

## Northern Star Resources Jundee Mine

### W1/2/3 Waste Rock Landform Rehabilitation Monitoring Summary

#### **Purpose:**

This document summarises data collated from rehabilitation monitoring on the Jundee W1/2/3 Waste Rock Landform (WRL).

#### **Context:**

Northern Star are developing a renewable energy implementation plan to reduce Scope 1 and 2 emissions by 35% by 2030, and progress towards net zero emissions by 2050. To achieve this target, Jundee intends to install a solar farm on the upper surface of W1/2/3 WRL.

The 202ha W1/2/3 WRL is situated on the south eastern side of the Jundee Mine Complex (see Appendix 1). The WRL was constructed between 1995 and 2001 and rehabilitation was completed progressively between 1998 to 2002. Design specifications of the W1/2/3 WRL include:

- Height between berms – 10m
- Overall Height – 40m
- Design/actual elevation – 590m AHD
- Volume – 59.1 million bcm
- Source of material – Main, Hughes, Nim3 Pits
- Batter angle – 20°
- Berm Width – 5m wide berms. Perimeter and internal bunds on flat surfaces. Partially armoured out slopes.

Rehabilitation monitoring commenced in 1998. Jundee's initial method of monitoring was Ecosystem Function Analysis (EFA) Monitoring – where field data is collected along transects within analogue and rehabilitation sites. The interpretation of the data infers health of an ecosystem based on aspects such as soil stability, infiltration, nutrient cycling and plant cover and diversity along that transect.

More recently Northern Star shifted its monitoring method to aerial surveys to assess the rehabilitation performance with respect to the Mine Closure Plan completion criteria. The shift towards aerial surveying was completed to:

- i) Understand the performance of the whole waste landform instead along transects which may not be representative of the overall rehabilitation;
- ii) Be more effective with human resources and consultants time;
- iii) Reduce safety risk to personnel by minimising the time needed to walk up and down the landform batters.

### EFA Rehabilitation Monitoring Summary:

Table 1 is visually illustrates the performance of the rehabilitation with respect to the regional ranges from the EFA monitoring parameters.

Stability, infiltration, nutrient cycling, erosion and vegetation diversity were generally within the average regional range. Lower plant cover and density were considered above the regional range, whereas upper plant cover and diversity were below regional range.

Year of Rehabilitation	Last Survey	EFA Parameter								
		Stability	Infiltration	Nutrient Cycling	Erosion	Lower Plant Cover	Lower Plant Density	Upper Plant Cover	Upper Plant Density	Diversity
1998	2013	Green	Green	Green	Green	Blue	Blue	Red	Red	Green
1999	2013	Green	Green	Red	Green	Blue	Green	Red	Red	Green
2000	2013	Green	Green	Green	Red	Blue	Green	Green	Green	Green
2002	2010	Green	Green	Green	Green	Blue	Blue	Red	Red	Green

	Below average regional range		Within average regional range		Above average regional range
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### Aerial Rehabilitation Monitoring Summary:

On the upper surface of the W1/2/3 WRL, soil stability and infiltration is high with negligible erosion. However, erosion is present and is primarily concentrated along the lower batter, particularly in the eastern half of the landform. Gullies on the batters are advanced, and cross multiple lifts. The crest bund is intact and appears to be preventing water flow to the areas directly down slope. The berms installed between lifts are generally very narrow, and there are numerous areas of tunnelling and potential sinkholes forming.

Upper and lower storey vegetation has established however, coverage remains below baseline; approximately half of the analogue (14% relative to the analogue of 25%). The majority of cover is woody vegetation, with low levels of ground cover observed. Cover is more advanced along the northern half of the landform.

### Photographs:

Representative photographs of the upper surface of the W1/2/3 WRL were taken in October 2022 to and are displayed in Appendix 2. Observations from October aligned to previous monitoring efforts including:

- Soil stability and infiltration is high with negligible erosion as a result of deep contour ripping and compartmentalisation of the upper surface;
- Woody vegetation dominates vegetation structure the which is likely to be attributed to the drought experienced as grasses and herbs have not been able to sustain through this dry period;
- Broadly vegetation cover on the surface of the dump is less than surrounding vegetation.
- Upper vegetation cover tends to have formed in patches, which is reflective of the Mulga patch/interpatch growth regime in the Murchison region; and,
- Lower vegetation cover has more uniform coverage on the upper surface relative to upper storey plants; however still appears to be in less presence than the surrounding vegetation/analogue.

**Commentary with Respect to Proposed Activities:**

The proposed initial ~25ha solar farm activities are planned to be located on the upper surface of W1/2/3 WRL. This activity will result in clearing of rehabilitated native vegetation.

Monitoring and observations of the upper surface of the W1/2/3 WRL has indicated there is minimal erosion and below average levels of vegetation cover. The proposed activities are unlikely to impact the batters provided that crest bunds and surface water management is controlled adequately.

It is considered clearing of rehabilitation is preferred over clearing undisturbed native vegetation. The upper surface of the W1/2/3 WRL is a suitable location to place the solar farm as rehabilitation is of lower environmental value relative to the undisturbed native vegetation.

Appendix 1: W1/2/3 WRL with respect to Jundee Operations



Appendix 2: W1/2/3 WRL Upper Surface Photographs



