



Erosion and Sediment Control Plan (ESCP)

**Friday Flat and Middle Slopes Fan Gun Project,
Thredbo Alpine Resort, Kosciuszko National Park, NSW
December 2021**

Friday Flat and Middle Slopes Fan Gun Project

Erosion and Sediment Control Plan (ESCP)

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Document Control

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1 Introduction

This Erosion and Sediment Control Plan (ESCP) has been prepared for the Friday Flat and Middle Slopes Fan Gun Project (the Project). The Project site is located within Thredbo Alpine Resort (Thredbo), approximately 30 kilometres (km) south-west of Jindabyne, New South Wales (NSW).

2 Site Description

The Project site and activities are located on a pre-disturbed and highly modified environment. (**Figure 1**) (NSW Government 2021). The Project is not located within waterfront land or riparian corridors.

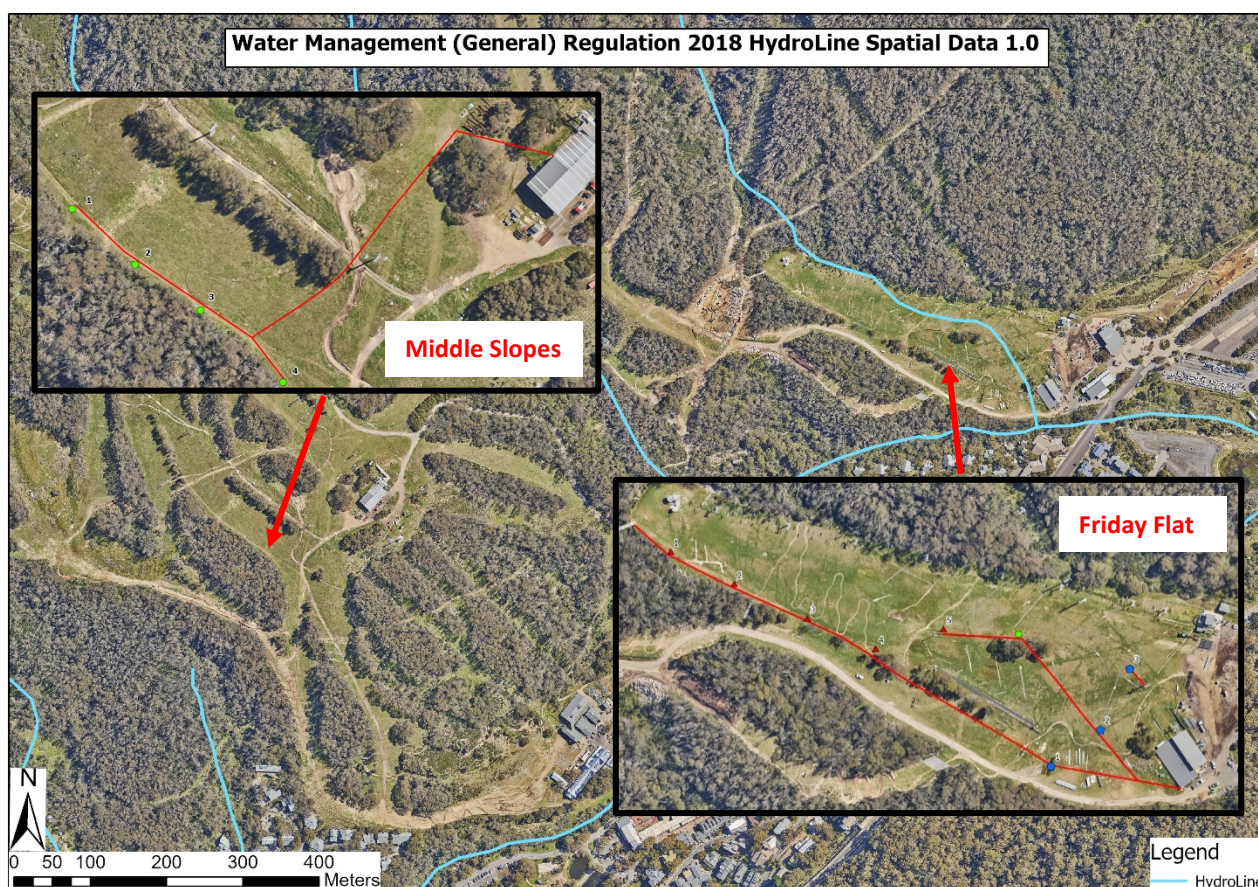


Figure 1: General Project location within proximity to mapped watercourses (NSW Government 2021)

3 Roles and Responsibilities

Role	Responsibilities
Project Manager	- Ensure the ESCP is made available, communicated, maintained and understood by all Construction Personnel; and - Ensure ESCP adheres to conditions of approval following the provision of Development Consent from DPIE.
Environmental Officer	- Ensure implementation and compliance with the ESCP; - Ensure all ESCs are installed and adequately functioning in accordance with ESCP; and - Inspections and monitoring of all erosion and sediment control measures.
Construction Manager	- Establishment and removal of erosion and sediment control measures; and - Ongoing maintenance of erosion and sediment control measures.

4 Management Measures

4.1 General

- All erosion and sediment controls (ESCs) measures will be installed and maintained in accordance with **Sections 5** and **6** of this ESCP; and
- Works will cease during substantial rainfall events.

4.2 Vegetation

- No clearing of native vegetation is to occur;
- All reasonable and practicable efforts will be taken to delay the disturbance to existing ground cover (organic or inorganic) prior to land-disturbing activities; and
- All reasonable and practicable measures must be taken to minimise the disturbance to trees, shrubs and ground covers outside of the construction corridor.

4.3 Site Access Protection Measures

- Site access points will be appropriately managed to minimise the risk of sediment being tracked onto sealed, public roadways.

4.4 Soil and Stockpile Management

- All stockpiles will be constructed and managed in accordance with *Soil Stockpile Guidelines for the Resort Areas of Kosciuszko National Park* (OEH 2017). For stockpiles within the construction corridor, they will adhere to the following criteria:
 - Located directly adjacent to the works and in areas with sufficient room to accommodate the volume of material being stockpiled
 - Situated on relatively flat ground (where possible)
 - Not within 40 m of a watercourse; and
- Sediment controls to be installed down-slope of stockpiles, where required (refer **Section 5.7**).

4.5 Trenches

- The maximum length of pipeline to remain open overnight is approximately 100 metres (m);
- ESCs will be installed in accordance with **Sections 4.7** and **5**;
- Backfill will be placed at equivalent compaction of the surrounding soil with an excavator to minimise possibility of soil subsidence; and

- Where trenches are left open overnight, egress points for fauna (e.g. timber ramps) will be installed.

4.6 Waste Management

- All building and construction waste onsite to be minimise in the first instance;
- Designated waste collection areas will be established on-site with covered receptacles;
- Building and construction waste will be managed in accordance with KT's waste management procedures; and
- No material is to be swept or hosed into any waterways or waterbodies.

4.7 Drainage, Erosion and Sediment Control

The installation of effective drainage and ESCs are essential to ensure soils and waterways are protected and the success of rehabilitation. A summary of the controls to be implemented onsite are provided in **Table 1**. Any additional or alternative controls must be approved by the Environmental Officer prior to use.

4.8 Site Rehabilitation

- All ESC measures will remain in place until all exposed areas of soil are stabilised and/or revegetated; and
- All rehabilitation will be undertaken in accordance with the *Rehabilitation Guidelines for the Resort Areas of Kosciuszko National Park* (DECC 2007). See Appendix 10 of Guideline for list of recommended species for rehabilitation.

Table 1: Drainage, Erosion and Sediment Controls

Activity	Control	Purpose	Timing	Location	Installation Requirements	Materials required
Excavations, trenching	Sediment fence	To prevent sediment run-off	Where required, installed prior to commencement of activity and retained in place until exposed areas of soil are stabilised / rehabilitated	Downslope side of any excavations; wetter areas of trenches	To be in accordance with construction notes in Section 5.1	Geotextile fabric (non-woven), star pickets/wooden stakes
Trenching	Straw bale filter fencing	To prevent sediment run-off	Where required, during excavation of trenches	Drier areas of trenches, across or at the toe of slope	To be in accordance with construction notes in Section 5.4	Straw bales; support posts/stakes; geofabric
	Trench breakers	Reduce erosive run-off velocities	Prior to forecast rain event, where required	Within open trenches	In accordance with construction notes in Section 5.5	Straw bales
Down-slope excavations	Straw bales	Divert water around and away from open excavation works	Installed once the trenches have been excavated and retained in place until excavations are stabilised/rehabilitated	To be placed at each end of the open trenches	To be in accordance with the construction notes in Section 5.4	Straw bales; stakes
Cross-slope excavations	Straw bales; Coir logs	Divert water around and away from excavation works	Installed once trenches have been excavated, where required	To be installed on the uphill side of excavations running cross-slope (where required)	To be in accordance with the construction notes in Sections 5.2, 5.3 and 5.4	Straw bales; stakes; coir logs
Dewatering excavations	Geofabric filter dam	To capture sediment	In the event water enters an excavation and its required to be pumped out prior to recommencement of works	Equipment and pumping operation to be confined to construction corridor	To be in accordance with the construction notes in Section 5.6	Geotextile filter fabric (heavy duty non-woven); support posts/stakes; straw bales

*Straw bales to be certified weed-free

5 Control Installation Notes

This section details the installation requirements for controls listed in **Table 1**.

5.1 Sediment Fence

Construction notes:

- 1) Construct sediment fences as close as possible to being parallel to the contours of the site, but with small returns to limit the catchment area of any one section. **The catchment area should be small enough to limit water flow if concentrated at one point to 50 L/s in the design storm event, usually the 10-year event.*
- 2) Dig a 150 mm deep trench along upslope line of fence for the bottom of the fabric to be entrenched.
- 3) Install 1.5 m long star pickets into ground at 2.5 m intervals (max) on the downslope edge of the trench. **Fit star pickets with safety caps.*
- 4) Fix geotextile to the upslope side of the posts ensuring it goes to the base of the trench.

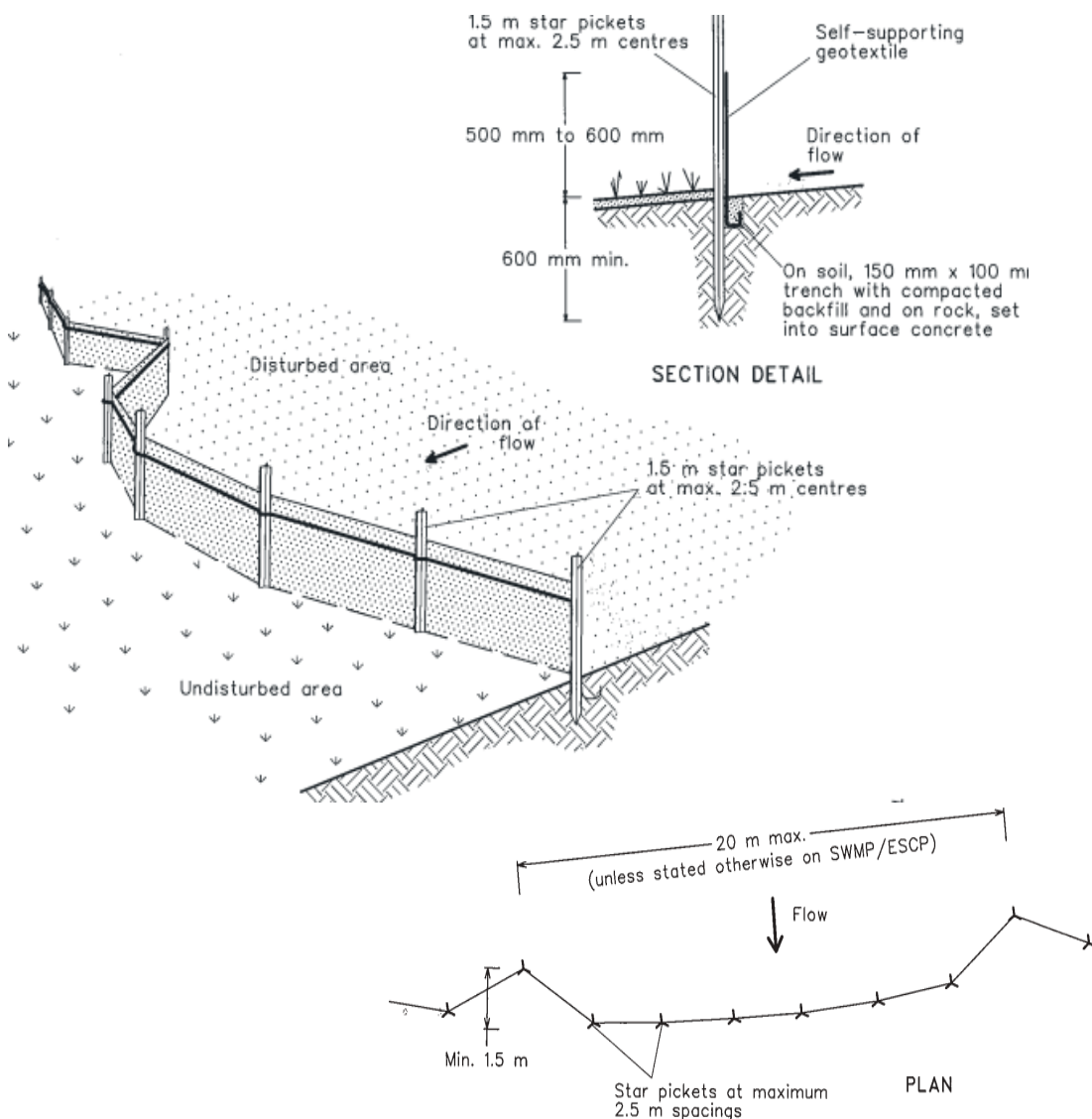


Figure 2: Standard Sediment Fence Installation (Source: Landcom 2004)

5.2 Cross Drainage and Sediment Barriers

The recommended spacing for cross drainage and sediment barriers is provided in **Table 2**.

Table 2: Recommended spacing for cross drains and sediment barriers

Slope Grade (%)	Cross Drain / Sediment Barrier (m)
5-10	15-20
10-15	10-15
15-25	8-10
>25	5-8

Source: NPWS 2007; Parr-Smith and Polley (1998)

Note: To calculate the grade of a slope: (rise/run) x 100 = slope grade

5.3 Coir Logs

Construction notes:

- 1) Secure logs by driving the stakes between the outer netting and the core material each side of the logs and secured into the ground (not through centre of log).
- 2) Ensure spacing of stakes does not exceed an interval of 1 m.
- 3) Once driven into ground, the stakes should sit at least two-thirds below the ground and one-third above.

5.4 Straw Bale Filter

Construction notes:

- 1) Construct the straw bale filter as close as possible to being parallel to the contours of the site.
- 2) Place bales lengthwise in a row with ends tightly abutting (1 bale = max height of filter). Fill gaps between bales with straw and wrap with geofabric where necessary.
- 3) Embed each bale in the ground 75-100 mm and anchor with two 1.2 m stakes/star picket. Angle the first stake in each bale towards the previously laid bale. Stakes should be driven 600 mm into ground, sitting flush with top of bale (if possible). **If using star pickets which protrude above bales, fit with safety caps.*
- 4) Where a straw bale filter is constructed downslope from a disturbed batter, ensure the bales are placed 1-2 m downslope from the toe.

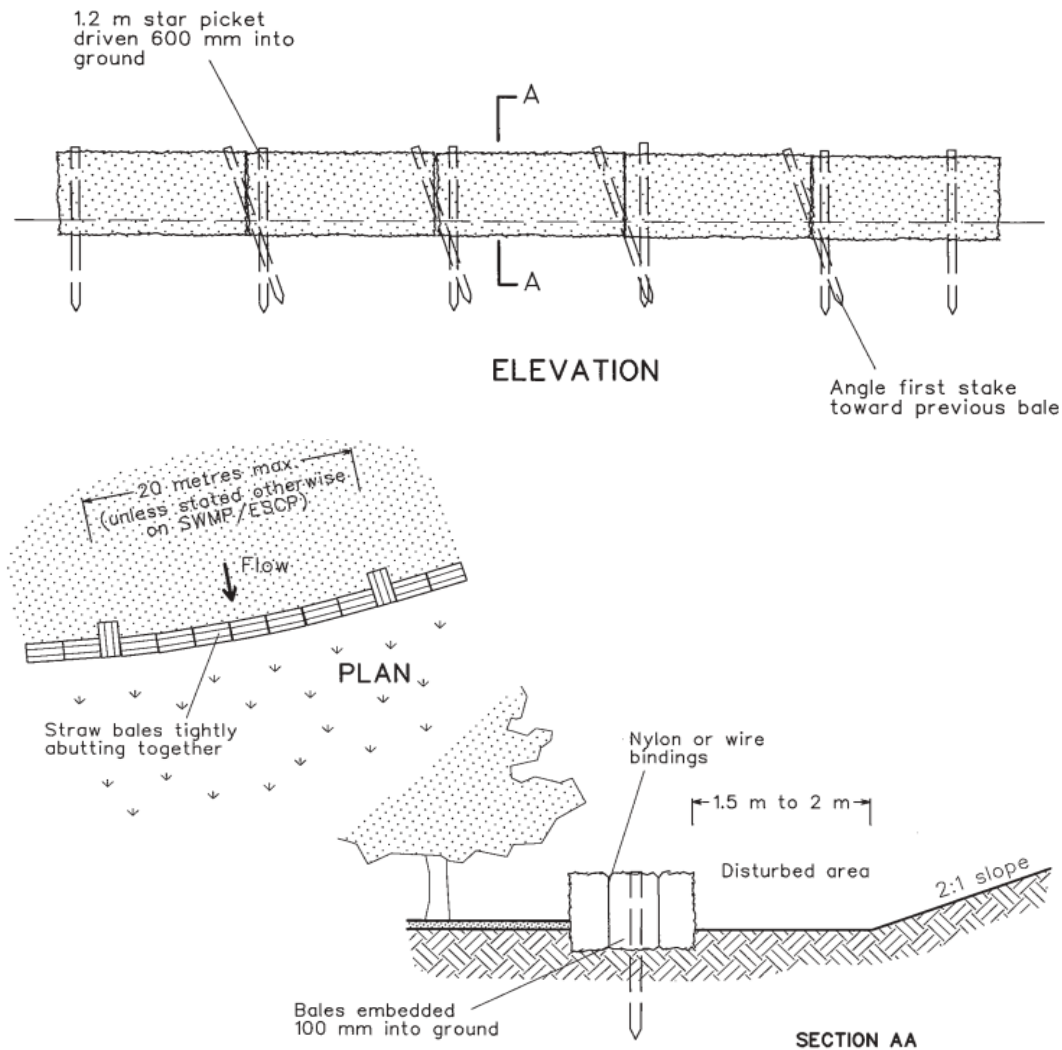


Figure 3: Standard Straw Bale Filter Installation (Source: Landcom 2004)

5.5 Trench Breakers

Construction notes:

- Trench breakers may comprise soil or straw bales (or a combination).
- The recommended spacing of trench breakers to be determined on-site according to the slope and potential for subsurface flow, refer **Table 2** for recommended spacing.

5.6 Geofabric Filter Dam Installation

Construction notes:

- 1) Where practicable, locate the filter dam at least 50 m from the edge of a waterbody.
- 2) Suitably clear and prepare the surface where the filter dam will be installed.
- 3) Arrange straw bales to form an enclosure and securely anchor each bale with at least one (1) star picket or stake.
- 4) Securely attach the filter fabric to the straw bales and reinforce with stakes. If more than one sheet of fabric is used, then overlap within a minimum of 600 mm at all joints.



Figure 4: Standard Installation of Geofabric Filter Dam

5.7 Soil Stockpile Management

Construction notes:

- 1) Stockpiles should be located at least 2 m (preferably 5 m) from existing vegetation and waterbodies, concentrated water flows, roads and hazard areas. Recommended location within weed free, disturbed area if possible.
- 2) Construct stockpiles as low, flat mounds (<2 m high) with a slope <50% (26°)
- 3) Install appropriate sediment controls (e.g. sediment barriers 1-2 m downslope) around stockpiles. **It is recommended to cover stockpiles (e.g. with anchored geofabric) during strong wind or high rainfall events.*

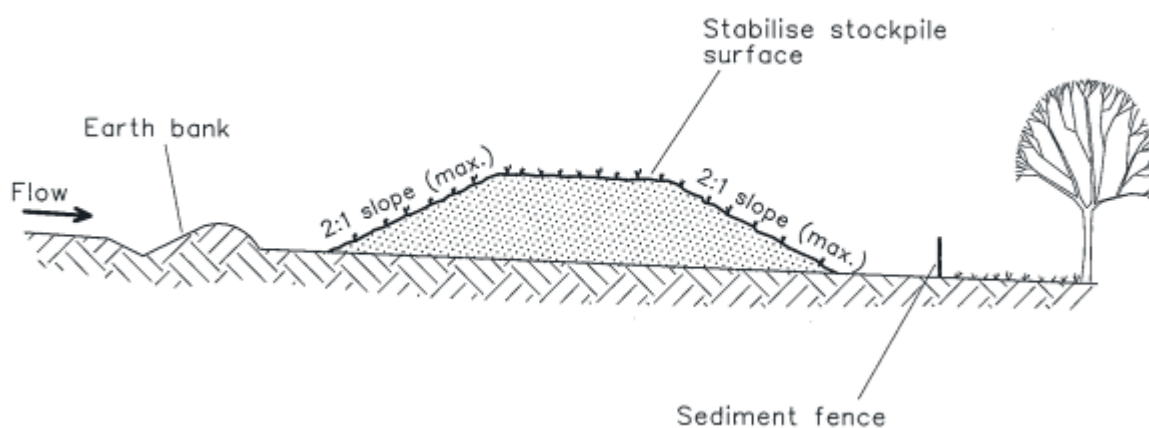


Figure 5: Stockpile Management (Source: Landcom 2004)

6 Monitoring and Maintenance

6.1 Inspections and Monitoring

The Environmental Officer appointed for the Project will be responsible for ensuring that all erosion and sediment controls are installed in accordance with this plan. Regular monitoring and maintenance will be the responsibility of all construction personnel. The Environmental Officer will undertake weekly inspections of all erosion and sediment controls for the duration of the works.

Table 3: Erosion and Sediment Control Inspections Summary

Control	Inspections
Sediment fence	• Ensure sediment fence will adequately pond water up-slope of the fence; • Ensure fabric is adequately buried; • Check the space of support stakes; • Check for excessive sediment deposition; • Check for damage to fabric; • Check for erosion down-slope of any spill through weirs; and • Ensure the fence is not concentrating or diverting flows in an undesirable manner.
Straw bale filter	• Check that water will either pass through or over the bale, but not around the bales.
Geofabric filter dam	• Inspect the filter medium for leaks resulting from holes, tears or joint failure; • Check for displacement of straw bales; • Check the clarity of the outflow; and • Inspect the dam at least daily during de-watering operations.
Coir logs	• Check for displacement of the logs; and • Check for soil erosion adjacent to the logs.

6.2 Maintenance Program

All erosion and sediment control measures will be checked regularly to ensure they remain in good working order at all times (e.g. prior to forecast rain, daily during extended periods of rainfall and after significant rainfall events).

Table 4: Erosion and Sediment Control Maintenance Measures

Control	Maintenance
Sediment fence	• Repair any torn sections; • If fencing is sagging between stakes, install additional support posts; and • Remove accumulated sediment if the sediment deposit exceeds a depth of 1/3 the height of the fence.
Straw bale filter	• Replace the straw bale filter if full or partial collapse of the bale occurs; and • Remove and suitably dispose of accumulated sediment prior to replacing the bales.
Geofabric filter dam	• Replace the filter fabric when it becomes blocked with sediment and/or the flow rate through the barrier becomes unacceptably low.
Coir logs	• Repair or replace displaced logs that are likely to cause erosion issues.

7 Reporting

The Environmental Officer will report on the effectiveness of controls and details on any non-conformance on the **Erosion and Sediment Control Inspection Report (Appendix A)**. The report forms part of the weekly environmental inspections and will be provided to the Project Manager with weekly internal reporting requirements.

8 References

Department of Environment and Climate Change (DECC) 2004, *Rehabilitation Guidelines for the Resort Areas of Kosciuszko National Park*, <https://www.environment.nsw.gov.au/research-and-publications/publications-search/rehabilitation-guidelines-for-the-resort-areas-of-kosciuszko-national-park>

Department of Planning & Environment (DPE) (2017) *What to include with your development application*, version January 2017, <https://www.planning.nsw.gov.au/Policy-and-Legislation/~media/65E2BA89886F426991525FF25707A9A9.ashx>

Eco Logical Australia Pty Ltd (ELA) 2021, *Snowmaking Works, Friday Flat and Middle Slopes, Thredbo*, reference: 20761

International Erosion Control Associated (IECA) 2021, *Design fact sheets*, viewed 18 August 2021, <https://austieca.com.au/publications/book-4-design-fact-sheets>

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Landcom 2004, *Managing Urban Stormwater: Soils and Construction, Volume 1, 4th Edition*, NSW Government.

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Office of Environment and Heritage (OEH) 2017, *Soil Stockpile Guidelines for the Resort Areas of Kosciuszko National Park, version 1.0, October 2017*, NSW National Parks and Wildlife Service.

Witheridge 2012, *Erosion and Sediment Control – A Field Guide for Construction Site Managers*. Catchment & Creeks Pty Ltd., Brisbane, Queensland.

9 Acronyms

Acronyms	
%	percent
°	degrees
DA	Development Application
DECC	Department of Environment and Climate Change
DPIE	NSW Department of Planning, Infrastructure and Environment
ESCP	Erosion and Sediment Control Plan
ESCs	Erosion and Sediment Controls
KNP	Kosciuszko National Park
KT	Kosciuszko Thredbo Pty Ltd
m	metre
NSW	New South Wales
SEE	Statement of Environmental Effects
SEMP	Site Environmental Management Plan
Thredbo	Thredbo Alpine Resort

10 Appendices

Appendix A ESC Inspection Report

THREDBO ENVIRONMENTAL SERVICES INSPECTION REPORT FOR TEMPORARY EROSION/SEDIMENTATION CONTROLS

Sheet ____ of ____

Project: _____ Inspection Date: _____

Inspected by: _____ Inspect the site weekly or immediately after rain.

1. Are temporary drains effective in diverting all runoff from exposed areas to silt traps or other sediment structures before leaving site? If No, state location and action required:	Yes/No
2. Have new areas been disturbed which need temporary controls? If Yes, state where:	Yes/No
3. Are there any disturbed areas where work is sufficiently advanced for revegetation to be undertaken? If Yes, state where:	Yes/No
4. Is any dirty runoff water bypassing or overflowing existing silt traps/sediment control structures? Do existing traps need to be increased in capacity? Are any additional traps needed? If Yes, state location, action needed and priority:	Yes/No Yes/No Yes/No
5. Do any silt traps/sediment control structures need maintenance or repair to operate effectively? If Yes, state location, action needed and priority	Yes/No
6. Are any silt/sediment control structures more than 60% full or otherwise in need of cleaning out? If Yes, state location	Yes/No
7. Are actions taken after last inspection adequate and effective? If NO, list outstanding actions:	Yes/No
Signature: _____ Date: _____	



Appendix B ESC Non-conformance Report

Project:			
Date:		Raised by:	
Details of non-conformance:			
Details of specification / procedure not conforming to:			
Corrective Actions:			
Preventative Actions:			
Non-conformance resolved:		Yes: ☐ No: ☐ Date:	
Environmental Officer Signature		Project Manager Signature	