Hera Resources Pty Limited
ABN: 72 138 992 999

Hera Mine – Modification 4
PA 10_0191

Environmental Assessment

April 2016

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1. INTRODUCTION

1.1 SCOPE

This *Environmental Assessment* has been prepared by Hera Resources Pty Limited (the Proponent) with the assistance of R.W. Corkery & Co. Pty. Limited (RWC) to support an application for a fourth modification to PA 10_0191 (the Proposed Modification). The Proposed Modification seeks to modify the project boundary to allow for the extraction of additional Mineral Resources recently identified to the North of the existing project boundary.

The application to modify PA 10_0191 is made under Section 75W of the *Environmental Planning and Assessment Act 1979* (EP&A Act), in accordance with the transitional arrangements of that Act associated with the repeal of Part 3A.

Figure 1 presents the location of the Mine, located approximately 100km southeast of Cobar in western New South Wales and approximately 4km south of the village of Nymagee. The Mine is located within Mining Lease (ML) 1686 (**Figure 2**). The extended project boundary and activities are shown in **Figure 3**.

The Proposed Modification seeks to modify the following component activities and operations at the Mine.

- The Project Site boundary.
- The area of operation of the underground mine.
- Allow for the installation of a further ventilation shaft by way of a fresh air intake raise.

The information contained within this *Environmental Assessment* relates specifically to those aspects of the Mine to be modified. Aspects of the Mine that would not be modified would continue to be undertaken in accordance with the terms of approval nominated by Condition 2 of Schedule 2 of PA 10_0191, i.e. in accordance with:

- the *Environmental Assessment* prepared by RWC for the Hera Project (RWC, 2011);
- the *Statement of Commitments* presented in Appendix 5 of PA 10_0191;
- the Conditions of PA 10_0191;
- Modification 1 and Modification 2, including supporting documentation identified in PA 10_0191; and
- Modification 3 (pending), including supporting documentation.

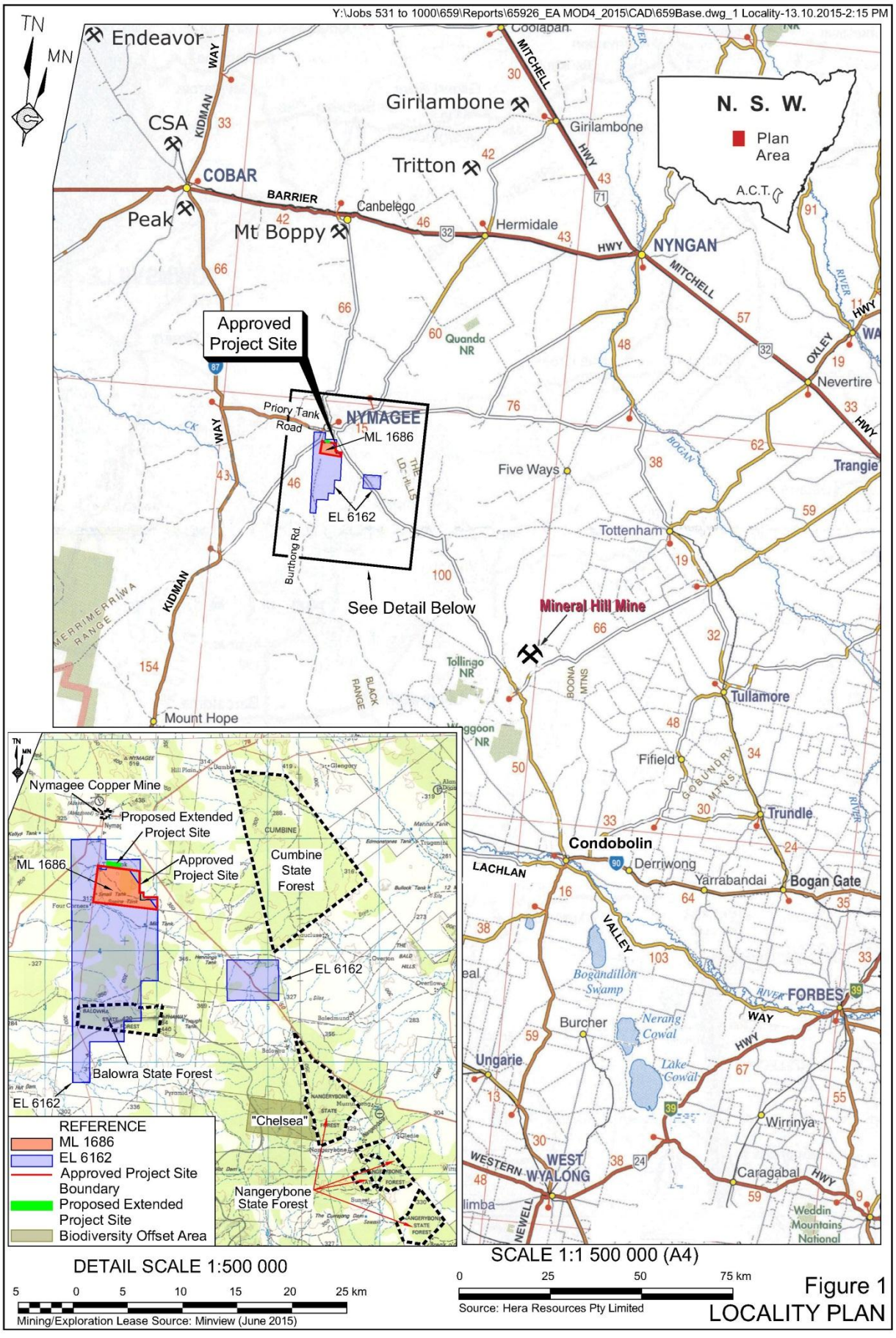

Figure 1
LOCALITY PLAN

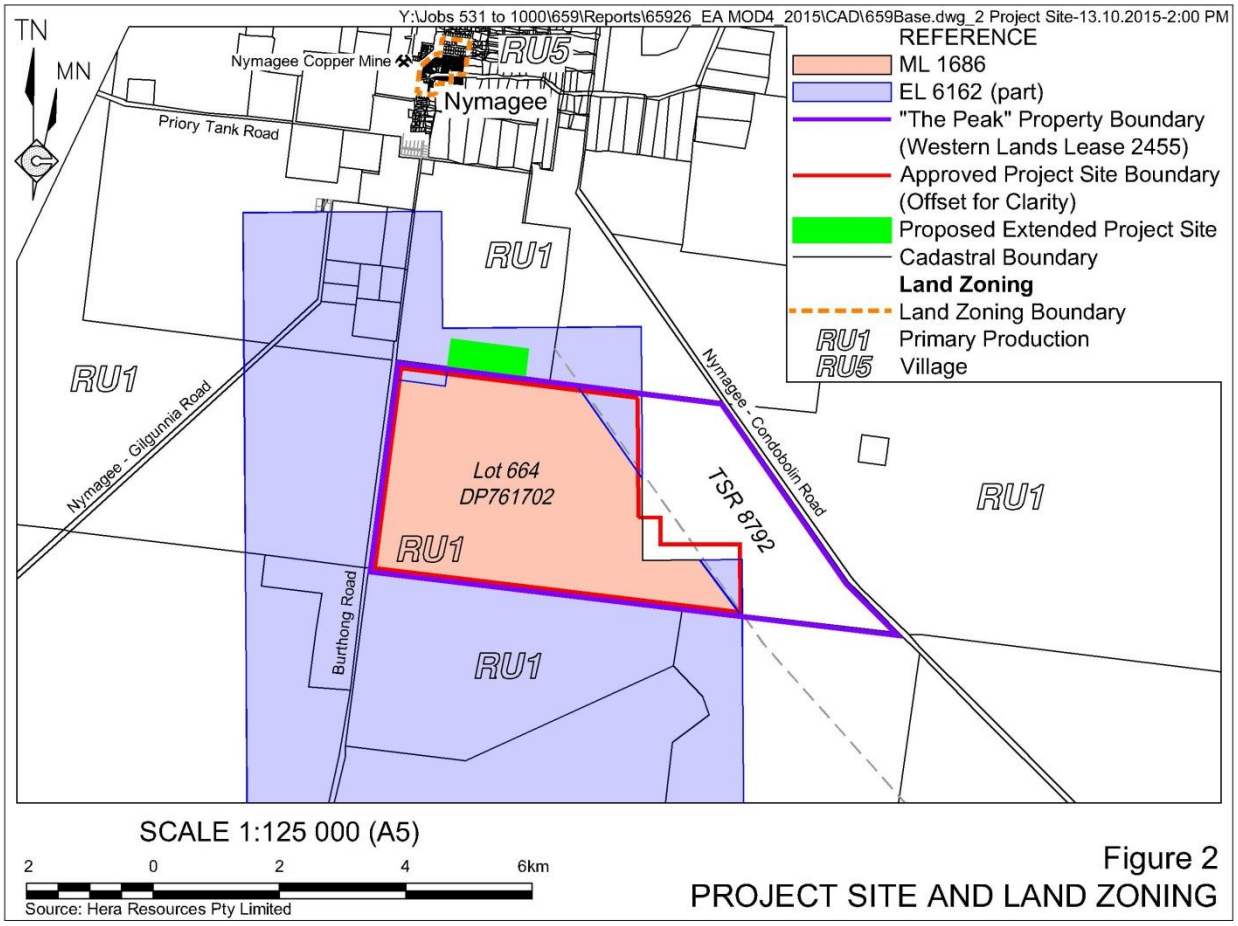

Figure 2
PROJECT SITE AND LAND ZONING

1.2 THE PROPONENT

The Proponent, Hera Resources Pty Limited is a wholly owned subsidiary of Aurelia Metals Limited (Aurelia). Aurelia is an Australian Securities Exchange listed exploration and mining company based in Orange, NSW. The company is managed by a highly experienced board with a combined industry experience of more than 170 years. The Board is supported by a small, technically-focused management team based in Orange and on-site. In addition to operating the Hera Mine, Aurelia is also active in the exploration for copper, gold and tin on a number of tenements within NSW.

Aurelia was previously known as YTC Resources Limited until June 2014, when it changed its name to Aurelia Metals Limited.

1.3 THE PROJECT SITE

For the purposes of this document, the application area for the Proposed Modification is referred to as the Project Site and includes Proposed Extended Project Site (**Figure 2**). The Proposed Extended Project Site is located wholly within an adjacent landholding immediately north of the existing Project Site and ML1686. This adjacent land is Lot 1730 in Deposit Plan 763521 which is part of Western Lands Lease No. WLL3577 "The Woolshed Paddock". WLL3577 is held by Jannene Bronwyn Dunne. WLL3577 was granted under the *Western Lands Act 1901* and is administered by the Crown Lands Division of the NSW Department of Primary Industries.

The Proposed Extended Project Site is classified Zone RU1 – Primary Production under the *Cobar Local Environment Plan (LEP) 2012* (**Figure 2**). Mining is permissible with consent within that zone.

1.4 BACKGROUND TO THE PROPOSED MODIFICATION

1.4.1 Introduction

The following sub-sections provide background information to the Proposed Modification in relation to the existing mineral authorities, revised resources and reserve calculations and the approved activities occurring at the Mine that are proposed to be modified.

1.4.2 Existing Approvals, Licences and Tenements

Table 1 identifies the approvals, licences and authorities currently in place for the Hera Mine, the issuing/responsible authority, date of issue and duration.

Table 1: Existing Approvals, Licences and Authorities

Issuing Authority	Type	Date of Issue	Expiry	Comments
Department of Planning & Environment	Project Approval (PA) 10_0191	31 July 2012		Mining operations may be undertaken until 31 December 2022.
Department of Trade & Investment, Regional Infrastructure & Services - Division of Resources & Energy	Mining Lease (ML) 1686	16 May 2013	16 May 2034	For copper, gold, lead, silver and zinc.
	Exploration Licence (EL) 6162	26 November 2003	25 November 2018	Group 1 Minerals. Renewed 3 April 2014.
Environment Protection Authority	Environment Protection Licence No. 20179	18 March 2013		Anniversary date: 18 March. Review Date: 18 March 2018.
Department of Primary Industries – NSW Office of Water	Water Access Licence (WAL) 28773	1 August 2012	-	Permits extraction of up to 240ML per year.
	WAL 30298	16 September 2013	-	Permits extraction of up to 3 ML per year.

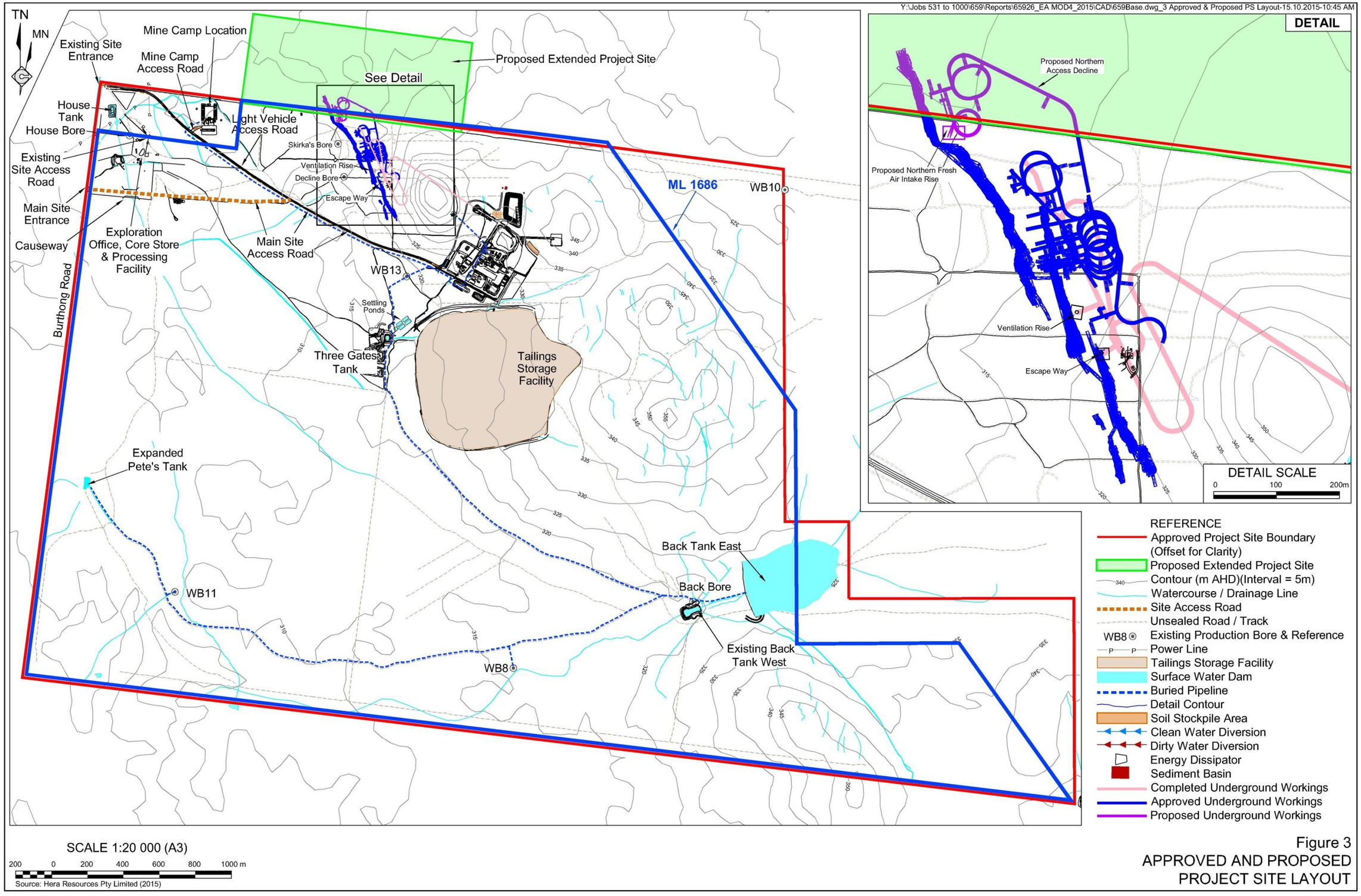

Figure 3
APPROVED AND PROPOSED
PROJECT SITE LAYOUT

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1.4.3 Identified Resources and Reserves

A Joint Ore Reserves Committee (JORC) compliant mineral resource estimate was completed by the Proponent in June 2010 and updated in July 2011 (**Table 2**).

The Proponent has since conducted further exploration and identified additional resources. An updated JORC-compliant mineral resource estimate was completed by the Proponent in July 2015 and is presented in **Table 2.** The July 2015 Mineral Resource estimate includes resources that are contained within the Proposed Extended Project Site.

Table 2: Mineral Resource Estimates for the Hera Deposit

Category	Tonnes	Au g/t	Ag g/t	Pb %	Zn %	Cu %
July 2011 Resource Statement						
Indicated	2 113 000	4.2	17.0	2.8	3.9	0.2
Inferred	330 000	3.5	14	2.3	3.3	0.1
TOTAL	**2 444 000**	**4.1**	**16.4**	**2.8**	**3.8**	**0.2**
July 2015 Resource Statement						
Measured	658 000	5.14	15.59	2.96	3.40	0.24
Indicated	958 000	3.37	17.97	3.02	4.51	0.15
Inferred	890 000	2.37	73.91	4.85	6.02	0.10
TOTAL	**2 506 000**	**3.48**	**37.21**	**3.65**	**4.76**	**0.15**
Source: Hera Resources Pty Limited						

1.5 APPROVED ACTIVITIES

The approved Mine is fully described in RWC (2011 and 2015) and YTC (2013a and 2014). In summary, the approved activities include the following (**Figure 3**).

- Extraction of waste rock and metalliferous ore using underground open stope mining methods and underground load and haul operations until 31 December 2022.
- Backfilling of underground stope voids created during underground mining using potential acid-forming waste rock to minimise sulphide oxidation.
- Use of surface infrastructure required for the underground mine, including a box cut, portal and decline, magazines, fuel store, ventilation rises and power and water store.
- Use of a processing plant, including a run-of-mine (ROM) pad, two waste rock emplacements, crushing, grinding and screening operations, gravity separation and flotation circuits to process up to 505 000 tonnes per annum (tpa) to produce gold and silver doré (unrefined bars) and a zinc/lead concentrate.

- Use of a tailings storage facility, including cyanide detoxification of tailings prior to discharge to the Tailings Storage Facility.
- Use of facilities, including the following:
  - the Proponent's Site Office and car park;
  - a Contractors Office, Laydown area, hardstand and workshop;
  - a Reagent Store, plant workshop, ablutions facilities, crib room, hardstand and laydown areas;
  - a concentrate storage shed; and
  - an explosives magazine.
- Use of a water management system, including two sediment basins, two tanks, a water catchment dam and an associated water diversion system to enable the harvesting and supply of water for environmental flows.
- Use of a Light Vehicle Access Road and a Main Site Access Road and intersection to allow site access from Burthong Road.
- Transportation of up to 50 000tpa of zinc/lead concentrate from the Mine to Hermidale via public roads, including Hermidale Road.

In addition, development consent 2012/LD-00004 for the construction and use of a mine camp, including accommodation facilities, ablution facilities, a water treatment facility, communal facilities and a communal car park was granted by Cobar Shire Council on 14 March 2012.

1.6 ENVIRONMENTAL PERFORMANCE

The environmental performance of the Hera Mine is described in full in the following documents, with a summary presented in Section 1.6 of RWC (2015).

- Hera Mine Annual Environmental Management Mining Lease 1686 for the Period 16 May 2013 to 31 December 2013 (YTC, 2013b).
- Hera Mine Annual Environmental Management Mining Lease 1686 for the Period 1 January 2014 to 15 May 2014 (Aurelia Metals, 2014).
- Hera Mine Annual Environmental Management Mining Lease 1686 for the Period 16 May 2014 to 15 May 2015 (Aurelia Metals, 2015).

Two reportable incidents have occurred since 22 June 2015. These incidents may be summarised as follows.

- 1 and 2 November 2015 - Water quality parameters were exceeded during discharge from Licence Point 3 (Sediment Basin 1). The incident was reported to the Environment Protection Authority and a report was

prepared. A courtesy email was provided to Department of Planning and Environment.

- 12 January 2016 - Monitoring indicated that the PM_{10} 24-hour average concentration criteria was exceeded. The incident was reported to the Environment Protection Authority and a report was prepared. A copy of the report was provided to the Department of Planning and Environment.

1.7 FORMAT OF THE REPORT

This *Environmental Assessment* has been structured to address the general requirements and key issues nominated by the Secretary's Environmental Assessment Requirements (SEARs) and include the following sections.

This *Environmental Assessment – Modification 3* has been compiled in a single volume with five sections of text as follows.

Section 1: Introduces the Proposed Modification, the Proponent, the Project Site and provides relevant background information.

Section 2: Describes the Proponent's objectives and the Proposed Modification in sufficient detail to enable the application for modification to be fully understood.

Section 3: Provides a description of the process used to identify and prioritise the key issues for assessment, including stakeholder consultation and a review of relevant planning instruments.

Section 4: Describes the anticipated impacts associated with the Proposed Modification.

Section 5: Evaluates the Proposed Modification in terms of biophysical, economic and social consideration, and the goals and guidelines of Ecologically Sustainable Development and provides a conclusion to the document.

References: Lists the various source documents referred to for information and data used during the preparation of the *Environmental Assessment*.

Appendices: Present the following additional information.

- Appendix 1 – GCE (Ground Control Engineering) (2015); Hera Mine Northern Pod Subsidence Assessment.
- Appendix 2 – Aquade (2016); Assessment of Potential Groundwater Impacts due to North Pod Expansion of Hera Project, Nymagee NSW.
- Appendix 3 – OzArk (2015); Ecology Field and Heritage Desktop Assessment: Proposed Air Vent at Hera Gold Mine.

1.8 MANAGEMENT OF INVESTIGATION

This document has been prepared by Mr Dean Fredericksen (MSc (Hons)), formerly Chief Operating Officer with the Applicant and now consulting to the Company. Mr Mitchell Bland (BSc (Hons), MEcon Geol, LLB (Hons)), Principal Environmental Consultant with R.W. Corkery & Co Pty. Limited (RWC) undertook a peer review of the document. RWC also assisted with preparation of the figures for the document.

In addition, specialist advice in relation to the Proposed Modification has been provided by:

- Mr Phil Cameron (BSc, Ass Dip App Sci.), OzArk Environment and Heritage Management (ecology).
- Mr Allan Wade (BGSc, Masters Hydrology), Aquade Groundwater Services Pty Ltd.
- Mr David Dickson (B Eng Geological) Ground Control Engineering Pty Ltd.

2. DESCRIPTION OF THE PROPOSED MODIFICATION

2.1 INTRODUCTION

2.1.1 Objectives of the Modification

The Proponent's objectives in developing the Project as a whole are identified in Section 2.1.1 of RWC (2011). The Applicant's objectives in modifying PA 10_0191 are to:

- ensure optimal efficiency of the Project and to facilitate mining of recently identified mineral resources;
- enable access to Mineral Resources that are not within the currently approved Project Site; and
- enable underground access north of the existing mining areas to facilitate further exploration of the deposit.

2.1.2 Overview of the Proposed Modification

In addition to the currently approved activities, the Proposed Modification would include the following activities (**Figures 3** and **4**).

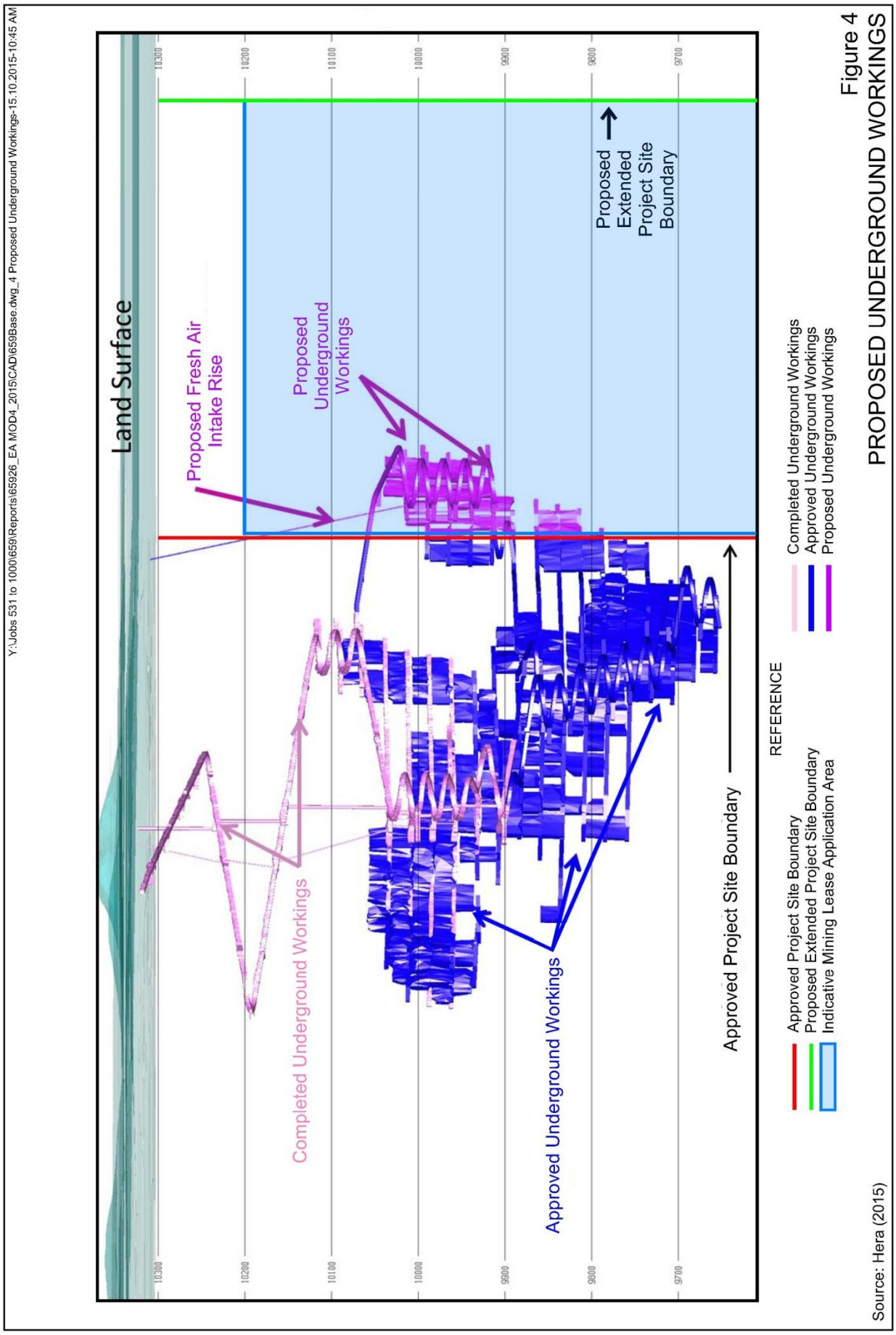
- Extension of the Project Site to the north.
- Establishment of a Northern Access decline and mining area.
- Establishment of a Northern Fresh Air intake rise.

All other activities would remain as approved under PA 10_0191.

2.2 PROPOSED EXTENSION OF THE PROJECT SITE AND MINING AREA

Typically, as mineral exploration and mining progresses, more detailed information regarding the geological setting and mineralisation is obtained. During 2014 and 2015 additional mineralisation was located north of the existing Project Site and outside of the Mining Licence ML 1686.

This mineralisation has been called the "North Pod" and consists of similar Gold-Zinc-Lead-rich ore to that currently being mined from the Hera Deposit.


Y:\Jobs 531 to 1000\659\Reports\65926_EA MOD4_2015\CAD\659Base.dwg_4 Proposed Underground Workings-15.10.2015-10:45 AM
Land Surface
Proposed Fresh Air Intake Rise
Proposed Underground Workings
Proposed Extended Project Site Boundary
Completed Underground Workings
Approved Underground Workings
Approved Project Site Boundary
10300
10200
10100
10000
9900
9800
9700
REFERENCE
Approved Project Site Boundary
Proposed Extended Project Site Boundary
Indicative Mining Lease Application Area
Completed Underground Workings
Approved Underground Workings
Proposed Underground Workings
Source: Hera (2015)
Figure 4
PROPOSED UNDERGROUND WORKINGS

A detailed mining planning and economic evaluation study was completed and determined the following.

- The optimal decline access to the North Pod mineralisation would be from an extension to the existing Main Hera decline commencing approximately 250m below surface (**Figure 4**).
- Development and stoping of ore would begin approximately 280m below the existing land surface.
- All ore and waste mined would be hauled back through the existing decline and mine portal to the existing ROM Pad and waste rock emplacements on the surface.
- All of the proposed activities would be conducted below ground and there would be no surface disturbance within the proposed Extended Project Site.
- A requirement to establish a Fresh Air intake Rise. This rise will commence approximately 300m below surface and will be angled such that the rise surface expression will be within the existing project approval area.
- Ore would be treated through the existing processing facilities and tailings would be deposited within the currently approved tailings storage facility which has a design capacity of 2.45Mt. The current Mining Inventory for the expanded project is circa 2.4Mt as per internal mine planning estimates (unpublished)There are no changes proposed to the approved rate of processing, life of mine and existing surface processing facilities and stockpiles.

2.3 PROPOSED NORTHERN FRESH AIR INTAKE RIASE

The approved mining operations include operation of an exhaust ventilation rise and escape way (**Figure 3**). Mining of the North Pod would require construction and use of a further ventilation rise for fresh air intake. The ventilation rise would be an inclined rise, with the surface expression of the rise located within the existing Project Site. The rise would not be equipped with a ventilation fan at the surface.

2.4 HOURS OF OPERATION

No change to the approved hours of operation are proposed.

2.5 EMPLOYMENT, ECONOMIC CONTRIBUTIONS AND CAPITAL COST

2.5.1 Employment

The following description is from Hera Mod 3. The Mine currently employs approximately:

- 59 full-time employees of the Proponent;
- 60 full-time contract personnel undertaking underground mining, concentrate haulage, plant maintenance and support; and
- varying numbers of short-term contract personnel engaged to assist with specific projects.

In addition, a range of non-site based personnel service the Mine, including transport operators, local and regional engineering and maintenance firms and other suppliers.

In addition, upgrade activities recently approved as part of MOD3 would result in employment of an additional approximately 25 full-time personnel for a period of approximately 6 months.

The Proposed Modification would not result in additional employment, however, it would facilitate extraction of ore that is currently not within the Project Site boundary, thereby extending the period over which the Proponent is able to operate the Mine and provide that employment.

In addition, extending the Project Site boundary would enable further exploration to be conducted adjacent to the Hera Deposit. That work has the potential to identify further Mineral Resources which would provide for a longer mine life, with associated downstream benefits including extension of the Project Life and length of employment for personnel and contributions to the regional economy and state government through royalty payments.

2.5.2 Economic Contributions

Table 3 presents approximate annual economic contributions for the Mine and forecast contributions for the Mine, as modified by MOD3. The Proposed Modification would be unlikely to result in significant changes to the current annual contributions.

Table 3: Approximate Annual Economic Contributions

Contribution	2013/2014 Contributions	Anticipated Modified Contributions
Wages, Salaries etc.		
• Employees	$7 million	$8 million
• Contractors	$6 million	$7 million
• Total	$13 million	$15 million
Goods and Services (incl labour)		
• NSW	$25 million	$27.5 million
• Australia (ex. NSW)	$20 million	$22 million
• International	$5 million	$5.5 million
• Total	$50 million	$55 million
Taxes and Royalties		
• Rates and VPA payments	$0.3 million	$0.3 million
• Royalties	$2 million	$3 million
Source: Hera Resources Pty Limited		

2.5.3 Capital Cost

The Capital program for the proposed northern expansion of the mine to access the North Pod Mineralisation is as shown in **Table 4**.

Table 4: Summary of Capital required to develop the North Pod area

		Cost
Decline	2170 metres	$ 11.1M
Fresh Air intake Rise		$ 2.2M
Resource Infill Drilling		$ 0.77M
Total		**$14.07M**

2.6 REHABILITATION, FINAL LANDFORM AND DECOMMISSIONING

With the exception of the surface expression of the proposed Northern Fresh Air Intake Ventilation Rise, the Proposed Modification would not result in additional surface disturbance. As a result, the approved rehabilitation, final land form and decommissioning activities would be as described in RWC (2011) and RWC (2015).

The proposed Northern Fresh Air Intake Ventilation Rise would be rehabilitated in a similar manner to the approved rises, namely, capped with a suitably designed and engineered cap that will permit reopening of the rises at a later time if required.

2.7 BIODIVERSITY OFFSET

The Proposed Modification would result in disturbance of land previously disturbed for exploration operations approximately 20m x 20m (0.04ha) in size. As a result, no modifications to the approved Biodiversity Offset Strategy are proposed.

2.8 DEVELOPMENT ALTERNATIVES

2.8.1 Introduction

The Proponent has reviewed numerous alternative modification scenarios. This subsection provides a review of a range of alternatives considered, and identifies why each was, after careful consideration, rejected.

2.8.2 Not Mining the recently identified Mineral Resources

Failure to access and mine the recently identified Mineral Resources would result in an underutilisation of identified Mineral Resources. This would be contrary to the objects of the *Mining Act 1992* to encourage and facilitate the discovery and development of mineral resources. Failure to mine the North Pod would also result in a lost opportunity for the NSW economy through non-payment of royalties and contributions to the state economy.

Furthermore by preventing access for further exploration of a highly prospective corridor, the potential for future discoveries of economic mineralisation would be severely limited.

2.8.3 No Northern Fresh Air Intake Rise

Failure to construct the Northern Fresh Air Intake Rise would severely stress the Mine's ventilation system, restricting the ability of the Applicant to operate the mine in a safe and efficient manner.

3. CONSULTATION AND PLANNING ISSUES

3.1 CONSULTATION

3.1.1 Community Consultation

Introduction

The Proponent has maintained an open and honest relationship with the community surrounding the Project Site through a range of formal and informal consultations held with individual community members and groups. The following provides a brief overview of consultation that has been undertaken.

Community Consultative Committee

The Hera Mine Community Consultative Committee (CCC) meetings are held quarterly. The meetings are attended by community representatives. The CCC meetings discuss environmental and operational progress of the Mine and provide an opportunity to discuss any concerns held by the community.

The Proposed Modification was formally presented to the CCC at a meeting on 7 December 2015. The committee was briefed on the Proposed Modification and were provided with an opportunity, both at the meeting and subsequently, to ask questions and present matters that they would like to see addressed in this document. No matters relevant to the Proposed Modification were raised and no specific issued to be addressed were identified.

Landholder Consultation

An informal meeting was held, between the Proponent and the family holding the land to the north of the Project Site in relation to the Proponent's proposed activities. That consultation was followed up with written correspondence in June 2015 in which the proponent indicated its intention to apply for a subsurface mining lease for the land immediately north of the existing lease which is held by the family.

Hera Resources has had ongoing communications with the family in order to facilitate access for both exploration and environmental monitoring purposes. To date there has been no formal agreement reached and consultation continues.

3.1.2 Consultation with Government Agencies

Consultation with The Department of Planning and Environment in relation to the Proposed Modification was undertaken between August and September 2015, with the Department provided with a range of verbal briefings and email exchanges. The Department indicated in writing 02 October 2015, that given the scope of the Proposed Modification, that it did not propose to issue SEAR's, but that the Applicant should undertake individual consultation with relevant government agencies.

Furthermore, correspondence describing the Proposed Modification was provided to the following government agencies on 15 October 2015. Each agency was requested to provide matters required to be addressed. No responses were received / the date that responses were received is indicated in parenthesis.

- Bogan Shire Council. (No Response).
- Cobar Shire Council. (Responded 16/11/15. No further information required).
- DPI Water. (No Response).
- Department of Trade and Investment, Division of Resources and Energy (DRE) (Verbal discussions with Steve Cozens, Senior Projects Officer).
- Environment Protection Authority (EPA). (No Response)

3.2 REVIEW OF PLANNING ISSUES

3.2.1 State Legislative Planning Issues

At the time of the approval of PA 10_0191, *State Environmental Planning Policy (Major Development 2005)* identified the Mine as a Major Project for which project approval under Part 3A of the EP&A Act was necessary as its capital investment value was of more than $30 million.

Clause 2(1)(a) of Schedule 6A of the EP&A Act identifies that approved Projects, including the Mine, may be classified as transitional Part 3A Projects. Clause 3(1) of that Schedule identifies that Part 3A, including Section 75W, continues to apply to such projects. As a result, the Proposed Modification may be made under the now repealed Section 75W of the EP&A Act.

State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007

This SEPP specifies matters requiring consideration in the assessment of any mining, petroleum production and extractive industry development as defined in NSW legislation.

The Application of this SEPP to the Mine, and by extension to the Proposed Modification, is presented in **Table 5**.

State Environmental Planning Policy (Infrastructure) 2007

This SEPP identifies, amongst other things, the matters to be considered in the assessment of development adjacent to particular types of infrastructure.

The Proposed Modification does not seek to amend any activities in the vicinity of the classes of infrastructure identified by this SEPP. As a result, this SEPP is not relevant to this application.

Table 5: Application of SEPP (Mining, Petroleum Production and Extractive Industries) 2007

Relevant SEPP Clause	Description	EA Section
12AA: Significance of resource	Consideration is given to the significance of the resource that is the subject of the application, having regard to:	
	• the economic benefits, both to the State and the region; and	2.5
	• the advice provided by the DG of DTIRIS as to the relative significance of the resource in comparison with other mineral resources across the State.	NA
12AB: Non-discretionary development standards for mining	Consideration is given to development standards that, if complied with, prevents the consent authority from requiring more onerous standards for those matters.	NA
12: Compatibility with other land uses	Consideration is given to:	
	• the existing uses and approved uses of land in the vicinity of the development;	1.5
	• the potential impact on the preferred land uses (as considered by the consent authority) in the vicinity of the development; and	4.2 to 4.4
	• any ways in which the development may be incompatible with any of those existing, approved or preferred land uses.	4.2 to 4.4
	The respective public benefits of the development and the existing, approved or preferred land uses are evaluated and compared.	NA
	Measures proposed to avoid or minimise any incompatibility are considered.	NA
13: Compatibility with mining, petroleum production or extractive industry	Consideration is given to whether the development is likely to have a significant impact on current or future mining, petroleum production or extractive industry and ways in which the development may be incompatible.	NA
	Measures taken by the Proponent to avoid or minimise any incompatibility are considered.	NA
	The public benefits of the development and any existing or approved mining, petroleum production or extractive industry must be evaluated and compared.	NA
14: Natural resource and environmental management	Consideration is given to ensuring that the development is undertaken in an environmentally responsible manner, including conditions to ensure:	
	• impacts on significant water resources, including surface and groundwater resources, are avoided or minimised;	4.3
	• impacts on threatened species and biodiversity are avoided or minimised; and	4.4
	• greenhouse gas emissions are minimised and an assessment of the greenhouse gas emissions (including downstream emissions) of the development is provided.	NA
	Consider any certification by the Chief Executive of OEH or the DG of DPI that measures to mitigate or offset the biodiversity impact of the proposed development would be adequate.	NA
15: Resource recovery	The efficiency of resource recovery, including the reuse or recycling of material and minimisation of the creation of waste, is considered.	1.4.3 and 2

Table 5: Application of SEPP (Mining, Petroleum Production and Extractive Industries) 2007 (Cont'd)

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Relevant SEPP Clause	Description	EA Section
16: Transportation	The following transport-related issues are considered.	
	• The transport of some or all of the materials from the Project Site by means other than public road.	NA
	• Limitation of the number of truck movements that occur on roads within residential areas or roads near to schools.	NA
	• The preparation of a code of conduct for the transportation of materials on public roads.	NA
17: Rehabilitation	The rehabilitation of the land affected by the development is considered including:	
	• the preparation of a plan that identifies the proposed end use and landform of the land once rehabilitated;	NA
	• the appropriate management of development generated waste;	NA
	• remediation of any soil contaminated by the development; and	NA
	• the steps to be taken to ensure that the state of the land does not jeopardize public safety, while being rehabilitated or at the completion of rehabilitation.	4.2

State Environmental Planning Policy 33 – Hazardous and Offensive Development

This SEPP identifies that hazardous and offensive industries, and potentially hazardous and offensive industries, may pose a significant risk in relation to the locality, to human health, life or property, or to the biophysical environment without the implementation of appropriate impact minimisation measures.

An assessment of the Mine under this SEPP is presented in RWC (2011). In summary, that assessment determined that risk levels associated with the use of Potassium Amyl Xanthate, Sodium Cyanide, Hydrogen Peroxide and Lead Nitrate would be acceptably low. As the Proposed Modification would not change the activities identified as potentially hazardous under that SEPP, it is not relevant to the Proposed Modification.

State Environmental Planning Policy 55 – Remediation of Land

This SEPP required that consent for any development cannot be granted unless the consent authority has considered whether the land is contaminated.

No land within the Project Site is contaminated. As a result, this SEPP is not relevant to the Proposed Modification.

3.2.1.1 Local Planning Issues

The Mine occurs within the Cobar Local Government Area. The Mine is zoned RU1 – Primary Production under the *Cobar Local Environment Plan 2012* (Cobar LEP). While underground mining is not identified as permissible with consent within that zone, Clause 70(1)(b) of the Mining SEPP identifies that underground mining is permissible with consent in any zone that permits agriculture. As the Project Site is zones RU1 – Primary Production under the Cobar LEP (**Figure 2**), the SEPP has the effect that underground mining is permissible with consent.

4. ASSESSMENT OF KEY ENVIRONMENTAL ISSUES

4.1 INTRODUCTION

Section 4 of RWC (2011) provides a range of background information with respect to the environment within and surrounding the Project Site. This section also provides detailed assessment of the impacts associated with the Proposed Modification when compared with those approved under MOD3 and presented in Section 4 of RWC (2015).

Key potential impacts as a result of the Proposed Modification include the following.

- Geotechnical and surface subsidence impacts.
- Groundwater/hydrogeological impacts.
- Ecological and heritage impacts.

The Proposed Modification would have a negligible impact on the following. As a result, they have not been addressed further in this document.

- Surface water.
- Noise and blasting.
- Air quality.
- Traffic and transportation.
- Soil and land capability.
- Visual amenity.
- Bushfire.
- Waste management.

4.2 GEOTECHNICAL AND SURFACE SUBSIDENCE IMPACTS

4.2.1 Introduction

The proposed modification would result in the expansion of the Mine into the expanded Project Site from a decline commencing approximately 250 m below surface. All operations within the extended Project Site would be conducted from underground, with the upper most extent of the proposed mining to approximately 140 m below the existing land surface. With this in mind, the Proponent intends to concurrently apply for a Mining Lease with a surface exclusion from the surface to 100m below the surface.

Ground Control Engineering Pty Ltd (GCE) were engaged to review the geotechnical conditions within the vicinity and directly above the proposed North Pod mining areas to determine the potential for mining induced instability to propagate through into the exclusion zone within the expanded Project Site.

A full report from GCE is included as **Appendix 1** and is hereafter referred to as GCE (2016).

4.2.2 Assessment methodology and Impact Assessment

GCE (2016) assessed the geotechnical conditions of diamond drill holes that penetrate the area immediately above and adjacent to the proposed North Pod Mining Areas to determine the likely ground conditions immediately adjacent to the proposed mining areas. The assessment reviewed existing geotechnical logging information collected by site geologists and also the undisturbed core photographs stored on site. The objective of this assessment was to categorise the ground conditions relative to suitable Rock Mass Characterisation Systems to determine the expected stability under the proposed mining scenarios.

The Rock Mass Classification system used for this assessment is the Tunnelling Quality Index (Q) after Barton *et al* (1974). This assessment determined the appropriate Rock Mass Classification (Q Value) for a series of domains, being the Hanging Wall, Footwall and Ore Zone.

The proposed mine plan is to access the orebody by decline and ore development along strike as shown in **Figure 4**. The bulk of the ore will be recovered by long hole stoping methods with backfill introduced to all stopes other than a top level development drive which will be left open. Based on currently available information the upper stoping level is anticipated to be approximately 37m AHD or approximately 237m below the surface and approximately 160m below the top of the fresh rock interface.

To determine the probability of failure of the crown above the top of the stoping and the fresh rock interface the Q Values determined during the rock mass classification process are compared to a database of approximately 500 case histories of crown stability performance drawn from literature reviews. This work is shown graphically in **Figure 5.**

The results of this assessment indicate the likelihood of surface subsidence associated with the proposed mining plan is very low with a probability of failure in the range of <10% to <0.5%. This is based on an assumption that, should the crown fail it is able to continue to unravel upward with sufficient void below this to take all of the unravelled material. Failure is generally arrested by choking of the void due to the bulking of the failed material.

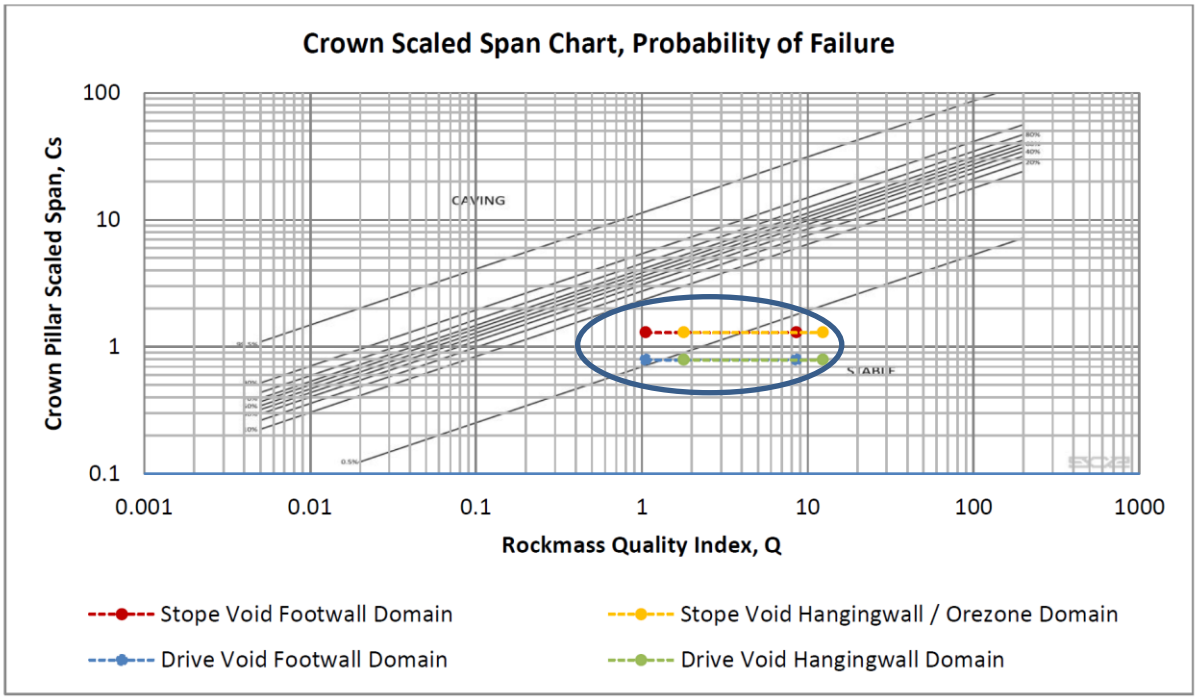

Figure 5: Predicted crown stability range for anticipated North Pod ground conditions

To determine the potential height to which any failure could propagate under more unfavourable conditions than determined in this report GCE (2016) analysed the potential extent of propagation of a failure of the crown should it occur. Using conservative bulking factors of 20 – 30%, and the most probable mode of failure, namely unravelling and slabbing of the jointed rockmass, this analysis estimates the probable limit of unravelling of the rockmass above a 10m wide by 26m high stope is could be in the range 87m to 130m above the floor of the void or to within 191m to 148m below the ground surface for the scenario whereby the top most stope in the mining sequence is left unfilled. Thus any potential failure above the North Pod mining area would be arrested within the fresh rock at a distance of at least 148m below the natural ground surface and 48m below the surface exclusion zone associated with the Mining Lease Application.

GCE recommend that on the basis that the current geotechnical information is not comprehensive, that the mining voids should be filled with rock fill to limit the void into which any potential failures (probability of failure in the range of <10% to <0.5%) could propagate.

Using this backfill approach would increase the likelihood of long term stability, corresponding with a likely estimated stability classification of 'G' – 'Of no concern' (see **Table 6**). This prediction corresponds with the deep estimated extents of plausible void choking (GCE 2016).

Table 6: Exposure Risk Guidelines

Class	Probability of Failure %	Minimum Factor of Safety	Maximum Scaled Span, Cs (= Sc)	ESR (Barton et al. 1974)	Design Guidelines for Pillar Acceptability/Serviceable Life of Crown Pillar				
					Expectancy	Years	Public Access	Regulatory position on closure	Operating Surveillance Required
A	50 – 100	<1	$11.31Q^{0.44}$	>5	Effectively zero	< 0.5	Forbidden	Totally unacceptable	Ineffective
B	20 – 50	1.0	$3.58Q^{0.44}$	3	Very, very short-term (temporary mining purposes only ; unacceptable risk of failure for temporary civil tunnel portals	1.0	Forcibly Prevented	Not acceptable	Continuous sophisticated monitoring
C	10 – 20	1.2	$2.74Q^{0.44}$	1.6	Very short-term (quasi-temporary stope crowns ; undesirable risk of failure for temporary civil works)	2 – 5	Actively prevented	High level of concern	Continuous monitoring with instruments
D	5 – 10	1.5	$2.33Q^{0.44}$	1.4	Short-term (semi-temporary crowns, e.g.under non-sensitive mine infrastructure)	5 – 10	Prevented	Moderate level of concern	Continuous simple monitoring
E	1.5 – 5	1.8	$1.84Q^{0.44}$	1.3	Medium-term (semi-permanent crowns, possibly under structures)	15–20	Discouraged	Low to moderate level of concern	Conscious superficial monitoring
F	0.5 – 1.5	2	$1.12Q^{0.44}$	1	Long-term (quasi-permanent crowns, civil portals, near-surface sewer tunnels)	50–100	Allowed	Of limited concern	Incidental superficial monitoring
G	<0.5	>>2	$0.69\ Q^{0.44}$	0.8	Very long-term (permanent crowns over civil tunnels)	>100	Free	Of no concern	None required

GCE's assessment is that the estimated probability of failure is >0.5%.

4.2.3 Management and Mitigation Measures

GCE (2016) recommend that the proposed mining plan ensure that the remaining unfilled void left at the uppermost levels of the North Pod area be limited to the a 6.0m void equivalent to development drive. This will impose a significant limit the propagation height of any potential failure and reduce the potential for surface subsidence impacts.

By adopting this this mitigation measure long term stability of the crown above the stoping areas will be assured.

Further to this GCE recommend that geotechnical data collection continues during further diamond drilling and mapping of underground openings to ensure that ground conditions encountered are monitored and evaluated in line with the findings of their study.

4.3 GROUNDWATER

4.3.1 Introduction

The Proposed Modification would result in the expansion of the Mine into the expanded Project Site from a decline commencing approximately 250m below surface. The underground workings would extend approximately 300m further North than those proposed at the original Project Approval Stage.

Aquade Groundwater Services Pty Ltd (Aquade) was engaged to undertake an assessment of the potential groundwater impacts associated with the expanded mining of the North Pod area. The potential impacts of the larger mining footprint were assessed based on additional hydrogeological information that has been obtained since the original application for Project Approval. Potential groundwater impacts assessed included the following.

- Groundwater inflows to the underground mine.
- The impact on neighbouring bores.
- The impact on Groundwater Dependant Ecosystems (GDEs).

A full report from Aquade is included as **Appendix 2** and is hereafter referred to as Aquade (2016). The figures that are included in this section are reproduced from that report.

4.3.2 Assessment Methodology

The assessment (Aquade, 2016) draws upon a number of prior reports completed by Aquade (2015a) and Aquade (2015b) and Impax (2011).

There has been approximately two years of groundwater extraction and drawdown data collected by Hera Resources which enables Aquade to make an interpretation of average aquifer properties over a large area and therefore provide a sound basis for prediction of long term groundwater impacts.

Aquade (2016) considered previous underground inflow rates and up-to-date conceptualisation of the hydrogeology to predict the likely change in inflow rates as a result of Modification 4.

Aquade (2016) also undertook analytical modelling of the aquifer to predict the level of drawdown at the nearest bores most likely to be impacted by an expansion of the Mine to the North. This modelling was completed using the Aqtesolv software.

4.3.2.1 Aquifer Properties

Aquifer properties were first derived from analysis of the drawdown data for WB5 (**Figures 6** and **7**) which has recorded drawdown since 27 July 2013 due to extraction from the decline.

The effective aquifer properties evaluated for the decline were transmissivity, T = 3.8 m^2/day and Specific Yeild, Sy = 0.0088 As they were evaluated from a long period of drawdown, they were interpreted to be average properties over a significant area (radius > 1.0km).

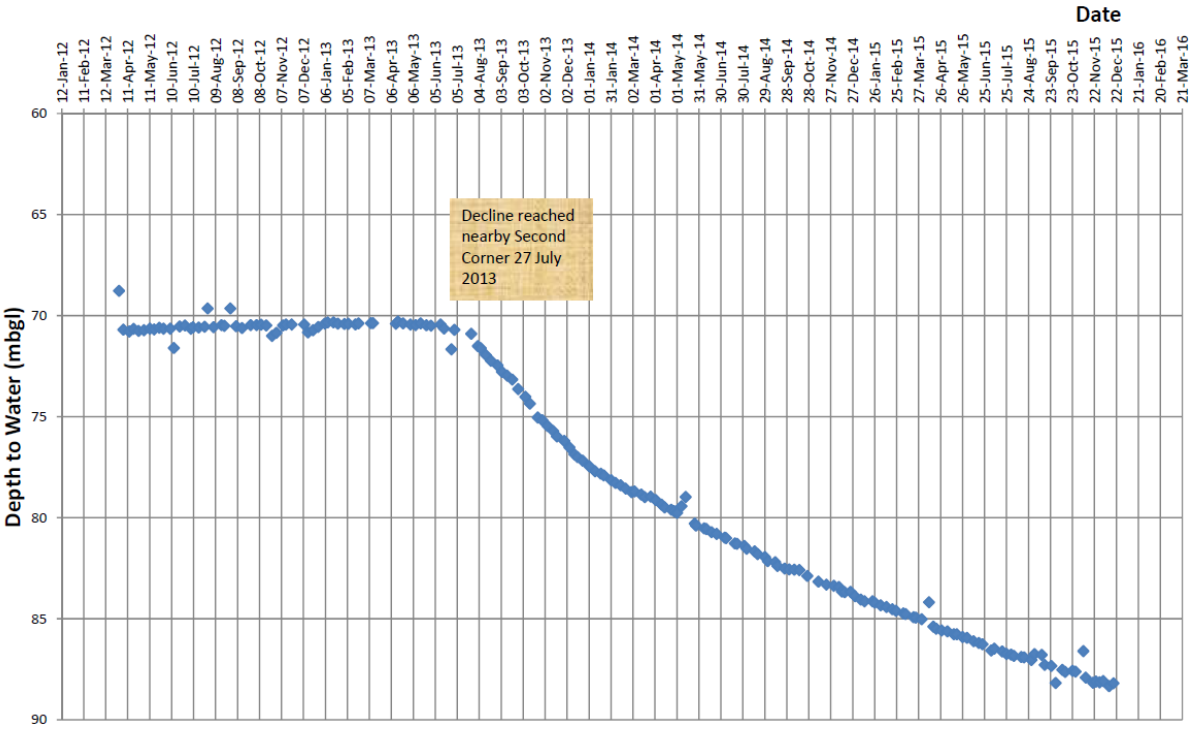

Figure 6: WB05 groundwater levels

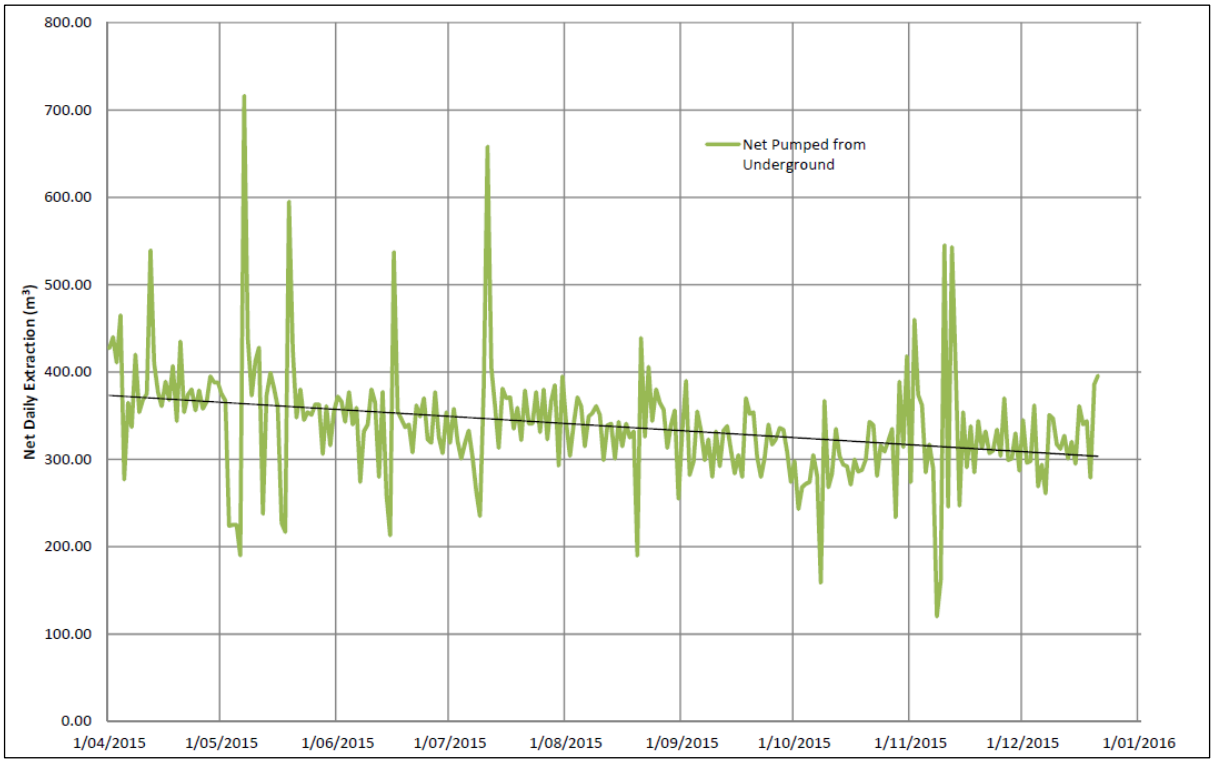

Figure 7: Daily net extraction rate from Hera underground workings

4.3.3 Impact Assessment

4.3.3.1 Mine Inflows

Pre-mining expectations that the most significant inflows to the working would take place within 250m from the surface, Impax (2011), have been confirmed during mining. The inflows to the mine have been gradually declining post intersection of this higher permeability zone. (**Figure 7**) shows the inflow rate from April to December 2015.

Aquade (2016) conclude that over time the inflows to the mine will not substantially change as a result of Mining in the North Pod area. However during construction of the new Fresh Air intake rise and/or when North Pod development workings intersect exploration drillholes, inflows could temporarily increase.

Aquade (2016) states that the inflow to the underground workings could increase to more than 1ML/day for a few days via the fresh air intake raise construction, or even when the North Pod workings intersect existing exploration drill holes. However a temporary increase to several hundred m3/day is considered more likely. Although inflows could temporarily increase, Aquade (2016) does not predict that long-term inflows will change significantly due to the Proposed Modification.

Any potential increased inflows due to the development of the North Pod area, specifically the new Fresh Air intake rise, are expected to be short lived and are very unlikely to exceed site Water Extraction Licencing levels.

4.3.3.2 Groundwater Drawdown

Worst case draw down predictions were made using the above aquifer properties. The nearest receptors GW017385 and WB15 are 2.0km and 1.5km respectively away from the North Pod mining area (**Figure 8**). WB15 is to be used as a trigger monitoring point for potential impact on registered bore GW017385 as surface access for monitoring of this bore has been withheld by the landholder.

No analysis was undertaken for the Southern area of the Existing Project boundary as the expansion of the mine to the North will have no additional impacts to the Southern areas of the existing Project Area.

The results of this analysis indicate that it is feasible that a potential drawdown of 3.0m could occur at GW017385 from a 10 years of groundwater extraction from the mine at a rate of 350m^3/day. This drawdown would be in excess of the 2.0m drawdown which is considered the Level 1 Minimal Impact Consideration of the NSW Aquifer Interface Policy.

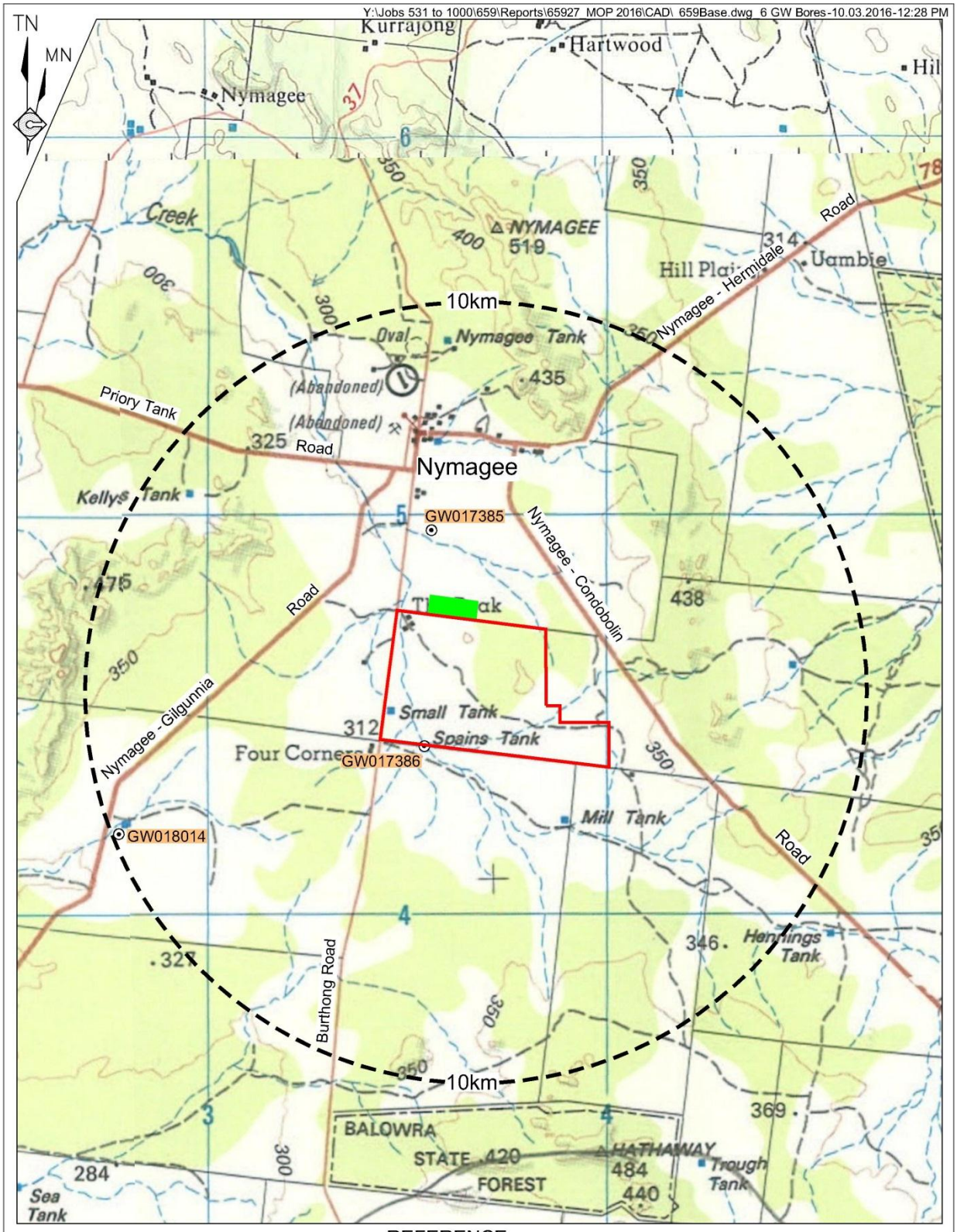

Figure 8
REGISTERED NON-PROJECT RELATED GROUNDWATER BORES

This is considered a worst case drawdown prediction due to the following reasons.

- 10 years of dewatering. Project Approval allows mining to December 2022 which is less than the 10 years used in this modelling.
- An extraction rate from underground of 350m^3/day. It is anticipated that this rate could be as low as 240m^3/day if the reduction in extraction rate from UG continues.
- Nil recharge has been assumed. There is evidence of recharge in Groundwater bore GW017385 which has relatively low Total Dissolved Solids in comparison to regional groundwater.
- The central point of drawdown was assumed to be the coreholes which have been drilled above the North Pod Zone. In reality it is expected the new fresh air intake shaft is likely to be the centre of drawdown which is further away from GW017385 than assumed in the modelling.

For these reasons Aquade consider the drawdown predictions caused by the modification at GW017385 is likely to be less than 3.0m.

4.3.3.3 Groundwater Dependant Ecosystems

Groundwater Dependant Ecosystems were not identified in prior assessment (Impax, 2011). As such there are no potential impacts on Groundwater dependant ecosystems for consideration in this study.

4.3.4 Management and Mitigation Measures

The management of mine dewatering is an ongoing component of the Mine's operations and a requirement of the Project Approval and water licences.

Hera Resources has developed a comprehensive groundwater management plan that details the collection of groundwater monitoring data including;

- Volume of water pumped form underground:
- Groundwater levels in the monitoring bore network around site; and
- Programs to monitor the potential impacts on potentially affected landholders.

As a component of the management plan, monitoring bore WB015 was installed to provide early warning of any potential impacts on the neighbouring bore GW017385. Aquade estimate that, if there was 4.0m drawdown at WB015 caused by extraction within the mine project area, drawdown at GW017385 would be less than 2.0m at the same time. A trigger of 4.3m of drawdown at WB15 has been recommended (Aquade, 2015b). This recommended trigger value has not changed as a result of modification to the Project Site boundary (MOD4).

Project Approval 10_0191, Condition 21, deals with the requirement of Hera Resources to provide Compensatory Water Supply should any owner of privately owned land be

adversely impacted as a result of the project. Hera Resource has in place sufficient monitoring to provide early warning on any impacts on neighbouring property owners.

4.4 ECOLOGY AND HERITAGE

4.4.1 Introduction

An additional fresh air intake rise would be constructed as part of this proposed modification. The vent shaft would be an angled shaft commencing on the surface within the existing approved Project Site and plunging to the north to intersect the proposed North Pod underground development workings.

Construction of this shaft would take place within an area of 20 metres by 20 metres and be concluded over approximately 2 months. The area chosen for the site is within a previously disturbed area that was the site of several surface exploration drillholes (**Figure 3**).

OzArk Environmental and Heritage Management Pty Ltd (OzArk, 2015) were engaged to conduct a review of the site to confirm the potential ecology and heritage impacts of the proposed surface disturbance and to recommend appropriate management practices to be implemented during the construction and ongoing operation of the Fresh Air rise. A copy of that report is presented in **Appendix 3**.

4.4.2 Impact Assessment

OzArk inspected the proposed site of the air intake in October 2015.

They observed that Access Tracks were already in place and that land surrounding the proposed site had already been cleared as part of approved exploration activities. There was sufficient area for equipment laydown, temporary stockpiles of topsoil and parking, etc.

There is no requirement to disturb additional vegetation and only sparse ground cover will be affected.

OzArk have provided the recommendations for inclusion in a specific management plan to be implemented during project construction which covers disturbance to soil, management of water and inadvertent disturbance to vegetation and fauna.

Further to this is OzArk (2015) note the following.

- Heritage – a previous assessment (OzArk, 2011) did not record any objects of Aboriginal heritage significance within the Project Site. OzArk inspected the site of the proposed disturbance and confirmed no objects of suspected Aboriginal heritage significance were observed. As a result, Aboriginal heritage related impacts associated with the Proposed Modification would be negligible.
- Ecology – OzArk (2015) state that as there will be no clearing of native vegetation there would be no biodiversity impacts associated with the Proposed Modification.

5. EVALUATION AND JUSTIFICATION OF THE PROPOSED MODIFICATION

5.1 ECOLOGICALLY SUSTAINABLE DEVELOPMENT

5.1.1 Introduction

Throughout the design of the Hera Project, both in its original application for Project Approval and the Proposed Modification, the Proponent has endeavoured to address each of the sustainable development principles. The following subsections draw together the features of the Proposed Modification that reflect the four principals of sustainable development, namely:

- the precautionary principle;
- the principle of social equity;
- the principle of the conservation of biodiversity and ecological integrity; and
- the principle for the improved valuation and pricing on environmental resources.

5.1.2 The Precautionary Principle

The Precautionary Principle identifies that if there are threats of serious or irreversible environmental damage; lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

In preparing and planning the Proposed Modification, the Proponent engaged the Specialist Consultants identified in Section 1.8 to provide advice or to assess critical aspects of the Proposed Modification. Each of these specialists are experts in their field and provided the Proponent with detailed and specific advice and recommendations which the Proponent has adopted. These specialists have also undertaken an assessment of the Proposed Modification and determined, based on their experience and expertise, that the Proposed Modification would not significantly impact on the particular aspect of the environment the subject of their assessment.

This approach demonstrates that throughout the development of the Proposed Modification, the Proponent and its consultants have, by undertaking an appropriate level of research, baseline investigations and environmental evaluation, adopted an anticipatory approach to potential impacts. These controls, safeguards and/or mitigation measures have therefore been planned with a comprehensive knowledge of the existing environment and the potential risk of environmental degradation posed by the Proposed Modification.

5.1.3 Social Equality

Social equity embraces value concepts of justice and fairness so that the basic needs of all sectors of society are met and there is a fair distribution of costs and benefits to the community. Social equity includes both inter-generational (between generations) and intra-generational (within generations) equity considerations.

If approved, the Proposed Modification would ensure intra-generational equality through:

- permitting access to additional ore resources, thereby removing an technical limitation on the area that could potentially be mined and making the positions of these employed at the Mine more secure; and
- ensuring that the proposed additional mining activities would not result in further surface disturbance.

If approved, the Proposed Modification would ensure inter-generational equality through ensuring that the final landform would be as approved.

The Proposed Modification would ensure that the Mine is as robust as possible, and that resources would continue to be available to ensure that these benefits would continue.

5.1.4 Conservation of Biological Diversity and Ecological Integrity

The protection of biodiversity and maintenance of ecological processes and systems are central goals of sustainability. It is important that developments do not threaten the integrity of the ecological system as a whole or the conservation of threatened species in the short- or long-term.

Additional disturbance associated with the Proposed Modification would be negligible (0.04ha). As a result, the Proposed Modification would have a very limited impact on threatened flora and fauna.

5.1.5 Improved Valuation and Pricing of Environmental Resources

The issues that form the basis of this principle relate to:

- the acceptance that all resources are appropriately valued;
- cost-effective environmental stewardship is adopted; and
- the adoption of user pays prices based upon the full life cycle of the costs.

In line with these objectives, the Proponent's principal objective of the Proposed Modification is the design and operations of the Mine in a manner that minimises impacts on the environment and surrounding residents, as well as researching, planning and designing of the environmental safeguards and mitigation measures to prevent irreversible damage to environmental resources. In doing so, the Proponent has and would continue to invest considerable resources in the management and mitigation of environmental risks.

5.1.6 Conclusion

The approach taken in planning for this Proposed Modification has been multi-disciplinary and involved consultation with the community, a range of Specialist Consultants and various government agencies. Emphasis has been placed on the application of appropriate safeguards to minimise any additional and potential environmental, social and economic impacts that may occur as a result of the Proposed Modification. The design of the Proposed Modification has addressed each of the sustainable development principles and, on balance, it is concluded that the Proposed Modification achieves a sustainable outcome for the local and wider environment.

5.2 JUSTIFICATION OF THE MODIFICATION

5.2.1 Introduction

In assessing whether the Proposed Modification is justified, consideration has been given both to the predicted residual impacts on the local and wider environment and the potential benefits the Proposed Modification, if approved, would have for the Proponent, surrounding land owners and residents, the Nymagee community, the Cobar LGA, NSW and Australia. Further justification arises from the controls, safeguards and mitigation measures for impact minimisation proposed by the Proponent and the incorporation of the principles of Ecologically Sustainable Development.

This subsection discusses the above in terms of biophysical and socio-economic considerations. It also discusses the consequences of the Proposed Modification not proceeding.

5.2.2 Biophysical Considerations

The following presents an overview of the range of additional residual impacts on the biophysical environment should the Proposed Modification proceed.

- Geotechnical and surface subsidence.

  The Proponent proposes to make an application for a Mining Lease that would exclude the land from the surface to a depth of 100m below surface. The uppermost stoping level is anticipated to be approximately 237m below surface. A geotechnical assessment was undertaken to determine the potential for the proposed stopes to propagate upwards. That assessment determined that assuming an unfilled void, the maximum extent of propagation would be approximately 148m below ground surface. However, should the upper void be backfilled as proposed, the extent of propagation of the stope would be substantially less. As a result, the geotechnical assessment determined that the probability of failure would be less than 0.5%.

- Groundwater.

  A groundwater assessment was undertaken using monitoring data collected from within and surrounding the Project Site since the commencement of mining operations. That assessment determined the following.

  - Inflows to the underground mine would be largely consistent with the current inflows, namely between 0.3ML and 0.4ML per day, with a gradual decrease in the rate of groundwater inflow with time.
  - A potential drawdown of up to 3m may occur in registered bore GW017385 located approximately 2.0km to the north of the proposed mining operations. Should such a drawdown be observed during monitoring, the Proponent would ensure that a suitable alternative water source is made available in accordance with Condition 3(21) of Project Approval 10_0191.
  - No impacts on groundwater dependent ecosystems are anticipated.

- Ecology and heritage.

  As surface disturbance will be limited to a 20m x 20m area of previously disturbed land, no adverse ecology or heritage-related impacts are anticipated.

5.2.3 Socio-Economic Considerations

The Proposed Modification, if approved, would provide several economic benefits to the local and regional socio-economic setting, including the following.

- Continued employment of approximately 100 full-time equivalent positions;
- Continued contribution of approximately $15 million per year to the local and wider economy through wages and salaries;
- Continued support of local community services and projects;
- Continued contribution of approximately $55 million per year to the local, State and national economy through the purchases of goods and services; and
- Continued contribution of approximately $300 000 and $3 million per year to the Local and State and Governments through the payment of voluntary contributions and royalties.

The Proposed Modification would ensure that the Mine is economically robust and would continue to operate until the end of the approved life of mining in 2022.

5.2.4 Consequences of Not Proceeding with the Proposed Modification

The consequences of not proceeding with the Proposed Modification include foregoing the opportunity to extract identified resources located to the north of the Project Site and Mining Lease 1686.

It is therefore considered that the benefits of proceeding with the Proposed Modification far outweigh the minor impacts on the environment that would result.

6. REFERENCES

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OzArk (2011); *Hera Project, via Nymagee – Ecology Assessment*

OzArk (2015); *Ecology Field and Heritage Desktop Assessment: Proposed Air Vent at Hera Gold Mine* (presented as **Appendix 3**).

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