

# Mining Management Plan Exploration Activities

## Northern Territory of Australia – Mining Management Act

It is recommended that the Mining Management Plan is completed in conjunction with the user guide, available on the [Northern Territory Government website](#).

### Section 1 – Project Details

<b>Project Name</b> Provide new or existing project name	Borroloola Project
<b>Authorisation Number</b> Insert existing authorisation number, where applicable	0234-04 Variation 5
<b>Operator Name</b> Use ASIC-ABR registered name (if a company), or name of the applicant	Sandfire Resources NL
<b>Location and Access Details</b> Include brief description of the location, access details, and distance to nearest town or community	<p>The Borroloola Project is centred about 660 km southeast of Darwin in the “Gulf Country” of the Northern Territory. On the eastern boundary are the township of Borroloola, the McArthur River (HYC) Mine and its loading facility at Bing Bong on the Gulf of Carpentaria. To the south is Cape Crawford and to the northwest are Nathan River and Lorella Springs Stations (Figure 1-1).</p> <p>Access to the Project area is good with sealed roads from Darwin, by travelling about 590 km southwards along the Stuart Highway to Hi-Way Inn and then 270km eastwards along Carpentaria Highway to Cape Crawford. The unsealed Cape Crawford - Nathan River – Roper Bar Road runs south-north across the project area, and then continues west along the Roper Highway to meet the Stuart Highway near Mataranka, providing an alternate access route during the dry season. The unsealed Ryan’s Bend Road crosses the southern part of the Project from west to east.</p> <p>The Cape Crawford - Nathan River – Roper Bar Road provides access to Lorella Springs Pastoral Lease on which the Lorella Springs Wilderness Camping and Caravan Park (LSWP) and the former Sandfire Exploration base camp are located. During 2010, the road into Lorella Springs was substantially upgraded resulting in improved access to the central parts of the Project area. However, access deteriorates significantly in the central and northern parts of the Project area where multiple creek crossings need to be navigated. Each wet season results in substantial damage to most creek crossings which need to be re-established.</p>

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<b>Target Commodity Details</b> Include target commodities (i.e. gold, copper etc)	Copper, Lead, Zinc, Manganese, Iron Ore
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<b>Mining Activities</b> Summarise the mining activities (exploration) to be the subject of the proposed Authorisation or Variation	The proposed low-impact exploration activities would be non-ground disturbing geological reconnaissance mapping and surface rock chip sampling on EL26555. Disturbance would be calculated as attributable to campsites and access tracks.
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<b>Proposed Schedule</b> Include start and finish dates of ground disturbing work	The proposed low-impact exploration activities would be carried out between 1 May and 30 November 2020.
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### Mining Interest and Land Ownership

List the mining interests (titles), the title holder name/s, the title expiry date and the Property name/Land holder (e.g. pastoralist or Aboriginal land trust) for each title (Figure 1-2).

Title Number	Title Holder	Expiry Date	Property Name or Land Holder
EL26555	Sandfire Resources NL	10/09/2020	Limmen NT Portion 819 CLP 346 St Vidgeons Area A Limmen National Park
EL26831	Sandfire Resources NL	08/06/2019	McArthur River Station PPL 1051 Gurdanji Aboriginal Corporation Estate W Lagoon Aboriginal Corporation Estate Limmen National Park
EL26833	Sandfire Resources NL	08/06/2019	Lorella Springs PL 757 McArthur River Station PPL 1051 No Title (ex-Billengarra PL1069) Limmen National Park
EL26835	Sandfire Resources NL	08/06/2019	Lorella Springs PL 757
EL26836	Sandfire Resources NL	08/06/2019	Lorella Springs PL 757 Wurrunburru Association Inc. CLP 429
EL26938	Sandfire Resources NL	08/06/2021	No Title (ex-Billengarra PL1069) Limmen National Park
EL26939	Sandfire Resources NL	08/06/2021	Lorella Springs PL 757 No Title (ex-Nathan River PL756) Limmen National Park
EL28508	Sandfire Resources NL	19/07/2019	McArthur River Station PPL 1051
EL28656	Sandfire Resources NL	26/10/2019	McArthur River Station PPL 1051 Leila Creek Estate No Title (ex-Billengarra PL1069) Limmen National Park
EL28658	Sandfire Resources NL	26/10/2021	No Title (ex-Billengarra PL1069) Limmen National Park
EL29022	Sandfire Resources NL	24/07/2018	Lorella Springs PL 757
EL30048	Sandfire Resources NL	02/06/2019	Lorella Springs PL 757 Wurrunburru Association Inc. CLP 429
EL30137	Sandfire Resources NL	08/06/2019	Lorella Springs PL 757

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Title Number	Title Holder	Expiry Date	Property Name or Land Holder
EL30152	Sandfire Resources NL	08/06/2019	Lorella Springs PL 757
EL30156	Sandfire Resources NL	08/06/2019	McArthur River Station PPL 1051 Limmen National Park
EL30157	Sandfire Resources NL	08/06/2019	No Title (ex-Nathan River PL756) Limmen National Park
EL30158	Sandfire Resources NL	08/06/2019	Lorella Springs PL 757 No Title (ex-Nathan River PL756) Wurrunburru Association Inc. CLP 429 Limmen National Park
EL30305	Sandfire Resources NL	08/06/2020	Lorella Springs PL 757 No Title (ex-Billengarra PL1069) Limmen National Park
MLN624	Sandfire Resources NL	31/12/2031	No Title (ex-Billengarra PL1069) Limmen National Park

Delete or add rows as required

## Organisational Structure

Position Title	Name
Managing Director and Chief Executive Officer	<b>Mr Karl M Simich</b>
General Manager Geology	<b>Mr Shannan Bamforth</b>
Exploration Manager – Regional	<b>Mr Damien Stephens</b>
Project Geologists	<b>Ms Laura Spelbrink, Ms Kristyn Adamczyk, Mr Matt Porter</b>
Principal Environmental Scientist	<b>Mrs Claire Tolley</b>
Radiation Safety Officer	<b>Ms Samantha Masters</b>
Compliance Officer	<b>Mr Allan Wynne</b>
Administration Geologist	<b>Ms Hannah Wallace</b>

Delete or add rows for various position titles as required

## Section 2 – Operator Self-Assessment of the Environmental Risk

The purpose of this self-assessment is to ensure Operators complete a project risk assessment of potential environmental impacts and are aware of other legislative obligations from various Agencies. As a result of this self-assessment, further information may be required in the form of a management plan to enable full assessment of the MMP. If you have any queries please contact a Mining Officer prior to submitting the MMP. Useful resources to assist with this self-assessment are provided in the User Guide.

### Environmental considerations

ASSESSMENT ASPECT	YES or NO	ACTIONS REQUIRED (if answered YES)	APPENDED INFORMATION (Evidence of consultation with DENR and/or management plan)
<b>Step 1:</b> Are there any threatened flora and fauna species or habitats of significance that may occur in the proposed work area?	YES	It is likely a threatened species will show up in most reports. Therefore, the Operator must undertake a likelihood analysis, which looks at the likelihood of the species or its habitat occurring at or near the site. If the analysis results in a high likelihood, then a “Significant Impact Assessment” should be undertaken, which may require consultation with the DENR – Flora and Fauna Division. The DENR may recommend a Biodiversity Management Plan – this must be developed and attached to the MMP.	A search on NRMaps has indicated no threatened significant flora species are recorded on EL26555. Four sites of Native Flora are recorded, (Figure 1-3). A desktop review of Fauna and Flora including weeds of the Borroloola Project region was undertaken during 2012 by EcOz Environmental and the Significant Species ID Booklet 2012 & Addendum 2014 88p Guide was prepared in handbook form to include with induction of field staff (Attachments 2-1A & 2-1B).
<b>Step 2:</b> Are there any known declared weeds within the proposed work area?	NO	Under the <i>Weeds Management Act</i> declared weeds are required to be eliminated or controlled by the owner and occupier of land. Seek advice from DENR – Weeds Management to ensure management measures are appropriate for the level of activity proposed and attach a Weed Management Plan (if required).	A search on NRMaps has indicated no weed species are recorded on EL26555 (Figure 1-3)
<b>Step 3:</b> Will you be using water from bores or other sources for the operation?	NO	<i>Note the Government is proposing to amend the exemption of water licencing under the Water Act for mining activities, including exploration. This section will be updated in light of any changes in the future.</i>	Reconnaissance field exploration vehicles will bring in water as and when required.

## Environmental assessment and cultural considerations

ASSESSMENT ASPECT	YES or NO	MANAGEMENT REQUIREMENTS	APPENDED INFORMATION
<b>Step 4:</b> Is your project likely to have a significant impact on the environment?	NO	Refer to the NTEPA Environmental Factors and Objectives Guideline.	
<b>Step 5:</b> Are there Aboriginal sacred sites in the Project area?	TBA	Sacred Sites are protected under the NT <i>Aboriginal Sacred Sites Act</i> and administered by the Aboriginal Areas Protection Authority (AAPA). It is recommended that advice be sought from AAPA in relation to sacred site protection.	Borroloola Project EL26555 AAPA Online Request for Information on Recorded and Registered Heritage Sites - Summary and Map (Attachment 2-2).
<b>Step 6:</b> Are there archaeological and heritage sites in the Project area?	NO	Heritage and archaeology sites are protected in the NT. NT Heritage Branch of the Department of Natural Resources and Environment (DENR) administers the <i>Heritage Act</i> . Seek advice in relation to protection of heritage and archaeological sites.	

## Section 3 – Amendments

As per Section 41(3) of the *Mining Management Act*, an MMP reviewed and amended under Section 41(1)(a) is to clearly identify amendments made.

Section	Amendment
General	MMP Report follows the 11 January 2019 Structure Guide
2.1 Mining Interest and Land Ownership	<p>Mining Interest and Land Ownership Table updated to indicate the title holder name/s, the title expiry date and the Property name/Land holder (e.g. pastoralist or Aboriginal land trust) for each title at 13 January 2020. The Nomination of an Operator and Application for Variation of an Authorisation Forms have been executed and lodged with DPIR to reflect the surrender of seven Exploration Licenses since the approval of Authorisation 0234-04 Variation 5 on 4 January 2017:</p> <ul style="list-style-type: none"> <li>• Surrender of EL30098 (12 October 2017), forms executed 4 May 2018 - 24 granted Exploration Licenses and one Mining Lease retained.</li> <li>• Surrender of EL30302 (9 July 2018), forms executed 3 September 2018 - 23 granted Exploration Licenses, one Mining Lease retained.</li> <li>• Surrender of EL28534, EL28540 and EL28541 (11 September 2018), forms executed 10 October 2018 -20 granted Exploration Licenses and one Mining Lease retained.</li> <li>• Surrender of EL28657 and EL28659 (5 November 2018), forms executed on 5 September 2019 - 18 granted Exploration Licenses and one Mining Lease retained.</li> </ul> <p>Eleven granted and two application Exploration Licenses that were previously held jointly with Minerals and Metals Group Limited (MMG), were explored under MMP Authorisation 0814-01. An Application for a Certificate of Closure authorised by MMG on 25 May and by Sandfire on 27 May 2019 was submitted to DPIR and accepted on 17 June 2019. Following the transfer of MMG's interest in these titles, Sandfire is now the registered holder of 100% interest in the tenements as advised by DPIR on 17 June 2019.</p>
4.5 Induction and Training	<p>Section 4.5 of the MMP provides a brief overview of the induction process, however does not include detail regarding the project-specific training topics.</p> <p>The Borroloola Site Induction was used to induct Sandfire staff, and contract driller's personnel. The topics include Safety Policy, Duty of Care, Incidents and Hazard Reporting, Standard Operating Procedures - including Personal Health and Hygiene, Company Policies and Standards - including Fitness for Work, Hazards, Stakeholders, Environment, Aboriginal Heritage, Camp Facilities and Rules and Contacts during the Induction. Environmental issues covered include Fauna - Birds, Mammals, and Reptiles, and Flora – weeds.</p>
4.6 Identification of Environmental Aspects and Impacts	<p>Provide detail of soil remediation process, including where remediation will be undertaken, treatment and monitoring processes, and how soil will be utilized once deemed remediated.</p> <p>Table 7: Identification of Environmental Aspects and Impacts</p> <p>The <i>Soil Conservation and Land Utilization Act</i> legislation may be relevant to this project.</p> <p>Contaminated soils will be either removed to a facility in Katherine NT approved for disposal of hydrocarbon wastes, or remediated on site for minor spills. Topsoil will be re-spread as soon as possible after cessation of drilling.</p>

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Section	Amendment
4.7 Emergency Procedures and Incident Reporting	<p><i>This matrix has been reviewed against the DME Advisory #AT8-006 Environmental Incident Reporting Guideline January 2014 (SAN00211397-001) in which the Table, Guide to Severity Classification, identifies the criteria to be used to assess the severity of an environmental incident, rated 1 to 4.</i></p> <p>All environmental incidents in accordance with Section 29 of the Mining Management Act (MMA).</p>
4.8 Environmental Audits and Inspections	<p>Monitoring of the Health and Safety Management Plan</p> <p><i>Exploration will conduct one internal audit of an exploration site and one external audit of an exploration site in 2014.</i></p> <p>When will the next environmental audits and inspections be conducted? Sandfire Resources currently has no exploration Staff at its Borrooloola Project to complete an internal audit. DPIR Environment staff completed an external audit of rehabilitation of EL26555 RC Drilling activities in 2015 (CIC).</p>
4.9 Environmental Performance Reporting	<p>Invasive Species Management</p> <p>Has the vehicle wash down area been monitored for weed growth in the past two years, given the operator has not conducted any exploration in the area?</p> <p>The vehicle wash down area is part of the Exploration Base Camp which is used by Lorella Springs Pastoral Lease following the agreement with the manager in May 2016 (CIC).</p>

Delete or add rows as required

## Section 4 – Activities Proposed

Mining Interests (i.e. titles)	EL26555	EL30137
Number and type of proposed drill holes	N/A	N/A
Maximum depth of proposed holes (m)	N/A	N/A
Number and size of drill pads to be cleared (Length: m x Width: m)	N/A	N/A
Total area of drill pads to be cleared (ha)	N/A	N/A
Is drilling likely to encounter groundwater? (Y, N, unsure)	N/A	N/A
Number of costeans (Length: m x Width: m x Depth: m)	N/A	N/A
Number of bulk sample pits	N/A	N/A
Total bulk sample (tonnes) (Length: m x Width: m x Depth: m)	N/A	N/A
Bulk sample pits approved under <i>Mineral Titles Act?</i> (Y or N)	N/A	N/A
Length of line/track clearing (1.25km x 2.5m)	0.31	N/A
Camp area to be cleared (2 of 30m x 30m)	0.18	N/A
Camp Infrastructure (i.e. demountable, tents)	Fly camp vehicles, tents	N/A
Previous disturbance yet to be remediated on title (ha) if known	0.00	0.00
Other	N/A	N/A
Total area disturbed proposed (ha)	0.49	0.00

## Section 5 – Previous Disturbance (for existing Authorisations only)

Mining Interests (i.e. titles)	EL26555	EL30137
Number/type of holes drilled	12 RC	N/A
Maximum depth of holes drilled (m)	120m	N/A
Number of holes remediated (i.e. plugged/capped)	12 RC	N/A
Number and size of drill pads cleared (Length: m x Width: m)	23 pads 15m x 15m	N/A
Total area of drill pads cleared (ha)	0.517ha	N/A
Total area of drill pads remediated (ha)	0.517ha	N/A
Was groundwater encountered? (Y or N)	Y	N/A
Length of line/track cleared (Length: km x Width: m)	14.03km x 4m	N/A
Length of line/track remediated (Length: km x Width: m)	14.03km x 4m	N/A
Number of costeans excavated (Length: m x Width: m x Depth: m)	N/A	N/A
Number of costeans remediated	N/A	N/A
Total bulk sample pits excavated (Length: m x Width: m x Depth: m)	N/A	N/A



Mining Interests (i.e. titles)	EL26555	EL30137
Total bulk sample pits remediated	N/A	N/A
Camp area cleared (ha)	N/A	2.0
Camp area remediated (ha)	N/A	2.0
Number of sumps excavated (Length: m x Width: m)	23 sumps 3m x 3m	
Number of sumps remediated	23	
Total area disturbed (ha)	6.15ha	2.0
Total area remediated (ha)	6.15ha	2.0

## Section 6 – Environmental Management

By checking these boxes, you are agreeing to implement the following minimum environmental management standards on the project area. Where boxes have been left unchecked, justification is required.

6.1	<b>Y</b>	Blade-up approach for clearing will be used (i.e. no windrows, leave root stock and topsoil) PR Land Clearing and Disturbance
6.2	<b>Y</b>	Significant vegetation will be avoided during clearing (i.e. large trees, specimens providing habitat or food sources, riparian vegetation, and threatened species)
6.3	<b>Y</b>	Vegetation clearing during, and immediately after rainfall events, will be avoided
6.4	<b>Y</b>	Vegetation clearing will be kept to the minimum required to safely traverse vehicles and drill rigs along tracks and drill pads
6.5	<b>Y</b>	Where blade-up techniques cannot be employed, topsoil and vegetation will be stockpiled appropriately for remediation purposes
6.6	<b>Y</b>	All employees and contractors will be trained and inducted in relation to the management of environmental risks in the work area, including weeds, waterways, threatened species, soil erosion, sacred sites and heritage areas FM Weed Seed Hygiene Inspection Sheet MP Aboriginal Heritage SWP Non-Indigenous Cultural Heritage Guideline
6.7	<b>N/A</b>	Sumps will be lined or tanks of appropriate size to contain water, sediment and drilling fluids encountered during drilling, will be used
6.8	<b>N/A</b>	Sumps, drill holes, and fuel stores will be located away from environmentally significant areas and water courses
6.9	<b>N/A</b>	Excavations (sumps, costeans and pits) will be appropriately ramped to allow fauna egress
6.10	<b>N/A</b>	Drill holes will be securely capped immediately after drilling
6.11	<b>Y</b>	Vehicle hygiene measures will be employed to prevent the introduction and spread of invasive species and pathogens when mobilising vehicles and equipment from one location to another FM Weed Seed Hygiene Inspection Sheet

6.12	<b>Y</b>	Hydrocarbon spills will be minimised using liners and drip trays under machinery, and appropriately sized spill-kits available in the event of a spill
6.13	<b>Y</b>	Hazardous substances (including hydrocarbons) will be stored and handled in accordance with relevant Australian Standards
6.14	<b>Y</b>	Hydrocarbons will be stored in lined and bunded areas
6.15	<b>Y</b>	Waste will be stored securely while on-site to minimise windblown rubbish and access by feral animals
6.16	<b>Y</b>	Waste will be removed off-site and disposed of at an appropriate waste management facility
6.17	<b>Y</b>	All environmental incidents will be reported to the Department in accordance with Section 29 of the Mining Management Act.

Justification and alternative management measures:

No exploration drilling is proposed on EL26555 during 2020.
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## Section 7 – Remediation and Closure

By checking these boxes, you are agreeing to implement the following minimum remediation standards on the project area. Where boxes have been left unchecked, justification is required.

7.1	<b>N/A</b>	Drill holes plugged below ground level at a minimum depth of 0.4 metres and soil mounded to prevent subsidence, within 6 months of completion of drilling
7.2	<b>N/A</b>	Drill samples/spoil returned down drill holes, buried in sumps, or removed from site
7.3	<b>N/A</b>	All drill hole and access markers including flagging tape, wooden markers and star pickets will be removed from site
7.4	<b>N/A</b>	Re-contouring of cut and fill drill pads will be consistent with the surrounding terrain
7.5	<b>Y</b>	Ripping/scarifying of drill pads, and compacted areas along the contour (on sloping ground) and cross-ripping (zig-zag) along tracks
7.6	<b>Y</b>	Tracks will be remediated, including pushing in all windrows Drill Site Access and Track Rehabilitation
7.7	<b>Y</b>	Appropriate erosion and sediment controls will be installed where erosion is evident or likely to occur
7.8	<b>Y</b>	All tracks will be remediated unless otherwise agreed in writing by the land holder or appropriate third party Agreement with Rhett Walker Lorella Springs Pastoral Leaseholder (CIC)
7.9	<b>Y</b>	Access through watercourses will be removed and banks restored
7.10	<b>Y</b>	No erosion is occurring in disturbed areas, tracks and in remediated areas

7.11	<b>N/A</b>	All excavations backfilled within 6 months of completion of drilling
7.12	<b>N/A</b>	All water bores decommissioned unless otherwise agreed in writing by the land holder or appropriate third party. The bore must comply with the Minimum Construction Requirements for Water Bores in Australia and may require permits or licenses under the <i>Water Act</i>
7.13	<b>Y</b>	All rubbish and infrastructure will be removed from site
7.14	<b>Y</b>	Replacement of topsoil and vegetation
7.15	<b>Y</b>	Contaminated soils (e.g. hydrocarbon or hazardous chemicals) will be remediated or removed from site
7.16	<b>Y</b>	Monitoring will be undertaken following the wet season or a significant rainfall event Campsites and access tracks will be rehabilitated at the end of exploration activities, prior to the wet season.




Justification and alternative management measures:


## Section 8 – Required Attachments


8.1	<b>Y</b>	Security Calculation Spreadsheet (CIC)
8.2	<b>Y</b>	Nomination of Operator Form Sandfire Resources provided updated Nomination of Operator and Authorisation 0234-04 Variation forms on 5 September 2019
8.3	<b>N/A</b>	Spreadsheet with coordinates of proposed drill holes or polygons of target areas
8.4	<b>Y</b>	Google Earth KML/shape files/track logs of proposed tracks and camp sites
8.5	<b>Y</b>	A map of the work area(s) showing: (Figure 8-1)  <ol style="list-style-type: none"> <li>1. title boundaries and title numbers</li> <li>2. current and proposed drill holes, or polygons of target areas</li> <li>3. current and proposed tracks</li> <li>4. remediated areas</li> <li>5. camp sites</li> <li>6. sacred/heritage sites</li> <li>7. environmental constraints</li> </ol>
8.6	<b>N/A</b>	Remediation Register (for existing Authorisations)
8.7	<b>Y</b>	Photographs of remediation work Exploration Base Camp regrowth in 2014 (CIC)
8.8	<b>N/A</b>	Radiation Management Plan (if applicable)

## Section 9 – Declaration

The Mining Management Plan must be endorsed by a senior representative of the company who has the appropriate level of authority to do so.

	Author	Reviewed by	Approved by
Date	17/01/2020	17/01/2020	17/01/2020
Name	Allan Wynne	Hannah Wallace	Damien Stephens
Signature			

I Damien Stephens, Exploration Manager - Regional, declare that I have the authority to make the commitments contained in this mining management plan on behalf of the company. To the best of my knowledge the information contained in this plan is true and correct and commit to undertake the works in accordance with the agreed minimum standards and all relevant Northern Territory and Commonwealth Government legislation.

SIGNATURE:  .....

DATE: 17/1/2020. .....