HASTINGS
Technology Metals Limited

APPENDIX 5-11

Waste Rock Management Plan

Yangibana Rare Earths Project

Waste Rock Management Plan

September 2017

Version Number	Issue Date	Prepared by	Reviewed by	Approved by
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EXECUTIVE SUMMARY

Hastings Technology Metals Limited (Hastings) is currently completing a Definitive Feasibility Study (DFS) for the Yangibana Rare Earths Project (the Project). The operations of the Project will involve open cut mining from four pits, disposal of waste rock, processing of ore and disposal of tailings. This management plan focusses on the disposal of waste rock.

Waste rock, generated from four pits has been thoroughly characterised and is well understood with respect to the proportions of competent and non-competent waste, waste rock radioactivity levels and geochemistry.

The key management requirements associated with waste rock are safety, stability, non-polluting, and capacity to support a local revegetation ecology. The planning settings and outcomes for these key aspects can be summarised as follows:

> **Safety:** The waste rock at Yangibana is primarily stable, durable material and the landform will have batter slopes <18 degrees, and will be safe for pedestrian access. They will be located outside of the Pit Zone of Instability (ZOI).
>
> **Stability:** Waste Rock Landforms (WRL's) will be geotechnically stable with maximum vertical heights of approximately 40-50m and average overall batter slope angles of less than 18 degrees. The majority of waste rock is predominantly durable fresh waste rock, however there are minor components of saprolite and transitional waste rock, which are characterised as erosive. At the Bald Hill pit, where one third of the waste rock is low competency saprolite, the mine schedule will permit encapsulation/cladding of this low competency waste rock surrounded by competent material. Hence all of the waste rock landforms at surface will have high erosional stability.
>
> **Non-polluting:** The Waste Rock Landforms will, overall, be considerably below the nominal radiation threshold of one becquerel per gram (with an average 0.38 Bq/g for all waste rock). Where any exceedances to this threshold occur, they will be very local and very minor, and below the existing natural outcrop radioactivity levels regionally. Any exceedances will be identified via monitoring and local cover measures installed. The waste rock is non-acid forming, does not leach neutral mine drainage constituents of concern and is non saline.
>
> **Capable of supporting revegetation:** The waste rock will form a stable surface on which to place and integrate topsoil. Studies indicate that the primary disturbance area (and hence soil harvesting) will occur over the "Hill Soils" which are more amenable to the development of a stable substrate for plant establishment (non-sodic, non-saline and with some inherent soil structure). As landform stability is a high priority, plant available water may be lower than analogue and hence revegetation may not meet analogue conditions, however revegetation is expected to develop to an acceptable degree.

This management plan provides guidance and specifications for the management of waste rock at the Project and integrates with the Yangibana Waste Rock Materials Characterisation Report (Trajectory, 2016), and the Preliminary Mine Closure Plan (Hastings, 2017).

The following summarises the requirements of the Environmental Impact Assessment:

Title of proposal	Yangibana Rare Earths Project
Proponent name	Hastings Technology Metals Limited
EPA assessment number	2115
Purpose	The purpose of this EMP is to meet the requirements of the Environmental Scoping Document relevant to the management of waste rock (work program # 34, 44 and 47): *Determination of waste rock volumes above 1 Bq/g, associated lithologies and strategies to manage these materials.* *Describe the proposed management, monitoring and mitigation methods to be implemented demonstrating that the design of the proposal has addressed the mitigation hierarchy in relation to impacts (direct and indirect) on soils/land/environment. This description should contain recommendations for soil handling to minimise erosion of stockpiled soils.* *Outline the outcomes/objectives, trigger and contingency actions to ensure impacts (direct and indirect) are not greater than predicted.*
Key Environmental Factor	Terrestrial Environmental Quality
Objective	*To maintain the quality of land and soils so that environmental values are protected.* Specific objectives of the WRMP are to ensure the effective characterisation, placement and configuration of waste rock, which meet closure objectives of being: • Safe: The waste rock landforms are on average below the proposed threshold of <1Bq/g. Landforms are geotechnically stable and safe to access on foot. • Stable: The waste rock landforms have durable, mixed fraction waste rock exposed on the final surfaces such that erosion is minimised and the landforms are stable over the long-term • Non-polluting: The waste rock landforms do not discharge unacceptable Acid Mine Drainage (AMD), neutral metalliferous or saline drainage to surface or groundwater. • Ecologically Sustainable: The landforms, to the extent that the stabilising substrate allows, will be revegetated with local provenance species and ecological communities which generally reflect the surrounding landscape.
EMP Provisions: Outcomes	The waste rock landform surfaces will not exceed threshold levels of radiation above background levels. Landforms will be geotechnically stable and safe to access on foot.

	The waste rock landforms will have a durable, mixed fraction of waste rock exposed on the final surfaces such that erosion is minimised and the landforms are stable over the long-term. The waste rock landforms will not discharge unacceptable AMD, neutral metalliferous or saline drainage to surface or groundwater. The landforms, to the extent that the stabilising substrate allows, will be revegetated with local provenance species and ecological communities, which generally reflect the surrounding landscape.

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1. CONTEXT, SCOPE AND OBJECTIVES

1.1 Proposal

Hastings Technology Metals Limited (Hastings) proposes to develop the Yangibana Rare Earths Project (the Proposal), located approximately 150km northeast of Gascoyne Junction, in the Upper Gascoyne region of Western Australia.

Rare Earth Elements (REE) will be mined from four deposits. During mining the REE ore will be taken to the ROM pad in preparation for processing, whereas waste rock will be deposited in waste rock landforms, alongside each respective pit. A processing plant, consisting of a beneficiation process and a hydrometallurgical process, will produce a mixed rare earths carbonate product. Tailings will be disposed in three tailings storage facilities (TSFs). Support infrastructure will include, but is not limited to, power, water, accommodation facilities, airstrip and linear infrastructure.

The underlying land tenure is pastoral lease, with the Project overlying Gifford Creek and Wanna Stations (both stations are owned by the same leaseholder, Bagden Pty Ltd and previously formed the single lease Wanna Station).

Hastings holds tenements which form the Project under its 100%-owned subsidiaries, Gascoyne Metals Pty Ltd and Yangibana Pty Ltd. Additionally, Hastings has a 70% interest in various tenements with joint venture partners, Mojito Resources Limited (30% ownership), which is subsidiary of Rare Earth Minerals Plc. The project (Figure 2) is located on tenements that cover 650 km^2.

Pre-feasibility drilling studies have been undertaken and indicate that the most economic resources are located in the eastern and western belts. The current planned mining schedule will focus on the Bald Hill South and Fraser's areas in the first years before moving to Yangibana West and Yangibana North in later years.

The project is seeking to extract rare earths (mainly, neodymium, praseodymium, and dysprosium) from ironstone-hosted mineralisation and potentially from carbonatite hosted mineralisation at greater depths. The country rock is Pimbyana granite and migmatite / anatectic granite of the Gascoyne Complex. This granite has been intruded by dykes, veins, and sills of the Gifford Creek Ferrocarbonatite Complex, a feature of which are the ironstone veins that are associated with the target ore (Pearson *et al* 1995, Pirajno *et al*. 2014, Pirajno *et al* 2015).

The ore bodies will be mined using conventional open pit methods of drill and blast, load and haul. Proposed depths of open pits range from approximately 60 metres below ground level (mBGL) at Bald Hill, to approximately 85 mBGL at Yangibana to approximately 95 mBGL at Fraser's. The largest pit will be Yangibana, which comprises of two deposits - Yangibana North and Yangibana West.

Deposits will require dewatering prior to mining. Depth to groundwater within deposits ranges from 6 mBGL to 30 mBGL.

Mine waste rock will be generated throughout the mining phase of operations. The ratio of ore to waste rock will vary depending on the deposit and the depth of mining, with less waste rock produced with depth. The proposed annual mining rate is approximately 8 million tonnes per annum (Mtpa), of which 1 Mtpa will be ore. Four Waste Rock Landforms (WRLs) will be constructed adjacent to the source open cut pit. WRLs will be reshaped during the rehabilitation phase of the operation to meet final landform design parameters. The proposed maximum height of WRLs is approximately 40 metres above the natural surface.

1.2 Key environmental factor

This WRMP specifically addresses the Key Environmental Factor: Terrestrial Environmental Quality.

Key activities, relevant to management of waste rock, that have the potential to affect terrestrial environmental quality include:

- Mining of waste rock.
- Storage of topsoil.
- Construction of waste rock landforms (WRLs).
- Closure and rehabilitation of WRLs.

1.3 Legislative and condition requirements

The Project is currently in the process of completing approvals requirements. Relevant legislation and guidelines are:

- *Mining Act 1978* (WA);
- *Mining Rehabilitation Fund Act 2012* (WA);
- *Mines Safety and Inspections Act 1994* (WA);
- *Environmental Protection Act 1986* (WA);
- *Environmental Notes on Mining: Care and Maintenance* (DMP 2009a);
- *Environmental Notes on Mining: Waste Rock Dumps* (DMP 2009b); and
- *Strategic Framework for Mine Closure* (Australian and New Zealand Minerals and Energy Council (ANZMEC) and the Minerals Council of Australia (MCA) 2000).

This work is intended to inform and satisfy the requirements of a Mining Proposal, and formal Environmental Impact Assessment under Part lV of the *Environmental Protection Act 1986* (WA). This WRMP considers the Mine Closure Guidelines (DMP 2015); and the Draft Material Characterisation Guidelines (DMP 2016).

This EMP meets the requirements of the Environmental Scoping Document (EPA, May 2017) for the Yangibana Rare Earths Project (EPA Assessment Number 2115):

> *34. Determination of waste rock volumes above 1 Bq/g, associated lithologies and strategies to manage these materials.*
>
> *44. Describe the proposed management, monitoring and mitigation methods to be implemented demonstrating that the design of the proposal has addressed the mitigation hierarchy in relation to impacts (direct and indirect) on soils/land/environment. This description should contain recommendations for soil handling to minimise erosion of stockpiled soils.*
>
> *47. Outline the outcomes/objectives, trigger and contingency actions to ensure impacts (direct and indirect) are not greater than predicted.*

1.4 Purpose

The intent of this Waste Rock Management Plan (WRMP) to ensure that waste rock is effectively managed:

- over the full operating lifecycle and beyond closure of the mine,
- in a safe manner,
- to minimise risk to the environment and community,
- to maximise the efficiency of resource utilisation, and
- to consider future land use options.

In addition, the purpose of this WRMP is to also meet the requirements of the Environmental Scoping Document relevant to the management of waste rock (work program # 34, 44 and 47).

1.5 Scope

The scope of this document is for the waste rock generated by mining activities at the following Project pits:

- Frasers
- Bald Hill
- Yangibana West
- Yangibana North

The Plan also contains general information on the inventory, storage and deployment of soils and subsoils.

This Management Plan does not contain information on tailings management, which will be detailed in the *Tailings Storage Facility Operating Manual.*

1.6 Objectives

The overarching EPA objective for terrestrial environmental quality is:

- *To maintain the quality of land and soils so that environmental values are protected.*

Specific objectives of the WRMP are to ensure the effective characterisation, placement and configuration of waste rock, which meet closure objectives of being:

- Safe: The waste rock landforms are on average below the proposed threshold of <1Bq/g. Landforms are geotechnically stable and safe to access on foot.
- Stable: The waste rock landforms have durable, mixed fraction waste rock exposed on the final surfaces such that erosion is minimised and the landforms are stable over the long-term
- Non-polluting: The waste rock landforms do not discharge unacceptable AMD, neutral metalliferous or saline drainage to surface or groundwater.
- Ecologically sustainable: The landforms, to the extent that the stabilising substrate allows, will be revegetated with local provenance species and ecological communities which generally reflect the surrounding landscape.

2. APPROACH AND BASELINE

Results of materials characterisation studies, and a number of assumptions and uncertainties inform the management approach for meeting the environmental objective of this WRMP. The identified management actions, management targets, monitoring, reporting, and review and revision of management actions are aligned with the overall management approach.

2.1 Relationship with other documentation

This WRMP is developed to support and compliment other documents utilised by Hastings to understand, specify, approve and monitor aspects of environmental management at the Project. This WRMP utilises and aligns with the recommendations of the:

- Yangibana Waste Rock Characterisation Study (Trajectory 2017),
- Yangibana Soil Characterisation Study (Landloch 2016),
- Yangibana Waste Rock Erosion Study (Landloch 2016), and
- Yangibana Waste Rock Landform Design (Snowdens 2017).

This document interfaces directly with the Preliminary Mine Closure Plan (Hastings 2016) and the Yangibana Landform Evolution Study (Trajectory 2017).

The structure and content of this document takes into account the *Instructions on how to prepare Environmental Protection Act 1986 Part IV Environmental Management Plans* (EPA, 2016).

2.2 Baseline studies

All Project mine pit lithologies have been characterised geochemically and classify as Non- Acid Forming (NAF). Sulphide-S forms are consistently absent as indicated by Total-S values less than 0.1 % (and generally less than 0.01 %). Gypsum-S may occur locally within the range 0.1-1.5 % in the surficial colluvium and waste-saprolite-zone. However, this is 'benign-S' and the gypsum-Ca has the effect of suppressing clay dispersion. Enrichments in minor-elements are modest, reflective of the lack of sulphide-minerals.

Geochemically, the colluvium, waste-saprolite, waste-saprock and waste-bedrock streams are benign and pose no concerns for water quality or rehabilitation programmes. Physically, the colluvium, waste-saprolite and waste-saprock streams comprise varying clay contents with the cation-exchange complex of the clay-mineral suites being variously sodic. In terms of clay-dispersion tendency the latter is offset locally through gypsum occurrences.

The primary waste lithologies, which will be mined in large quantities and hence form part of the waste management and landform design strategy are ironstone, fresh granite, transitional granite/ironstone (saprock) and weathered granite (saprolite). The fresh waste rock and transitional rock components have a higher proportion of gravels, cobbles and larger clasts and will therefore provide more suitable armouring and growth media layers.

A proportion of the waste rock inventory (approximately 8-9%) may have radionuclide levels that exceed 1Bq/g. These zones are thought to be generally proximal to the ore body, primarily in the ironstone.

The mineralogy associated with the Project is not one which is associated with asbestiform minerals.

2.2.1 Soil characterisation

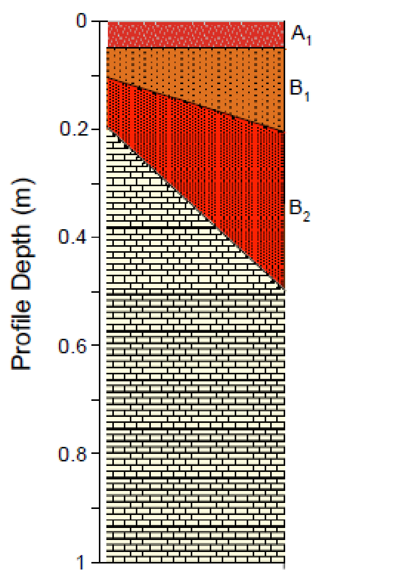
Two main soil types were recorded within the proposed disturbance footprint (Figure 1), distribution of each unit dependent on geology, geomorphology and topographical features, as detailed following:

- Dark brown sandy duplex soils (“Hills soils”): Associated with the extensive granite geology that forms the low hills and rises across the site, specifically the stone mantles and outcrops of granite and ironstone. This soil type can be divided into an A and B horizon overlying a C horizon of decomposing granite (Figure 1). Soil depths vary from ~20cm up to 50cm. It is considered neutral to slightly acidic that does not vary much through the profile or between sample locations. It is characterised by low salinity levels and a maximum exchangeable sodium percentage below 6%, indicating it is a non-sodic soil (Table 1).
- Dark brown sandy loam over clay loam soils (“Plains soils”): Associated with low relief areas and flood plains of drainage lines. This soil type can be divided into A and B horizons - a thin sandy loam topsoil over clay loam with an overall shallow depth (<30cm; Figure 1). It is strongly alkaline, saline and sodic. Two variations within this soil unit were identified. One variation, associated with drainage lines, will not be impacted by the Project. The second variation has a deeper profile, saline, sodic and clay-rich and has greater mottling. This soil unit variation will interact with proposed mine infrastructure and has the potential to be difficult to manage.

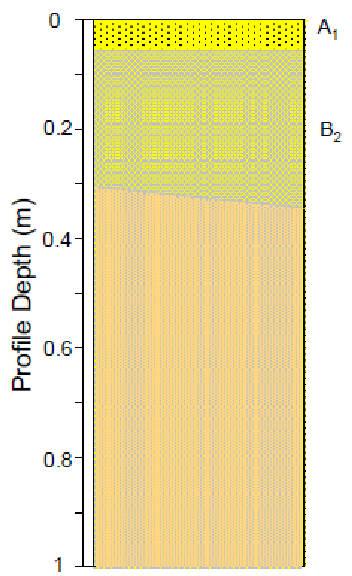
The Hills soil unit also included a subset of soils located around the Bald Hill deposit, which reported some variation in physical and chemical parameters compared to the other Hills soils; a slightly higher pH and higher dispersion index (more dispersive; Table 1).

Landloch (2016a) summarise the soil properties as follows:

- Both soils have low fertility (normal for arid zone soils), are clay rich, poorly or not well structured, and represent an erosion risk if used on constructed slopes;
- Limiting factors for each soil type include:
  - Hills soil – presence of a clay-rich subsoil will impact on methods employed for stripping, stockpiling and respreading; and
  - Plains soil – high sodicity has the potential for clay dispersion once free salts are leached from the profile.



A typical Hill soil unit profile



A typical Plain soil unit profile

(Source: Landloch 2016a)

FIGURE 1: SOIL PROFILES FOR HILL AND PLAIN SOILS AT THE YANGIBANA RARE EARTHS PROJECT

TABLE 1: AVERAGE SOIL CHARACTERISTICS - CHEMICAL AND PHYSICAL

Analysis		Unit	Hills Soil	Hills Soil – Bald Hill area	Plains Soil
$pH_{1:5}$ – Water		pH units	6.60	7.70	8.30
Electrical Conductivity ($EC_{1:5}$)		dS/m	0.01	0.04	4.5
Total Nitrogen		mg/kg	315	390	275
Total Phosphorus		mg/kg	360	340	230
Organic Carbon		mg/kg	0.17	0.23	0.6
Plant Available Nutrients	Phosphorus	mg/kg	21.9	9.6	10.3
	Potassium	mg/kg	215	265	480
	Sulphur	mg/kg	3.9	5.0	20
	Copper	mg/kg	0.7	1.0	0.5
	Iron	mg/kg	13.5	12.6	8.5
	Manganese	mg/kg	6.4	13.4	0.8
	Zinc	mg/kg	0.8	0.5	0.3
Exchangeable Cations	Calcium	meq/100g	2.5	3.5	9.0
	Magnesium	meq/100g	1.8	2.5	1.0
	Potassium	meq/100g	0.3	0.18	0.4
	Sodium	meq/100g	0.15	2.6	1.0
	Aluminium	meq/100g	0.01	0.01	0.01
	Effective Cation Exchange Capacity	meq/100g	4.7	6.6	11.5
	Exchangeable Sodium Percentage	%	3.4	5.4	17.4
Particle Size Distribution	Coarse sand	%	50	37	35
	Fine sand	%	32	42	29
	Silt	%	6	11	13
	Clay	%	12	10	23
Dispersion Index		Class	2	2 - 7	2 - 7

2.2.2 Erosion studies

Landloch investigated surficial waste rock outcrops and conducted characterisation investigations on ironstone, granite and weathered granite samples.

Landloch (2016b) completed a preliminary landform surface erodibility assessment on the WRL designs generated during the pre-feasibility study by Snowden Group, assessing three rock types for use as rock armour on rehabilitated landforms. The three rock types were ironstone, weathered granite and fresh granite. The physical characteristics of surface rock material reported by Landloch (2016b) are summarised in Table 2.

TABLE 2: PHYSICAL CHARACTERISTICS OF SURFACE ROCK

Parameter	Unit	Ironstone	Surface Granite	Weathered Granite
Rock particle density	g/cm^3	3.8	2.9	2.0
Rock water absorption	%	1.3	3.4	17.1
Slake durability (2nd cycle)	%	99.5	95.5	88.5
Thorium-232	ppm	188	25.4	23.7

A WEPP model was developed to assess slope (batter) erosion potential. Methodologies, assumptions and inputs are detailed in Landloch (2016b). The preliminary findings of the assessment indicate that a combination of Hills soil and rock produces a more erosion resistant surface cover than soils alone. It is important to note that rock materials assessed were those available at surface with varying degrees of weathering, therefore, the model results have limited applicability in determining landform heights and slope angles. Landloch (2016b) recommend further sampling and assessment of fresh granite and other competent waste rock during the first two years of mining operations.

Erosion tests found ironstone and granite samples provide clear armouring benefits with respect to improving erosion resistance when mixed with soils. The weathered granite provided little or no armouring benefits.

2.2.3 Waste rock stability and durability

From a stability and durability perspective the waste rock in the pits has been classified and proportioned as follows:

- Frasers Pit: 2% saprolite, 7% weathered granite, 91% fresh granite.
- Bald Hill Pit: 31% saprolite, 23% weathered granite, 46% fresh granite.
- Yangibana Pits (North and West): 2% saprolite, 16% weathered granite, 83% fresh granite.

These proportional volumes indicate that, for the Frasers Pit, Yangibana North Pit and Yangibana West Pit, there are very low volumes of lower competency material that will be encapsulated within the waste rock dump by the higher competency fresh granites (91% and 83% respectively), which will be used to enclose all sloped surfaces.

The waste proportions for the Bald Hill Pit are, however, less favourable but manageable. Approximately 31% of the waste rock at Bald Hill is comprised of low competency saprolite and a further 23% is weathered granite. Often transitional lithotypes, such as weathered granites, can present opportunities as they are comprised of a mix of larger durable fractions and finer fractions, which provides durable substrates (achieving landform stability) whilst maintaining favorable water properties (ideal for plant establishment). However, this can only be determined when the material is examined at a field scale. If the fines fraction of the weathered granite is predominant or are of low durability, as is the case for waste rock from the Bald Hills Pit, then sufficient fresh granite, i.e. 46% of the waste, will be used to clad the slopes of the WRL. Since this material will be produced at the end of the pit development, placement of the mine waste in the appropriate zones should not be difficult to schedule (discussed in following sections).

2.2.4 Radioactivity

Characterisation of soils and waste rock have been undertaken for the Project to the extent required to inform harvesting and storage approaches, material segregation requirements, landform design considerations, and closure and rehabilitation planning. A small portion of the waste rock has levels that exceed 1 Bq/g, however this is not considered to be a significant risk and can be managed so that it is diluted within the respective WRL.

Eight percent of waste samples exceed the 1 Bq/g threshold, i.e. 42 samples out of 452 waste rock samples analysed. The average reading for waste rock above the threshold was 1.49 Bq/g. The average for all waste below the threshold was 0.38 Bq/g.

The waste rock as a whole will be below the 1 Bq/g threshold and any exceedances to the threshold, based on the data, would be localized and very minor. In the context of natural outcrops with considerably higher readings, the risks for this aspect of waste rock management can be considered negligible. Monitoring will be undertaken to assure this outcome is achieved. A cover of benign material will be placed over areas where local exceedances to the 1 Bq/g threshold are identified.

2.2.5 Growth media

The current state of knowledge regarding topsoil and subsoil is:

a) The Plain Soils are low stability soils and should not be deployed on sloped surfaces.
b) The Hill Soils are more suitable for slopes, however are likely to be thin and hence low volumes will be generated.
c) Some of the footprint is made up of outcrop from which no soils will be harvested.

Of the two soil types mapped within the proposed disturbance footprint, Landloch (2016a) recommend avoiding disturbance of the Plains soil type, associated with low relief areas of flood plains and drainage lines. This soil type is characterised by high salinity, high sodicity, high clay contents, strongly alkaline and low nutrient status. This soil type would disperse if disturbed and may limit vegetation establishment if used in rehabilitation.

Approximately 93% of proposed disturbance occurs within the Hills soil type, 4.5% within the Plains soil type, and 2.5% is currently unmapped. The unmapped areas of the proposed disturbance footprint are predominantly associated with the northern access roads.

A preliminary soil balance has been determined using the following assumptions:

- Stripping only of the Hills soil type;
- Soils stripped from the open pit footprints, but no soils respread on upper batters;
- Respreading of soils on all Project disturbance, including areas with underlying Plains soil type (where soils were not stripped);
- Depths of soil respreading:
  - 100 mm on areas at, or near, natural ground surface.
  - 200 mm on slopes and top surfaces of elevated landforms (WRLs and TSFs) where soils are co-mingled with rock armour.
- Two methodologies have been used to calculate the soil balance:
  - Landloch (2016a): 100 mm topsoils and 300 mm subsoils stripped and stockpiled separately at 1 m and 2 m height, respectively. No recommended depth of respreading was given.
  - DMP (2015): 200 mm combined topsoil and subsoil stripping, stockpiled approximately 2 m height. Depth of respreading no greater than 50 mm (to allow for seed emergence).
- Differences in recommended depths of soil stripping and height of stockpiles results in different disturbance footprint / area to rehabilitate.

The differences in the calculations highlight that further work and consideration will be required throughout the design phase to determine which method will be applied during construction and operations. The large volume of excess soils generated using the Landloch method, as well as the significant disturbance footprint for stockpile storage, may be limiting.

TABLE 3: PRELIMINARY SOILS BALANCE - HILLS SOIL TYPE

	Unit	Methodology	
		Landloch (2016a)	DMP (2015)
Soil stripping and stockpiling			
Area stripped	Ha	868	686
Depths stripped	mm	100 mm topsoil 300 mm subsoil	200 mm topsoil and subsoil stripped together
Stockpile height (windrows / paddock dumped)	m	1 m topsoil 2 m subsoil	2 m
Stockpiling			
Area for stockpiles	Ha	270	89
Volume harvested	m^3	4,350,000	1,770,000
Respreading			
Area to rehabilitate	Ha	1,043	861
Soil depth	mm	100 mm on natural ground surface 200 mm on elevated landforms slope and top surface, where co-mingled with rock armour	
Volume used	m^3	1,486,808	1,305,308
Excess soil	m^3	2,863,192	464,692

2.3 Closure work program

There are four proposed WRLs, positioned next to their respective open pit and a ROM pad adjacent to the processing plant. Due to the similarities of material for these four landforms, it is presumed they will have similar closure requirements, as summarised in Table 5 below.

TABLE 4: CLOSURE WORK PROGRAM – WASTE ROCK LANDFORMS

CLOSURE WORK PROGRAM – WASTE ROCK LANDFORMS	
Domain feature	Bald Hill WRL Frasers WRL Yangibana North WRL Yangibana West WRL Run of Mine (ROM)
Description	WRLs will be NAF, predominantly competent materials, and located adjacent the source open pit ROM will be constructed of NAF material
Disturbance area	Total landforms: 215.51 Ha 5.65 Ha ROM 58.67 Ha Bald Hill WRL

CLOSURE WORK PROGRAM – WASTE ROCK LANDFORMS	
	45.49 Ha Frasers WRL 40.15 Ha Yangibana North WRL 65.58 Ha Yangibana West WRL
Rehabilitation status	To be constructed
Estimated closure date	2026
Post mining land use	Pastoral use - grazing
Preliminary closure objectives and associated completion criteria	1.1) Comply with all legally binding conditions and commitments relevant to rehabilitation and closure: • All conditions and commitments are met. 1.4) Apply soils that will promote and benefit rehabilitation: • Delineation of vegetation, topsoil and subsoil stockpiles; and • Application of soils in locations where soil type and harvested volumes of useable soils dictate. 2.1) Construct safe, stable, non-polluting post mining landforms which support vegetation growth and are erosion resistant: • Landforms are placed outside the pit void zone of instability; • Surface water management and drainage is incorporated into the landform design; • Final surfaces do not significantly erode following heavy rainfall events; and • Characterisation of waste and rehabilitation materials to determine appropriate placement / segregation in the final landform. 3.1) Surface drainage structures will be constructed to an appropriate hydrology design standard to minimise erosion of permanent mining landforms and maintain ecosystem function: • Surface drainage to downstream environments is maintained. 4.1) Rehabilitated areas support self-sustaining and resilient vegetation, with biodiversity trending towards analogue sites: • Rehabilitated areas show trends that indicate long-term return to a functioning and sustainable ecosystem; and • Rehabilitated areas support revegetation with local provenance vegetation in the short-medium term. 7.3) Cover materials on landforms to be rehabilitated shall have radiation levels consistent with background levels: • Landforms do not emit radiation at surface exceeding background levels determined through baseline monitoring.
Specific closure assumptions	• Waste rock will not be backfilled into final voids; and • Waste segregation via encapsulation or within purpose constructed containment cells is not warranted.
Landform design	For Yangibana and Frasers: 40m high WRL with a single concave slope with concave slope of 20 degrees for the upper 50% of the vertical height and 15 degrees for the lower 50% of the vertical height. Batters composed of fresh or transitional granite which is primarily composed of durable mixed fraction material with a majority grading from grave, cobble and above. Batters will be sheeted with 150mm of hill soils. Top sections will be profiled such that there is a 5 degree backslope away from perimeters. Perimeters will have a 1m high bund (or as required to meet a

CLOSURE WORK PROGRAM – WASTE ROCK LANDFORMS	
	1:2000 ARI and cell bunding to compartmentalize water on the surface where it will infiltrate or evapotranspire. The top surface will be covered with 150mm of hill soil or subsoils which has a good structure such as caprock or gravel risk subsoils. As For Bald Hill except: The WRL will have one mid batter berm which will be 20m wide and backsloped at 5 degrees after the final surface is reprofiled. Hence there will be 2, 20m high lifts reprofiled as above to a 20/15 degree concave slopes. As the volumes of suitable armouring are more limited at Bald Hills the mine schedule will ensure that a minimum of 2m of fresh or transitional granite which is primarily composed of durable mixed fraction material with a majority grading from gravel, cobble and above is either in situ or placed as an armour.
Investigations required	Direct monitoring of mined waste on a weekly basis and then monthly to ensure RN thresholds are achieved. Where waste rock landform surfaces exceeding radiation thresholds are identified then the areas is covered with an additional suitable benign material.
Knowledge gaps	Detailed landform design based on final waste rock volumes and schedule
Rehabilitation materials	Benign competent waste rock and Hills soil type on batters Plain soil type on top/flat surfaces
Closure monitoring and maintenance	• Surface water monitoring - opportunistic • Post closure landform stability monitoring • Erosion maintenance • Periodically audit landforms against approved design reports • Rehabilitation ecosystem monitoring
Closure strategy - key tasks	
Progressive rehabilitation[1]	Progressively shape, contour and spread suitable soil on WRLs Establish diversion drains at the toe of WRLs
Planned decommissioning and closure	• Final profile of WRL will be achieved during operation, no re-profiling will be required • Remove ramps • Rock armour slopes (where necessary) • Spread soil • Rip and seed top surface and batters • Reconfigure diversion drains to ensure they remain self-sustaining and non-eroding
Premature closure	The landforms will be made safe and stable

1 Progressive rehabilitation will be conducted, initially on the Frasers or Bald Hill WRL, whichever pit is mined first. The lessons learned for this WRL will inform continual improvement of this document (and other related documents) for the next WRL and so forth. In consultation with key stakeholders, the final post mining land use, following rehabilitation, will consist of self-sustaining native vegetation and fauna habitats suitable for grazing to reflect the pre-mining state as closely as possible.

2.4 Key assumptions and uncertainties

It is assumed that the waste rock characterisation assessment, soils assessment and erosion assessment, have accurately recorded the geochemical and geophysical characteristics of the different waste rock litholgies. It is uncertain what the specific geophysical characteristics and potential for erosion will be of waste litholgies at depth. However, knowledge of the performance of fresh granite, in general, indicates that it is not erosive.

Pit optimisation may result in changes in currently known quantities of waste lithologies, which then flows onto how best to schedule waste rock movement and placement within the WRLs.

Given there are no other nearby mining developments in the local or regional area, lessons-learnt for rehabilitation practices cannot be applied and an adaptive management approach will likely be required.

2.5 Management approach

Hastings has adopted a risk-based management approach. The risk management process is based on the approach set out in the *Leading Practice Sustainable Development Program for the Mining Industry - Risk Assessment and Management* (Department of Resources, Energy and Tourism (DRET) 2008).

The risk assessment identifies risk pathways (unwanted event and the associated environmental receptor / factor), which may cause material impact to key environmental factors specified by the DMIRS (prev. DMP; 2016) and the EPA (2016). It also identifies the level of uncertainty associated with a risk pathway, which are:

- Low certainty: Risk rating is based on subjective opinion or relevant past experience. Limitations in baseline data/information, which results in general conclusions and/or further work is required.
- Moderate certainty: Risk rating is based on similar conditions being observed previously. Baseline data/information has some gaps or minor further work required.
- High certainty: Risk rating is based on testing, modelling or experiments. Baseline data/information is complete and analysis appropriate for level of data.

In order to focus management efforts, the risk assessment has been used to determine:

- Inherent risk of identified risk pathways;
- Mitigation of risk (using the hierarchy of controls); and
- Assessment of residual risk.

When mitigating inherent risk, treatment measures have been evaluated using the hierarchy of controls, as recommended by DMIRS (prev. DMP, 2016):

- Where reasonably practicable, eliminate the risk;
- Reduce the risk by substituting a different activity which poses a lower risk;
- Control the risk with engineered solutions (including physical barriers); and
- Mitigate the risk using administrative controls.

Hastings will demonstrate, throughout all phases of the Project, regular review of the risk assessment by relevant personnel and key stakeholders, progressive implementation of priority treatment measures, and on-going evaluation of performance. An adaptive management approach will be implemented, where performance objectives are not met by mitigation measures or due to change management, as a component of the continual improvement of this WRMP.

2.6 Rational for choice of provisions

Provisions are based on:

- Materials characterisation assessments including:
    - Presence of radionuclides at levels greater than 1 Bq/g;
    - erosivity of certain lithologies of waste rock; and
    - presence of sodic, saline, dispersive topsoil (Plains soil type).
- Proposal activities including:
    - Mining of waste rock;
    - storage of topsoil;
    - construction of waste rock landforms;
    - closure and rehabilitation of waste rock landforms.
- Consideration of inherent risk severity from a risk assessment.
- Consideration of level of uncertainty.
- Industry best-practice.

3. WASTE ROCK MANAGEMENT PLAN PROVISIONS

3.1 Objectives

This section of the WRMP identifies the legal provisions that Hastings proposes to implement to meet the EPA objective for terrestrial environmental quality:

> *To maintain the quality of land and soils so that environmental values are protected.*

Specific objectives of the WRMP are to ensure the effective characterisation, placement and configuration of waste rock, which meet closure objectives of being:

> Safe: The waste rock landforms will, on average, have radionuclide levels below the proposed threshold of <1Bq/g. Landforms are geotechnically stable and safe to access on foot.
>
> Stable: The waste rock landforms will have a durable, mixed fraction of waste rock exposed on the final surfaces such that erosion is minimised and the landforms are stable over the long-term.
>
> Non-polluting: The waste rock landforms will not discharge unacceptable AMD, neutral metalliferous or saline drainage to surface or groundwater.
>
> Ecologically sustainable: The landforms, to the extent that the stabilising substrate allows, will be revegetated with local provenance species and ecological communities which generally reflect the surrounding landscape.

3.2 Management actions and targets

Hastings has identified the management target/s used to measure performance and monitoring that will be undertaken in relation to the management actions to be implemented to mitigate risk. Hastings will review and revise management actions if the management targets are not met.

Management-based provisions (Table 6), identified through risk assessment, will be implemented to achieve the environmental objectives. These management actions focus the greatest management effort on proposal activities that have the highest likelihood of causing environmental impact or where the consequence of an impact is severe and likely to be irreversible (an inherent risk rating of moderate and above) in relation to waste rock landforms. These management actions were specifically developed to meet the environmental objective for terrestrial environmental quality, and will be implemented by Hastings for the Yangibana Rare Earths Project.

TABLE 5: MANAGEMENT-BASED PROVISIONS

EPA factor and objective Terrestrial Environmental Quality: *To maintain the quality of land and soils so that environmental values are protected.*
Outcome(s) • The waste rock landform surfaces will not exceed threshold levels of radiation above background levels. • Landforms will be geotechnically stable and safe to access on foot. • The waste rock landforms will have a durable, mixed fraction of waste rock exposed on the final surfaces such that erosion is minimised and the landforms are stable over the long-term. • The waste rock landforms will not discharge unacceptable AMD, neutral metalliferous or saline drainage to surface or groundwater. • The landforms, to the extent that the stabilising substrate allows, will be revegetated with local provenance species and ecological communities, which generally reflect the surrounding landscape.

Risks and impacts

Risk 1: Unacceptable concentration of elevated radionuclides greater than local background.
Inherent risk severity: Moderate
Level of certainty: Moderate
Impacts:

- Exposure to gamma radiation
- Exposure to radon and thoron gases

Risk 2: Failure to construct according to design including profiling specifications and depth of stable durable fresh waste rock.
Inherent risk severity: Moderate
Level of certainty: Moderate
Impacts:

- Immediate inundation of flora and fauna habitat within path of failure / erosion.
- Immediate inundation of ephemeral drainage channels down gradient of WRL.
- Potential downstream impacts from increased sediment load.
- WRLs slope failure / erosion results in unstable landform.

Risk 3: Harvest, storage and deployment of Plains Soil.
Inherent risk severity: Moderate
Level of certainty: High
Impacts:

- Unsuccessful rehabilitation of WRLs
- Dispersion of topsoil stockpiles

Management actions	Management targets	Monitoring	Reporting
Risk 1 Mitigation *Mining Schedule* to take into account waste rock movement and placement from source locations adjacent to ore body (i.e. waste rock most likely to have elevated levels of radionuclides). Areas of the WRLs with elevated radionuclide levels that exceed thresholds of 1Bq/g will be covered with benign rock materials.	No exceedance of radionuclide thresholds of the WRL surface at closure.	Re-profiled waste rock landform will be monitored for exceedances in radionuclide thresholds.	The Annual Environmental Report (AER; to DMP) will include records of monitoring, exceedances of radionuclide thresholds and mitigation actions.
Risk 2 Mitigation *Mining Schedule* to take into account waste rock movement and placement from weathered granite and saprolite lithologies i.e. walls and surfaces of WRL to be comprised of fresh granite.	No erosion of WRLs.	Audit of construction of each WRL against the respective WRL design specifications. Annual audit of mining schedule.	Audit outcomes will be included in the AER.

WRL to be constructed in accordance with the respective WRL design specifications as detailed in the *WRL Design Report*.		Routine inspections of waste rock landforms to ensure that slope angle, berm width and cover material are according to design. Inspections of WRL surfaces following heavy rainfall events to establish competent materials are performing as determined by the geotechnical assessment.	
Risk 3 Mitigation Plains soils will not be harvested in accordance with the *Land Clearing and Topsoil Stockpiling Work Instruction.* Topsoil delineation, harvesting and storage to be conducted in accordance with the *Land Clearing and Topsoil Stockpiling Work Instruction.* Rehabilitation of WRLs will occur in accordance with the *Mine Closure Plan*.	No use of Plain Soils as a growth media on rehabilitated areas.	Audit of implementation of *Land Clearing and Topsoil Stockpiling Work Instruction.*	Non-conformances with management actions will be reported in the AER.

3.3 Monitoring

The purpose of monitoring is to inform, through the management target/s, if the environmental objective is being achieved and when management actions will be reviewed and revised. This section summarises the monitoring program (Table 2-2) to determine whether (or not) management targets are achieved.

TABLE 3-2: MONITORING TO MEASURE THE EFFICACY OF MANAGEMENT ACTIONS AGAINST THE MANAGEMENT TARGET

Indicator	Method	Location	Frequency	Review of management actions
Management target 1: No exceedance of radionuclide thresholds of the WRL surface at closure.				
Exceedance of radionuclide thresholds	Gamma radiation levels as per methodology for baseline surveys	WRL final surfaces	At completion of re-profiling phase of final WRL surfaces	Three exceedances of radionuclide thresholds on any one WRL surface

Indicator	Method	Location	Frequency	Review of management actions
Management target 2: No erosion of WRLs.				
Construction of WRL in accordance with WRL design specifications	Independent audit of construction of each WRL against the respective WRL design specifications.	Each WRL	Annually audit, of respective WRL being constructed	Significant non-conformances, as determined by an independent auditor Erosion of WRL surfaces
	Routine inspections of waste rock landforms to ensure that slope angle, berm width and cover material are according to design.	Each WRL	Weekly inspection of respective WRL being constructed	Erosion of WRL surfaces
Fresh granite waste rock is performing as a competent material	Inspections of WRL surfaces following heavy rainfall events to establish competent materials are performing as determined by the geotechnical assessment.	Each WRL	Following each heavy rainfall event	Erosion of fresh granite waste rock
Incorrect placement of waste rock lithologies	Audit of mining schedule.	Each WRL in construction	Quarterly	Non-conformances.
Management target 3: No use of Plain Soils as a growth media on rehabilitated areas.				
Dispersion of topsoil stockpiles Poor rehabilitation success.	Auditing the implementation of the *Land Clearing and Topsoil Stockpiling Work Instruction.* i.e. topsoil mapping against areas where topsoil has been harvested, and topsoil storage.	Topsoil storage areas Ground disturbance areas	Construction	Identification of non-conformances.

3.4 Reporting

3.4.1 Annual Reporting

The Compliance Assessment Report will be submitted to the EPA Services, and will demonstrate compliance with the conditions of the Ministerial Statement issued under Part IV of the *Environmental Protection Act 1986* (WA).

Annual Environmental Reports shall be submitted to the Department of Mines, Industry Regulation and Safety (DMIRS) and Department of Water and Environmental Regulation (DWER), and will demonstrate compliance with licence conditions, relevant laws and responsible environmental management including QA/QC parameters, as described in section 4.7.

3.4.2 Reporting on Exceedance of the Management Target

In the event that the management target is exceeded (or not met), the CEO of the EPA Services will be notified within 7 days of identification of the exceedance.

4. WASTE ROCK LANDFORM SPECIFICATIONS

The following specifications are developed via information from the characterisation studies conducted to-date, erosion modelling and long term monitoring studies of revegetation in mining. The management implications are set forth based on domains, providing guidance on the four WRL.

4.1 Frasers and Yangibana North and South Waste Rock Landforms

The Frasers WRL will be constructed from NAF waste rock. The fresh granite waste rock dominates the waste inventory and hence it is expected that the outer surfaces of the waste rock will be primarily of armouring with low erodibility material. The landform will be water harvesting and concentration of runoff in drains or benches should be avoided. Hill soils will be preserved for respreading on the batter surfaces. Suitable subsoils will be spread on top surfaces. Soils should be spread at 100-150 mm and integrated into the waste rock with ripping or scarification. The maximum WRL height is 40 m with the average slope angle of 17.5 degrees, which is comprised of a 20-degree slope for the upper 50% of the slope height and a 15 degree slope for the lower 50% of the slope height (as per Figure 2).

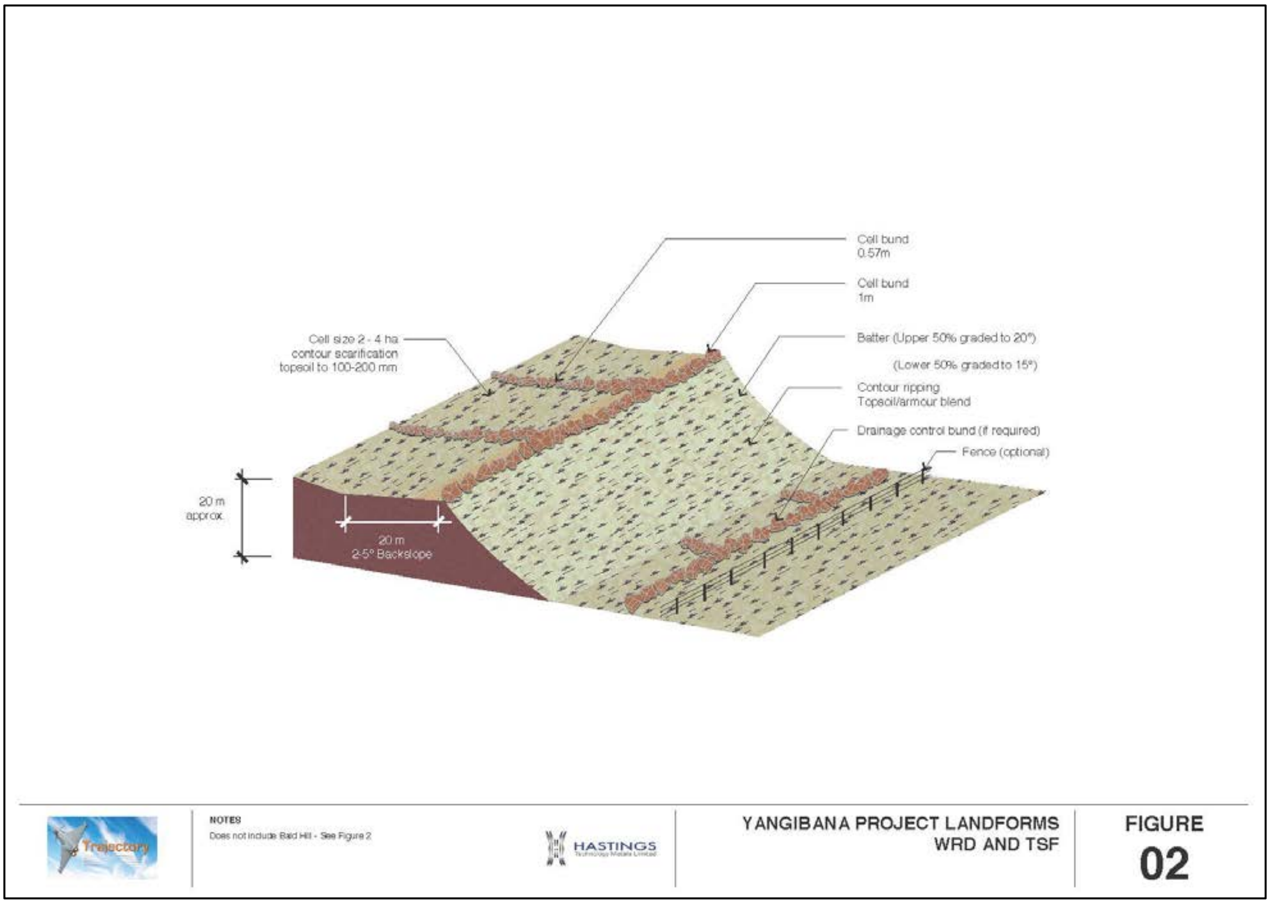


FIGURE 2: YANGIBANA NORTH AND WEST, AND FRASERS WASTE ROCK LANDFORM PROFILE

4.2 Bald Hill Waste Rock Landform

The Bald Hill WRL will be constructed from NAF waste rock. The volumes of ironstone and fresh granite waste rock are sufficient in the waste inventory to ensure that the outer surfaces of the waste rock will be armoured with low erodibility material. The mine schedule will be the primary document that responds to this requirement. The landform can be water harvesting. The inclusion of one inter batter berm will shorten the overall slope length of the batter in response to the probability of lower stability material being included in the substrate matrix. Hill soils will be preserved for respreading on the batter surfaces, whilst plain soils will not be harvested and stored as they are unsuitable for revegetation. Suitable subsoils, will be spread on top/flat surfaces to 100-150 mm and will be integrated into the waste rock with ripping or scarification. Figure 3 shows the typical landform specifications for Bald Hill WRL.

Bald Hill WRL is also one area where a 1:100 flood event will reach the reprofiled batter. In order to respond to flood events the 1:2000 or PMP flood event will be selected and an additional armour layer of durable coarse fresh waste rock will be placed to this level.

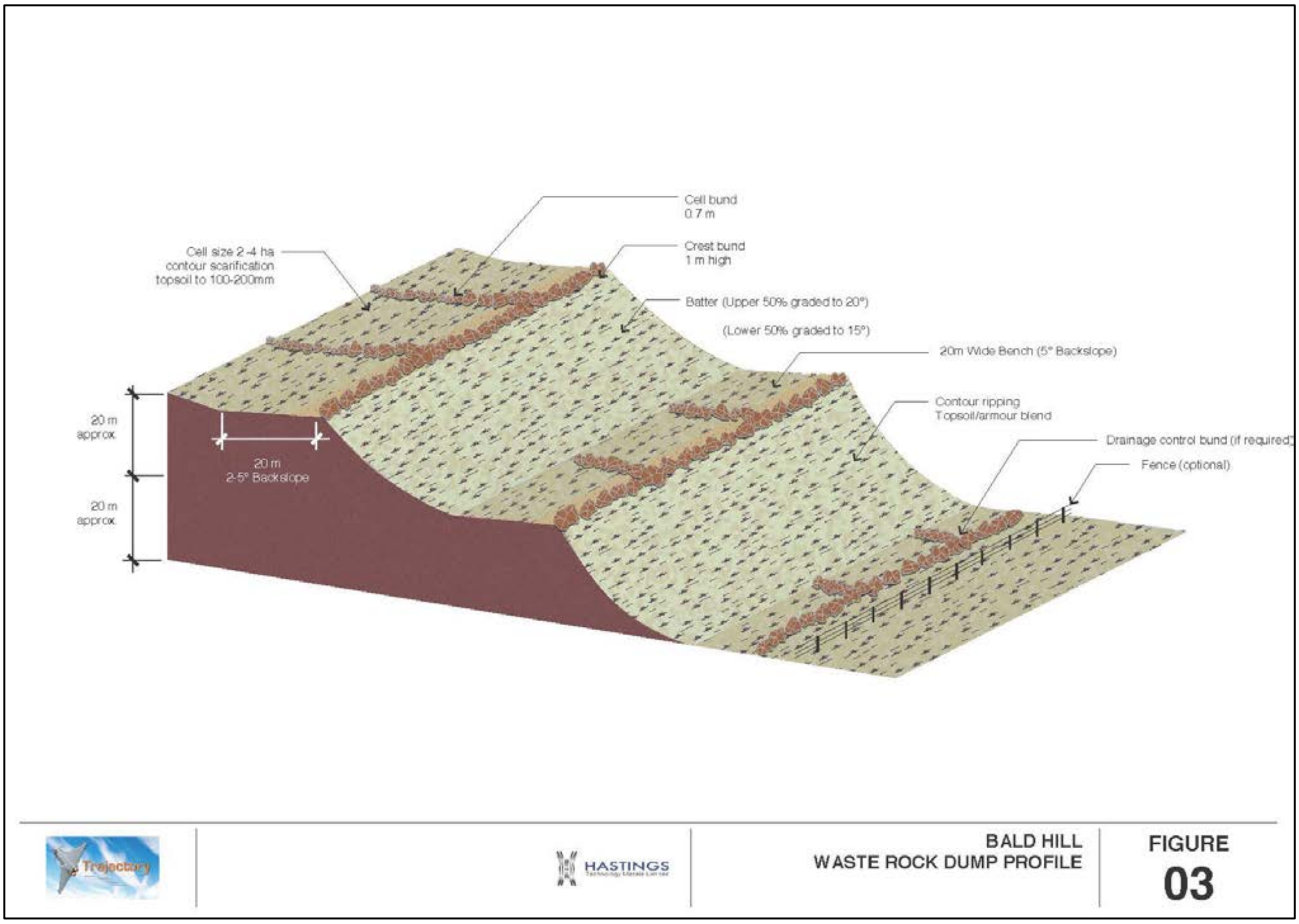


FIGURE 3: BALD HILL WASTE ROCK LANDFORM PROFILE

4.3 Benchmarking

4.3.1 Batters and Embankment

Extensive benchmarking has been undertaken to ensure that the designs being proposed here are consistent with good practice and have demonstrated, in field performance of up to 20 years, and to be durable. The key aggregate learning from extensive observations of WRLs is that concave slopes add value and that slopes of 17-18 degrees, where constituted with durable material and sheeted with growth media can stabilize and perform well where drainage run-on is restricted.

4.3.2 Drainage

As discussed above, benign materials, such as that comprising the WRL's can be "water harvesting", which is a very common approach throughout WA whereby as much water as possible is infiltrated or ponded to add to the store of plant available water.

4.3.3 Flood Armouring

Flood armouring will be constructed as a buttress against areas up to the elevation where 1:2000 or PMP flood events reach up the dump batter. It is important to note, as was the case with a study at Pardoo in the Pilbara, that the water reaching this elevation has little if any velocity and as such the armour is primarily required to stabilise the embankments during an ephemeral saturation episode. As such an additional 1m of durable, coarse fresh waste rock is specified.

4.4 Performance measures and monitoring

This study has determined that the primary design considerations and aspects, which can be adjusted via options for specific methodologies, will realise the desired design period of 1000 years without significant erosion or embankment failure. Specifications are set and objective performance measures are presented as being acceptable, and conform with the regulatory approach to criteria being SMART (specific, measurable, achievable, results-focused, and time- bound).

4.5 Specifications and performance measures

Table 6 sets out measures to demonstrate the performance of the landforms based on the design considerations and inputs that informed the design.

TABLE 6: SPECIFICATIONS AND PERFORMANCE MEASURES

Specification	Performance Measure
Maximum 40m lift height (provides conservatism against model)	A). Erosion features average <0.5m depth B). Erosion < 5 tonnes/ha/year after 3-year establishment period
Average slope angle 17.5 degrees	A and B above and post construction angle QA/QC survey
20 degrees in upper 50% of slope and 15 degrees in lower 50% of slope	A and B and post construction angle QA/QC survey
Hydrology measures to PMP estimate to limit run-on from top surface or berms to batters below. Nominal 1m crest bund.	C) Top and bench tolerances <.5m variability. Post construction angle QA/QC survey zero run-on from up gradient surfaces demonstrated via foot traverse inspection after three years
Cell bunding of 0.7m and perimeter bunding of 1m. Infiltration + Evapotranspiration > 100% of incident rainfall on flat surfaces	C and Permeameter testing demonstrates infiltration in as constructed and 3 years post revegetation
Berms for 20m high batters (Bald Hill) are 20m wide after reprofiling	Post construction angle and berm width QA/QC survey
0.5m high bunds at 10m offset from final toe position. Cross bunds installed where natural ground at gradient greater than 2 degrees	Post construction QA/QC survey
Rip lines ***on contour*** and minimum 0.5m deep and 1m wide at base of windrow	Post construction QA/QC survey

Specification	Performance Measure
40% of exposed surface comprised of durable fraction equal to or greater than gravel	Post reprofiling stability mapping QA/QC survey
Armouring subsoils spread at 150 – 200mm over reprofiled waste rock. 20% of final exposed surface after 3-year stabilisation period will be gravels/cobbles form the soil	Post reprofiling stability mapping QA/QC survey
Minimum 2m of in situ or imported durable armouring granite waste rock after final reprofiling	Post Construction validation survey
Provenance seed mix of grasses, shrubs and woody plants	25% plant cover after three-year establishment period
Provenance seed mix of grasses, shrubs and woody plants	50% of pre-mining diversity after three-year establishment period
Include introduction of biological matter and soil inoculants in revegetation process	Presence/absence of cryptograms in survey after three-year establishment period
Provenance seed mix of grasses, shrubs and woody plants	5% surface cover by humus layer after three-year establishment period

4.6 Progressive rehabilitation and trials

At each of the landforms, progressive rehabilitation trials shall be initiated at the earliest opportunity in accordance with the specifications to demonstrate performance criteria can be met.

However, for the 40m high WRL's the full height will need to be reached before slope completion because these cannot be progressively constructed. In the case of Bald Hills, it may be possible to close the lower lift while the upper lift is still under construction.

4.7 QA/QC and verification

When any surface is constructed such that it is prepared as the final closure surface and no further work is to be undertaken, the following parameters should be measured as QA/QC either using field based survey or remote sensing (as per Table 6):

- Total landform height above natural ground – minimum and maximum
- Batter angle – steepest, shallowest and average
- Top surface variability across top (<.5m desirable)
- Berm tolerance/fall laterally (<.5m desirable)
- Perimeter 1 m and cell bund 0.7m height confirmed
- Cross ripping adherence to contour
- Randomized samples of 1m square quadrat of % durable fraction exposed - substrate
- Depth of armouring cover (where specified)
- Depth of growth media cover
- Effective width of benches (where specified)
- Seed mix – diversity against baseline flora studies

This verification review shall be conducted for each tranche of closure works and included in the reporting process (Section 3.4).

5. ADAPTIVE MANAGEMENT AND REVIEW OF THE WRMP

5.1 Approach

Hastings will implement adaptive management to learn from the implementation of mitigation measures, monitoring and evaluation against management target/s, to more effectively meet the environmental objective. The following approach will be followed:

- Monitoring data will be evaluated and compared to baseline and reference site data on an annual basis (or more frequently in some instances) in a process of adaptive management to verify whether or not responses to the impact are the same or similar to predictions;
- Address evaluation of assumptions and uncertainties listed;
- Annual review of the risk assessment and revision of risk-based priorities on the basis of monitoring program information, incidences, verification of modelling outcomes and new information;
- Increased understanding of the ecological regime, best practice, new technologies;
- Revision through consideration of incidents and associated investigations, or when management actions are not as effective as predicted or as result of change management (e.g. construction versus operations phases);
- External changes during the life of the proposal (e.g. changes to the sensitivity of the key environmental factor, implementation of other activities in the area, etc.); and
- Annual review of this WRMP as a component of the continual improvement process within the mining management system.

5.2 Early response indicators, criteria and actions

Given there are no risks with either a low level of certainty or a high inherent risk rating, management and monitoring is considered sufficient and therefore early response indicators, criteria and actions have not been determined. Given that there are four WRLs that will be constructed sequentially, there will be learnings from the first WRL to be constructed. The success of the first WRL will determine whether or not early response indicators, criteria and actions should be identified for the other three WRLs. This will form a component of the continual improvement process of Hastings mine management system, this management plan and associated procedures.

5.3 Revision of management actions

Where the management target/s is not met or exceeded, Hastings will review and revise the risk assessment, review and revise management actions and identify additional management actions where necessary.

6. ROLES, RESPONSIBILITIES AND COMPETENCY

Roles and responsibilities for the execution of this WRMP are set out below in Table 7.

TABLE 7: WASTE ROCK MANAGEMENT ROLES AND RESPONSIBILITIES

Role	Responsibilities
Engineering design consultant	Ensure the closure specifications are considered in landform design and footprint.
General Manager	Ensure the resourcing of planning and scheduling, and the routine review of management documentation is resourced
Mining Manager	Ensure Mine Plan and Mine Schedule considers the need to place a deep cover of durable fresh waste rock on batter slopes. This will primarily be associated with Bald Hill, which will require a more detailed waste rock projection and placement schedule.
Mine Planner	Quarterly review of the mine plan with respect to volumes and timing for mine waste of different lithotypes to fulfil objectives of this Plan
Environmental Manager	Ensure waste rock and growth media inventories and forecasts are routinely checked and updated. Conduct or coordinate QA/QC on landform construction processes.

7. STAKEHOLDER CONSULTATION

Consistent with the EPA's expectations for this WRMP to align with the principles of EIA, Hastings consulted with key stakeholders while developing this document. Table 8 provides a summary of consultation that occurred. The comments raised during consultations with stakeholders were considered in the development of the Condition EMP. The following sections present stakeholders' comments and Hastings responses to those comments.

TABLE 8: STAKEHOLDERS CONSULTED, COMMENTS AND RESPONSES

Organisation(s)	Comments	Hastings response to comments
EPA Services: Response to relevant section of the Environmental Review Document.	Requirement in the ESD for consideration of waste rock management to be included as a component of the revised version of the Environmental Review Document.	Production of this EMP.
Department of Mines, Industry Regulation and Safety	A general discussion regarding the waste characterisation study outcomes and implications to landform design and closure.	No further action required.

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ABBREVIATIONS AND ACRONYMS

ANZECC	Australian and New Zealand Environment Conservation Council
AMD	Acid Mine Drainage
Bgj	Gleysolic Horizon
Bq	Becquerel (SI unit of radioactivity)
DITR	Department of Tourism and Industry
DMP	Department of Mines and Petroleum
EC	Electrical Conductivity
EPA	Environmental Protection Authority
ESP	Exchangeable Sodium Percentage
GARD	Global Acid Rock Drainage
ha	Hectares
ICMM	International Council on Mining and Metals
m	Metres
m^3	Cubic metres
mg/l	Milligrams per Litre
mm	Millimetres
mtpa	Million tonnes per annum
NAF	Non-Acid Forming
NEMP	National Environment Protection (Assessment of Site Contamination) Measure
NORM	Naturally occurring radioactive material
PAF	Potentially Acid Forming
pH	Hydrogen Potential
ppm	parts per million
PSD	particle size distribution

ROM	Run of Mine
TDS	Total Dissolved Solids
TSF	Tailings Storage Facility
TSS	Total suspended solids

GLOSSARY

Acidic and metalliferous drainage	AMD is inclusive of: acidic drainage metalliferous drainage (encompassing all metals/metalloids/non-metals which may be contaminants of concern) and saline materials and/or drainage.
Dispersive material	Dispersive materials are structurally unstable. They disperse into basic particles sand, silt and clay in fresh water.
Fibrous material	A mineral with an aspect ratio of 5:1 (http://www.dmp.wa.gov.au/documents/Guidelines/MSH_G_ ManagementOfFibrousMineralsInWaMiningOperations.pdf)
Kinetic Testing	Kinetic testing encompasses a group of tests where the acid generation characteristics of a sample are measured with respect to time.
Metalliferous drainage	Metalliferous drainage (encompassing all metals/metalloids/non-metals, which may be contaminants of concern)
Mineralogy	The mineral assemblage of the rock. There are several methods for determining this including X-Ray powder diffraction.
Silicate Material	A compound containing an anionic silicon compound.
Static geochemical testing	Static geochemical tests provide information on the bulk geochemical characteristics of material at a point in time. They do not provide information on rates of chemical processes or the rates of release of weathering products. Static tests include acid base accounting tests where measurements are made over a short fixed period of time.