



Perilya Broken Hill Limited
ABN: 46 099 761 289

Environmental Impact Statement

for the
Recommencement
of Mining
Operations at the

Broken Hill North Mine

Prepared by:



R.W. CORKERY & CO. PTY. LIMITED



No. 1 Shaft, 1910



No. 2 Shaft & Concentrator, 1940



No. 3 Shaft, 1958



No. 3 Shaft, 2016

February 2017

This page has intentionally been left blank



Perilya Broken Hill Limited
ABN: 46 099 761 289

Environmental **I**mpact **S**tatement

for the Recommencement of
Mining Operations
at the

Broken **H**ill **N**orth **M**ine

Prepared for:

Perilya Broken Hill Limited
ABN: 46 099 761 289
Wentworth Road
BROKEN HILL NSW 2880

Telephone: (08) 8088 8582
Fax: (08) 8088 8664
Email: north.mine.project@perilya.com.au

Prepared by:

R.W. Corkery & Co. Pty. Limited
Geological & Environmental Consultants
ABN: 31 002 033 712

Brooklyn Office:

1st Floor, 12 Dangar Road
PO Box 239
BROOKLYN NSW 2083

Orange Office:

62 Hill Street
ORANGE NSW 2800

Brisbane Office:

Suite 5, Building 3
Pine Rivers Office Park
205 Leitchs Road
BRENDALE QLD 4500

Telephone: (02) 9985 8511

Facsimile: (02) 6361 3622

Email: brooklyn@rwcorkery.com

Telephone: (02) 6362 5411

Facsimile: (02) 6361 3622

Email: orange@rwcorkery.com

Telephone: (07) 3205 5400

Facsimile: (02) 6361 3622

Email: brisbane@rwcorkery.com

Ref No. 938/04

February 2017



R.W. CORKERY & CO. PTY. LIMITED

This Copyright is included for the protection of this document

COPYRIGHT

© R.W. Corkery & Co. Pty Limited 2017

and

© Perilya Broken Hill Limited 2017

All intellectual property and copyright reserved.

Apart from any fair dealing for the purpose of private study, research, criticism or review, as permitted under the Copyright Act, 1968, no part of this report may be reproduced, transmitted, stored in a retrieval system or adapted in any form or by any means (electronic, mechanical, photocopying, recording or otherwise) without written permission. Enquiries should be addressed to R.W. Corkery & Co. Pty Limited.

Author's Certification

for the submission of an Environmental Impact Statement prepared in accordance with the *Environmental Planning and Assessment Act 1979*.

a) EA prepared by:

name: Mitchell Bland
qualifications: BSc(Hons), MEconGeol, LLB(Hons)
address: 62 Hill Street
Orange NSW 2800

b) Development application by:

applicant name: Perilya Broken Hill Limited
applicant address: Wentworth Road
Broken Hill NSW 2880

c) Application Number:

SSD_7538

d) Address/land details:

Properties to be developed Land
Description:

Lot	DP	Lot	DP
7313 ¹	1185108	7319 ¹	1185108
7314 ¹	1185108	3870	757298
7316	1185108	3871	757298
7318 ¹	1185108	4143 ¹	757298
Unnamed Crown road reserves			
Note 1: Part Lot only			

e) Project Outline:

The Applicant proposes to undertake the following.

- Recommence mining operations using the existing Cosmopolitan Decline to extract ore to a depth of between 1 750m and 2 250m below surface over a period of approximately 25 years.
- Crush extracted ore within a surface ROM pad using a mobile crusher.
- Transport crushed ore via the public road network to the Company's Southern Operations using A-double Road Trains.
- Undertake ancillary activities associated with the proposed mining works, including re-establishment and refurbishment of a range of existing infrastructure, construction and operation of a pastefill plant, including a tailings harvesting area, and construction of a haul road.

f) Assessment of Environmental Impact:

The assessment of environmental impacts of this project includes the matters referred to in the Secretary's Environmental Assessment Requirements provided to the Applicant on 6 May 2016 under Schedule 2, Part 2 of the *Environmental Planning and Assessment Regulation 2000*.

g) Declaration:

I, Mitchell Bland, hereby declare that I have overseen the preparation of the contents of this assessment and to the best of my knowledge:

- i) this EIS has been prepared in accordance with the requirements of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000*;
- ii) the document contains all available information that is relevant to the environmental assessment of the proposed development; and
- iii) that the information contained in the document is neither false nor misleading.

Signature: _____

M Bland

Name: _____

Mitchell Bland

Date: _____

1/2/2017



This page has intentionally been left blank



CONTENTS

	Page		Page
EXECUTIVE SUMMARY	ES-1	2.4	WASTE ROCK MANAGEMENT..... 2-22
SECTION 1: INTRODUCTION	1-1	2.4.1	Introduction 2-22
1.1 SCOPE	1-3	2.4.2	Waste Rock Characteristics 2-22
1.2 THE APPLICANT	1-6	2.4.3	In-Pit Waste Rock Placement..... 2-22
1.3 MINE SITE	1-7	2.4.4	Waste Rock Harvesting..... 2-23
1.4 EXISTING MINERAL AUTHORITIES, IDENTIFIED RESOURCE AND PRODUCTS	1-8	2.4.5	Waste Rock Balance 2-26
1.4.1 Existing Mineral Authorities and Approvals	1-8	2.5	STOCKPILING AND PROCESSING OPERATIONS..... 2-27
1.4.2 Resource.....	1-8	2.5.1	Introduction 2-27
1.4.3 Products and Need for the Proposal.....	1-10	2.5.2	Stockpiling Operations 2-27
1.5 BACKGROUND TO THE PROPOSAL.....	1-11	2.5.3	Crushing Operations 2-27
1.5.1 Introduction	1-11	2.6	TAILINGS HARVESTING AND PASTE FILL OPERATIONS..... 2-28
1.5.2 History of Mining Operations.....	1-11	2.6.1	Introduction 2-28
1.5.3 Current Broken Hill Mining Operations	1-13	2.6.2	Tailings Harvesting Area and Balance 2-28
1.5.4 Environmental Management and Performance	1-21	2.6.3	Tailings Harvesting Operations .. 2-30
1.6 FORMAT OF THE DOCUMENT	1-22	2.6.4	Tailings Transportation and Stockpiling Operations 2-30
1.7 MANAGEMENT OF INVESTIGATIONS ..	1-24	2.6.5	Paste Fill Operations 2-31
SECTION 2: DESCRIPTION OF THE PROPOSAL.....	2-1	2.7	TRANSPORTATION 2-31
2.1 INTRODUCTION.....	2-3	2.7.1	Introduction 2-31
2.1.1 Objectives	2-3	2.7.2	Internal Road Network..... 2-32
2.1.2 Overview of the Proposal.....	2-3	2.7.3	Site Access Road and Intersection..... 2-33
2.1.3 Approvals Required	2-5	2.7.4	External Road Network 2-33
2.2 SITE ESTABLISHMENT AND REFURBISHMENT ACTIVITIES.....	2-6	2.8	WATER MANAGEMENT..... 2-40
2.2.1 Introduction	2-6	2.8.1	Introduction 2-40
2.2.2 Re-establishment of Access to the Underground Workings	2-6	2.8.2	Classes of Water 2-40
2.2.3 Re-establishment of the Haul Road Network	2-9	2.8.3	Surface Water Environment and Management 2-41
2.2.4 Refurbishment of Existing Surface Facilities.....	2-9	2.8.4	Groundwater Environment and Management 2-45
2.3 MINING OPERATIONS.....	2-12	2.8.5	Water Balance..... 2-53
2.3.1 Geological Setting.....	2-12	2.9	FACILITIES AND SERVICES..... 2-55
2.3.2 Mineral Resources and Reserves.....	2-15	2.9.1	Facilities 2-55
2.3.3 Efficiency of Resource Recovery.....	2-16	2.9.2	Services 2-56
2.3.4 Indicative Mining Methods.....	2-16	2.10	NON-PRODUCTION WASTE MANAGEMENT..... 2-57
2.3.5 Mining Schedule	2-19	2.10.1	Existing Mine Waste Facility..... 2-57
2.3.6 Mining Equipment	2-20	2.10.2	Management of Non-production Wastes 2-58
		2.11	PROPOSAL LIFE AND HOURS OF OPERATION 2-58
		2.11.1	Hours of Operation 2-58
		2.11.2	Life of the Proposal 2-58



CONTENTS

	Page		Page
2.12	EMPLOYMENT, CAPITAL COST AND ECONOMIC CONTRIBUTIONS.....	2-60	
2.12.1	Employment.....	2-60	
2.12.2	Capital Cost	2-61	
2.12.3	Ongoing Economic Contributions.....	2-61	
2.13	SITE REHABILITATION, DECOMMISSIONING AND MINE CLOSURE.....	2-62	
2.13.1	Introduction and Mine Closure Considerations.....	2-62	
2.13.2	Rehabilitation and Mine Closure Objectives.....	2-63	
2.13.3	Conceptual Rehabilitation Domains and Final Landform.....	2-64	
2.13.4	Final Land Use.....	2-66	
2.13.5	Rehabilitation and Mine Closure Consultation and Timing.....	2-67	
2.13.6	Progressive Rehabilitation	2-67	
2.13.7	Rehabilitation Documentation	2-67	
2.13.8	Delayed Commencement	2-67	
2.14	PROJECT RATIONALE AND ALTERNATIVES CONSIDERED	2-69	
2.14.1	Introduction	2-69	
2.14.2	No Recommencement	2-70	
2.14.3	Shaft Operation.....	2-70	
2.14.4	Use of Larger or Smaller Road Trucks.....	2-71	
2.14.5	Use of Rail Transport.....	2-71	
SECTION 3: CONSULTATION, ISSUE IDENTIFICATION AND PRIORITISATION.....		3-1	
3.1	INTRODUCTION	3-3	
3.2	CONSULTATION.....	3-3	
3.2.1	Community Consultation.....	3-3	
3.2.2	Government Agency Consultation.....	3-5	
3.3	PLANNING CONTEXT	3-6	
3.3.1	Introduction	3-6	
3.3.2	Commonwealth Legislation.....	3-6	
3.3.3	NSW Legislation	3-7	
3.3.4	NSW Planning Issues	3-10	
3.3.5	Local Planning Issues	3-13	
3.4	ANALYSIS OF ENVIRONMENTAL RISK	3-14	
3.5	PRIORITISATION OF KEY ENVIRONMENTAL ISSUES	3-15	
SECTION 4: ASSESSMENT AND MANAGEMENT OF KEY ENVIRONMENTAL ISSUES.....		4-1	
4.1	ENVIRONMENTAL SETTING	4-3	
4.1.1	Introduction	4-3	
4.1.2	Topography and Drainage	4-3	
4.1.3	Climate	4-3	
4.1.4	Land Ownership and Land Use....	4-7	
4.2	AIR QUALITY	4-11	
4.2.1	Introduction	4-11	
4.2.2	Existing Air Quality Environment.....	4-11	
4.2.3	Potential Sources of Air Contaminants.....	4-12	
4.2.4	Air Quality Criteria and Goals....	4-15	
4.2.5	Assessment Methodology	4-17	
4.2.6	Management and Mitigation Measures	4-18	
4.2.7	Assessment of Impacts	4-19	
4.2.8	Monitoring	4-22	
4.3	HUMAN HEALTH.....	4-24	
4.3.1	Introduction	4-24	
4.3.2	Background Information	4-24	
4.3.3	Existing Lead in the Environment.....	4-27	
4.3.4	Assessment Methodology	4-30	
4.3.5	Management and Mitigation Measures	4-31	
4.3.6	Assessment of Impacts	4-31	
4.3.7	Monitoring	4-32	
4.4	NOISE AND BLASTING.....	4-33	
4.4.1	Introduction	4-33	
4.4.2	Existing Noise Climate	4-33	
4.4.3	Surrounding Noise Catchments	4-33	
4.4.4	Assessment Criteria	4-35	
4.4.5	Assessment Methodology	4-36	
4.4.6	Management and Mitigation Measures	4-38	
4.4.7	Assessment of Impacts	4-38	
4.4.8	Monitoring	4-41	
4.5	TRAFFIC AND TRANSPORTATION.....	4-42	
4.5.1	Introduction	4-42	
4.5.2	Existing Road Traffic Environment.....	4-42	
4.5.3	Predicted Changes to Traffic Environment.....	4-46	
4.5.4	Management and Mitigation Measures	4-46	
4.5.5	Assessment of Impacts	4-47	

CONTENTS

	Page		Page
4.6	HISTORIC HERITAGE.....	4-49	
4.6.1	Introduction	4-49	
4.6.2	History of the Mine Site and Surrounds	4-49	
4.6.3	Registered Sites of Heritage Significance.....	4-49	
4.6.4	Assessment Methodology	4-51	
4.6.5	Potential Heritage Impacts	4-52	
4.6.6	Management and Mitigation Measures	4-55	
4.6.7	Assessment of Significance and Impacts	4-55	
4.6.8	Drainage Channel	4-57	
4.6.9	Monitoring	4-57	
4.7	SURFACE WATER	4-58	
4.7.1	Introduction	4-58	
4.7.2	Existing Surface Water Environment.....	4-58	
4.7.3	Potential Surface Water Impacts	4-60	
4.7.4	Management and Mitigation Measures	4-61	
4.7.5	Assessment of Impacts	4-61	
4.8	GROUNDWATER	4-61	
4.8.1	Introduction	4-61	
4.8.2	Existing Groundwater Environment.....	4-62	
4.8.3	Management and Mitigation Measures	4-64	
4.8.4	Assessment of Impacts	4-65	
4.8.5	Monitoring	4-65	
4.9	ECOLOGY	4-66	
4.9.1	Introduction	4-66	
4.9.2	Regional and Local Setting	4-66	
4.9.3	Desktop Assessment	4-66	
4.9.4	Field Survey Methodology.....	4-67	
4.9.5	Mine Site Flora and Fauna.....	4-67	
4.9.6	Potential Direct and Indirect Impacts	4-69	
4.9.7	Management and Mitigation Measures	4-69	
4.9.8	Assessment of Impacts	4-69	
4.9.9	Assessment of Offsets	4-70	
4.10	ABORIGINAL HERITAGE.....	4-70	
4.10.1	Introduction	4-70	
4.10.2	Assessment Methodology	4-70	
4.10.3	Results.....	4-71	
4.10.4	Management and Mitigation Measures	4-71	
4.10.5	Assessment of impacts	4-71	
4.11	VISUAL AMENITY.....	4-71	
4.11.1	Introduction	4-71	
4.11.2	Existing Visual Environment.....	4-72	
4.11.3	Potential Visual Amenity Impacts.....	4-72	
4.11.4	Management and Mitigation Measures	4-72	
4.11.5	Assessment of Impacts	4-73	
4.12	BUSH FIRE	4-73	
4.12.1	Introduction	4-73	
4.12.2	Existing Bush Fire Hazard Environment.....	4-73	
4.12.3	Management and Mitigation Measures	4-73	
4.12.4	Assessment of Impact	4-74	
4.13	SOILS AND CAPABILITY.....	4-74	
4.13.1	Introduction	4-74	
4.13.2	Regional Soil and Land Capability Setting	4-74	
4.13.3	Mine Site Soil and Land Capability Setting	4-75	
4.13.4	Management and Mitigation Measures	4-75	
4.13.5	Assessment of Impacts	4-75	
4.14	AGRICULTURAL LANDS AND ENTERPRISES	4-75	
4.14.1	Introduction	4-75	
4.14.2	Agricultural Setting	4-75	
4.14.3	Potential Impacts.....	4-75	
4.14.4	Management and Mitigation Measures	4-76	
4.14.5	Assessment of Impacts	4-76	
4.15	SOCIO-ECONOMIC	4-76	
4.15.1	Introduction	4-76	
4.15.2	Policy Context	4-77	
4.15.3	Community Profile	4-78	
4.15.4	Potential Adverse and Beneficial Socio-Economic Impacts.....	4-86	
4.15.5	Management and Mitigation Measures	4-87	
4.15.6	Impact Assessment.....	4-88	
SECTION 5: EVALUATION AND JUSTIFICATION OF THE PROPOSAL.....5-1			
5.1	INTRODUCTION.....	5-3	
5.2	ANALYSIS OF ENVIRONMENTAL RISK.....	5-3	



CONTENTS

Page	Page
5.3	Figure 2.12
EVALUATION AND JUSTIFICATION OF THE PROPOSAL 5-6	Approved and Proposed Transport Routes 2-37
5.3.1	Figure 2.13
Introduction 5-6	Mine Site Catchments and Water Storages 2-42
5.3.2	Figure 2.14
Ecologically Sustainable Development..... 5-6	Conceptual Water Balance 2-54
5.3.3	Figure 2.15
Justification of the Proposal 5-13	Proposed Employment..... 2-60
5.4	Figure 2.16
CONCLUSION 5-18	Rehabilitation Domains and Indicative Final Landform 2-65
SECTION 6: REFERENCES 6-1	Figure 4.1
SECTION 7: GLOSSARY OF TECHNICAL TERMS, ACRONYMS, SYMBOLS AND UNITS 7-1	Regional Topography and Drainage 4-4
APPENDICES	Figure 4.2
Appendix 1	Local Topography and Drainage 4-5
Secretary’s Environmental Assessment Requirements	Figure 4.3
Appendix 2	Seasonal and Annual Wind Roses – 2014..... 4-8
Coverage of SEARs	Figure 4.4
Appendix 3	Land Ownership and Tenure..... 4-9
Summary of Management, Mitigation and Monitoring Measures	Figure 4.5
Appendix 4	Surrounding Land Use 4-10
Heavy Vehicle Authorisation Permit	Figure 4.6
Appendix 5	Cumulative Annual Average Dust Deposition..... 4-20
Surface Water Pollution Reduction Program Report	Figure 4.7
Appendix 6	Cumulative Annual Average PM10 Concentration 4-20
Groundwater Quality Investigation	Figure 4.8
FIGURES	Maximum 24-hour PM ₁₀ Concentration – Maximum Daily Operations 4-22
Figure 2.1	Figure 4.9
Mine Site Layout 2-4	Broken Hill Soil Lead Level Districts 4-29
Figure 2.2	Figure 4.10
Cosmopolitan Open Cut Pit and Haul Road Cutting 2-7	Noise Monitoring Locations and Noise Catchments..... 4-34
Figure 2.3	Figure 4.11
Surface Facilities Area 2-10	Noise Source Locations 4-37
Figure 2.4	Figure 4.12
Local Geological Setting 2-13	Approved and Proposed Transport Routes 4-43
Figure 2.5	Figure 4.13
Mine Site Geological Setting..... 2-14	Historic Heritage Sites..... 4-53
Figure 2.6	Figure 4.14
Long Section..... 2-17	Mine Site Catchments and Water Storages 4-59
Figure 2.7	Figure 4.15
Schematic Overview Of Proposed Mining Methods 2-18	Census Area 4-80
Figure 2.8	
Indicative In-pit Waste Rock Emplacement..... 2-24	
Figure 2.9	
Waste Rock Harvesting Area and Mine Water Management Ponds 2-25	
Figure 2.10	
Tailings Harvesting Area and Evaporation Ponds 2 & 3 2-29	
Figure 2.11	
Indicative Site Access Road Intersection 2-34	

CONTENTS

	Page		Page
TABLES		Table 4.5	Summary of Predicted Emissions – All Scopes 4-16
Table 2.1	North Mine Resource Summary 2-15	Table 4.6	Dust Deposition Assessment Criteria 4-16
Table 2.2	North Mine Mining Inventory 2-16	Table 4.7	Suspended Particulate Matter Assessment Criteria 4-16
Table 2.3	Indicative Production Schedule 2-21	Table 4.8	Metal Concentrations for Suspended Particulates 4-17
Table 2.4	Proposed Mining Equipment 2-21	Table 4.9	Annual Average Particulate Matter Emissions 4-19
Table 2.5	Indicative Waste Rock Balance 2-26	Table 4.10	Maximum 24-hour average Particulate Matter Emissions 4-21
Table 2.6	Indicative Tailings and Paste Fill Balance 2-28	Table 4.11	Predicted Incremental Heavy Metal Concentrations 4-23
Table 2.7	Comparison of Vehicle Classes 2-36	Table 4.12	Comparison of Greenhouse Gas Emissions 4-23
Table 2.8	Proposed Maximum Traffic Levels 2-40	Table 4.13	Soil Lead Levels 4-28
Table 2.9	Estimated Dirty Water Storage Volumes 2-44	Table 4.14	Human Health Risk Assessment Scenarios 4-30
Table 2.10	Groundwater Licences and Approvals 2-45	Table 4.15	Modelled Geometric Mean Blood Lead Level Results 4-31
Table 2.11	Standing Water Levels within the No. 3 Shaft 2-46	Table 4.16	Modelled Probability of Exceeding Blood Lead Levels 4-32
Table 2.12	Results of the Video and Physiochemical Survey 2-47	Table 4.17	Background Noise Monitoring Summary 4-33
Table 2.13	Water Quality Analysis Results 2-47	Table 4.18	Project-Specific Noise Criteria 4-35
Table 2.14	Evaporation Pond Design Criteria 2-51	Table 4.19	Noise Sources and Sound Power Levels 4-36
Table 2.15	Estimated Volume of Precipitates 2-52	Table 4.20	Predicted Construction Noise Levels 4-39
Table 2.16	Water Balance 2-55	Table 4.21	Predicted Operational Noise Levels 4-39
Table 2.17	Non-Production Waste Management 2-59	Table 4.22	Predicted Sleep Disturbance Levels 4-40
Table 2.18	Proposed Hours of Operation 2-59	Table 4.23	Predicted Road Noise Traffic Levels 4-41
Table 2.19	Summary Capital Investment Value Estimate 2-61	Table 4.24	Existing Traffic Volumes 4-45
Table 2.20	Indicative Rehabilitation and Mine Closure Consultation and Timing 2-68	Table 4.25	Proposed Maximum Traffic Levels 4-46
Table 2.21	Indicative Progressive Rehabilitation 2-69	Table 4.26	Registered Sites of Heritage Significance and Proposed Impact 4-50
Table 3.1	Application of SEPP (Mining, Petroleum Production and Extractive Industries) 2007 3-11	Table 4.27	Estimated Dirty Water Storage Volumes 4-60
Table 4.1	Climate Data 4-6	Table 4.28	Surrounding Registered Bores 4-63
Table 4.2	Estimated Emissions from the Proposal 4-13	Table 4.29	Groundwater Impact Assessment 4-65
Table 4.3	Metal Concentrations in Particulate Material 4-14		
Table 4.4	Modelled Vent Shaft In-stack Concentrations 4-14		



