

Table of Contents



Table of Contents

Certification	ii
Acknowledgements	iv
Study Contributors.....	v
Notes on the Text	vi
Abbreviations	xxiv
Glossary	xxix
Executive Summary	1
Introduction	1
The proponent	2
Proposal need	3
Proposal alternatives	12
Proposal description	13
Regulatory framework	19
Consultation	19
Approach to impact and risk assessment	20
Environmental assessment	21
Environmental management	xxv
Justification and conclusion	xxvii
Accessing the EIS	xxix
How to lodge a submission	xxx
What happens to my submission?	xxx
1 Introduction	1-1
1.1 Overview	1-1
1.2 Objectives of the Proposal	1-2
1.3 Location of the Proposal	1-4
1.4 Key features of the Proposal.....	1-7
1.5 The proponent	1-12
1.6 Background	1-13
1.7 Overview of approvals and environmental impact assessment process.....	1-16
1.8 Purpose and structure of this environmental impact assessment	1-18
2 Proposal Alternatives, Need and Benefits.....	2-23
2.1 Introduction	2-23
2.2 Strategic need for the Proposal	2-23
2.3 Proposal alternatives	2-42
2.4 Proposal benefits	2-64
3 Proposal Description	3-68
3.1 Proposal overview	3-68



3.2	Proposal concept.....	3-73
3.3	Land requirements.....	3-97
3.4	Overview of the Chandler Facility	3-97
3.5	Construction of the Chandler Facility	3-107
3.6	Operation of the Chandler Facility.....	3-120
3.7	Overview of the Apirnta Facility	3-161
3.8	Construction of the Apirnta Facility	3-168
3.9	Operation of the Apirnta Facility	3-172
3.10	Road infrastructure	3-177
3.11	Closure	3-180
3.12	Decommissioning.....	3-183
3.13	Rehabilitation.....	3-184
3.14	Post closure.....	3-184
3.15	Water resources.....	3-186
3.16	Utilities and services	3-189
4	Approval Pathway	4-193
4.1	Proposal components	4-193
4.2	Approval process summary.....	4-196
4.3	Commonwealth approvals	4-200
4.4	Northern Territory approvals.....	4-207
4.5	Local government requirements.....	4-223
4.6	Relevant international legislation or agreements	4-223
4.7	Approval timeframes	4-226
5	Stakeholder Engagement and Consultation	5-228
5.1	Introduction	5-228
5.2	Regulatory requirements	5-228
5.3	Consultation objectives.....	5-228
5.4	Consultation methodology	5-229
5.5	Consultation activities undertaken	5-230
5.6	Key issues raised during stakeholder consultation	5-238
5.7	Ongoing consultation (next steps).....	5-252
6	Risk Assessment	6-253
6.1	Introduction	6-253
6.2	Objectives.....	6-253
6.3	Risk assessment methodology	6-254
6.4	Pre-mitigation risk assessment	6-260
6.5	Mitigation and management measures.....	6-260
6.6	Post mitigation risk assessment.....	6-263
6.7	Discussion of risks	6-276
6.8	The Proposal's environmental impact assessment process	6-280
6.9	Cumulative impacts.....	6-283
6.10	Conclusion	6-284



7	Biodiversity	7-285
7.1	Introduction	7-285
7.2	Methodology.....	7-285
7.3	Existing environment	7-291
7.4	Assessment of risk during construction	7-328
7.5	Assessment of risk during operation	7-336
7.6	Assessment of risk during closure and rehabilitation	7-338
7.7	Assessments of significance – impacts on threatened and migratory species.....	7-339
7.8	Key threatening processes	7-346
7.9	Mitigation and monitoring	7-346
7.10	Summary of risk assessment.....	7-355
7.11	Conclusion.....	7-356
8	Groundwater.....	8-358
8.1	Introduction	8-358
8.2	Methodology.....	8-358
8.3	Existing environment	8-362
8.4	Site conceptual model	8-385
8.5	Assessment of risk during construction	8-396
8.6	Assessment of risks during operation	8-401
8.7	Assessment of risk during closure and rehabilitation	8-410
8.8	Mitigation and monitoring	8-412
8.9	Summary of risk assessment.....	8-418
8.10	Conclusion.....	8-419
9	Surface Water	9-422
9.1	Introduction	9-422
9.2	Methodology.....	9-422
9.3	Existing environment	9-433
9.4	Assessment of risk during construction	9-473
9.5	Assessment of risk during operation	9-490
9.6	Assessment of risk during closure and rehabilitation	9-490
9.7	Mitigation and monitoring	9-491
9.11	Summary of risk assessment.....	9-497
9.8	Conclusion.....	9-498
10	Historic and Cultural Heritage.....	10-499
10.1	Introduction	10-499
10.2	Methodology.....	10-499
10.3	Existing environment	10-504
10.4	Assessment of risk during construction	10-535
10.5	Assessment of risk during operation	10-551
10.6	Assessment of risk during closure and rehabilitation	10-551
10.7	Mitigation and monitoring	10-551



10.8	Summary of risk assessment.....	10-553
10.9	Conclusion.....	10-553
11	Human Health	11-554
11.1	Introduction	11-554
11.2	Methodology.....	11-554
11.3	Existing environment	11-554
11.4	Assessment of risk during construction, operation and closure and rehabilitation....	11-555
11.5	Mitigation and monitoring.....	11-557
11.6	Summary of risk assessment.....	11-561
11.7	Conclusion.....	11-563
12	Economic and Social	12-564
12.1	Introduction	12-564
12.2	Methodology.....	12-564
12.3	Existing environment	12-567
12.4	Assessment of impacts during construction and operation	12-587
12.5	Assessment of impacts during closure and rehabilitation.....	12-603
12.6	Assessment of risk during construction, operation and closure and rehabilitation....	12-604
12.7	Mitigation and monitoring.....	12-604
12.8	Summary of risk assessment.....	12-606
12.9	Conclusion.....	12-607
13	Closure and Rehabilitation	13-609
13.1	Introduction	13-609
13.2	Methodology.....	13-609
13.3	Assessment of risk during closure and rehabilitation.....	13-610
13.4	Mitigation and monitoring.....	13-618
13.5	Summary of risk assessment.....	13-620
13.6	Conclusion.....	13-621
14	Bushfire.....	14-623
14.1	Introduction	14-623
14.2	Methodology.....	14-623
14.3	Existing environment	14-624
14.4	Assessment of risk during construction, operation and closure and rehabilitation....	14-631
14.5	Mitigation and monitoring.....	14-631
14.6	Summary of risk assessment.....	14-633
14.7	Conclusion.....	14-633
15	Air Quality.....	15-634
15.1	Introduction	15-634
15.2	Methodology.....	15-634



15.3	Existing environment	15-639
15.4	Assessment of risks during construction	15-646
15.5	Assessment of risks during operation	15-647
15.6	Assessment of risks during closure and rehabilitation	15-648
15.7	Mitigation and monitoring	15-648
15.8	Assessment of post-mitigated risks	15-652
15.9	Summary of risk assessment.....	15-653
15.10	Conclusion	15-656
16	Noise and Vibration.....	16-657
16.1	Introduction	16-657
16.2	Methodology.....	16-657
16.3	Existing environment	16-658
16.4	Assessment of risks during construction, operation and closure and rehabilitation ..	16-661
16.5	Mitigation and monitoring.....	16-663
16.6	Summary of risk assessment.....	16-664
16.7	Conclusion.....	16-664
17	Landscape and Visual Amenity	17-666
17.1	Introduction	17-666
17.2	Assessment methodology.....	17-666
17.3	Existing environment	17-670
17.4	Assessment of risk during construction	17-677
17.5	Assessment of risk during operation	17-677
17.6	Closure and rehabilitation.....	17-683
17.7	Mitigation and monitoring.....	17-683
17.8	Summary of risk assessment.....	17-683
17.9	Conclusion.....	17-686
18	Other Risks.....	18-687
18.1	Public health and food	18-687
18.2	Biting insects	18-694
18.3	Greenhouse gas assessment.....	18-697
18.4	Traffic	18-699
18.5	Environmental offsets.....	18-711
19	Cumulative Impacts.....	19-712
19.1	Introduction	19-712
19.2	Methodology.....	19-712
19.3	Relevant projects	19-712
19.4	Cumulative benefits	19-715
19.5	Cumulative impacts.....	19-716
19.6	Conclusion.....	19-717
20	Environmental Management	20-719



20.1	Overview	20-719
20.2	Summary of mitigation measures that would be implemented for the Proposal	20-720
21	Justification	21-752
21.1	Proposal benefits	21-752
21.2	Environmental impacts	21-754
21.3	Consideration of ecologically sustainable development	21-757
22	Conclusion and Recommendations	22-760
22.1	Conclusion	22-760
22.2	Recommendations	22-765
23	References	23-767
Volume VII – Appendices		0
Appendix A: Terms Of Reference		1
Appendix B: EIS Study Team.....		2
Appendix C: Waste Acceptance Documentation.....		3
Appendix C1	Waste Acceptance Policy	3
Appendix C2	Waste Acceptance Criteria	3
Appendix C3	Waste Acceptance Procedure.....	3
Appendix C4	Waste Zoning Guide.....	3
Appendix D: Proponent Environmental Record		4
Appendix E: Soils Report		5
Appendix F: Listed Waste Inventory		6
Appendix G: Waste Management Plan		7
Appendix H: Risk Assessments		8
Appendix I: Hydraulic Backfill Report		9
Appendix J: Rehabilitation Closure Plan		10
Appendix K: Geology and Geotechnical Assessment of Chandler Halite (Rock Salt) Formation		11
Appendix L: Outline Sediment and Erosion Management Plan		12
Appendix M: Environmental Management Plan		13
Appendix N: Risk Matrix		14
N.1	Groundwater Impact Assessment.....	14
N.2	Surface Water Impact Assessment	14
Appendix O: Biodiversity Assessment		15
Appendix O1	Biodiversity Impact Assessment.....	15
Appendix O2	Biodiversity Management Plan	15
Appendix O3	Biting Insects Management Plan.....	15
Appendix P: Groundwater Assessment		16



Appendix Q: Outline Water Management Plan	17
Appendix R: Surface Water Assessment	18
Appendix S: Historic and Cultural Heritage Assessment.....	19
Appendix S1 Cultural Heritage Impact Assessment	19
Appendix S2 Cultural Heritage Management Plan	19
Appendix T: Outline Emergency Response Plan	20
Appendix U: Economic and Social Impact Assessment.....	21
Appendix V: Social Impact Management Plan	22
Appendix W: Bushfire Management Plan	23
Appendix X: Air Quality Impact Assessment	24
Appendix X1 Part A	24
Appendix X2 Part B.....	24
Appendix X3 Part C.....	24
Appendix X4 Part D	24

List of Figures

Figure 1-1 Regional location of the Proposal.....	1-6
Figure 1-2 The proposed Chandler Facility. Aboveground infrastructure shown above and underground infrastructure shown below	
Figure 1-3 The proposed Apirnta Facility. Aerial view (top) and proposed warehouse (bottom).....	
Figure 1-4 The proponent's tenements within the NT	1-15
Figure 2-1 Global uses of salt	2-24
Figure 2-2 Global salt production by leading countries in 2012	2-25
Figure 2-3: Salt industry trends.....	2-26
Figure 2-4 Salt trends and opportunities for the proponent and the Proposal.....	2-27
Figure 2-5 Difference between landfill and a geological repository.....	2-30
Figure 2-6 The waste hierarchy and the proponent's service offering.....	2-32
Figure 2-7 Waste sources by sector	2-34
Figure 2-8 Hazardous waste volumes by State or Territory in Australia	2-36
Figure 2-9 Market volume waste assumptions versus total market (excluding legacy waste)	2-37
Figure 2-10 Waste treatment and disposal options	2-38
Figure 2-11 By using engineered and natural salt barriers the waste becomes permanently isolated	2-40
Figure 2-12 Potential waste customers by volume.....	2-41
Figure 2-13 Illustrative example of stage gate feasibility study framework.....	2-43
Figure 2-14 Location of prospective sites on a regional level.....	2-46
Figure 2-15 Location of preferred sites.....	2-47
Figure 2-16 Proposal benefits associated with environmentally sound management	2-67
Figure 3-1 Key components of the Proposal.....	3-70



Figure 3-2 Key milestones for the Proposal	3-72
Figure 3-3 Proposal concept	3-73
Figure 3-4 Chandler Facility layout	3-76
Figure 3-5 Apirnta Facility layout	3-77
Figure 3-6 Chandler Proposal lifecycle.....	3-79
Figure 3-7 Regional geology	3-81
Figure 3-8 Average soil pH by site.....	3-82
Figure 3-9 Changes in electrical conductivity over time by site	3-83
Figure 3-10 Chandler salt resource	3-86
Figure 3-11 Overview of waste acceptance procedure for the Proposal	3-92
Figure 3-12 Multi-barrier isolation of waste at the Proposed Chandler Facility	3-94
Figure 3-13 Underground layout of the proposed Chandler Facility.....	3-99
Figure 3-14 Proposed mine access decline.....	3-101
Figure 3-15 Proposed aboveground layout of the Chandler Facility	3-103
Figure 3-16 Summary of key construction stages (Chandler Facility including Henbury Access Road and Chandler Haul Road)	3-108
Figure 3-17 Example of main shaft headframe structure (Chandler Facility).....	3-114
Figure 3-18 Stockpiles including run of mine salt	3-116
Figure 3-19 Proposed waste storage and isolation operation (Chandler Facility).....	3-127
Figure 3-20 Illustration of waste emplacement and long term safety case for packaged waste (Chandler Facility)	3-128
Figure 3-21 Process overview for viscous backfill.....	
Figure 3-22 Process overview for flushing backfill.....	
Figure 3-23 Salt creep in excavated room	3-151
Figure 3-24 Schematic of proposed sealing strategy.....	3-152
Figure 3-25 Concept layout of the accommodation village	3-157
Figure 3-26 The waste hierarchy.....	3-160
Figure 3-27 Conceptual design of the Apirnta Facility looking east	
Figure 3-28 Waste storage container (ISO 20-foot shipping container)	3-174
Figure 3-29 The proponent's traceability process	3-175
Figure 3-30 Establishment of engineered barriers to underground mine.....	3-181
Figure 3-31 Backfilling of underground mine	3-182
Figure 4-1 Approval process (environmental, tenements and Traditional Owners)	4-198
Figure 4-2 Approval process (EIS)	4-199
Figure 4-3 Environmental impact assessment process (NT EPA).....	4-227
Figure 5-1 A breakdown of the top ten issues raised during the preparation of the Chandler EIS.....	5-239
Figure 6-1 Risk summary of pre-mitigated and post mitigated risks.....	6-277
Figure 6-2 Likelihood of risks pre and post mitigation	6-279
Figure 6-3 Consequence of risks pre and post mitigation	6-279
Figure 7-1 Terrestrial flora and fauna survey site locations	7-290
Figure 7-2 Distribution of land systems within the proposed development footprint and vicinity	7-298
Figure 7-3 Distribution of vegetation communities within the proposed development footprint and vicinity	7-305



Figure 7-4 Fire history within the proposed development footprint and vicinity	7-306
Figure 7-5 Distribution of fauna habitat within the proposed development footprint and vicinity	7-312
Figure 8-1 Groundwater monitoring network	8-360
Figure 8-2 Regional geological provinces.....	8-363
Figure 8-3 Regional cross section of geological strata	8-364
Figure 8-4 Local geological setting.....	8-367
Figure 8-5 Electro seismic hydraulic conductivity tomography across the Proposal area (Geo9 2015)8-	373
Figure 8-6 Hydrograph for the Horseshoe Bend Shale Formation.....	8-374
Figure 8-7 Hydrograph for the Upper Langra Formation.....	8-374
Figure 8-8 Hydrograph for the Lower Langra Formation	8-375
Figure 8-9 Regional groundwater flow direction	8-377
Figure 8-10 A 75 kilometre buffer showing regional groundwater bores	8-380
Figure 8-11 A 25 kilometre groundwater buffer showing local groundwater bores	8-381
Figure 8-12 Location of key surface water features and springs	8-384
Figure 8-13 Location of conceptual cross section lines	8-387
Figure 8-14 Cross section D-D ¹ regional conceptual hydrogeological model	8-388
Figure 8-15 Cross section E-E ¹ regional conceptual hydrogeological model	8-389
Figure 8-16 Conceptual site groundwater model	8-390
Figure 8-17 Potential impacts of groundwater drawdown from proposed groundwater bores ...	8-392
Figure 8-18 Water balance schematic	8-395
Figure 8-19: The idealised strain-time curve for a creep test - Atkins (2016).	8-407
Figure 8-20: Location of the Chandler Facility in the stable interior of the Australian tectonic plate (after Benz et al. 2011).....	8-409
Figure 8-21 All recorded Australian earthquakes up to 2011. After Geoscience Australia	8-410
Figure 8-22 Shaft sealing techniques during construction	8-412
Figure 8-23 Decline sealing techniques during construction.....	8-413
Figure 9-1 Location of existing surface water monitoring locations	9-423
Figure 9-2 Sites selected for hydrological and geomorphological monitoring.....	9-424
Figure 9-3 Catchment delineation	9-431
Figure 9-4 Local topography within the study area	9-435
Figure 9-5 Surficial geology in the study area.....	9-436
Figure 9-6 Daily average rainfall at Chandler - 5 November 2015 to 31 January 2017	9-440
Figure 9-7 Rainfall - monthly cumulative deviation from the mean.....	9-442
Figure 9-8 NT Drainage Divisions and River Basins	9-444
Figure 9-9 (a) Lake Eyre bioregion and (b) Pedirka subregion.....	9-445
Figure 9-10 Major rivers surrounding the Proposal site. Aerial imagery sourced from ESRI partners..	9-446
Figure 9-11 Catchment connectivity within the study area.....	9-447
Figure 9-12 Percentage of flow record in which given average-daily flow rate is exceeded	9-450
Figure 9-13 Surface water features within the study area	9-453
Figure 9-14 Hydraulic characteristics of Halfway Dam	9-454



Figure 9-15 Conceptual site hydrological model within the Chandler mine infrastructure area	9-458
Figure 9-16 Long profiles of study channels	9-463
Figure 9-17: Typical cross sections for (a) Hugh River (b) Railway Crossing Creek.....	9-464
Figure 9-18: Particle size distributions.....	9-465
Figure 9-19 Average of annual maximum inundation from between 2000 and 2015	9-471
Figure 9-20 Water detected between 1987 and 2016 - image taken from GA (2016) Water Observations from Space dataset.....	9-472
Figure 9-21 Erosion potential hotspots within the mine infrastructure area.....	9-477
Figure 9-22 Topography and drainage lines	9-479
Figure 9-23 1.5 hour storm profile for 100-year ARI rainfall depth of 62.9 mm	9-481
Figure 9-24 6 hour storm profile for 100-year ARI rainfall depth of 107.4 mm	9-482
Figure 9-25 24 hour storm profile for 100-year ARI rainfall depth of 170.2 mm	9-482
Figure 9-26 Rainfall areal reduction factor	9-483
Figure 9-27 Catchment area – peak flow relationship.....	9-484
Figure 9-28 Peak flow per km ²	9-485
Figure 9-29 Flood hazard at Chandler Haul Road Crossing.....	9-487
Figure 9-30 Topography at the proposed Apirnta Facility	9-489
Figure 9-31 Proposed surface water diversion within the mine infrastructure area	9-496
Figure 10-1 Cultural heritage exclusion zones	10-509
Figure 10-2 Archaeological material recorded in the area of the proposed Chandler Facility.....	10-515
Figure 10-3 Archaeological material recorded in the area of the proposed Apirnta Facility	10-519
Figure 10-4 Archaeological material recorded in the area of the proposed Chandler Haul Road	10-520
Figure 10-5 Archaeological material recorded in the area of the proposed Henbury Access Road....	10-525
Figure 10-6 Archaeological material likely impacted during construction of the proposed Chandler Facility	10-537
Figure 10-7 Archaeological material likely impacted during construction of the proposed Apirnta Facility	10-539
Figure 10-8 Archaeological material likely impacted during construction of the proposed Chandler Haul Road	10-540
Figure 10-9 Archaeological material likely impacted during construction of the proposed Henbury Access Road	10-543
Figure 12-1 Illustrative scenario using Tasman Global	
Figure 12-2 Estimated Resident Population: Northern Territory and local region (2004 – 2014)	12-570
Figure 12-3 Age and gender profile: indigenous and non-indigenous people in the Northern Territory	12-571
Figure 12-4 Age and gender profile: indigenous and non-indigenous people for the local region.....	12-572
Figure 12-5 Age and gender profile: indigenous and non-indigenous people in Alice Springs	12-573
Figure 12-6 Age and gender profile: indigenous and non-indigenous people in Sandover Plenty SA2	12-574
Figure 12-7 Value of gross state product by state (2004-2015)	12-575
Figure 12-8 Gross state product average annual growth	12-576



Figure 12-9 Unemployment rate: NT and local region	12-579
Figure 12-10 Industry of employment: NT and local region (percentage of total employed persons aged 15+)	12-580
Figure 12-11 Non-school qualification NT and local region (percentage of total persons with a qualification aged 15+)	12-581
Figure 12-12 Personal weekly income: NT and local region (percentage of total persons aged 15 and over)	12-582
Figure 12-13 Capital and operational expenditure on the Proposal	12-589
Figure 12-14 Direct employment during construction and operation of the Proposal.....	12-591
Figure 12-15 Contribution to gross product or real economic output	12-592
Figure 12-16 Contribution to real incomes.....	12-594
Figure 12-17 Employment creation (construction and operation).....	12-596
Figure 12-18 Occupational classification of direct workforce	12-599
Figure 14-1 Daily average air temperature (red) and observed range in temperature (grey) - Chandler - 5 November 2015 to 31 July 2016.....	14-625
Figure 14-2 Annual and seasonal wind roses - Chandler – 5 November 2015 to 31 July 2016	14-627
Figure 14-3 Annual and seasonal wind speed distribution - Chandler – 5 November 2015 to 31 July 2016	14-628
Figure 14-4 Bushfire history in the vicinity of the Proposal.....	14-630
Figure 15-1 Population dense locations in the vicinity of the Proposal	15-640
Figure 16-2 Proposed air quality monitoring locations	15-651
Figure 16-1 Cultural heritage exclusion zones (vibration assessment)	16-660
Figure 16-2 Ground vibration predictions for different charge masses and distances (average ground conditions)	16-662
Figure 16-3 Ground vibration predictions for different charge masses and distances (worst case ground conditions).....	16-662
Figure 17-1 Zone of theoretical visibility for the Proposal	17-669
Figure 17-2 Sensitive visual receptors	17-676
Figure 17-3 View shed analysis	17-682
Figure 18-1 Schematic of traffic count data locations in relation to the Proposal.....	18-703
Figure 18-2 Road network in the vicinity of the Proposal	18-704
Figure 19-1 Major projects in progress or proposed in the vicinity of Alice Springs (including the Proposal)	19-714

List of Tables

Table ES-1 Hazardous waste accepted and not accepted for underground disposal and permanent isolation.....	9
Table 1-1 Hazardous waste accepted and not accepted for underground storage, disposal and permanent isolation.....	1-4
Table 1-4 Summary of investigations undertaken by the proponent (2010-2016)	1-13
Table 1-5 The proponent's current tenements within the NT.....	1-14



Table 1-6 Document structure.....	1-19
Table 2-1 Challenges and opportunities in the salt market.....	2-28
Table 2-2 Australian waste and hazardous waste market summary.....	2-34
Table 2-3 Estimated legacy waste volumes in Australia (tonnes)	2-35
Table 2-5 Tellus' three phase site selection process	2-44
Table 2-6 Regional site and target selection criteria	2-45
Table 2-6 Alternatives considered throughout the development of the Proposal	2-53
Table 2-10 Comparison of alternatives against short or long-term advantages and disadvantages	2-63
Table 3-1 Key characteristics of the Proposal.....	3-71
Table 3-2 The proponent's current tenements within the NT.....	3-72
Table 3-3 Key components of the Proposal	3-74
Table 3-4 Lifecycle milestones of the Proposal.....	3-78
Table 3-5 Mineral resource estimation.....	3-85
Table 3-6 Hazardous waste accepted and not accepted at the proposed Chandler and Apirnta Facility	3-89
Table 3-7 Standards and specifications	3-96
Table 3-8 Summary of land take requirements	3-97
Table 3-9 Indicative construction schedule (Chandler Facility)	3-107
Table 3-10 Construction workforce profile (Chandler Facility including Henbury Access Road and Chandler Haul Road)	3-109
Table 3-11 Indicative salt stockpile volume and height (Chandler Facility).....	3-115
Table 3-12 Annual demand for utilities and services during construction of the Chandler Facility.....	3-117
Table 3-13 Indicative overburden stockpile volume and height (Chandler Facility)	3-120
Table 3-14 Indicative schedule	3-121
Table 3-15 Operational workforce profile (Chandler Facility)	3-122
Table 3-16 Waste types and examples potentially suitable for hydraulic backfill	3-139
Table 3-17 Indicative construction schedule (Apirnta Facility).....	3-169
Table 3-18 Haulage and access road summary.....	3-177
Table 4-1 Mining operation approval process	4-195
Table 4-2 Waste storage and isolation approval process	4-195
Table 4-3 Commonwealth legislation, regulation and policies.....	4-203
Table 4-4 National policies and codes of practice	4-205
Table 4-5 Summary of Facility tenure and agreements to be reached for mining operations	4-211
Table 4-6 Summary of Facility tenure and agreements to be reached for waste management operations	4-212
Table 4-7 Required documents and parties involved	4-213
Table 4-8 Other relevant Northern Territory legislation	4-217
Table 4-9 Territory policies, guidelines, standards and codes of practice.....	4-220
Table 5-1 Summary of stakeholder consultation and engagement activities	5-231
Table 5-2 Stakeholders consulted and type of consultation undertaken.....	5-233
Table 5-3 Issues raised by stakeholders and interested parties since 2012	5-239
Table 5-4 Key issues concerns and interests raised during stakeholder engagement and consultation	5-241



Table 6-1 Nature of a hazard	6-255
Table 6-2 Likelihood of a hazard	6-256
Table 6-3 Consequence of a hazard	6-257
Table 6-4 Risk significance criteria	6-258
Table 6-5 Risk significance matrix	6-259
Table 6-6 Risk duration	6-259
Table 6-7 Management and mitigation measures.....	6-261
Table 6-8 List of controls and mitigation measures.....	6-262
Table 6-9 Confidence descriptors for mitigation options	6-263
Table 6-10 Risk assessment	6-265
Table 6-11 Quantification of pre-mitigated and post mitigated risks by nature	6-276
Table 6-12 Quantification of pre-mitigated and post mitigated risk.....	6-276
Table 6-13 Cumulative impact methodology.....	6-284
Table 7-1 Survey effort (terrestrial flora and fauna surveys)	7-287
Table 7-2: Land systems within the proposed development footprint and vicinity.....	7-293
Table 7-3 Introduced flora species in the proposed development footprint and vicinity.....	7-300
Table 7-4 Description of vegetation communities within the proposed development footprint and vicinity.....	7-302
Table 7-5 Conservation-significant flora species either recorded or predicted to occur within the proposed development footprint or locality	7-309
Table 7-6 Conservation-significant fauna species either recorded or predicted to occur within the proposed development footprint or locality	7-324
Table 7-7 Migratory species either recorded or predicted to occur within the proposed development footprint or locality	7-327
Table 7-8 Estimated amount of land system cleared for construction of the Proposal.....	7-329
Table 7-9 Estimated vegetation removal by vegetation type for construction of the Proposal	7-329
Table 7-10 Estimated loss of habitat from construction of the Proposal	7-331
Table 7-11 Biodiversity mitigation and management measures	7-348
Table 7-12 Summary of risk assessment (biodiversity)	7-355
Table 8-1 Stratigraphic summary of the south-eastern extent of the Amadeus Basin	8-366
Table 8-2 Aquifer parameters	8-393
Table 8-3 Water balance (average rainfall per year)	8-394
Table 8-4 Construction phase water demands	8-398
Table 8-5 Key sensitive receptors and their water source.....	8-400
Table 8-6 Operation raw water demands.....	8-402
Table 8-7 Groundwater quality sampling suite.....	8-415
Table 8-8 Proposed groundwater mitigation and management measures.....	8-417
Table 8-9 Summary of groundwater risk assessment.....	8-418
Table 9-1 Chemical and physical stressor trigger values for aquatic ecosystem 95% protection	9-426
Table 9-2 Chemical and physical stressor trigger values for livestock protection.....	9-427
Table 9-3 Hardness categories for ANZECC guidelines	9-427
Table 9-4 Sediment guideline values to compare to raw and normalised chemical data.....	9-428
Table 9-5 Comparison of sediment contaminant concentrations to guideline values.....	9-429



Table 9-6 Rainfall gauge data	9-439
Table 9-7 Observed daily maximum and average rainfall at Chandler - 5 November 2015 to 31 January 2017	9-439
Table 9-8 Monthly average air temperature, rainfall and humidity at the Chandler AWS	9-441
Table 9-9 Rainfall intensity, frequency and duration data	9-441
Table 9-10 Flow rate of significant floods, as measured at Stuart Highway gauging stations	9-450
Table 9-11 Sinuosity estimates for study reaches	9-463
Table 9-12: Thresholds for movement of study channel sediments	9-466
Table 9-13 Estimated flood flow rates at the Hugh and Finke Rivers	9-473
Table 9-14 Summary of site characteristics	9-475
Table 9-15 Chandler Haul Road flood risk – 100-year ARI	9-487
Table 9-16 Mitigation and management measures (surface water)	9-491
Table 9-17 Summary of surface water risk assessment	9-497
Table 10-1 Summary of transects surveyed	10-502
Table 10-2 Summary description and distribution of land systems within the proposed development footprint	10-506
Table 10-3 Summary of archaeological material recorded within the area of the proposed Chandler Facility	10-512
Table 10-4 Summary of archaeological material recorded within the area of the proposed Apirnta Facility	10-518
Table 10-5 Summary of archaeological material recorded within the area of the proposed Chandler Haul Road	10-518
Table 10-6 Summary of archaeological material recorded within the area of the proposed Henbury Access Road	10-523
Table 10-7 Mitigation and management measures (cultural heritage)	10-551
Table 10-8 Summary of risk assessment (historic and cultural heritage)	10-553
Table 11-1 Potential hazards and associated risks during all phases of the Proposal	11-556
Table 11-2 Mitigation and management measures (human health and safety)	11-557
Table 11-3 Summary of risk assessment (human health and safety)	11-562
Table 12-1 Population estimates	12-568
Table 12-2 Population and population growth estimates	12-570
Table 12-3 Health care services in the vicinity of the Proposal	12-585
Table 12-4 Rates of offending per 100,000 population by crime (Darwin and Alice Springs)	12-587
Table 12-5 Key financial assumptions for the Proposal	12-588
Table 12-6 Key employment assumptions for the Proposal	12-590
Table 12-7 Projected cumulative change in gross product or real economic output	12-592
Table 12-8 Projected cumulative change in real income	12-593
Table 12-9 Direct and indirect job creation (construction and operation)	12-596
Table 12-10 Cumulative projected change in real government tax revenues, relative to the reference case (A\$ Million)	12-597
Table 12-11 Mitigation and management measures (economic and social)	12-604
Table 12-12 Summary of risk assessment (economic and social)	12-606
Table 13-1 Guiding rehabilitation principals	13-610



Table 13-2 Mitigation and management measures (closure and rehabilitation)	13-618
Table 13-3 Summary of risk assessment (closure and rehabilitation)	13-620
Table 14-1 Observed temperatures - Chandler – 5 November 2015 to 31 July 2016	14-625
Table 14-2 Mitigation and management measures (bushfire)	14-632
Table 14-3 Preliminary asset protection zone (setbacks)	14-632
Table 14-4 Summary of risk assessment (bushfire)	14-633
Table 15-1 Structure of air quality risk assessment	15-636
Table 15-2 Definition of accident likelihood (Parts B, C and D)	15-638
Table 15-3 Population dense locations in the vicinity of the Proposal (ABS 2011)	15-639
Table 15-4 Discrete sensitive receptor locations used in the air quality risk assessment	15-641
Table 15-5 Assumed background concentrations for the air quality risk assessment	15-643
Table 15-6 Darwin air quality compliance with NEMP criteria (2015)	15-644
Table 15-7 Details of the meteorological monitoring surrounding the Proposal	15-645
Table 15-8 Pre-mitigated operational phase risk criteria	15-647
Table 15-9 Worst case pre-mitigated risks	15-648
Table 15-10 Transport infrastructure and potential loss of containment risks	15-648
Table 15-11 Mitigation and management measures (air quality)	15-649
Table 15-12 Post mitigation operational phase risks	15-652
Table 15-14 Worst case post mitigated risks	15-653
Table 15-15 Loss of containment risk from transportation infrastructure	15-653
Table 15-15 Summary of risk assessment (air quality)	15-655
Table 16-1 Vibration limits for cosmetic damage (BS7385.2)	16-657
Table 16-2 Mitigation and management measures (noise and vibration)	16-663
Table 16-3 Summary of risk assessment (noise and vibration)	16-664
Table 17-1 Visual quality assessment of landscape types within the proposed development footprint and vicinity	17-674
Table 17-3 Summary of risk assessment (visual)	17-684
Table 17-2 Mitigation and management measures (landscape and visual amenity)	17-685
Table 18-1 Mitigation and management measures (public health and food)	18-691
Table 18-2 Species of mosquitos likely to occur within the proposed development footprint or vicinity	18-695
Table 18-3 Mitigation and management measures (biting insects)	18-696
Table 18-4 Mitigation and management measures (greenhouse gases)	18-698
Table 18-5 Baseline road traffic volumes along the Stuart and Barkly Highways	18-702
Table 18-6 Mitigation and management measures (traffic and transportation)	18-710
Table 19-1 Major projects in progress or proposed in the vicinity of Alice Springs (including the Proposal)	19-713
Table 20-1 Collation of mitigation and management measures for the Proposal	20-721
Table 22-1 Challenges and opportunities in the salt market	22-761
Table 22-2 Challenges and opportunities in the waste market	22-763



List of Plates

Plate 2-1 Tellus has supported indigenous jobs during the development of the EIS and would continue to support indigenous employment through the construction, operation, and closure and rehabilitation of the Proposal.	
Plate 2-2 Tellus would continue to support the local community through construction and operation of the Proposal.....	
Plate 3-1 Cores from mining horizon	3-87
Plate 3-2 Example of continuous miner excavating rooms in a salt mine	
Plate 3-3 Product salt stored in bulk bags.....	
Plate 3-4 Container types that would be used for storage, disposal and isolation at the Chandler Facility	
Plate 3-5 Pyramid stacking of waste packages	
Plate 3-6 Salt backfill sprayer placing fine salt around waste packages.....	
Plate 3-7 Example of simple single-skin wall seal in geological repository in Germany.....	
Plate 3-8 Control room of typical hydraulic backfill plant.....	3-132
Plate 3-9 Typical underground hydraulic backfill.....	3-132
Plate 3-10 Example high-bay stacking of wood pallets.....	3-164
Plate 3-11 Example of emergency shower and eye wash station	3-164
Plate 3-12 Example of spill kit.....	3-164
Plate 3-13 Example of rainwater tank	3-168
Plate 3-14 Example of vehicle wash down facility.....	3-168
Plate 5-1 Site visit with traditional owners.....	5-232
Plate 7-1 Dunefield habitat	
Plate 7-2 Sandplain habitat (left) and sandplain with watercourses (right).....	7-314
Plate 7-3 Low mesa terrain habitat (left) and high mesa terrain habitat (right)	7-316
Plate 7-4 Riverine dune/river habitat	
Plate 7-5 Prominent hill and low range habitat.....	
Plate 7-6 Alluvial plain habitat	
Plate 7-7 Claypan habitat	
Plate 7-8 Plains habitat	
Plate 7-9 Creekline/drainage depression habitat dominated by mulga (<i>Acacia aneura</i>)	
Plate 7-10 Coolabah lignum swamp habitat	7-321
Plate 7-11 Southern marsupial mole backfilled tunnels in a mole trench on the bank of the Finke River	
Plate 9-1 View south-west toward the Maryvale Hills and Charlotte Range from the proposed Chandler Facility.....	9-434
Plate 9-2 Trioda basedowii Plate 9-3 <i>Acacia aneura</i>	9-437
Plate 9-4 Snake Gully colluvial zone and deeply incised gully	9-455
Plate 9-5 Mary's Creek – note the alluvial sands, defined embankment and riparian vegetation .	9-456
Plate 9-6 Finke River in-stream habitat and pool areas laden with fine alluvial sediment deposition .	9-468
Plate 9-7 Evidence of large woody debris within Halfway Creek	9-469



Plate 9-8 Evidence of historic high velocity flow events in Halfway Creek.....	
Plate 10-1 Section of Rumbalara land system	
Plate 10-2 Section of Angas land system, west of the Finke River	
Plate 10-3 Retouched/grinding implement, ground and pitted surface (left), other side (middle), retouch/use-wear along edges (right)	10-511
Plate 10-4 Broken unifacially retouched flake, possibly a broken unifacial point, dorsal (left) and bulbar (right) surfaces.....	10-511
Plate 13-1 Graphical representation of surface monument.....	
Plate 14-1 Evidence of past bushfire and regrowth of juvenile mulga in the foreground	
Plate 14-2 Shrubs in the background scared by bushfire and understorey regrowth in the foreground	
Plate 14-3 Spinifex grass within the proposed accommodation village.	
Plate 17-1 Existing view looking south-west towards the proposed accommodation village	
Plate 17-2 Existing view looking south from the proposed accommodation village towards the proposed Chandler Facility– visible on the horizon are Maryvale Hills.....	
Plate 17-3 Existing view looking north-west from the proposed accommodation village – visible in the distance is Charlotte Range	
Plate 17-6 Existing view looking south-west from the proposed Chandler Facility towards Chambers Pillar.	
Plate 17-7 View east from Chambers Pillar towards the proposed Chandler Facility and Apirnta Facility	
Plate 17-8 View looking east towards the proposed Apirnta Facility.....	
Plate 17-12 Typical clump of spinifex within the proposed development footprint.....	
Plate 17-11 Example of mesa formations and contrasting colours at Chambers Pillar.....	
Plate 17-13 Graphical representation of proposed above ground infrastructure within the mine infrastructure area (Chandler Facility).....	
Plate 17-14 Graphical representation of proposed above ground infrastructure at the Apirnta Facility.	
Plate 18-1 Maryvale Road.....	
Plate 18-2 Chambers Pillar Road (in the vicinity of where the proposed Chandler Haul Road would cross Chambers Pillar Road.....	
Plate 18-3 The Stuart Highway (in the vicinity of the proposed T-intersection at Henbury Access Road).....	
Plate 18-4 The Central Australian Railway (in the vicinity of the proposed Apirnta Facility).....	
Plate 21-1 Tellus has supported indigenous jobs during the development of the EIS and would continue to support indigenous employment through the construction, operation, and closure and rehabilitation of the Proposal.	
Plate 21-2 Tellus would continue to support the local community through construction and operation of the Proposal.	