



Environmental Performance

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FY23 Achievements

Freehold land set aside as an offset location for the protection and enhancement of Malleefowl habitat

Significant advancement of our Environmental Management System

Contribution of knowledge to industry on significant butterfly species

Environmental Snapshot

0

Number of materially adverse environmental incidents³⁸

5,938

Tonnes of waste sent for recycling (excluding waste rock and tailings)

0.00009

Freshwater Consumption Efficiency (ML/tonne ore processed)

2.15^M

Tonnes of tailings recycled for pastefill

38. Refer to disclosure on page 93 "Environmental Incident Summary"

Environmental Performance

Northern Star values the diverse environments in which we operate, and we are committed to ongoing demonstrated performance improvements in our stewardship of these important ecosystems.

Our Environmental Policy, Global Standards and Environmental Management System (EMS) provide a framework to facilitate our management and protection of the natural resources we are proud to be given access to.



Brendon McGillivray, Senior ESR Advisor inspecting rehabilitation at Kanowna Belle, Kalgoorlie Production Centre, Western Australia

Environmental Management System

Northern Star is committed to continually improving our EMS. We have been focussing on the integration and standardisation of EMS processes in our day-to-day Operations to ensure proactive environmental management occurs at all stages and across all areas of the business.

As highlighted in our FY22 Sustainability Report, a gap analysis was undertaken by external specialist consultants which has led to the development of an EMS Action Plan.

Figure 29 below highlights a number of the key EMS initiatives that are currently in progress within the business.

Figure 29 Northern Star EMS Initiatives in Progress



Biodiversity

Northern Star's Operations are located in a variety of natural environments, each with its own unique biodiversity values. Northern Star undertakes biodiversity surveys in and around all areas where disturbance is certain, and is committed to maintaining and conserving biodiversity values and applies the 'mitigation hierarchy' (avoid, minimise, rehabilitate, offset) when there is a potential for biodiversity impacts.

Northern Star has continued to implement programs to better understand and monitor specific biodiversity values within and surrounding its Operations.

For example, the annual Malleefowl monitoring program continued at Carosue Dam with additional environmental team members trained in identifying and monitoring Malleefowl nesting mounds. Monitoring efforts have also extended to a parcel of freehold land south of Coolgardie set aside for the protection and enhancement of Malleefowl habitat in accordance with federal approval conditions. A Conservation Covenant application has

been submitted for this parcel under the *Soil and Land Conservation Act 1945*.

In addition, monitoring in our Kalgoorlie Production Centre has continued to aid better understanding of the distribution of important butterfly species. Sensitivities surrounding these populations prevents further details being disclosed.



More on our website...

An overview of our approach to biodiversity assessment and protection is available on our Company website at [Environmental Stewardship](#).

Details of important species, habitats, and ecological communities within and around our Operations can be found in our Biodiversity Values on our website at [Biodiversity Values](#).

TNFD Alignment

The Taskforce on Nature-related Financial Disclosures (TNFD) provides a framework for identifying nature-related risks and opportunities.

During FY24 Northern Star plans to conduct a gap analysis between the TNFD required governance disclosures and its existing governance and risk management processes.

Northern Star also plans on completing a benchmarking exercise against industry peers to set baseline reference

points for its actions and disclosures in relation to nature-related risks and opportunities. This benchmarking is proposed to focus on gold mining assets.

The ESS Committee will receive a summary and report on the gap analysis and benchmarking exercise to allow Directors and senior managers to understand the relative maturity of disclosures by Northern Star and its peers, and to develop an action plan towards adopting the TNFD recommendations over the next few years.



More on our website...

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Reclamation & Closure Preparedness

Northern Star has closure and reclamation plans at each of our Operations, developed in accordance with our Reclamation and Closure Preparedness Global Standard and approved by regulators in each region.

Our Reclamation and Closure Preparedness Global Standard requires all sites to ensure they plan and budget for progressive rehabilitation of areas no longer required for operational purposes.

In FY23, there were limited areas available for rehabilitation compared to previous years. Our general approach to rehabilitation includes the stockpiling of topsoil and vegetation which also contains valuable seeds during clearing works.

Once areas are ready for rehabilitation, we contour landforms to appropriate angles to minimise the risk of erosion and ensure long term stability, undertake deep ripping to encourage water retention and increased plant establishment, then place our previously removed topsoil over the area and undertake seeding with species in accordance with approved closure plans.

Monitoring of rehabilitated areas occurs to determine progress against completion criteria and to ensure any

underperformance can be addressed through remedial actions such as removal of weeds, reseeding or infill planting. In FY23, for example, progressive rehabilitation of the Kanowna Belle TSF2 Cell 1 was undertaken. This involved topsoil application on the starter embankment with light contour ripping, and rock armouring and topsoil application on the Stage 1 embankment raise with deep contour ripping.

Our exploration team rehabilitates access tracks and drill pads within six months of completing works, as required by their approvals.

During FY23 Northern Star saw increase in our overall disturbance footprint as can be seen from Table 16 and Table 17 overleaf. This is attributed primarily to clearing for the expansion of tailings facilities at CDO, TBO and KCGM.

Table 16 Rehabilitation and Land Disturbance Across our Operations

Rehabilitation and Land Disturbance (ha)	FY23	FY22	FY21
Land cleared	716.6	579.6	-
Rehabilitation completed	66.6	140.3	126.1

Table 17 Rehabilitation and Land Disturbance Details for FY23 by Operation

Operation	Site	Land Cleared (ha)	Land Rehabilitation (ha)
Kalgoorlie	Carosue Dam Operations	205	25.3
	Kalgoorlie Operations	29.5	27.2
	KCGM Operations	381	-
Yandal	Jundee Operations	-	-
	Bronzewing Operations	95.6	-
	Thunderbox Operations	-	-
Pogo	Pogo Operations	5.61	0.2
	Tanami	0.2	13.8
		716.6	66.6

Western Australia Mining Rehabilitation Fund

Western Australia's Mining Rehabilitation Fund (MRF) commenced in 2013 as part of the WA Department of Mines, Industry Regulation and Safety's (DMIRS) strategy to encourage responsible development of resources and a commitment by the Mining Industry to environmental and community safety.

Northern Star collects and reports its mining-related disturbance and rehabilitation data to DMIRS annually and pays the required levy in to the MRF Fund.

In FY23, Northern Star reported a total of 10,884 ha of land disturbed and 2,440 ha of land under rehabilitation, with \$3.2M paid in to the MRF fund for FY23.

Of our Western Australian sites, KCGM has the greatest MRF liability as shown in Table 18. This is due to the scale of the Operation. Northern Star divested Paulsens and Western Tanami in June 2022; however, the Company still has tenements at Paulsens held under a Joint Venture, resulting in a small liability.

When planning projects, Northern Star tries to use existing disturbed areas as much as possible as part of the land disturbance mitigation hierarchy. This ensures we limit our clearing of new areas as much as possible. Whilst most of Northern Star's land rehabilitation is forecast occur when sites are at final closure, we look for opportunities along the way to rehabilitate areas that are not required for future use.

Table 18 MRF Rehabilitation Liability and Levy by Operation

Operation	Site	FY23 Rehabilitation Liability	FY23 MRF Levy	FY22 Rehabilitation Liability	FY22 MRF Levy
Kalgoorlie	Carosue Dam Operations	A\$ 47,619,929	472,376	45,470,058	449,927
	Kalgoorlie Operations	A\$ 38,702,463	384,079	38,602,625	382,830
	KCGM Operations	A\$ 129,000,450	1,282,097	125,009,258	1,241,203
Yandal	Jundee Operations	A\$ 31,508,069	313,177	41,330,366	409,217
	Bronzewing Operations	A\$ 30,642,839	297,870	28,939,488	288,047
	Thunderbox Operations	A\$ 47,111,560	465,075	47,907,245	472,759
Pogo	Pogo Operations	A\$ N/A	N/A	N/A	N/A
Exploration	Pulsens	A\$ 2,756	-	2,490,946	24,112
	Tanami	A\$ -	-	7,527,668	74,818
		\$324,588,066	\$3,214,673	\$337,277,654	\$3,342,913

Waste Management


Our efforts to minimise and manage waste across our Operations are guided by our Waste Management Global Standard, which places a focus on reducing, reusing and recycling as priorities for waste management. Treatment and disposal of waste products into landfill should be a final option considered.

Wastes that cannot be reused or recycled are disposed of in onsite landfill facilities or sent to offsite landfill and incineration facilities, dependent on the type of waste.

Wastes are transported from our sites to licenced facilities and waste management service providers via approved

freight companies with controlled waste licences as required.

During FY23 Northern Star saw an overall increase in materials recycled, with significant volumes of scrap metal recycled at Pogo.

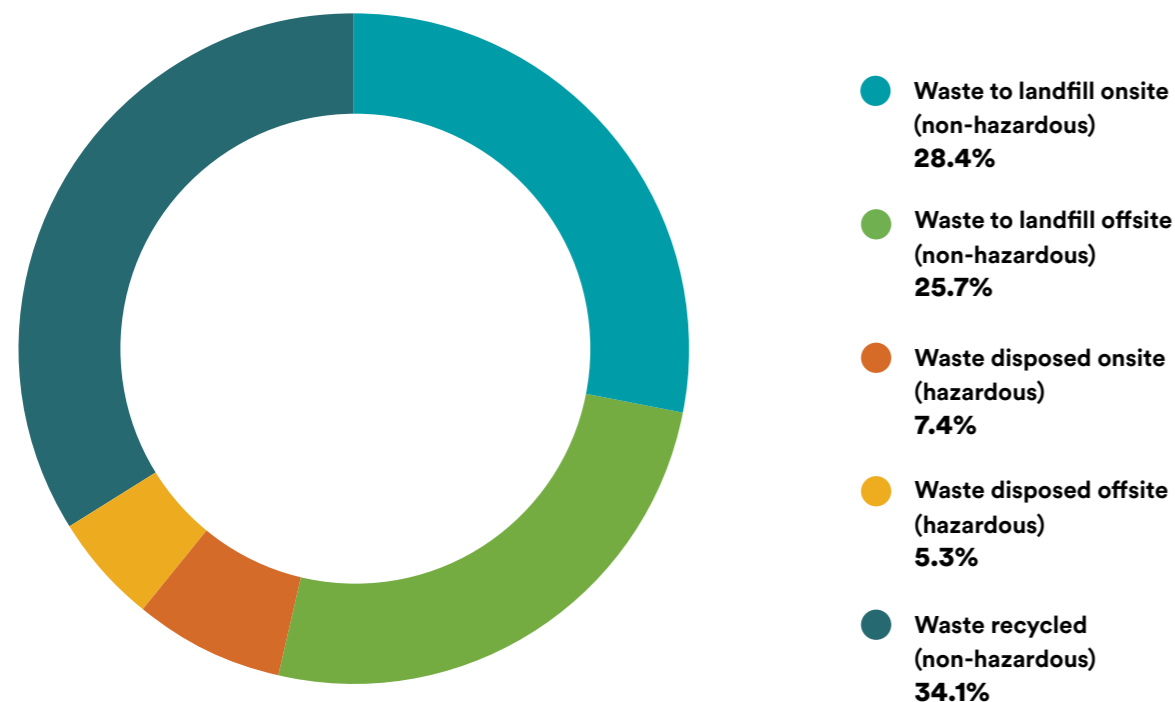


More on our website...
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Table 19 Key Recyclables

Key recyclables (tonnes)	FY23	FY22	FY21
Batteries	37	37	35
Co-mingled waste ³⁹	256	257	275
General waste	65	59	38
Scrap metal	3,856	2,949	3,389
Toner cartridges	-	-	4
Tyres	-	160	150
Waste oil	1,724	1,669	1,363
	5,938	5,131	5,254

Figure 30 Distribution of Waste (Excluding Waste Rock and Tailings)



39. Co-mingled wastes are items comprising paper, cardboard, aluminium, steel, glass and rigid plastics that can be placed together in a single recycling bin, based on the capability of the receiving facility.

Waste Rock

Waste rock is material mined from our Operations that does not contain gold at economic levels. This material must be disposed of to waste rock landforms or backfilled into open pits or underground voids.

Northern Star undertakes waste optimisation and reduction programs continuously for both our existing mining Operations as well as any proposed new mines.

While the tonnes of waste rock produced per annum may appear to be large, they are already significantly reduced by our waste optimisation programs.

Volumes of waste generated and placed in waste dumps is reduced through a number of different ways including

application of optimal mining methodologies, underground versus open pit mining, waste rock recycling and in-pit waste rehandling.

Where generation of waste rock is unavoidable, backfilling is Northern Star's first preference as it eliminates the need to create permanent landforms in the environment, while decreasing safety risks associated with open voids. However, backfilling relies on availability and distance to barren voids and is not always practical.

FY23 saw an increase in the total amount of waste rock produced as a result of increased material movement at KCGM, and commencement of mining at Orelia (Bronzewing) and Otto Bore (Thunderbox Operations).

Table 20 Waste Rock Production

Production Centre	FY23	FY22	FY21
Kalgoorlie	86,553,507	70,816,917	74,470,505
Yandal	30,613,636	19,803,016	23,297,362
Pogo	763,561	769,686	834,972
Waste Rock sent to waste dumps (t)	117,930,704	91,389,619	98,602,839
Kalgoorlie	1,422,218	3,895,509	4,475,126
Yandal	210,343	881,295	2,074,889
Pogo	-	-	-
Waste rock recycled for backfill (t)	1,632,561	4,776,804	6,550,015
Kalgoorlie	87,975,724	74,712,426	78,945,630
Yandal	30,823,979	20,684,311	25,372,251
Pogo	763,561	769,686	834,972
Total waste rock generated (t)	119,563,264	96,166,423	105,152,853

Hazardous Materials

Mineral processing and mining practices can result in hazardous materials being produced at our Operations. Site-specific management plans and procedures outline how each material is to be managed to ensure compliance with relevant regulations and to reduce the risk of causing environmental harm. Training is conducted to ensure staff involved in hazardous material management are competent to undertake the required tasks.

Hazardous materials are generated through our mining and mineral processing practices. For the purposes of this Report, the following waste streams are included:

- Naturally occurring arsenic trioxide
- Mercury
- Batteries
- Waste hydrocarbons
- Greases
- Hydrocarbon contaminated waste

Tailings

Northern Star deposits tailings material into four different types of tailings storage facilities (TSF's), with all remaining compliant with local, state, and federal regulations and guidelines in their respective jurisdictions throughout FY23.

FY23 saw an increase in the total amount of tailings produced, resulting from an increase in material processing.

Tailings Recycling Opportunities

Northern Star has continued to seek opportunities across our business in FY23 to optimise waste recycling where this can be achieved in accordance with regulations, guidelines and permits.

As we develop our underground Operations, the use of pastefill, or cemented paste backfill, has continued to be an opportunity for us to recycle a portion of our tailings generated.

The pastefill, which is broadly a combination of thickened fine grained mine tailings plus a binding agent such as cement, is created at our onsite pastefill plants and pumped through special infrastructure into selected areas of our underground workings.

The pastefill is used to backfill open voids, and once cured can provide additional stability to underground workings.

By design, the majority of tailings are discharged into our purpose built TSF's, but in FY23 we diverted 2.15M tonnes of tailings into pastefill which was 8% of our overall tailings production for the year, and an increase of the volume recycled by 70% from FY22.

Global Industry Standard on Tailings Management

Whilst managing the risks associated with TSFs is our priority, we continue to assess the additional benefits associated with the administrative cost of achieving conformity with the Global Industry Standard on Tailings Management (GISTM).

Northern Star's tailings storage facilities have been the subject of third-party evaluations and gap analyses in the context of GISTM compliance.

Assessment of the risks, benefits and costs, and the necessary steps and timeframe involved to achieve conformity and to maintain ongoing annual compliance with GISTM is a complex process, given that the GISTM contains six topic areas, with 15 Principles consisting of 77 auditable requirements.

Northern Star intends to align with the GISTM over time, including ensuring that all new tailings storage facilities align to GISTM on a risk-based approach, and use the principles moving forward, making decisions on compliance on a case by case basis. Northern Star considers that its current performance-based risk-informed approach is consistent with best practice standards and is appropriate for Northern Star's operations.



More on our website...

An overview of our tailings management, deposition types, and facility details are available on our Company website at [Environmental Stewardship](#)

Details of our current tailings storage facilities can be found at: [FY23 Tailings Storage Summary](#)



Tailings Storage Facility 3 embankment and discharge pipes at Jundee, Yandal Production Centre, Western Australia

Table 21 Tailings Production and Recycling

Production Centre	FY23	FY22	FY21
Kalgoorlie	18,022,507	19,158,977	24,532,649
Yandal	6,190,053	5,458,936	8,380,467
Pogo	853,753	719,362	846,751
Tailings sent to TSF's (t)	25,066,312	25,337,275	33,759,867
Kalgoorlie	939,774	634,544	602,369
Yandal	833,096	311,818	20,396
Pogo	375,040	314,640	107,729
Tailings recycled for pastefill (t)	2,147,910	1,261,002	730,494
Kalgoorlie	18,962,280	19,793,521	25,135,018
Yandal	7,023,149	5,770,754	8,400,863
Pogo	1,228,793	1,034,002	954,480
Total tailings generated (t)	27,214,222	26,598,277	34,490,361

Table 22 Tailings Composition

Tailings Composition (tonnes)	FY23	FY22	FY21
Non-Cyanide containing tailings	1,228,793	1,034,002	954,480
Cyanide containing tailings	25,985,430	25,564,275	33,535,881



Andrew Bell, Closure Works Supervisor and Darcy Chaplin, Production Employee - Shovel, KCGM, Kalgoorlie Production Centre, Western Australia

Water Stewardship

Access to water is a fundamental human right and is critical to our Operations. Most of our sites exist in areas with high baseline water stress, and we are committed to using and managing this valuable resource in a sustainable way to ensure shared users and the environment are not adversely impacted.

Total water withdrawals have increased in FY23 from FY22 due to increased production. Water intensity has also increased slightly, across the business. Key water uses across our Operations are processing and beneficiation purposes, as well as dust suppression. Water is also treated for use in our camps and offices.

Key water conservation and reduction projects across our Operations in FY23 included the commissioning of the tailings thickener at Thunderbox and the installation of automatic vaporiser change-over equipment for de-icing liquid oxygen plant vaporisers at the Gidji Processing Plant. Several initiatives at KCGM continue to contribute to our reduced use of fresh water in Kalgoorlie.


Northern Star's Global Water Standard requires all sites to ensure water-related risks are considered as part of the site risk assessment process. These risk assessments identify key water stakeholders, water resources at risk of water stress and whether the water source is within environmentally significant areas. Sites develop detailed water management plans guided by the results of the risk assessment.

Water abstraction, use and discharge is highly regulated and, as such, significant monitoring is undertaken to ensure volumes and discharges are within limits

Monitoring also allows us to ensure all water-related infrastructure complies with licence requirements and is maintained to minimise the risk of unintended spills or discharges to the environment.

In Western Australia, all Northern Star's borefields are operated in accordance with Department of Water and Environmental Regulation (DWER) endorsed Groundwater Operating Strategies.

In Alaska, our Pogo Operations are required to operate in accordance with the Alaskan Department of Environmental Conservation (ADEC) Alaska Pollutant Discharge Elimination System Permit, which allows for the discharge of treated water into the Goodpaster River. In addition, Pogo must adhere to the Storm Water Pollution Prevention Plan which manages the risk of polluted stormwater entering creeks and the Goodpaster River.







More on our website...
An overview of our water management, conservation, and stewardship details are available on our Company website at [Environmental Stewardship](#)



Photo taken by employee Miranda McCarthy of the Gravel pond, pumps and mine water treatment plant at Pogo Operations, Alaska

Table 23 Water Stress

Operational Centre Water Data (ML)	Baseline water stress level ⁴⁰	Water recycled or reused	Total freshwater withdrawal	Total other water withdrawal	Total discharge	Net total consumption
Kalgoorlie		11,212	1,326	13,759	-	15,085
Yandal		2,334	333	7,463	-	7,796
Pogo		493	28,402	1,240	27,717	1,926
Exploration		-	-	7	-	7
Total		14,039	30,061	22,470	27,717	24,814

Key  High  Medium  Low

Table 24 Net Total Water Consumption

Net Total Water Consumption (ML)	FY23	FY22	FY21
Kalgoorlie	15,085	11,600	11,172
Yandal	7,796	6,549	6,523
Pogo	1,926	814	447
Exploration	7	75	58
Total	24,814	19,039	18,200
Net Total Water Consumption Efficiency (ML/t ore processed)	0.0009	0.0007	0.0007

Table 25 Freshwater Consumption

Freshwater Consumption (ML)	FY23	FY22	FY21
Kalgoorlie	1,326	1,578	1,849
Yandal	333	252	227
Pogo	685	-	-
Exploration	-	10	34
Total	2,344	1,840	2,110
Freshwater Consumption Efficiency (ML/t ore processed)	0.00009	0.00007	0.00008

40. Baseline water stress measures the ratio of total water withdrawals to available renewable surface and groundwater supplies. Water withdrawals include domestic, industrial, irrigation, and livestock consumptive and non-consumptive uses. Available renewable water supplies include the impact of upstream consumptive water users and large dams on downstream water availability. Higher stress level values indicate more competition among users. Information on baseline water stress levels is available from the World Resources Institute – Aqueduct Water Risk Atlas: <https://www.wri.org/applications/aqueduct/water-risk-atlas>

Air Quality


Northern Star monitors and manages key air quality metrics across our Operations and local communities located adjacent to our Operations.

Air quality is typically influenced by industrial emissions, cars, planes, household emissions including wood fired heaters, bushfires and controlled burnoffs, dust from unsealed roads and construction development, degraded lands and many other sources.

Air quality results are reported to the Australian and United States Governments via several mechanisms:

- Australian data is reported via the National Pollutant Inventory⁴¹

- Alaskan data is reported via the Toxics Release Inventory⁴²
- The air quality metrics disclosed in this Report are calculated in accordance with the Australian Government's National Pollutant Inventory methodology to ensure consistency in calculation methods across regions.



More on our website...
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Table 26 Measured Air Emissions

Air Total Emissions (tonne)	FY23	FY22	FY21
Carbon monoxide	3,479	3,436	2,767
Oxides of nitrogen	13,207	11,456	9,859
Oxides of sulphur	20,928	26,162	21,197
Particulate matter <10um (total)	15,762	12,976	10,892
Mercury	0.01	0.02	0.009
Lead	0.2	0.2	0.2
Volatile organic compounds	545	433	360

41. www.npi.gov.au
42. www.epa.gov/trinationalanalysis



Brendon McGillivray, Senior ESR Advisor at the Sonic Detection and Ranging (SODAR) wind profiler station, Kanowna Belle, Kalgoorlie Production Centre, Western Australia

Environmental Incidents Summary

Northern Star has an internal system for recording environmental incidents, including documenting incident details and corrective actions to be undertaken. The system enables automatic reminders to be sent to personnel responsible for implementing the corrective actions.

Most incidents relate to spills both within and outside of primary containment infrastructure, these account for 60% of incidents. All spills are cleaned up immediately with any hydrocarbons or contaminated materials disposed of in an appropriate and licensed landfill facility.

Northern Star's reporting standards require all incidents to be reported, whether they cause actual harm to the environment or not. In this way, we are able to identify trends that could point to a potential for larger incidents. Where trends appear in our data, actions are taken to explore more closely what is leading to these.

Once causes have been identified, relevant environmental personnel are involved in developing an appropriate response.

Following an inspection during 2019 by the United States Environmental Protection Agency (EPA) at our Pogo Operations, Northern Star received notification in 2022 that several waste streams at the assay laboratory in the Pogo processing plant were not determined, registered and managed according to *Resource Conservation and Recovery Act (RCRA)* technical requirements.

These breaches did not cause environmental harm but related to improperly storing, treating and disposing of hazardous materials at Pogo. The breach of RCRA resulted in the Company paying a financial settlement of US\$600,000 to the EPA in October 2022.

Key Pogo Environmental staff have also received direct training from and conducted a RCRA Program review with the assistance of a specialist consultant and they continue to work with the consultant on evaluating waste streams at the Pogo Operations.

Figure 31 FY23 Environmental Incidents by Consequences

