0.05

Calculated Swale Properties

Mannings N: 0.595
 Batter Slope: 1:5
 Velocity (m/s): 0.029
 Hazard: 0.015
 Cross sectional Area (m²): 1.25
 Swale Capacity (cubic metres per sec): 0.037

Fluxes... Notes... More

Cancel Back Finish

Properties of Detention Basin

Location: Detention Basin

Inlet Properties

Low Flow By-pass (cubic metres per sec): 0.00000
 High Flow By-pass (cubic metres per sec): 100.0000

Storage Properties

Surface Area (square metres): 500.0
 Extended Detention Depth (metres): 0.50
 Exfiltration Rate (mm/hr): 0.00
 Evaporative Loss as % of PET: 100.00

Outlet Properties

Low Flow Pipe Diameter (mm): 150
 Overflow Weir Width (metres): 0.6
 Notional Detention Time (hrs): 1.87

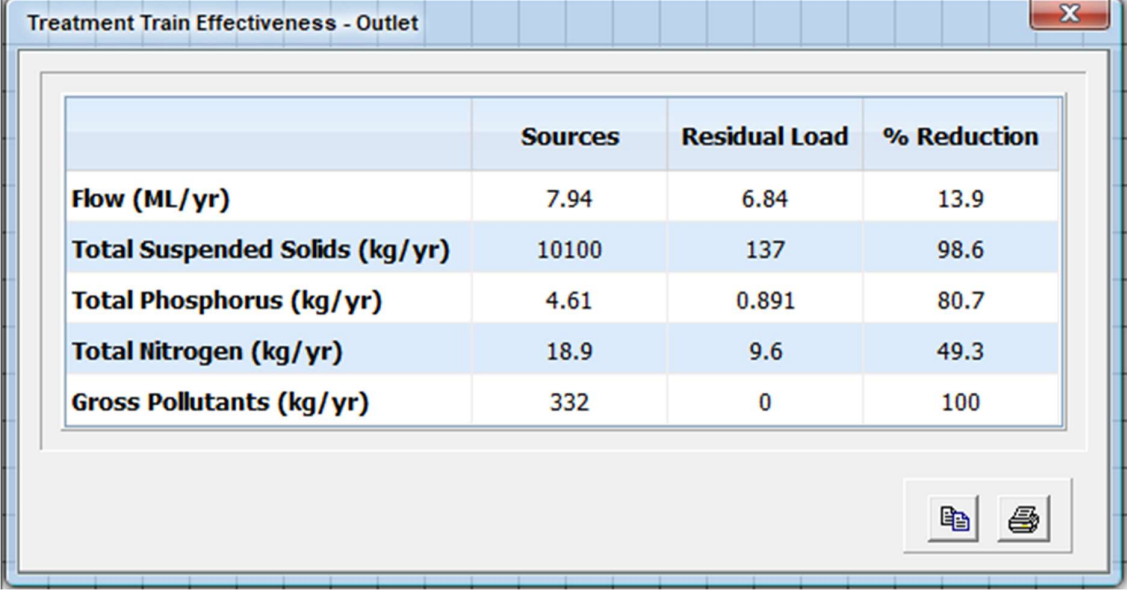
☐ Use Custom Outflow and Storage Relationship
 Define Custom Outflow and Storage Not Defined

Re-use... Fluxes... Notes... More

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Figure 4 – MUSIC inputs

MUSIC results shown in Figure 5 show the targets can be achieved. Refer Figure 5 for results.



| | Sources | Residual Load | % Reduction |
|---------------------------------------|---------|---------------|-------------|
| Flow (ML/yr) | 7.94 | 6.84 | 13.9 |
| Total Suspended Solids (kg/yr) | 10100 | 137 | 98.6 |
| Total Phosphorus (kg/yr) | 4.61 | 0.891 | 80.7 |
| Total Nitrogen (kg/yr) | 18.9 | 9.6 | 49.3 |
| Gross Pollutants (kg/yr) | 332 | 0 | 100 |

Figure 5 – MUSIC results

5. CONCLUSION

The stormwater management plan for 126 Broughans Road Finley shows that;

- Discharge from the developed site will be limited to pre developed flows.
- The discharge to pre developed flows is achieved by a detention basin that limits the discharge to predeveloped flows.
- The water quality targets can be achieved to 'best practice' targets.