CHAPTER 12

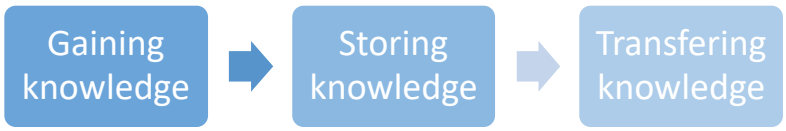
Management of Rehabilitation and Closure Knowledge

1. Introduction

There are three distinct stages of data management throughout the project life. To begin with, ENGIE Hazelwood must set out on a journey of acquiring knowledge, that is to establish a knowledge base that informs individual elements of the DMRP. The gaining of knowledge will continue throughout the life of the project.

The second stage relates to the storage of knowledge, such that it can be used by a range of stakeholders at various phases of the project life.

The third stage is the transfer of knowledge either at relinquishment or in instances where the commercial entity owning or managing the site, either before or after relinquishment, changes. While ENGIE Hazelwood will initially store all relevant knowledge, at some stage it will cease to operate, and therefore arrangements should be made to transfer to the appropriate agency, for instance the Mine Land Rehabilitation Authority (MLRA).



2. Gaining knowledge

2.1 APPROACH TO TECHNICAL STUDIES

Since the early 2000s ENGIE Hazelwood has undertaken many technical studies resulting in over 150 technical reports that support the rehabilitation planning for the Mine.

A list of reports undertaken, as well as what areas of knowledge the report addresses, is provided in Table 12.2 at the conclusion of this chapter. While many of these reports have been superseded, the overview this provides is useful context of the long-term engagement, scientifically and technically, on the rehabilitation subject matter.

As part of the HRP EES, an additional 16 detailed technical studies were undertaken to understand the potential impacts of the project to the environment and to encapsulate all relevant matters to concluding that the RL+45M preferred concept was appropriate to progress. Hence, these studies summarise all information crucial to the rehabilitation concept of the pit lake at RL+45m and build on past studies shared during earlier approval processes. Those 16 studies are summarised further in Table 12.1 below.

The ongoing technical information will be managed by ENGIE Hazelwood up until a point when agreed between the parties in preparation for land transfers and / or license relinquishment. Information on site will be managed through an accessible data management platform.

Table 12.1– Table of EES technical reports

REPORT ID	TITLE	AUTHOR	SUMMARY
A	Climate Change	ARUP	Provides the settings and criteria for climate scenarios in the assessment of all technical studies. Information on current and future climate projections in the Project area.
B	Water Resource Use and Regulation	ARUP	A review of the regulatory settings that exist for the Project currently with regard to surface and groundwater use and the relationship to the new Project requirements.
C	Water Balance and Water Quality	RGS	Detailed analysis including modelling of the water quality within the proposed pit lake for the Project scenarios. Includes geochemical and water quality parameters including assessment of the HARA.
D	Catchments, Rivers and Wetlands	Alluvium	Provides a detailed review of the surface water resource requirements and any impacts on the local catchment including downstream flow requirements in RAMSAR wetland assessment.
E	Groundwater	ERM	Detailed modelling of the groundwater conditions under the Project scenarios. Assessment of aquifer pressures, recovery, impacts to water quality on groundwater dependant ecosystems both locally and regionally.
F	Land and Solid Waste	ERM	An overview of the existing regulatory context for assessment of soils for contamination and acid sulphate potential. Provides review of the condition of the Project site soils, including the Hazelwood Cooling Pond. Acknowledgment of the existing audit and environmental action notice and their relationship to the EES.
G	Geotech	WSP	A detailed highly technical review of the site geotechnical conditions (batter stability, ground movement and other hazards) and necessary controls in place to ensure a safe, stable and sustainable Project outcome. Assessment of the current mine licence conditions including references to weight balance (separate report) and groundwater induced rebound.
H	Ecology	AECOM	Provides an assessment including flora and fauna field surveys of the existing conditions relating to Ecology on the Project site. Review of the regulatory framework for protected species at a State and Commonwealth (EPBC) level on the potential impact to such values form the Project scenarios.
I	Aboriginal Cultural Heritage	Alan Long & Assoc.	A detailed review of the aboriginal cultural heritage that has existed pre mining and post mining. The Project impacts on these existing cultural conditions are assessed from an impact perspective in this technical report.
J	Historical Heritage	JEM Archaeology	Provides a details review of the historical heritage scene that has existing pre mining and post mining. The Project impacts on these existing conditions are assessed from an impact perspective in this technical report.
K	Air Quality	AECOM	A review of the any potential changes to air quality from the Project baseline from the use of heavy machinery or earth moving equipment and their potential impact the surrounding environment.
L	Noise and Vibration	AECOM	Impact from construction relating to noise and vibration are assessed in this technical report. They are assessed from the Project baseline and largely involve the use earth moving equipment.
M	Landscape and Visual	Hansen	The Project's final landform may materially change the landscape and current surrounding uses. This report assesses the impact, both positive and negative, that the Project's final landform may have in the amenity in the local area.
N	Land Use	AECOM	The Projects final landform may materially change the landscape and current surrounding uses. This report assesses the impact both positive and negative the Project final landform may have.
O	Socio-economic	ARUP	A look at the socio-economic environment and changes that may arise due to the Project being implemented.
P	Mine Fire Risk	ARUP	Detailed review of fire risk scenarios, the regulatory framework for managing them and the Project mine fire risk.
Q	Transport	AECOM	Assessment of potential impacts from additional vehicle movements associated with the Project. Focus on heavy vehicles within the local road network.
	ADDITIONAL REPORTS		
	Hazelwood Mine Closure: Assessment of Landform & Water Supply Alternatives	Niboi Consulting	An assessment of alternative landforms undertaken using a multi criteria analysis approach to recommend landforms to proceed for further assessment in the EES. Landforms assessed included full backfill, alternative water supplies (incl desal and seawater), partial lake levels and full pit lakes.
	Modelling Assumptions for Groundwater and Surface Water Assessments	ERM	The baseline report presented a range of Modelling Assumptions for Groundwater and Surface Water Assessments that represented the current starting point for the full EES assessment. Conditions presented included groundwater, climate and geotechnical assumptions both locally and regionally.
	Hazelwood Mine: Geotechnical Assessment of Lake Levels	CMQ Geotechnics	This report identifies several alternate pit lake filling levels and assesses these against geotechnical and hydrogeological conditions (including weight balance) to understand the constraints and risks for each level.
	Consultation Report	Nation Partners	Presents the scope and methods for undertaking engagement and consultation in relation to the EES. It also demonstrates how feedback was received, considered and incorporated in the assessment process for the EES.

3. Knowledge Base

The Mine has been operating since 1955 and has a significant knowledge base. The knowledge base provides a record of experience for geotechnical, environmental, fire and safety issues learnt in developing, operating and rehabilitating the Hazelwood coal mine. This is supplemented by regional and global experience from other local and overseas coal mines. These experiences have been applied to the planned activities proposed in this DMRP.

The knowledge base provides data on the technical studies that have been undertaken by ENGIE Hazelwood and other technical experts to:

- further the understanding of specific issues and risks;
- provide information that allows for the assessment of risks;
- inform the response to provide adequate mitigation and controls of risk; and
- assist in developing the mitigation methods, performance monitoring and assessment of controls.

These activities assist in demonstrating that the principles of safe, stable, non-polluting and sustainable are achieved.

The process of growing ENGIE Hazelwood's knowledge base in relation to rehabilitation of the site will continue to evolve over time. As the site gets closer to completion of the active rehabilitation phase, the level of specificity and detail in relation to knowledge will become more critical to the development of detailed design plans for closure, the establishment of management and implementation plans, the finalisation of post mining land uses and the evolution of SMART completion criteria.

ENGIE Hazelwood will continue to engage relevant technical experts throughout these activities to inform decision making.

4. Storing knowledge

4.1 OVERALL INFORMATION MANAGEMENT PRINCIPLES

Key datasets in relation to rehabilitation are to be centrally stored to provide retention and transparency of corporate knowledge. ENGIE's chief mining information management platform is secure electronic databases paired with purpose appropriate applications. Key datasets either reside in or are in the process of migrating to this platform.

Information systems are to be secure and robust. Cyber security standards are applied to limit access to Administrative Managers, with configuration rights, or Managers, with standard data entry and reporting access.

Information is to be actively managed. Discipline leads within the Mine Technical Services group are responsible for data capture and integrity. The Senior Geotechnical Engineer role within the Mine Technical Services group is responsible for information management and system maintenance.

Where possible technology is to be adopted and utilised to improve information availability and reliability. Recent examples include the adoption of telemetry to automate data entry, data loggers for piezometers facilitating continuous 12 hourly readings, prisms facilitating monthly ground movement surveys, drone-based survey mapping, implementation of a continuous GNSS based ground movement monitoring system and Citect business critical real time monitoring. In addition to this, given the move to a more adaptive / real time data capture focusing on a number of additional units have also been purchased and installed with associated telemetry which allows a significant amount of key monitoring information to be read via Citect in the Ground Stability Dashboard.

Information is to be readily accessible to users, particularly in relation to trigger action response plans (TARPs). Application users are able to report from these systems. Custom reporting tools can be used to show ground water levels, rainfall and ground movement against TARPs. Key information on more critical areas is also now reporting and visible via Citect. ENGIE information management approach is accredited under ISO 9001.

4.2 MANAGEMENT OF REHABILITATION AND CLOSURE KNOWLEDGE

Management of data and records that continually inform the knowledge base for closure planning is essential. High quality, user friendly, systems and processes that record site data and maintain records ensure the current planning status is well understood and can allow information to be promptly updated as the knowledge base informing closure increases. For this reason, ENGIE Hazelwood has several record management systems and processes which will ensure a robust approach is applied to the management of this knowledge which are an extension of existing site systems.

ENGIE Hazelwood uses quality assured management systems to coordinate and track a variety of rehabilitation and closure specific information. This is inclusive of compliance documents such as MIN5004 licence conditions that specify rehabilitation requirements, internal reports, plans, Standard Operating Procedures (SOP's), technical documents, calibration records, laboratory data and reports, field monitoring databases, engineering designs and spatial databases.

This information is stored using a variety of systems, including:

- the Archival Data System (ADS), containing historical records of the operational history of Hazelwood Mine where the site was operated by the SECV;
- Hewlett Packard Content Manager (HPCM), containing all historical licences and technical reports;
- Earth Science Data Management System (ESdat) database, containing all current and historical environmental data
- Paradigm, ENGIE Hazelwood's primary document control system, containing policies, procedures, plans and instructions;
- Drawing Register, containing all engineering design drawings associated with the construction, operation and closure of the site;
- Engineering Designs, containing engineering designs for all engineering works; and
- Geographic Information System (GIS), containing all the survey, geotechnical and hydrogeological monitoring data at Hazelwood Mine.

A brief summary of the record management and document control systems used to manage information relating to closure planning is provided below.

4.3 ARCHIVAL DATA SYSTEM (ADS)

The ADS is a system used to manage the long-term retention and record-keeping of archives no longer being actively used. This enables access to important information and ensures data is available for future reference. This system mostly comprises hard copy records, filed in storage locations either onsite and / or in the Government records management system. This system can be used as a source of reference to historical information relating to Hazelwood Mine. Since the HP CM system was adopted, filing of documents into this system ceased.

4.4 HEWLETT PACKARD CONTENT MANAGER (HP CM)

The HP CM program is a document and records management system that captures, manages and secures information for ENGIE Hazelwood's business to ensure adherence to their internal document control processes and procedures. This data management system is the primary system used by ENGIE Hazelwood for record and data management of closure planning information, except for stakeholder engagement records, SOPs and other site plans / forms, engineering drawings, spatial data and engineering designs. The HP CM is mainly used for the storage of records relating to key technical studies (e.g. seismic, geotechnical, hydrogeology assessments), legal obligation documents (e.g. licences, compliance report records) and other scientific reports (e.g. revegetation records, topsoil characterisation results).

4.5 EARTH SCIENCE DATA MANAGEMENT SYSTEM (ESDAT)

ESdat is used to manage environmental monitoring data (e.g. surface water, air quality etc.) with specialisation in the validation, analysis and reporting on broad ranges of environmental data in a variety of forms including tables, graphs and maps. The ESdat system is also used to store historical environmental data used to inform the DMRP and the closure planning process.

4.6 PARADIGM

Paradigm software manages and controls documents created in any Microsoft Office application. It is the primary document control system where policies, procedures, plans and instructions are managed. Paradigm software is a compliance management system designed around the requirements of International Organisation for Standardisation (ISO) 9001.The software is used by to manage documents including, but not limited to, SOPs, Inspection Forms and other operational documents / checklists, management plans (e.g. Emergency Response Plan, Fire Readiness Guideline Planning) and technical plans (e.g. horizontal bore designs).

4.7 DRAWING REGISTER

Hazelwood Mine's Drawing Register is used for the storage and referencing of all engineering design drawings associated with the construction, operation and closure of the site. Further descriptions and examples of the information contained in the drawing register, specifically in relation to closure, are outlined below.

4.8 ENGINEERING DESIGNS

Engineering designs are developed for closure planning to provide pragmatic and constructible solutions to potential problems / challenges through development of functional products and processes. Engineering designs are integral to the closure planning process and verification of the overall design of the post relinquishment landform. Engineering designs, along with the drawing register, form an integral part in the quality assurance / quality control (QA/QC) process ensuring verification of each phase from design criteria, construction and as-builts. Examples of engineering designs include (but are not limited to) the design of the shoreline for the pit lake, pit batter design profiles, cover designs and surface water management structures.

4.9 GEOGRAPHICAL INFORMATION SYSTEM (GIS)

Hazelwood Mine's GIS is used to create maps that clearly represent spatial or geographic data and demonstrates how different sets of data relate to one another. This may involve capturing, manipulating and analysing data before storing it in an appropriate format in the system, for future use on other aspects or technical studies associated with Hazelwood Mine. ENGIE Hazelwood uses figures generated through the application of GIS to visually represent the site, its features, overlaid with results from technical studies informing the DMRP e.g. Closure Domains, sensitive receptor locations, infrastructure locations etc.

The GIS also stores all the survey, geotechnical and hydrogeological monitoring data at Hazelwood. The system has been designed so that piezometers, standpipes, pump bore flow data, horizontal bore network data and survey pin / prism data is all stored in a singular data platform that allows for the easy generation of reports, trends and tracking against critical Trigger Action Response Plans (TARPs).

4.10 SYSTEM COMPLIANCE AND UPDATES

In early 2019, ENGIE Hazelwood rolled out a refurbished document management structure in an updated HP CM package. The updated structure complies with internal policy which sets out to achieve and maintain standards equivalent to that of ISO 9001, ISO 14001 and Australian Standard (AS) 4801. Documentation in the systems detailed above are stored on the Hazelwood Mine server and are backed up through standard practices. To ensure they are fulfilling the requirements of ENGIE Hazelwood's standards and procedures, internal plans and SOPs are reviewed every few years or more frequently as and when required. Additionally, Paradigm allows for controlled access to ensure the distribution, preservation and version control of documents is adequately maintained.

The document management structure implemented at the site allows for rigorous management and control over site information to safeguard the integrity of the documents and datasets. ENGIE Hazelwood will continue to collect, store and manage site rehabilitation and closure data which will be retained. ENGIE Hazelwood will engage with the ERR to determine any requirements for the release of documents and information that may be applicable at relinquishment of MIN5004.

4.11 CONSTRUCTION AND REHABILITATION QUALITY ASSURANCE / QUALITY CONTROL

QA / QC processes are implemented specifically to suit a variety of closure activities associated with the Hazelwood Mine. The purpose of the processes is to ensure implementation of closure designs and plans are overseen, rigorously checked and verified during the construction and / or rehabilitation works planning and execution phases. As technical studies and closure planning progress, ENGIE Hazelwood will further refine the detail in the verification process of collecting, testing and assessing materials to provide documentary evidence that closure plans and designs have been implemented as per the specifications. Examples of this include the assessment of materials available for use as capping or growth media on pit areas, QA / QC processes to inform completion criteria, validation processes for ground and surface water model source terms / data.

5. Transferring data/knowledge

There is an obligation on ENGIE Hazelwood to develop an understanding of how data/ knowledge will be transferred to the next land managers (see DMR Regulations (section 64F)). It is proposed additional details are to be provided to the Regulator on an annual basis given likely issue evolution.

It is expected the ENGIE Hazelwood will provide future land managers with a summary of the activities relevant to each domain including:

- summary of activities that have been undertaken in each domain;
- what the design criteria were and how this relates to future land use alternatives; and
- the intent behind post closure monitoring and maintenance activities.

Table 12.2– Technical reports and key area of knowledge

NO.	TECHNICAL STUDY	PIT LAKE				SURFACE WATER & GROUNDWATER						GEOTECH					OTHER							
		PIT LAKE WATER QUALITY	FILL METHODOLOGY	WAVE ACTION MODELLING	CLOSURE WATER BALANCE	WATER SUPPLY SOURCES	HYDROGEOLOGICAL MODELLING	SURFACE WATER CATCHMENT &/OR FLOOD MODELLING	SURFACE WATER DESIGN	BATTER STABILITY ASSESSMENT	GROUNDWATER QUALITY ASSESSMENT	CLAY SURCHARGE DESIGN	GROUND MOVEMENT FROM AQUIFER RECHARGE	STABILITY ASSESSMENTS	BATTER STABILITY	GROUND MOVEMENT	MOVEMENT AND MODELLING RISK MAPS	COVER DESIGN	EROSION ASSESSMENT	LANDFORM STABILITY	FLORA & FAUNA (INC AQUATIC)	LAND USE	FIRE RISK
1	Drilling Supervision and Sample Collection Factual Report (FSC Environmental 2019)	✓			✓																			
2	M1 Clay Characterization Investigation Programme Sample Selection and Testing (GHD 2017a)											✓		✓	✓	✓	✓							
3	Hazelwood Mine Rehabilitation Geotechnical Study: Review of SECV era and recent horizontal movement reports (GHD 2017c)													✓			✓							
4	Hazelwood Mine Rehabilitation Geotechnical Study: Regional Ground Movement after Mine Closure (GHD 2019)						✓						✓				✓							
5	Hazelwood Mine Stability Review (Phase 1) (Golder Associates 2017a)													✓	✓		✓							
6	Regional Monitoring Committee Latrobe Valley Regional Groundwater and Land Level Monitoring Report - Annual Report July 2017 to June 2018 (GHD 2018h)										✓				✓		✓							
7	Review of baseline data on water resources in the Latrobe Valley - A component of Stage 2 of the Regional Latrobe Valley Rehabilitation Strategy (DELWP 2017)					✓															✓			
8	Water Resource Modelling - Decision Paper #1 - Climate Data, Phase 1 (Draft) (LVRWS 2019)					✓																		
9	Water Resource Modelling - Decision Paper #2 - Objectives and Scenarios, Phase 1 (Draft) (LVRWS 2019b)					✓																		
10	Literature Review of Pit Lake Triggered Seismicity (SMEC 2017)													✓										
11	IMRG Report and Presentation - Stability Issues and Solutions for Mine Rehabilitation (Draft) (GHD 2017d)												✓	✓	✓									

5. TRANSFERRING DATA/KNOWLEDGE

NO.	TECHNICAL STUDY	PIT LAKE					SURFACE WATER & GROUNDWATER					GEOTECH					OTHER								
		PIT LAKE WATER QUALITY	FILL METHODOLOGY	WAVE ACTION MODELLING	CLOSURE WATER BALANCE	WATER SUPPLY SOURCES	HYDROGEOLOGICAL MODELLING	SURFACE WATER CATCHMENT &/OR FLOOD MODELLING	SURFACE WATER DESIGN	BATTER STABILITY ASSESSMENT	GROUNDWATER QUALITY ASSESSMENT	CLAY SURCHARGE DESIGN	GROUND MOVEMENT FROM AQUIFER RECHARGE	STABILITY ASSESSMENTS	BATTER STABILITY	GROUND MOVEMENT	MOVEMENT AND MODELLING RISK MAPS	COVER DESIGN	EROSION ASSESSMENT	LANDFORM STABILITY	FLORA & FAUNA (INC AQUATIC)	LAND USE	FIRE RISK
12	Prediction of Water Quality in Flooded Open Cut Brown Coal Mines in Victoria (HRL 2000)	✓																					
13	Industry Practice Review - Pit lake closure as riverine flow-through systems (MLC 2017)	✓			✓									✓									
14	Hazelwood Power Station and Mine - Yallourn North Open Cut Environmental Study (MLC 2019)	✓			✓																		
15	Assessment of Vegetation Cover Levels, Hazelwood Mine (Landloch 2018a)													✓	✓				✓	✓			
16	Ground Control Management Plan (ENGIE 2019a)						✓					✓	✓	✓	✓		✓						
17	Initial consideration of batter slope options, Hazelwood Mine (Landloch 2018d)													✓	✓				✓	✓			
18	Review of batter slope design options - Stage 2 (Landloch 2018b)													✓	✓				✓	✓			
19	Guidelines for batter slope construction, Hazelwood Mine (Landloch 2018c)																		✓	✓			
20	Batter Stability Assessment of West Field Western Batters and North Field Northern Batters using Probabilistic and Three Dimensional Modelling Methods (GHD 2019e)														✓								
21	Batter Stability Assessment of South West Field Northern Batters using Probabilistic and Three Dimensional Modelling Methods (GHD 2019f)														✓								
22	Batter Stability Assessment of East Field Eastern Batters using Probabilistic and Three Dimensional Modelling Methods (GHD 2018i)														✓								
23	Batter Stability Assessment of South East Field Western and South East Field Southern Batters using Probabilistic and Three Dimensional Modelling Methods (GHD 2019d)														✓								
24	Batter Stability Assessment of West Field Southern Batters using Probabilistic and Three Dimensional Modelling Methods (GHD 2018j)														✓								
25	Batter Stability Assessment of East Field Northern Batters using Probabilistic and Three Dimensional Modelling Methods (GHD 2018k)														✓								
26	Hazelwood Mine - Independent Review of GHD Report on Stability of WFWB and NFNB (Golder Associates 2019c)														✓								
27	Hazelwood Mine - Independent Review of GHD Report on Stability of South West Field Northern Batters (Golder Associates 2019d)														✓								
28	Hazelwood Mine - Independent Review of GHD Report on Stability of East Field Eastern Batters (EFEB) (Golder Associates 2018b)														✓								
29	Hazelwood Mine - Independent Review of GHD Report on Stability of SEFSB and SEFWB (Golder Associates 2019e)														✓								

5. TRANSFERRING DATA/KNOWLEDGE

NO.	TECHNICAL STUDY	PIT LAKE					SURFACE WATER & GROUNDWATER						GEOTECH				OTHER							
		PIT LAKE WATER QUALITY	FILL METHODOLOGY	WAVE ACTION MODELLING	CLOSURE WATER BALANCE	WATER SUPPLY SOURCES	HYDROGEOLOGICAL MODELLING	SURFACE WATER CATCHMENT &/OR FLOOD MODELLING	SURFACE WATER DESIGN	BATTER STABILITY ASSESSMENT	GROUNDWATER QUALITY ASSESSMENT	CLAY SURCHARGE DESIGN	GROUND MOVEMENT FROM AQUIFER RECHARGE	STABILITY ASSESSMENTS	BATTER STABILITY	GROUND MOVEMENT	MOVEMENT AND MODELLING RISK MAPS	COVER DESIGN	EROSION ASSESSMENT	LANDFORM STABILITY	FLORA & FAUNA (INC AQUATIC)	LAND USE	FIRE RISK
30	Hazelwood Mine - Independent Review of GHD Report on Stability of West Field Southern Batters (WFSB) (Golder Associates 2018c)														✓									
31	Hazelwood Mine - Independent Review of GHD Report on Stability of East Field Northern Batters (EFNB) (Golder Associates 2018d)														✓									
32	Hazelwood Ash Retaining Embankment (HARE) Post Closure Study (GHD 2018n)													✓				✓						
33	Foreshore erosion protection for Hazelwood Pit Lake: Assessment and functional design (Alluvium 2019c)			✓															✓					
34	Shoreline erosion modelling (MLC 2018)			✓															✓					
35	Batter Capping Material Sampling and Assessment Procedure including Existing Rehabilitation, Batters to be Reprofiled and Fire-holes (Landloch 2019g)																			✓		✓	✓
36	Hazelwood Surface Water Assessment - Catchment Review Memo (Alluvium 2019a)							✓	✓														
37	RGS response to Alluvium Catchment Review – Memo (RGS 2019c)							✓															
38	Conceptual Hydrogeological Model (GHD 2018a)						✓						✓										
39	Hazelwood Mine Closure Modelling Updated Groundwater Model Outputs of Future Scenarios (GHD 2019a)						✓						✓										
40	Hazelwood Mine HARA 2018 Groundwater Monitoring Report (GHD 2019g)										✓												
41	Hazelwood Mine Closure Modelling Groundwater Model Design and Construction (GHD 2018l)						✓																
42	Hazelwood Groundwater Modelling Report (GHD 2015)						✓																
43	M1 and M2 Aquifer Groundwater Quality Review 2016 – 2019 (GHD 2018g)										✓												
44	Hazelwood Mine Ground Movement Risk Assessment (Golder Associates 2019a) (Phase 2)												✓				✓						
45	Mine Ground Movement Risk Assessment – Peer Review (Coffey 2019a)												✓	✓			✓						
46	Mine Ground Movement Risk Assessment (Phase 3) (Golder Associates 2019b)												✓	✓			✓						
47	Peer Review - Mine Ground Movement Risk Assessment (Temporal Conditions) (Coffey 2019b)												✓	✓			✓						
48	Hazelwood Coal Mine Geochemistry Review (RGS 2018a)	✓																					
49	Water Quality in the Hazelwood Mine Lake: Part I - Water and Salt Balances (PanTek Solutions 2003a)	✓																					

5. TRANSFERRING DATA/KNOWLEDGE

NO.	TECHNICAL STUDY	PIT LAKE					SURFACE WATER & GROUNDWATER						GEOTECH					OTHER						
		PIT LAKE WATER QUALITY	FILL METHODOLOGY	WAVE ACTION MODELLING	CLOSURE WATER BALANCE	WATER SUPPLY SOURCES	HYDROGEOLOGICAL MODELLING	SURFACE WATER CATCHMENT &/OR FLOOD MODELLING	SURFACE WATER DESIGN	BATTER STABILITY ASSESSMENT	GROUNDWATER QUALITY ASSESSMENT	CLAY SURCHARGE DESIGN	GROUND MOVEMENT FROM AQUIFER RECHARGE	STABILITY ASSESSMENTS	BATTER STABILITY	GROUND MOVEMENT	MOVEMENT AND MODELLING RISK MAPS	COVER DESIGN	EROSION ASSESSMENT	LANDFORM STABILITY	FLORA & FAUNA (INC AQUATIC)	LAND USE	FIRE RISK
50	Water Quality in the Hazelwood Mine Lake: Part II - Evaluation of the Potential of Ash Leachate Contamination (PanTek Solutions 2003b)	✓																					
51	Water Quality in the Hazelwood Mine Lake: Part III - Lake Circulation and Water Quality (PanTek Solutions 2003c)	✓																					
52	Hazelwood Coal Mine: Pit Water Body Conceptual Model (RGS 2019a)	✓			✓																		
53	Hazelwood Stage 3 Pit Water Body Modelling (RGS 2019d)	✓			✓																		
54	Hazelwood Stage 3B Pit Water Body Modelling (RGS 2019b)	✓			✓																		
55	RGS proposed approach to establishing climate database (RGS 2019e)				✓																		
56	Hazelwood Mine Closure: Mine Filling Water Supply Strategy (GHD 2018b)		✓																				
57	Mine Water Supply Connections (GHD 2018c)		✓																				
58	HAP 2A Capping Design (GHD 2018m)																	✓				✓	
59	Asbestos Landfill 3 Capping Design (GHD 2018e)																	✓				✓	
60	Hazelwood Rehabilitation Project, HAP 4 Landfill Cap Design Report (GHD 2019c)																	✓				✓	
61	HAP 4 Stabilising Berm Stability Analysis (GHD 2019k)													✓				✓					
62	Surface Stability and long-term erosion potential: results of a simulated rainfall study at Hazelwood Mine: (1) field data and WEPP Erodibility parameters (Landloch 2019d)							✓						✓					✓				
63	Surface stability and long term erosion potential: results of a simulated rainfall study at Hazelwood Mine: (2) WEPP input files, initial simulations, and derivation of SIBERIA parameters (Landloch 2019e)							✓						✓					✓				
64	Surface stability and long term erosion potential: results of a simulated rainfall at Hazelwood Mine: (3) SIBERIA simulations and interpretation of outputs (Landloch 2019f)							✓						✓					✓				
65	Hazelwood Mine surface water management design framework (Alluvium 2019b)								✓						✓								
66	AGL Loy Yang Mine Rehabilitation Research Project Annual Progress Report (AGL 2017)													✓	✓								
67	Offset Implementation Plan Mine West Field Project (Indigenous Design 2007)																				✓		
68	Landscape Function Analysis (LFA) Report on Mine Rehabilitation (Indigenous Design 2018)																				✓		

NO.	TECHNICAL STUDY	PIT LAKE					SURFACE WATER & GROUNDWATER						GEOTECH					OTHER						
		PIT LAKE WATER QUALITY	FILL METHODOLOGY	WAVE ACTION MODELLING	CLOSURE WATER BALANCE	WATER SUPPLY SOURCES	HYDROGEOLOGICAL MODELLING	SURFACE WATER CATCHMENT &/OR FLOOD MODELLING	SURFACE WATER DESIGN	BATTER STABILITY ASSESSMENT	GROUNDWATER QUALITY ASSESSMENT	CLAY SURCHARGE DESIGN	GROUND MOVEMENT FROM AQUIFER RECHARGE	STABILITY ASSESSMENTS	BATTER STABILITY	GROUND MOVEMENT	MOVEMENT AND MODELLING RISK MAPS	COVER DESIGN	EROSION ASSESSMENT	LANDFORM STABILITY	FLORA & FAUNA (INC AQUATIC)	LAND USE	FIRE RISK
69	Identification of final land use options and mine site closure domains for closure of Hazelwood Mine Site (Landloch 2018e)																					✓	
70	Preliminary Review of Land Capability for Rehabilitated Land - Hazelwood Mine (SGM 2019)																					✓	
71	Post relinquishment land use suitability assessment, Hazelwood Mine (Landloch 2019b)																					✓	
72	Hazelwood Mine Landform Drainage Modelling Memo (Iteration 1) (RGS 2018b)							✓							✓					✓			
73	Final Landform Design Modelling – Iteration 2 Memo Report (RGS 2019f)							✓							✓					✓			
74	Final Landform Design Modelling – Iteration 3 and 4 Memo Report (RGS 2019g)							✓							✓					✓			
75	Hazelwood Mine Ancillary Areas – Preliminary Site Investigation (ERM 2019a) (Draft)							✓														✓	
76	Fire Risk Management Plan (ENGIE 2019b)																						✓
77	Hazelwood Mine Rehabilitation Value Created Modelling (Lake Options Analysis) (GHD 2019h)																					✓	
78	Hazelwood Concept Master Plan (Arup 2019)																					✓	
79	Hazelwood Mine Closure Groundwater Modelling – Stage 1 Future Scenarios (GHD 2019b)												✓		✓								
80	Erosion Modelling to support closure criteria for years 1 to 7 (Stage 1) (Landloch 2019a)						✓													✓		✓	
81	Peer Review Letter – Groundwater Model, Hazelwood Mine Void Rehabilitation (ERM 2019b)						✓																
82	HAP4 Remedial Works Design Report (GHD 2019i)																	✓					
83	Hazelwood EOD and Ash Storage Rehabilitation Project, HAP4 Drainage, Design Basis Report (GHD 2019j)																	✓					
84	DRAFT Hazelwood Ash Retaining Embankment (HARE) – Review of Post Closure Study (Golder 2019f)													✓				✓					
85	M2 Aquifer Trigger Levels, Factors Affecting Required Lake Level (GHD, 1019)						✓																
86	Development of Rehabilitation Options (Hazelwood Ash Retention Area) (Golder, 2020)																	✓					
87	Hazelwood Mine Rehabilitation Batter Stability Assessment of RL -7 AHD Lake Level Report (GHD, 2020)													✓	✓	✓	✓						
88	Hazelwood Mine Probabilistic Slope Stability Modelling, Critical Sections at -7m RL Lake Fill Scenario (GHD, 2019)													✓	✓	✓	✓						

5. TRANSFERRING DATA/KNOWLEDGE

NO.	TECHNICAL STUDY	PIT LAKE					SURFACE WATER & GROUNDWATER					GEOTECH		OTHER									
		PIT LAKE WATER QUALITY	FILL METHODOLOGY	WAVE ACTION MODELLING	CLOSURE WATER BALANCE	WATER SUPPLY SOURCES	HYDROGEOLOGICAL MODELLING	SURFACE WATER CATCHMENT &/OR FLOOD MODELLING	SURFACE WATER DESIGN	BATTER STABILITY ASSESSMENT	GROUNDWATER QUALITY ASSESSMENT	CLAY SURCHARGE DESIGN	GROUND MOVEMENT FROM AQUIFER RECHARGE	STABILITY ASSESSMENTS	BATTER STABILITY	GROUND MOVEMENT	MOVEMENT AND MODELLING RISK MAPS	COVER DESIGN	EROSION ASSESSMENT	LANDFORM STABILITY	FLORA & FAUNA (INC AQUATIC)	LAND USE	FIRE RISK
89	Hazelwood Mine Rehabilitation, Batter Stability Assessment of Sections N8, N4, N43A and N32A at -7m RL Lake Level (GHD, 2020)													✓	✓	✓	✓						
90	Preliminary Ecological Assessment of the Hazelwood Mine Site (Indigenous Designs, 2020)																				✓		
91	Habitat and Avifauna Assessment, Hazelwood Mine, Rehabilitation Closure Plan – Stage 1 (Wildlife Experiences, 2020)																				✓		
92	Hazelwood Mine closure advice (Coffey, 2004)	✓	✓	✓	✓	✓																	
93	Hazelwood Stage 4 Pit Water Body Modelling (RGS, 2021)						✓	✓	✓														
94	M1 & M2 Aquifer Groundwater Quality: January 2022 to May 2023 Review (GHD, 2023)						✓	✓	✓	✓	✓												
95	Solute Transport Screening Modelling: Hazelwood Ash Retention Area (HARA) (Senversa, 2024)						✓	✓	✓	✓	✓							✓					
96	Environmental Audit: Mine Void - Part 2, Hazelwood Power (AECOM, 2024)						✓	✓	✓	✓	✓							✓					
97	Hazelwood Rehabilitation Project: Environmental Effects Statement Weight Balance Assessment (GHD, 2025)						✓	✓	✓	✓	✓	✓		✓	✓	✓	✓						
98	Hazelwood Mine 'Critical Pool' and 'Minimum' Lake Level Stability Assessment (GHD, 2024)											✓		✓	✓	✓	✓						
99	Ground Movement Risk Assessment Report (GHD, 2024)						✓	✓	✓	✓	✓												