

Table of Contents

1. Introduction	1
1.1 Background	1
1.2 Overview of Existing and Approved Operations	1
1.2.1 Hera Mine	1
1.2.2 Exploration Decline Program	3
1.2.3 Peak Gold Mine	3
1.3 Federation Project	3
1.3.1 Overview	3
1.3.3 Project Design	10
1.4 Purpose of this Document	10
1.5 Secretary Environmental Assessment Requirements	11
1.6 Document Structure	11
1.7 Approvals Approach	11
1.8 The Applicant	12
1.9 The Study Team.....	12
2. Strategic Context	14
2.1 Overview.....	14
2.2 Project Justification	14
2.3 Regional Context	14
2.3.1 Project Location.....	14
2.3.2 Land Use.....	15
2.3.3 Local Transport Network	17
2.4 Local Context.....	17
2.4.1 Biophysical Factors	17
2.4.2 Social and Economic	25
2.4.3 Land Ownership.....	25
2.5 Planning Agreements.....	25
2.6 Alternatives Considered	26
2.6.1 Do Nothing	26
2.6.2 Other Alternatives	26
2.7 Cumulative Impacts	27
3. Existing Operations	30

3.1	Overview	30
3.2	Hera Mine	30
3.3	Peak Gold Mine	31
3.4	Nymagee Mine	31
3.5	Exploration Decline Program	32
3.6	Existing Approvals	32
4.	Project Description	36
4.1	Federation Project Overview	36
4.2	Phases of the Project and Existing Activities.....	41
4.3	Project Area and Definitions	41
4.4	Federation Site	44
4.5	Federation Mine.....	44
4.5.1	Federation Deposit	44
4.5.2	Federation Production.....	44
4.5.3	Box Cut and Portal	45
4.5.5	Lateral Development	46
4.5.6	Vertical Development and Ventilation	48
4.5.7	Mining Method.....	48
4.5.8	Mining Equipment.....	48
4.6	Power and Communications.....	49
4.7	Site Access.....	49
4.8	Tailings Paste Plant and Batch Plant.....	49
4.9	Waste Rock Management.....	50
4.10	Water Management.....	50
4.10.1	Water Demand	50
4.10.2	Water Supply.....	50
4.11	Water Management Infrastructure	51
4.11.1	Mine Dewatering.....	51
4.11.2	Stormwater Retention Pond	52
4.11.3	Lined Leachate Ponds	52
4.11.4	Drainages	52
4.11.5	Potable Water	52
4.11.6	Sewage Treatment Plant.....	52

4.12	Site Infrastructure	53
4.13	Services Corridor.....	54
4.14	Surface Extraction Area.....	54
4.15	Hera Mine Site	54
4.16	New Processing Plant.....	55
4.17	Production Rates.....	55
4.18	Tailings Production.....	59
4.19	Tailings Storage Facility (TFS).....	60
4.19.1	TSF Capacity	60
4.19.2	TSF Management.....	60
4.20	Solar Farm.....	61
4.21	Minor Infrastructure Changes	61
4.22	Peak Gold Mine.....	61
4.23	Transport.....	62
4.24	Workforce.....	62
4.24.1	Construction.....	62
4.24.2	Operational	62
4.25	Hazardous Materials and Dangerous Goods	63
4.25.1	Process Plant	63
4.25.2	Fuel Storage	64
4.25.3	Explosives.....	64
4.25.4	Cyanide	65
5.	Rehabilitation Strategy	66
5.1	Introduction	66
5.2	SEARs Requirements.....	66
5.3	Statutory Context	67
5.3.1	Mining Act 1992	67
5.3.2	Mining Regulation 2016.....	67
5.3.3	New Standard Rehabilitation Conditions on Mining Leases	67
5.4	Outline of the General Principles of the Rehabilitation Strategy.....	68
5.4.1	Rehabilitation Phases	68
5.4.2	Rehabilitation Objectives	69
5.4.3	Domain Selection and Objectives.....	71

5.5	Landform Design and Planning	72
5.5.1	Materials Balance	86
5.6	Rehabilitation Implementation	87
5.6.1	Vegetation Clearing	88
5.6.2	Soil Management	88
5.6.3	Revegetation	89
5.6.4	Rehabilitation Maintenance.....	89
5.6.5	Weed and Pest Management.....	90
5.6.6	Erosion and Sediment Control	90
5.7	Post Closure Monitoring and Maintenance	90
5.8	Barriers or Limitations to Rehabilitation	91
6.	Statutory Context	94
6.1	Overview.....	94
6.2	Environmental Planning and Assessment Act 1979	94
6.2.1	State Significant Development.....	94
6.2.2	Permissibility	95
6.3	Matters for Consideration	95
6.4	Project Approvals	106
6.4.1	Overview.....	106
6.5	Commonwealth Legislation	107
6.5.1	Environmental Protection and Biodiversity Conservation Act 1999	107
6.5.2	Native Title Act 1993	108
7.	Engagement.....	109
7.1	Introduction	109
7.2	Consultation Requirements	109
7.3	Stakeholder Scoping	109
7.4	Stakeholder Engagement Strategy.....	110
7.5	Stakeholder Engagement.....	112
7.5.1	Community.....	112
7.5.2	Government Agencies	115
7.5.3	Aboriginal Parties	117
7.6	Stakeholder Engagement Outcomes	118
7.6.1	Community Members and Landowners	118

7.6.2	Aboriginal Parties	118
7.7	Future Stakeholder Engagement.....	119
8.	Impact Assessment	120
8.1	Soils and Land Capability	120
8.1.1	Introduction	120
8.1.2	Assessment Requirements.....	120
8.1.3	Existing Environment.....	121
8.1.4	Assessment Approach.....	121
8.1.5	Results.....	124
8.1.6	Potential Impact to Agricultural Productivity	130
8.1.7	Mitigation and Management Measures	131
8.1.8	Conclusion.....	133
8.2	Geochemistry	133
8.2.1	Introduction	133
8.2.2	Assessment Requirements.....	134
8.2.3	Existing Environment.....	134
8.2.4	Assessment Approach.....	134
8.2.5	Results.....	138
8.2.6	Mitigation and Management Measures	139
8.2.7	Conclusion.....	139
8.3	Subsidence	140
8.3.1	Introduction	140
8.3.2	Assessment Requirements.....	140
8.3.3	Existing Environment.....	141
8.3.4	Assessment Approach.....	141
8.3.5	Predicted Impacts.....	142
8.3.6	Mitigation and Management Measures	144
8.3.7	Conclusion.....	145
8.4	Surface Water	145
8.4.1	Introduction	145
8.4.2	Assessment Requirements.....	146
8.4.3	Existing Environment.....	147
8.4.4	Assessment Approach.....	150

8.4.5	Predicted Impacts.....	154
8.4.6	Mitigation and Management Measures	158
8.4.7	Conclusion.....	161
8.5	Groundwater.....	161
8.5.1	Introduction	161
8.5.2	Assessment Requirements.....	161
8.5.3	Existing Environment.....	162
8.5.4	Assessment Approach.....	180
8.5.5	Predicted Impacts.....	183
8.5.6	Peer Review.....	195
8.5.7	Mitigation and Management Measures	195
8.5.8	Conclusion.....	196
8.6	Biodiversity	197
8.6.1	Introduction	197
8.6.2	Assessment Requirements.....	197
8.6.3	Study Context	197
8.6.4	Existing Environment.....	198
8.6.5	Assessment Approach.....	198
8.6.6	Potential Impacts.....	215
8.6.7	Mitigation and Management Measures	220
8.6.8	Biodiversity Credit Summary.....	222
8.6.9	Conclusion.....	224
8.7	Indigenous Heritage	225
8.7.1	Introduction	225
8.7.2	Assessment Requirements.....	225
8.7.3	Existing Environment.....	225
8.7.4	Assessment Approach.....	227
8.7.5	Predicted Impacts.....	232
8.7.6	Mitigation and Management Measures	258
8.7.7	Conclusion.....	259
8.8	Historic Heritage.....	259
8.8.1	Introduction	259
8.8.2	Assessment Requirements.....	260

8.8.3	Existing Environment.....	260
8.8.4	Assessment Approach.....	260
8.8.5	Predicted Impacts.....	261
8.8.6	Mitigation and Management Measures	261
8.8.7	Conclusion.....	261
8.9	Noise and Vibration.....	261
8.9.1	Introduction	261
8.9.2	Assessment Requirements.....	261
8.9.3	Existing Environment.....	262
8.9.4	Assessment Approach.....	263
8.9.5	Predicted Impacts.....	270
8.9.6	Mitigation and Management Measures	274
8.9.7	Conclusion.....	274
8.10	Air Quality.....	277
8.10.1	Introduction	277
8.10.2	Assessment Requirements.....	277
8.10.3	Impact Assessment Criteria	278
8.10.4	Existing Environment.....	279
8.10.5	Assessment Approach.....	286
8.10.6	Predicted Impacts.....	289
8.10.7	Mitigation and Management Measures	299
8.10.8	Conclusion.....	299
8.11	Greenhouse Gas.....	300
8.11.1	Introduction	300
8.11.2	SEARs Requirements.....	300
8.11.3	Methodology.....	300
8.11.4	The GHG Protocol	301
8.11.5	Greenhouse Gas Emission Estimates.....	302
8.11.6	Greenhouse Gas Emission Savings	303
8.11.7	Greenhouse Gas Emissions Reporting.....	303
8.11.8	Management and Mitigation Measures	304
8.12	Waste Management.....	304
8.12.1	Introduction	304

8.12.2	Assessment Requirements.....	304
8.12.3	Legislative Context.....	305
8.12.4	Waste Management at Hera Mine and for the Project.....	306
8.12.5	Waste Rock and Tailings Management Strategy.....	309
8.12.6	Impact Assessment.....	310
8.12.7	Mitigation and Management Measures.....	311
8.12.8	Conclusion.....	312
8.13	Traffic and Transport.....	312
8.13.1	Introduction.....	312
8.13.2	Assessment Requirements.....	312
8.13.3	Existing Environment.....	313
8.13.4	Assessment Approach.....	316
8.13.5	Predicted Impacts.....	317
8.13.6	Mitigation and Management Measures.....	329
8.13.7	Conclusion.....	330
8.14	Human Health Risk Assessment.....	330
8.14.1	Introduction.....	330
8.14.2	SEARs Requirements.....	330
8.14.3	Existing Environment.....	330
8.14.4	Assessment Approach.....	330
8.14.5	Predicted Impacts.....	331
8.14.6	Conclusion.....	338
8.15	Preliminary Hazard Assessment.....	339
8.15.1	Introduction.....	339
8.15.2	SEARS Requirements.....	339
8.15.3	Assessment Methodology.....	339
8.15.4	Existing Environment.....	341
8.15.5	Predicted Impacts.....	341
8.15.6	Potential Hazardous Incidents Identified for Further Discussion.....	347
8.15.7	Incident Scenarios and Control Measures.....	347
8.15.8	Conclusion.....	370
8.16	Landscape and Visual Assessment.....	370
8.16.1	Introduction.....	370

8.16.2	SEARs Requirements.....	370
8.16.3	Existing Environment.....	371
8.16.4	Methodology.....	371
8.16.5	Predicted Impacts.....	373
8.16.6	Receptor Sensitivity.....	375
8.16.7	Magnitude of Landscape Change	375
8.16.8	Summary of Landscape Impacts.....	377
8.16.9	Mitigation Measures.....	387
8.16.10	Conclusion	387
8.17	Social	387
8.17.1	Introduction	387
8.17.2	SEARs Requirements.....	387
8.17.3	Methodology.....	388
8.17.4	Consultation.....	388
8.17.5	Existing Environment.....	389
8.17.6	Impact Assessment.....	391
8.17.7	Mitigation and Management Measures	402
8.17.8	Residual Impacts.....	403
8.17.9	Conclusion.....	410
8.18	Economic	410
8.18.1	Introduction	410
8.18.2	SEARs Requirements.....	410
8.18.3	Assessment Methodology.....	411
8.18.4	Impact Assessment.....	414
8.18.5	Conclusion.....	420
8.19	Cumulative Impacts.....	421
9.	Management Measures and Summary of Commitments.....	424
9.1	Introduction	424
9.2	Environmental Management System	424
9.2.1	Construction Environmental Management Plan	424
9.2.2	Operational Environmental Management Plan	424
9.3	Environmental Management Strategy	425
9.4	Summary of Mitigation Measures.....	425

10.	Justification and Conclusion	426
10.1	Overview	426
10.2	Strategic Policies	426
10.2.1	Far West Regional Plan 2036	426
10.2.2	Cobar Shire Local Strategic Planning Statement	427
10.2.3	Strategic Rural Land Use Policy	428
10.3	Significance of the Resource.....	428
10.3.1	Demand for Gold	428
10.3.2	Gold Production	429
10.3.3	Silver Demand and Production.....	430
10.3.4	Zinc Demand and Production.....	430
10.3.5	Copper Demand and Production.....	431
10.3.6	Lead Demand and Production.....	432
10.4	Economic Justification.....	432
10.4.1	Economic Growth	432
10.4.2	Employment and Incomes	432
10.4.3	Support for the Local Economy	433
10.4.4	Government Revenue.....	434
10.5	Cost Benefit Analysis.....	434
10.6	Social Justification.....	435
10.7	Suitability of the Site	435
10.8	Ecologically Sustainable Development.....	436
10.8.1	The Precautionary Principle	436
10.8.2	Inter-Generational Equity	437
10.8.3	Conservation of Biological Diversity and Maintenance of Ecological Values	438
10.8.4	Improved Valuation, Pricing, and Incentive Mechanisms	438

Tables

Table 1-1	Proponent Details.....	12
Table 1-2	EIS Study Team	12
Table 1-3	Technical Team.....	12
Table 2-1	Ownership Details	25
Table 2-2	Project Alternatives Considered.....	26
Table 2-3	Approved and Planned Developments in Proximity to Federation Project.....	28
Table 3-1	Existing Approvals and Licences (Hera Mine)	33
Table 3-2	Existing Approvals and Licences (Nymagee)	34
Table 3-3	Existing Significant Approvals and Licences (PGM)	35
Table 4-1	Key Federation Project Elements	36
Table 4-2	Mining Fleet	48
Table 4-3	Federation Site Infrastructure.....	53
Table 4-4	Hera Annual Maximum Concentrate Production.....	56
Table 4-5	Processing Chemicals.....	63
Table 5-1	Rehabilitation SEARs Requirements	66
Table 5-2	Rehabilitation Objectives and Targets	69
Table 5-3	Domain Rehabilitation Objectives.....	71
Table 5-4	Rehabilitation Methodology and Completion Criteria	75
Table 5-5	Materials Balance	87
Table 5-6	Recommended Stripping Depths	88
Table 5-7	Soil Stripping Depths and Volume	88
Table 5-8	Potential Barriers or Limitations to Rehabilitation.....	92
Table 6-1	Pre-Conditions Statutory Considerations	96
Table 6-2	<i>Mandatory Statutory Considerations EP&A Act</i>	99
Table 6-3	Mandatory Considerations under Environmental Planning Instruments.....	103
Table 6-4	Other Relevant NSW Legislation	104
Table 6-5	Federation Project Approvals.....	106
Table 6-6	Approvals not required for SSD Projects	107
Table 7-1	Consultation SEARS Requirements.....	109
Table 7-2	Engagement Toolkit.....	111
Table 7-3	Community and Stakeholder Engagement	113
Table 7-4	Government Agency Consultation	115

Table 7-5	Themes from Community Consultation.....	118
Table 8-1	Land and Soil Capability SEARS Requirements.....	120
Table 8-2	Land and Soil Capability Classes.....	123
Table 8-3	Depth of Soil Suitable for Use as Topsoil During Rehabilitation	126
Table 8-4	Project Area Soil Management Summary.....	128
Table 8-5	Soil Requirements to Achieve Selected LSC Class Based on OEH (2012).....	129
Table 8-6	Post Project LSC class in the Project area.	130
Table 8-7	Land Use in Cobar Local Government Area	131
Table 8-8	Annual Value of Agricultural Production in Cobar LGA (ABS, 2012).....	131
Table 8-9	Geochemistry SEARS Requirements	134
Table 8-10	Geochemical Testing.....	137
Table 8-11	Subsidence SEARs requirements.....	140
Table 8-12	3D Discontinuum Model Inputs	141
Table 8-13	Surface Water SEARs Requirements.....	146
Table 8-14	Annual Average Water Balance.....	151
Table 8-15	Forecast Likelihood of Off-site Discharge	154
Table 8-16	Change in Catchment Area	154
Table 8-17	Laboratory Analytical Suite	156
Table 8-18	Water Quality Results.....	156
Table 8-19	Recommended Surface Water Monitoring Program.....	160
Table 8-20	Groundwater SEARs Requirements	161
Table 8-21	Registered Bores	164
Table 8-22	EPL Groundwater Monitoring Requirements.....	170
Table 8-23	Federation Site Groundwater Monitoring Network.....	170
Table 8-24	Nymagee Mine Monitoring Bore Details	171
Table 8-25	Nymagee Groundwater Quality	174
Table 8-26	Volumes Pumped from Production Bores October 2013 to June 2015 (Aquade, 2015) 175	
Table 8-27	Production Bores – March 2015 to December 2020	176
Table 8-28	Predictive Model Flow Budget	183
Table 8-29	Changes to Flow Budget – Incremental Change	184
Table 8-30	Biodiversity SEARs Requirements.....	197
Table 8-31	Plant Community Types in the Project Disturbance Area.....	203
Table 8-32	Vegetation Zones.....	204

Table 8-33	Areas and BAM Plot Requirement by Stage.....	205
Table 8-34	BioNet Atlas Threatened Species Records within 10km of the Project Area.....	206
Table 8-35	MNES Summary.....	207
Table 8-36	Bat Survey Results 2021.....	211
Table 8-37	Bat Survey Results 2020.....	211
Table 8-38	Species Excluded by Additional Survey.....	213
Table 8-39	Potential Direct Impacts	216
Table 8-40	Potential Indirect Impacts.....	216
Table 8-41	Prescribed Impacts Relevant to the Project Disturbance Area.....	218
Table 8-42	Biodiversity Management and Mitigation Measures	220
Table 8-43	Ecosystem Credit Summary from BAM-C	222
Table 8-44	Ecosystem Credit Summary (number and class of biodiversity credits to be retired) .	223
Table 8-45	Credit Summary.....	224
Table 8-46	Indigenous Heritage SEARs Requirements.....	225
Table 8-47	Summary of Database Searches for Aboriginal Heritage.....	226
Table 8-48	Registered Aboriginal Parties.....	228
Table 8-49	AFGM Attendees	228
Table 8-50	Recorded Sites Project Disturbance Area and Surrounds.....	236
Table 8-51	Previously Surveyed Sites – Exploration Decline Program and Surrounds.....	248
Table 8-52	Historic History SEARS Requirements.....	260
Table 8-53	Noise and Vibration SEARS Requirements.....	261
Table 8-54	Sensitive Receiver Locations	262
Table 8-55	Project Intrusive Noise Levels	263
Table 8-56	Project Amenity Noise Levels.....	263
Table 8-57	Project Noise Trigger Levels.....	265
Table 8-58	Maximum Noise Trigger Level.....	265
Table 8-59	Voluntary Land Acquisition Mitigation Policy Criteria.....	265
Table 8-60	Road Noise Criteria	266
Table 8-61	ANZEC Blasting Limits	266
Table 8-62	Noise Construction Management Levels.....	267
Table 8-63	Modelled Site-Specific Meteorological Parameters.....	268
Table 8-64	Closest Offset Distance – Road Traffic Assessment.....	269
Table 8-65	Predicted Operational Noise Levels.....	270

Table 8-66	Predicted Maximum Noise Levels	271
Table 8-67	Operational Road Traffic Noise Levels – Residential Receivers	272
Table 8-68	Blasting Emissions	273
Table 8-69	Predicted Construction Phase Noise Levels.....	273
Table 8-70	Air Quality SEARs Requirements	277
Table 8-71	NSW Impact assessment criteria and pending NEPM AQ standards	278
Table 8-72	NSW EPA air quality criteria for deposited dust.....	278
Table 8-73	DPIE Particulate Matter Mitigation Criteria.....	278
Table 8-74	DPIE Particulate Matter Acquisition Criteria.....	279
Table 8-75	Average Wind Speeds and Percentage Calms at Cobar MO AWS from 2015 to 2020 .	280
Table 8-76	Annual Average PM ₁₀ Concentrations at DPIE Stations from 2015 to 2020	284
Table 8-77	Annual Average PM _{2.5} Concentrations at DPIE Stations from 2015 to 2020.....	284
Table 8-78	Adopted Background Concentrations and Assessment Criteria	285
Table 8-79	Ventilation Rise Parameters.....	287
Table 8-80	Estimated TSP, PM ₁₀ and PM _{2.5} Emissions for the Project.....	287
Table 8-81	Predicted Annual Average Project Contribution and Cumulative Concentrations at Sensitive Receivers for TSP, PM ₁₀ and PM _{2.5}	289
Table 8-82	Predicted Maximum 24-hour Average Concentrations for Project Contribution and Cumulative Concentrations at Sensitive Receivers for PM ₁₀ and PM _{2.5}	290
Table 8-83	Predicted Monthly Average Project Contribution and Cumulative Dust Deposition Levels	292
Table 8-84	GHG SEARs Requirements.....	300
Table 8-85	Summary of Estimated Annual Average CO ₂ -e (tonnes).....	302
Table 8-86	Summary of Estimated Greenhouse Gas Savings from Using the Power Plant and Solar Farm Compared with the Grid (t CO ₂ -e)	303
Table 8-87	Summary of Estimated Greenhouse Gas Savings from the Solar Farm (t CO ₂ -e).....	303
Table 8-88	Waste Management SEARS Requirements.....	304
Table 8-89	Waste Classification, Source, Handling Transport and Disposal	307
Table 8-90	Construction Wastes	311
Table 8-91	Traffic and Transport SEARS Requirements.....	312
Table 8-92	Existing Road Network Summary	313
Table 8-93	Traffic Volumes	316
Table 8-94	Project Construction Workforce Trips on Shift Changeover Days.....	317
Table 8-95	Construction Project Deliveries.....	319
Table 8-96	Total Construction Traffic	319

Table 8-97	Peak Operational Workforce Trips on Shift Changeover Days.....	320
Table 8-98	Project Operational Delivery Trips	321
Table 8-99	Daily and Peak Hour Project Peak Operational Non-Haulage Trips	321
Table 8-100	Project Ore Transport and Daily Vehicle Trips.....	322
Table 8-101	Project Concentrates Transport and Daily Vehicle Trips.....	322
Table 8-102	Project Tailings Transport and Daily Vehicle Trips.....	323
Table 8-103	Project Ore, Concentrates and Tailings Transport Daily Trips.....	324
Table 8-104	Forecast Traffic Volumes During Project Construction	325
Table 8-105	Maximum Daily Traffic During Project Operations (vehicles per day)	325
Table 8-106	Maximum Peak Hourly Traffic During Project Operations (vehicles per hour)	326
Table 8-107	Indicative Peak Hour Midblock Level of Service in Peak Travel Direction.....	326
Table 8-108	Cumulative Aurelia Traffic – Priory Tank Road and Kidman Way Intersection 2025	327
Table 8-109	Review of Acute Exposure Risks	334
Table 8-110	Review of Chronic Inhalation Risks	334
Table 8-111	Summary and Review of Exposures to Chemicals in Drinking Water (maximum residential receptor).....	336
Table 8-112	Review of Concentrations in Grain (and similar) Crops – maximum sensitive receptor	337
Table 8-113	Hazard Analysis SEARs Requirements	339
Table 8-114	Dangerous Good in Storage– Processing Plant (Hera Mine)*	341
Table 8-115	Dangerous Good in Storage – Federation Site*	342
Table 8-116	Dangerous Goods Transport– Processing Plant (Hera Mine)	343
Table 8-117	Dangerous Goods Transport– Federation Site *	344
Table 8-118	Qualitative Likelihood Rating.....	345
Table 8-119	Qualitative Consequence Rating.....	345
Table 8-120	Risk Matrix.....	346
Table 8-121	Summary of Potential Major Incident Scenarios & Residual Risk after Implementation of Controls	349
Table 8-122	Landscape and Visual SEARs requirements.....	370
Table 8-123	Height of the Proposed Infrastructure Features.....	372
Table 8-124	Receptor Sensitivity Rating.....	375
Table 8-125	Magnitude of Change.....	375
Table 8-126	Impact Significance	377
Table 8-127	Receptor VP1 – Summary of Visual Impact Assessment.....	379

Table 8-128	Receptor VP2 – Summary of Visual Impact Assessment.....	382
Table 8-129	Receptor VP3 – Summary of Visual Impact Assessment.....	384
Table 8-130	Receptor VP4 – Summary of Visual Impact Assessment.....	386
Table 8-131	Summary of Visual Assessment	387
Table 8-132	Social Impacts SEARS Requirements	388
Table 8-133	Weekly Income	390
Table 8-134	Potential Project Impacts Identified in SIA Phase 1 for Further Investigation	392
Table 8-135	Positive and Unmitigated Negative Social Impacts.....	397
Table 8-136	Social Impacts Summary.....	404
Table 8-137	Economic SEARs Requirements	410
Table 8-138	Key Economic Assumptions.....	411
Table 8-139	Key Steps in CBA	413
Table 8-140	Potential Economic Costs and Benefits of the Project.....	415
Table 8-141	Net Production Benefits of the Project (\$M Present Values at 7% Discount Rate) ..	416
Table 8-142	Net Social Benefits of the Project	417
Table 8-143	LEA Summary	419
Table 10-1	Federation Deposit MRE at 30 June 2021.....	428

Figures

Figure 1-1 - Location Plan	2
Figure 1-2 - Project Boundary	5
Figure 1-3 - Federation Site Plan	6
Figure 1-4 - Hera Mine Site Plan.....	9
Figure 2-1 - Land Zoning	16
Figure 2-2 - Plant Community Types	19
Figure 2-3 - Soil Mapping Units	21
Figure 2-4 – Surface Water Lines	23
Figure 2-5 - Topography and Watercourses	24
Figure 4-1 - Project Boundary	38
Figure 4-2 - Federation Site Plan	39
Figure 4-3 - Hera Mine Site Plan.....	40
Figure 4-4 - Indicative Project Phases.....	41
Figure 4-5 - Proposed Components Staging	43
Figure 4-6 - Production Rate	45
Figure 4-7 - Conceptual Federation Mine Design.....	47
Figure 4-8 - New Process Plant	57
Figure 4-9 - Annual Concentrate Production	58
Figure 4-10 - Gold and Silver Production – Hera Mine	58
Figure 4-11 - Annual Tailings Production.....	59
Figure 4-12 - Project Workforce Histogram.....	63
Figure 5-1 - Federation Site Final Landforms	73
Figure 5-2 - Hera Mine Site Final Landforms	74
Figure 8-1 - Land and Soil Capability Classification	127
Figure 8-2 – Drill Hole Locations	136
Figure 8-3 – Monthly Evaporation Recorded at BOM Station Cobar	148
Figure 8-4 - Stream Order	149
Figure 8-5 - Annual Production Bore Usage.....	152
Figure 8-6 -Forecast Water Stored in TSF Decant Pond	153
Figure 8-7 – Catchments Proposed Conditions.....	155
Figure 8-8 - Proposed Surface Water Monitoring Locations	159
Figure 8-9 – Registered Groundwater Bores	167

Figure 8-10 – Groundwater Dependent Ecosystems.....	169
Figure 8-11 – Groundwater Monitoring Locations.....	172
Figure 8-12 – Hera Mine and Federation Site Water Quality Piper Diagram	174
Figure 8-13 – Hera Mine Monthly Groundwater Inflows	175
Figure 8-14 – Groundwater Contours Pre-Mining	178
Figure 8-15 - Groundwater Contours Hera Mine Pre-Federation Project	179
Figure 8-16 – Hydrogeological Domain	181
Figure 8-17 - Maximum Drawdown – Water Table – Approved Conditions.....	187
Figure 8-18 - Maximum Drawdown – Water Table – Proposed Conditions.....	188
Figure 8-19 - Maximum Drawdown – Water Table – Incremental Conditions.....	189
Figure 8-20 - Drawdown at End of Mining at Federation – Water Table –Proposed Conditions	190
Figure 8-21 - Drawdown 20 years Following the End of Mining at Federation	191
Figure 8-22 - Drawdown 100 years Following the End of Mining at Federation	192
Figure 8-23 - Drawdown 1000 years Following the End of Mining at Federation	193
Figure 8-24 - Predicted Mine Inflows	194
Figure 8-25 – Exploration Decline Disturbance and the Project Area	200
Figure 8-26 – Land Use	201
Figure 8-27 – Biodiversity Survey Transects	210
Figure 8-28 – Aboriginal Heritage Survey Units	231
Figure 8-29 - Recorded Aboriginal Sites	235
Figure 8-30 – Sensitive Receiver Locations.....	264
Figure 8-31 - Current Attended Noise Monitoring Locations	276
Figure 8-32 - Annual Wind Rose for WRF Output for 2017	281
Figure 8-33 - Seasonal Wind Rose for WRF Output for 2017.....	282
Figure 8-34 – HVAS and Dust Deposition Gauges in Relation to Hera Mine	283
Figure 8-35 - Time Series Results for 24-hour Average PM ₁₀ at R3	291
Figure 8-36 - Time Series Results for 24-hour Average PM _{2.5} at R3	291
Figure 8-37 - Predicted Annual Average TSP Concentrations (µg/m ³) Project Contribution (left) and Cumulative (right)	293
Figure 8-38 - Predicted Annual Average PM ₁₀ Concentrations (µg/m ³) Project Contribution (left) and Cumulative (right)	294
Figure 8-39 - Predicted Annual Average PM _{2.5} Concentrations (µg/m ³) Project Contribution (left) and Cumulative (right)	295
Figure 8-40 - Predicted Monthly Average Dust Deposition Levels (g/m ² /month) Project Contribution (left) and Cumulative (right)	296

Figure 8-41 – Predicted 24-hour Average PM ₁₀ Concentrations (µg/m ³) Project Contribution	297
Figure 8-42 – Predicted 24-hour Average PM _{2.5} Concentrations (µg/m ³) Project Contribution.....	298
Figure 8-43 – Existing Road Network	315
Figure 8-44 – Multi Level Risk Assessment Approach	340
Figure 8-45 – Visibility Analysis – 5km.....	374
Figure 8-46 – Zone of Theoretical Visibility for Viewpoint 1 (VP1)	378
Figure 8-47 – Zone of Theoretical Visibility for Viewpoint 2 (VP2)	381
Figure 8-48 – Zone of Theoretical Visibility for Viewpoint 3 (VP3)	383
Figure 8-49 – Zone of Theoretical Visibility for Viewpoint 4 (VP4)	385

Photos

Photo 8-1	Peak CMT 6	236
Photo 8-2	Federation Deposit CMT7	237
Photo 8-3	Federation Deposit CMT 8	237
Photo 8-4	Federation Deposit CMT 9	238
Photo 8-5	Federation Deposit CMT 10	239
Photo 8-6	Federation Deposit CMT 11	239
Photo 8-7	Federation Deposit CMT 12	240
Photo 8-8	Federation Deposit CMT 13	241
Photo 8-9	Federation Deposit CMT 14	242
Photo8- 10	Federation Deposit H2	242
Photo 8-11	Federation Deposit H3	243
Photo 8-12	Federation Deposit H4	244
Photo 8-13	Federation Deposit H5	245
Photo 8-14	Federation Deposit H6	246
Photo 8-15	The Peak Rock Water Hole 1	247
Photo 8-16	Federation Deposit Scar Tree 1	248
Photo 8-17	Federation Deposit Scar Tree 2	249
Photo 8-18	Federation Deposit Isolate Find 1	250
Photo 8-19	Federation Deposit H1	251
Photo 8-20	PIPE Aboriginal Quarry 01	251
Photo 8-21	PIPE OS1	252
Photo 8-22	PIPE OS2	252
Photo 8-23	PIPE CMT1	253
Photo 8-24	PIPE CMT2	254
Photo 8-25	PIPE CMT3	255
Photo 8-26	PIPE CMT4	256
Photo 8-27	PIPE CMT5	257
Photo 8.28	View Point 1 - Existing Hera Mine Entrance	377
Photo 8.29	View Point 2 - Burthong Road	381
Photo 8.30	View Point 3 - Burthong Road Private Receptor	383
Photo 8.31	View Point 4 - Burthong Road Private Receptor	385

Appendices

Appendix A	SEARs Table
Appendix B	Geochemical Assessment of Potential Waste Rock and Tailings (Terranus Earth Sciences 2021)
Appendix C	Road Transport Assessment (TTPA 2021)
Appendix D	Rehabilitation Strategy (SLR 2021)
Appendix E	Land and Soil Capability Assessment (Sustainable Soils Management 2021)
Appendix F	Community And Stakeholder Participation Strategy (SLR 2021)
Appendix G	Social Impact Assessment (Element Environment 2021)
Appendix H	Life-Of-Mine Surface Subsidence Assessment (Beck Engineering 2021)
Appendix I	Surface Water Impact Assessment (GHD 2021)
Appendix J	Groundwater Impact Assessment (GHD 2021)
Appendix K	Biodiversity Development Assessment Report (AREA 2021)
Appendix L	Aboriginal Cultural Heritage Assessment and Archaeological Survey Report (AREA 2021)
Appendix M	Noise and Vibration Impact Assessment (Muller Acoustic Consulting 2021)
Appendix N	Air Quality and Greenhouse Gas Assessment (ERM 2021)
Appendix O	TSF Risk Assessment
Appendix P	Human Health Assessment (EnRiskS 2021)
Appendix Q	Preliminary Hazard Assessment (SLR 2021)
Appendix R	Landscape and Visual Impact Assessment (SLR 2021)
Appendix S	Economic Assessment (Gillespie Economics 2021)
Appendix T	Mitigation Measures
Appendix U	Capital Investment Value Report (RPS 2021)
Appendix V	EPBC Referral Determination

Acronyms and Abbreviations

Acronym	Description
ABS	Australian Bureau of Statistics
ACHA	Aboriginal Cultural Heritage Assessment
AFGM	Aboriginal Focus Group Meeting
AHIMS	Aboriginal Heritage Information Management System
AIP	Aquifer Interface Policy
AIS	Agricultural Impact Statement
ALRA	<i>Aboriginal Land Rights Act 1983</i>
AMD	Acid Mine Drainage
ANC	Acid Neutralising Capacity
ANZEC	Australian and New Zealand Environment Council
AQIA	Air Quality Impact Assessment
AS	Australian Standard
ASX	Australian Stock Exchange
AWS	Automatic Weather Station
BAM	Biodiversity Assessment Method 2020
BC Act	<i>Biodiversity Conservation Act 2016</i>
BDAR	Biodiversity Development Assessment Report
bgl	Below Ground Level
BSC	Bogan Shire Council
BoM	Bureau of Meteorology
BOS	NSW Biodiversity Offsetting Scheme
CCC	Community Consultative Committee
CEC	Cation Exchange Capacity
CEMP	Construction Environmental Management Plan
CLM Act	<i>Crown Lands Management Act 2016</i>
CML	Consolidated Mine Lease
CO ₂ -e	Carbon dioxide equivalent
CPI	Consumer Price Index
CSC	Cobar Shire Council
CSPS	Community and Stakeholder Participation Strategy
DAWE	Department of Agriculture, Water, and Environment
DIDO	Drive in/Drive out
DGV	Default Guideline Value
DPIE	Department Planning, Industry, and Environment
DSE	Dry Sheep Equivalent

Acronym	Description
EC	Electrical Conductivity
ECA	Ethnographic content analysis
EIA	Economic Impact Assessment
EIS	Environmental Impact Statement
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EP&A Regulation	Environmental Planning and Assessment Regulation 2000
EPA	Environmental Protection Authority
<i>EPBC Act</i>	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
EPL	Environmental Protection Licence
ESCP	Erosion and Sediment Control Plan
ESE	East south east
FE	Finite element
FIFO	Fly in/Fly out
FWR Plan	Far West Regional Plan 2036
GDE	Groundwater Dependent Ecosystem
GHGA	Greenhouse Gas Assessment
GSV	Ground surface visibility
GWIA	Groundwater Impact Assessment
ha	Hectares
HHRA	Human Health Risk Assessment
IBRA	Interim Biogeographic Regionalisation for Australia
ICNG	Interim Construction Noise Guideline
IPCC	Intergovernmental Panel on Climate Change
kg	Kilogram
kl	Kilolitre
km	Kilometre
ktpa	Kilo tonnes per annum
L/s	Litres per second
LALC	Local Aboriginal Land Council
LEP	Local Environment Plan
LLS	Local Land Services
LOM	Life of Mine
LOR	Limit of Reporting
LSC	Land and Soil Classification
LSCA	Land and Soil Capability Assessment
LSPS	Local Strategic Planning Statement
m AHD	Metres Australian Height Datum

Acronym	Description
mg/L	Milligrams per litre
ML	Mine Lease
mm	Millimetre
MNES	Matters of National Environmental Significance
MPL	Mining Purposes Lease
MOD	Modification
MOP	Mine Operations Plan
MPA	Maximum Potential Acid
MRE	Mineral Resource Estimate
mth	Month
Mt	Million tonnes
NAF	Non Acid Forming
NAG	Net Acid Generating
NAPP	Net Acid Producing Potential
NEWA	Noise Enhancement Wind Analysis
NGER Act	<i>National Greenhouse and Energy Reporting Act 2007</i>
NGER Regulations	<i>National Greenhouse and Energy Reporting Regulations 2008</i>
NMLs	Noise Management Levels
NNTT	National Native Title Tribunal
NPV	Net Present Value
NPWS	National Parks and Wildlife Service
NTS Corp	Native Title Services Corporation Limited
NVIA	Noise and Vibration Impact Assessment
OEH	Office of Environment and Heritage
OEMP	Operational Environmental Management Plan
PAF	Potential Acid Forming
PCTs	Plant Community Types
PGM	Peak Gold Mine
PHA	Preliminary Hazard Analysis
PM _{2.5}	Particulate Matter _{2.5}
PM ₁₀	Particulate Matter ₁₀
POEO Act	<i>Protection of Environment Operations Act 1997</i>
PANL	Project Amenity Noise Levels
PINL	Project Intrusive Noise Levels
RAP	Registered Aboriginal Party
RAW	Readily Available Water
RARS	Return Air Risers

Acronym	Description
RASP	Rehabilitation and Security Panel
RBL	Rating Background Level
RCE	Rehabilitation Cost Estimate
REF	Review of Environmental Factors
RMP	Rehabilitation Management Plan
RNP	Road Noise Policy
ROM	Run of Mine
RR	Resource Regulator
RTA	Road Transport Assessment
SEARs	Secretary Environmental Assessment Requirements
SIA	Social Impact Assessment
SSD	State Significant Development
SSGV	Site Specific Guideline Values
SWIA	Surface Water Impact Assessment
t	Tonnes
TEC	Threatened Ecological Community
TDS	Total Dissolved Solids
TfNSW	Transport for New South Wales
TIA	Traffic Impact Assessment
tpa	Tonnes per Annum
TSF	Tailings Storage Facility
TSP	Total Suspended Particulates
USD	Unites States Dollar
VLAMP	Voluntary Land Acquisition and Mitigation Policy
VPA	Voluntary Planning Agreement
WAD	Weak Acid Dissociable
WAL	Water Access Licence
WARR Act	<i>Waste Avoidance Resource Recovery Act 2001</i>
WMP	Water Management Plan
µg/m ³	Microgram per cubic meter