

CHAPTER 20

HERITAGE



BIRD IN HAND GOLD PROJECT

MINING LEASE PROPOSAL



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BIHMLP_V2	O:\Technical\Bird In Hand\Regulatory\DSD\ML Application\BIHMLP_V2	PDF	18/6/2019

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Distribution Electronic Copies (Body and Appendices)

Document Number	Issued To	Format	Date
BIHMLP_Draft_V1	DEM	Adobe	18/12/2017
BIHMLP_V2	DEM (45 copies)	PDF	21/6/2019
BIHMLP_V2	DEM (5 copies)	Hard Copy	21/6/2019

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All maps presented in this chapter are in GDA94 / MGA zone 54 (EPSG: 28354) unless otherwise stated.

20 HERITAGE

This chapter discusses both Aboriginal and non-Aboriginal heritage aspects in relation to the land within and surrounding the proposed Mining Lease (ML) for the Bird in Hand Gold Project (the ‘Project’ or ‘BIHGP’).

Today, the landscape of Exploration Lease (EL) 4303, and more specifically the proposed ML boundary is largely rural. In the past it would have been part of an Aboriginal clan estate for the Peramangk people of the eastern Mount Lofty Ranges, although there are no records indicating whether they had significant sites in the vicinity. The model of Aboriginal use discussed in this chapter suggests seasonal use of the land, with the main camping places being at major waterholes along the Onkaparinga River, such as Bukartilla at Hahndorf. The finding of any surface Aboriginal material within EL 4303 is extremely unlikely given the nature of former Aboriginal use of the area, along with its subsequent history of intense mining activities and town construction during the late nineteenth century.

The Woodside area has a rich mining history. Since the arrival of the first colonists to South Australia in 1836, the mines in the Mount Lofty Ranges have produced a wide range of commodities, such as building stone, clay and slate for the rapidly growing city on the nearby Adelaide Plains (Kerr, 2011) Among the metalliferous materials that were mined are copper, silver, lead, zinc, gold and pyrite. The Wheal Gawler, which opened in 1841 at Glen Osmond, was Australia’s first metalliferous mine and heralded a mining boom that led to the discovery of many further deposits, such as the important copper deposits at Kapunda in 1842 and Burra in 1845 (Dutton, 1846). This mining boom, much of it later centred in the Mount Lofty Ranges to the east of Adelaide, saved the economy of the struggling new Colony of South Australia. The majority of places exhibiting non-Aboriginal heritage significance are related to the historic mines and remnants of their supporting infrastructure. Establishment of the proposed ML can impact the historical significance of sites, however, the likelihood of impact can be significantly reduced through the use of design and control measures outlined in this chapter.

This chapter identifies recognised sites of non-Aboriginal heritage in the locality of the proposed ML, including places of listed heritage significance and other identified culturally significant sites and outlines control and process strategies in the event of the discovery of unidentified heritage items through the life of the project. It provides an assessment of impacts on identified places of heritage significance and details design modifications and management measures incorporated into the project to reduce impacts where necessary.

20.1 APPLICABLE LEGISLATION AND STANDARDS

20.1.1 INDIGENOUS

The South Australian *Aboriginal Heritage Act 1988* (AHA) is administered by the South Australian Department of State Development, Aboriginal Affairs and Reconciliation (DSD-AAR). This legislation outlines that any Aboriginal site, object or remains whether previously recorded or not, is covered by the AHA. The Act provides the following definitions of an Aboriginal site in section 3.

“Aboriginal Site” means an area of land;

- a) That is of significance according to Aboriginal Tradition; and
- b) That is of significance according to Aboriginal archaeology, anthropology or history.

The AHA states that it is an offence under section 23 to ‘damage, disturb or interfere’ with an Aboriginal site, object or remains unless written authorisation is obtained from the Minister for Aboriginal Affairs and Reconciliation.

The AHA is the most relevant piece of legislation regarding Indigenous heritage issues for this particular project. The cultural heritage assessment has been conducted to determine if the proposed works are likely to damage, disturb or interfere with any cultural heritage sites.

Currently no native title exists over land, as all the affected lands are freehold, which means that native title is extinguished, as outlined in the *Native Title Act 1993* (Cth).

20.1.2 NON-INDIGENOUS

Department of Environment and Water (DEW) and the South Australian Heritage Council are responsible for protecting and conserving built, maritime and intangible heritage, non-Aboriginal cultural heritage of significance to South Australia, under the following legislation: *Heritage Places Act 1993* (SA); *Historic Shipwrecks Act 1981* (SA); *Historic Shipwrecks Act 1976* (Cth).

20.1.2.1 VEGETATION HERITAGE

The Native Vegetation Heritage Agreement area is recognised as a sensitive receptor, with particular values, and all assessment methodologies, existing environment, potentially impacting events, design and management strategies, and outcomes and associated measurement criteria have been discussed within Chapter 19 on Vegetation and Weeds.

20.2 ASSESSMENT METHOD

An expert consultant anthropologist, Dr Phillip Clarke undertook the heritage assessment work in 2016 (see Appendix S1). This assessment included a literature search and a site assessment visit, including an orientation trip to the ML area with company staff on the 8th of March 2016 in order to become familiar with the general environment and to take the site photographs to be used in the heritage report. Terramin provided some written material on the local heritage and mining history. At this stage, due to the circumstances of intensive European land use history and the location of the Bird in Hand (BIH) proposed mining lease being away from major water sources, it is not expected that there will be any need to explore the local Aboriginal archaeology in terms of surface material. The research in libraries, archives and the Internet was undertaken. This work was chiefly spread over the March-April 2016 period in order to make sure that key documents were sourced.

Dr Philip Clarke’s Heritage report is located in Appendix S1.

Additionally, a cultural heritage risk assessment was undertaken by EBS Heritage (EBS) in order to provide specific recommendations regarding project activities based on the risk profile. EBS reviewed desktop information and reviewed geotechnical investigations of the existing soil profiles, which is useful in understanding the extent of modern disturbance and/or the potential for soils to retain undisturbed cultural heritage.

The EBS Cultural Heritage Report is located in Appendix S2.

20.3 EXISTING ENVIRONMENT

The Aboriginal and European Heritage report as well as the Cultural Heritage Report is located in Appendix S1 and S2 respectively.

20.3.1 INDIGENOUS

20.3.1.1 DSD-AAR REGISTER SEARCH

Terramin conducted a search of the Register, maintained by DSD-AAR, in February 2014 and no sites are registered in the current project area.

The Central archive is a record of previously recorded heritage sites in South Australia. The central archive is not an exhaustive list of sites in a specific area and contains only sites that have been reported and/or registered. DSD-AAR advises that all Aboriginal sites are protected by the AHA and it is an offence to damage, disturb or interfere with any Aboriginal site, or damage any Aboriginal object (registered or not) without authority from the Minister for Aboriginal Affairs and Reconciliation.

20.3.1.2 SA MUSEUMS DATABASE

The South Australian (SAM) database is an inventory of Aboriginal cultural material and skeletal remains held by the SAM. A search of the database for entries relating to the project area was carried out using the following key words; Woodside, Pfeiffer Road. The search revealed no records for skeletal material found in the area or in surrounding areas.

20.3.1.3 OVERVIEW

Today, the landscape of EL 4303 is largely rural. In the past it would have been part of an Aboriginal clan estate for the Peramangk people of the eastern Mount Lofty Ranges, although there are no records indicating whether they had significant sites in the vicinity. The model of Aboriginal use discussed in this report suggests seasonal use of the land, with the main camping places being at major waterholes along the Onkaparinga River, such as Bukartilla at Hahndorf. While the eastern escarpment of the Mount Lofty Ranges is rich in Aboriginal rock engraving and painting sites, the only exposed natural rocks found during field surveying in the area have rough friable surfaces which would have been unsuitable for such activity. Furthermore, there are no recorded quarries for stone tools within EL 4303 and no examples of Aboriginal worked stone fragments were sighted during my site inspection.

The finding of any surface Aboriginal material within EL 4303 is extremely unlikely given the nature of former Aboriginal use of the area, along with its subsequent history of intense mining activities and town construction during the late nineteenth century. In the unlikely case that suspected Aboriginal material, such as stone artefacts or human bone, is uncovered during any future mining operations then this should be immediately reported to the Principal Heritage Officer at Aboriginal Affairs and Reconciliation, as per the *Aboriginal Heritage Act, 1988* regulations. Since there are no current native title claims registered for the eastern Mount Lofty Ranges region, there is not a claimant group which requires consultation concerning the mining development.

The surviving record of Aboriginal groups who lived in the eastern Mount Lofty Ranges is poor in comparison to the vast amount of information available for neighbouring groups living on the Adelaide Plains and in the Lower Murray (see Figure 3). This is partly due to a lack of an early missionary presence in the region and probably because at the time of European settlement the language and culture of the Aboriginal people living here was seen as being close to that of their neighbours, either the Adelaide

Plains or Murray River people (Chilman, 1990, pp. 12,29). For this reason, an overview of Aboriginal life and culture in the region within which Woodside Goldfield sits must be generated by augmenting the sparse historical records with ethnographic data from adjacent regions.

20.3.1.4 PERAMANGK

For living areas Aboriginal people preferred the relatively open river red gum (*Eucalyptus camaldulensis*) forest country in the vicinity of Woodside, Hahndorf and Mount Barker, and they generally avoided the stringybark (*Eucalyptus obliqua* and *E. baxteri*) forests of the higher elevations of the Mount Lofty Ranges. In 1849, explorer and colonist Charles Sturt noted that:

... with the exception of a few scattered families on the northern hills, and in the scrub, the mountain ranges are, and it appears to me have been, almost uninhabited. There are no old or recent signs of natives having frequented the hills, no marks of tomahawks on the trees, or of digging on the flats. The Mount Lofty ranges, indeed, are singularly deficient of animal life, and seem to be incapable of affording much subsistence to the savage, however luxuriant and beneficial the harvest they now yield. (Sturt, 1849)

There is an absence of archaeological records for the central spine area of the Mount Lofty Ranges, both in terms of surface finds and rock art, which is a fact that leads us to conclude that Aboriginal people rarely used this zone for camping or for the daily collection of food (Clarke, 2003, p. 115; Ellis, 1976, pp. 113-120; Martin, 1987, p. 10). An historian recorded that the Aboriginal people who camped along the Mount Barker Creek 'avoided barren stringybark forests and deep ravines of the tiers' (Schmidt (1983) cited by Coles, 1988). Much of their favoured plant food would have been associated with wetlands. For instance, the flat flood plain known as Lartingga-parri, which is on the eastern edge of the Mount Barker township, was a major Aboriginal campsite (Simpson P. , 2011) and today is the site of the Lartingga Wetlands project (Mount Barker District Council, 2016). The literature and museum artefact collections provide much more evidence of the nature of Aboriginal use of country along the eastern escarpment of the ranges.

Aboriginal bands residing in the country between the Mount Lofty Ranges and the Murray River moved about seasonally as hunter-gatherers. Tindale claimed that:

The Peramangk lived much of the year in the vicinity of Mount Barker and on the strip of red gum country running north to [the] Angaston district. In winter they kept to elevations below about 1,200 feet (365 m.) since the wet sclerophyll forests at higher elevations were very cold and wet with a winter rainfall of 45 inches (115 cm.) and more. This rain came to them from the west over the Mount Lofty heights, and as the westerly winds flowed down the eastern slopes toward the Murray plains, it decreased quickly to less than 15 inches (40 cm.). Their own territory was so well watered that they had little occasion to use the mallee-covered limestone flatlands to their east (Tindale, 1974, p. 60).

There are several such ancient river red gums on the Terramin ML, which would have probably been mature trees at the time of European settlement (see Figure 6). In earlier times many of these large gumtrees in the eastern Mount Lofty Ranges would have borne the wounds from where bark was removed to make shields and containers, although these scars would have grown over many decades ago (Boehm, 1948; Roberts, 2000). Larger trees with hollow bases could also have been used as sheltered winter campsites (Ellis, 1976, pp. 114,117). The creek line running through EL 4303 is only intermittently flowing, although it is part of the Onkaparinga River catchment.

European settlement interfered with Aboriginal use of the land, as shown in the descriptions of the German Lutherans arriving in the hills. Iwan stated that:

As they afterwards began to clear the area of Hahndorf and set about building their houses, they soon noticed that they were being regarded as unwelcome intruders. And that is all the less surprising since there happened to be a particularly large and deep waterhole in the proximity of Hahndorf, in which the natives liked to swim, and where they were in the habit of holding their corroborees dances (Iwan, 1988, p. 50).

Overall, European settlers found the Aboriginal people of the eastern Mount Lofty Ranges to be benign. Hahn considered that:

These people seem very good-natured, at least those living in the region of the Onkaparinga River. The general opinion is that beyond the Murray they are less well-disposed (Hahn, 1964, p. 132).

An historian remarked that at Hahndorf:

There appear to have been no fatal incidents during these early years, though there is one record of an Aboriginal's throwing a spear at a white woman who some days before had 'refused to give food to a number of natives who had come begging'. As the woman backed into the doorway the spear hit the door post. The mark could be seen for many years. (Simpson E. R., 1983, p. 59)

These occurrences appear minor when compared to the frontier conflict recorded in parts of South Australia, such as the West Coast and Mid North (Bull, 1878, pp. 12-13, 27-32, 48-50; Foster, Hosking, & Nettelbeck, 2001). On some occasions in the early decades of European settlement when there was a shortage of available labour, farmers employed local Aboriginal people to help bring in the harvest and to thresh sheaves (Coles & Draper, Aboriginal history and recently-discovered art in the Mount Lofty Ranges, 1988, pp. 2-3; Simpson E. R., 1983, p. 71; Mattingley & Hampton, 1988, p. 117).

Through the nineteenth century, disease continued to decimate the Indigenous population in the areas surrounding Adelaide. Analysis of the historical record suggests that the Aboriginal inhabitants of the eastern Mount Lofty Ranges had largely moved away from the region by the 1850s (Coles & Draper, Aboriginal history and recently-discovered art in the Mount Lofty Ranges, 1988, p. 3; Hossfeld, 1926, p. 293). It that European settlement forced the 'hills people' to merge with Aboriginal groups living along the Murray River, as their cultural affinities were stronger with this area.

20.3.2 EUROPEAN

20.3.2.1 BIRD IN HAND GOLD MINE

Since the arrival of the first British colonists to South Australia in 1836, the mines in the Mount Lofty Ranges have produced a wide range of commodities, such as building stone, clay and slate for the rapidly growing city on the nearby Adelaide Plains (Kerr, 2011). Among the metalliferous materials that were mined are copper, silver, lead, zinc, gold and pyrite. The Wheal Gawler, which opened in 1841 at Glen Osmond, was Australia's first metalliferous mine and heralded a mining boom that led to the discovery of many further deposits, such as the important copper deposits at Kapunda in 1842 and Burra in 1845 (Dutton, 1846, ch 10-12; Mudd, 2009). This mining boom, much of it later centred in the Mount Lofty Ranges to the east of Adelaide, saved the economy of the struggling new Colony of South Australia.

The finding of gold in the Woodside district occurred long after the gold rushes of the 1850s in eastern Australia. In early 1880 a farmer named Mitchell was using explosives to help clear his property of tree roots when he made the first discovery of gold in what became the Woodside Goldfield (Drew, 2011, p. 26). He uncovered a mass of quartz and gold worth £300, and after several other rich specimens

were removed several shafts were sunk and £650 of gold was extracted. In July 1881 the Woodside Gold Mining Company was formed, with its shareholders including the copper kings, Sir Thomas Elder and Mr Barr Smith (Anon., 1881; Anon., 1881; Anon., 1882). The Company wound up in late 1882 due to disappointing results. Soon afterwards, several promising quartz reefs were discovered a few kilometres east of Woodside. Total recorded gold production for the Woodside Goldfield is nearly 30,000oz, with more than 23,000oz coming from three mines – Bird-in-Hand (10,500oz), New Era and Eureka (McLean, 2007b, p. 5).

Between commencing in 1881 and winding down in 1935, the BIH Mine (Section 5278, mindep no.5761) was operated at various times by the following companies:

- Bird-in-Hand Gold Mining Company Ltd.
- Woodside Consols Gold-Mining Company NL.
- Great Eukaby and Bird-in-Hand Mining Company.
- The Woodside Consolidated Syndicate Ltd.
- Woodside Gold Mining Syndicate.
- Woodside Consolidated Gold Mining Company.
- Bird-in-Hand Gold Mines NL.

Mining activity started in July 1881 when prospector David McCracken discovered two gold bearing reefs on a section owned by James Shepherd, to the east of Woodside (Drew, 2011, p. 26; McLean, 2007a). After an initial crushing of 12t that yielded 22oz of gold, the Bird-in-Hand Gold Mining Company was formed on the 28th November 1881 and the BIH Mine established (Fradd & Morris, 2015, p. 5). The development of the BIH Mine eventually led to the establishment of other mines in its vicinity.

Mining at the BIH site began in late 1881 with work on the Main Shaft, and then in January 1882 a 10-head stamp battery and small steam engine from the Langlands Foundry in Melbourne began operation on the Ridge Mine section, as this was where water was sourced (Fradd & Morris, 2015, p. 8).

In February 1882 a newspaper claimed that the BIH was ‘the premier gold mine of the colony’ and reported that:

Speaking of the Bird-in-Hand, the crushing is going on very well, and the amalgam taken away promises a good return. There are many who estimate it at rather over than under 2 oz. of gold to the ton, and we believe the lowest estimate made is 11/2 oz. Even if no higher than this is obtained, it will give a splendid return, and prove the mine to be highly payable. We believe the quantity of amalgam already taken from the ripple-tables is considerably over 400 ounces. Every one interested will be anxious to know the result when the gold is retorted, and, indeed, everyone concerned in gold mining in South Australia must be watching with some degree of interest for the ultimate returns. This mine is proving itself the premier gold mine of the colony, and yet, even after crushing had commenced and the show of amalgam was so satisfactory, the price of shares fell 10 per cent. This fact illustrates our first statement, that the price of shares is not a reliable criterion of the value of prosperity of a mine (Anon., 1882, p. 3).

Then in March 1882, it was observed that:

The people in the Lobethal and neighbouring districts naturally take a great interest in the mining operations that are being carried on in their vicinity, for if the Bird-in-Hand proves a lasting concern, as there is every probability that it will, there can be little doubt that other paying mines will be discovered in that direction, and among the beneficial results of such a development of mineral wealth the increase of population and progress of trade in that part of the colony will not be the least important (Anon., 1882, p. 4).

There were high hopes that the BIH and other mines in the Woodside Goldfields would stimulate a boost for the local hills economy.

At the BIH in May 1883, a new 20-head battery powered by a 40hp steam engine from Martin & Company of Gawler was erected (see Figures 10 & 11) (Drew, 2011, p. 26; Fradd & Morris, 2015, p. 10; McLean, 2007a). This was the largest battery erected in South Australia up till then. A small steam engine was also installed at the Main Shaft for hauling and operating pumping equipment, although this was finally found insufficient for getting ground water out of the mine. An elevated tramway about 120m long was built from the landing brace at the Main Shaft to convey ore to the battery house.

With the aid of a Government subsidy of £3000, the company purchased a 50-inch Cornish pumping engine from the Bon Accord Mine near Burra, along with other equipment. Ore production was suspended while work was concentrated on the sinking of a new engine shaft, named the Victoria, to intersect the reef about 60m below the deepest workings, which by this time had been almost worked out. By early 1888 the Victoria Shaft had reached the 60 fathom level (110m), although difficulty occurred when much water was encountered in a crosscut at that level (Drew, 2011, p. 27; Fradd & Morris, 2015, p. 7; McLean, 2007a). Additional pumps were fixed in the shaft and a 360m long drainage passage was constructed at the 34m level, which reduced the load on the pumping engine. All water in the Victoria Shaft was removed by June, which allowed work at the 60 fathom level to be recommenced. In spite of the progress made, difficulties in raising development capital forced the closure of the BIH Mine in July 1889, leaving the engine shaft still 36m from the Main Reef. The mine was closed as business interest, local capital support and personnel were drawn into the silver boom at the newly discovered Broken Hill mining region of western New South Wales. Over the following decade, the mine was repeatedly purchased, dewatered and abandoned, owing to the great expense [that] would be entailed in developing it (Anon., 1885, p. 5).

In 1927 the Commonwealth Government bought the BIH Mine for the nearby Woodside (Inverbrackie) Army Barracks and it was used as its water supply from 1933 to 1967 (Anon., 1929, p. 10). On SA Water land on the Bird in Hand Road there was once a water treatment plant, although earth infill was placed there to level the area (see Figure 9 for the site of the 'Old SA Water pump house').

The mine was re-opened by the Bird-in-Hand Gold Mines NL in 1933 and the water was pumped out of the old workings to enable them to be cleared, restored and the engine shaft deepened by 18m (see Figures 12 & 13) (Pring & McHenry, 2009, p. 41). The engine house was converted for use as a switch room, engineers' quarters, change house and assay laboratory. The company wound up in July 1935, but the mine continued to be worked by tributers until 1938. The engine house and chimney were demolished in the 1950s, an occurrence which has denied the current landscape of much physical evidence for the mine's former significance. The BIH Mine was the largest on the Woodside Goldfield. The total estimated production of the BIH Mine was 22,584.88 tonne of ore, yielding 327,918.96 grams (10,544 ounces) of gold bullion, at a grade of 14.52 g/t gold (Drew, 2011, p. 28; Fradd & Morris, 2015, p. 8; Pring & McHenry, 2009, p. 41).

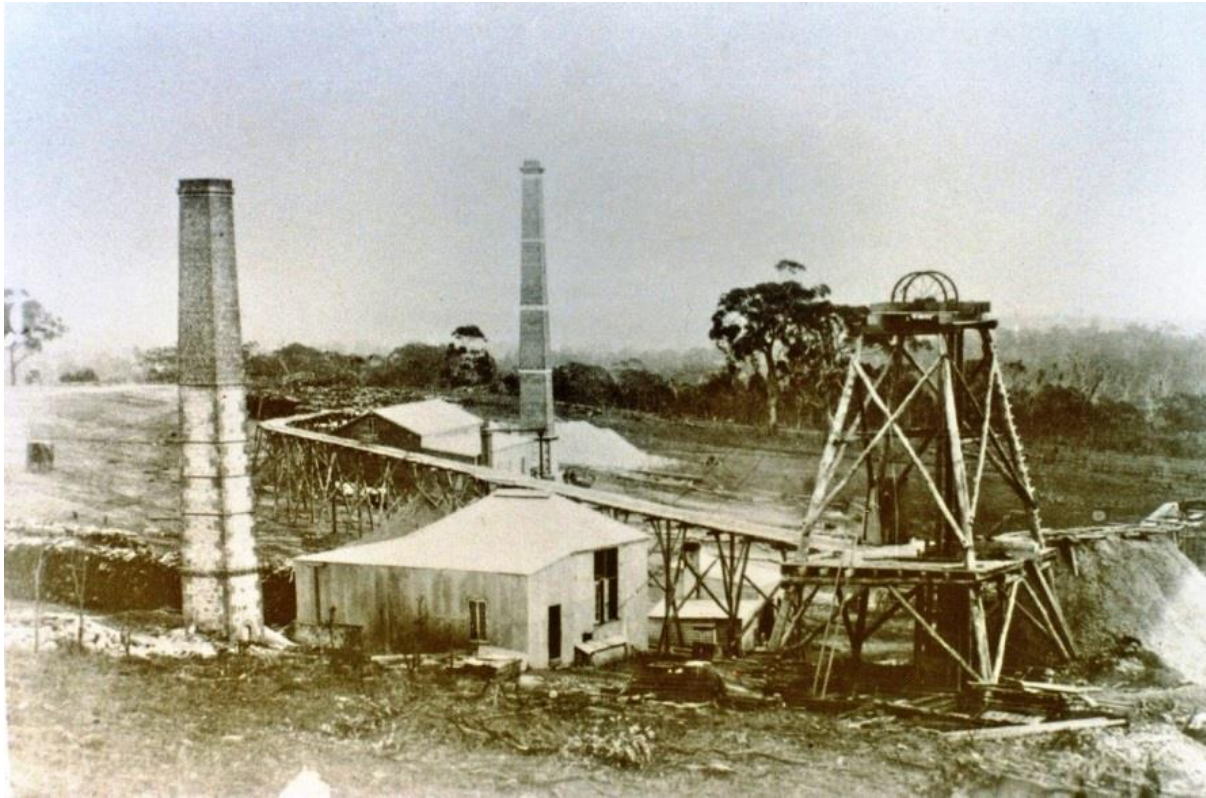


FIGURE 20-1 | BIRD-IN-HAND MINE IN 1884, WITH A VIEW LOOKING WEST TOWARDS THE WINDING HOUSE AND THE TRAMWAY TO THE 20 HEAD STAMP BATTERY (TERRAMIN, 2016).

20.3.3 EXISTING HERITAGE PLACES

20.3.3.1 REMAINING INFRASTRUCTURE AND ARTEFACTS

There are some physical relics of various mining structures within EL 4303 today, although much of the original infrastructure would have been removed for salvage during the early twentieth century. The battery and chimney stack associated with the Lone Hand Mine in the northern section of EL 4303 are the most prominent historic markers in the landscape (see Figure 20-1), and together these are already protected as a registered Heritage Place.¹ The possible puddler site near the Brind shaft (Figure 20-2) is not close to the proposed works, although it may require the implementation of protective measures, such as fencing. The area of Reefton Heights in the centre of EL 4303 would have once been covered in temporary houses for the mine workers, although it is now chiefly clothed by native vegetation regrowth. This woodland does contain some ruins in the form of building foundations and shaft openings, surrounded by scattered loose material, such as metal and glass. Identified features have been mapped below in Figure 20-3.

¹ State Heritage ID 12863, Heritage Number 15253 (http://maps.sa.gov.au/heritagesearch/HeritageItem.aspx?p_heritageno=15253, accessed 30 March 2016).

Since no significant mining activities are planned to take place at the surface of this woodland at Reefton Heights, then there is no apparent threat to this heritage. The minor work that might take place within the SA Water site of Reefton Heights does not pose any serious risk to the local mining heritage.



FIGURE 20-2 | LONE HAND CHIMNEY STACK, 8TH MARCH 2016.

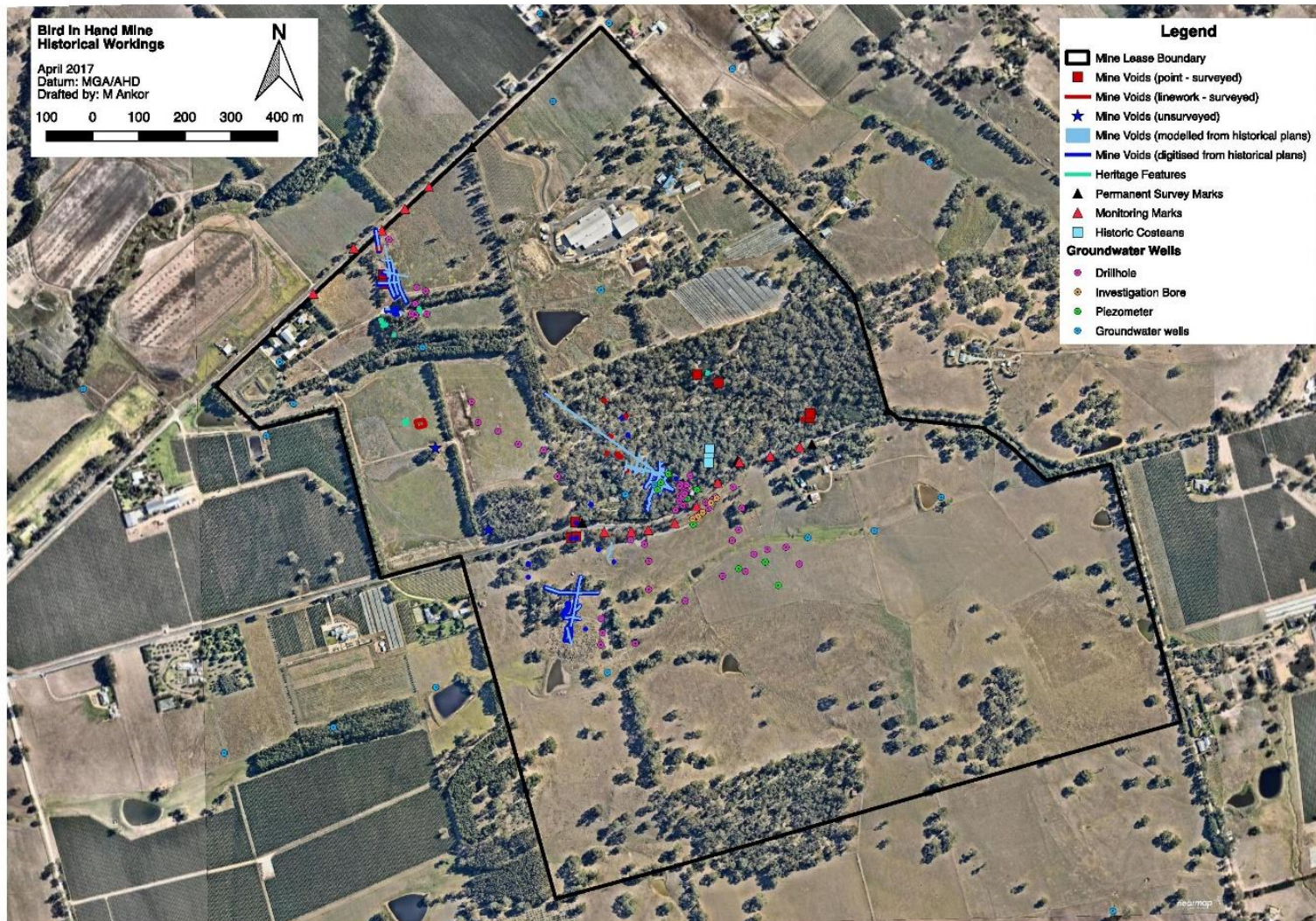


FIGURE 20-3 | BIRD IN HAND HISTORICAL WORKINGS

20.4 SENSITIVE RECEPTORS

Sensitive receptors within the ML include the Lone Hand Chimney and battery stack, as well as the Chimney associated with the historic Ridge Mine. Both locations are included in Figure 20-4

The Native Vegetation Heritage Agreement (NVHA) area is recognised as a sensitive receptor, and has been discussed in Chapter 19: Vegetation and Weeds.

TABLE 20-1 | SENSITIVE RECEPTOR TABLE

Sensitive Receptor	Summary	Impact ID
Persons who speak for Aboriginal heritage in the area (Peramangk)	Persons who speak for Aboriginal heritage in the area (Peramangk)	PIE_20_01
Site/item of non-Aboriginal heritage significance	Significant trees within Goldwyn are all <i>Eucalyptus camaldulensis</i> , identified in Figure 20-4	PIE_20_02
State Heritage Chimney on Goldwyn (Lone Hand) and Ridge Mine Chimney	Only listed State heritage place recognised onsite under the <i>Heritage Places Act 1993</i> (SA)	PIE_20_03

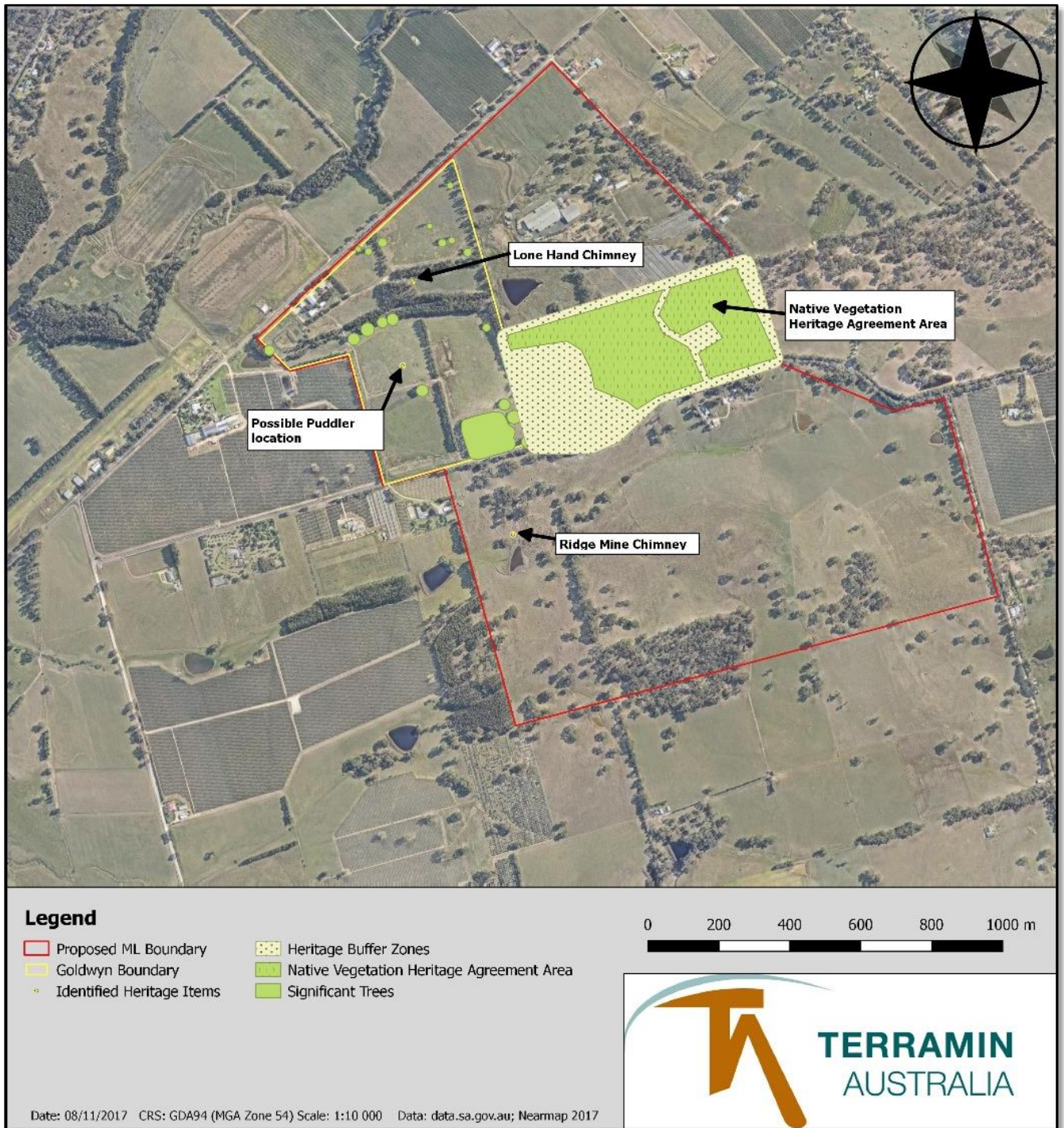


FIGURE 20-4 | IDENTIFIED SENSITIVE RECEPTORS

20.5 POTENTIALLY IMPACTING EVENTS

Potentially impacting events associated with heritage are all associated with land clearance/ground disturbance from mining activities.

Potentially impacting events relating to air overpressure and vibration (where they relate to heritage), are described in Chapter 17 (Air Overpressure and Vibration), they are not repeated here to avoid duplication.

TABLE 20-2 | POTENTIALLY IMPACTING EVENTS

Potentially Impacting Events	Mine Life Phase	Source	Potential Pathway	Sensitive Receptors	Confirmation of S-P-R	Impact ID
Ground disturbance from mining has the potential to damage, disturb or interfere with an unidentified site, object or remain of Aboriginal heritage significance	Construction, Operation	Ground disturbance from mining	Physical impact of machinery	Persons who speak for Aboriginal heritage in the area (Peramangk)	Yes	PIE_20_01
Ground disturbance from mining has the potential to damage or disturb an unidentified site or item of non-Aboriginal heritage significance (mining heritage artefacts)	Construction, Operation	Ground disturbance from mining	Physical impact of machinery	Site/item of non-Aboriginal heritage significance	Yes	PIE_20_02
Ground disturbance from mining has the potential to damage or disturb the State Heritage Chimney on Goldwyn (Lone Hand) and Ridge Mine Chimney	Construction, Operation, Closure	Ground disturbance from mining	Physical impact of machinery	State Heritage Chimney on Goldwyn (Lone Hand) and Ridge Mine Chimney	Yes	PIE_20_03

20.6 CONTROL MEASURES TO PROTECT ENVIRONMENT

20.6.1 DESIGN MEASURES

Buffer zones have been put in place around the identified heritage sites, as per the Biodiversity Management Plan for the Goldwyn property. Trees have also had buffer zones instated as per AS4970-

2009, which demonstrates these buffer zones will be effective if operational work procedures are adhered to.

Buffer zones are used routinely throughout industry and known to be effective in eliminating risk of damaging identified heritage items.

Additionally, the Blast Management Plan to be developed for the site needs to comply with 15mm/s ground vibration at the Lone Hand Heritage Chimney.

Identified design measures are outlined below in Table 20-3.

TABLE 20-3 | IDENTIFIED DESIGN MEASURES: HERITAGE

Design Measures	Impact ID
Buffer zones through construction, operation and closure earthworks of Lone Hand Chimney and Battery area and Ridge Chimney – 25m (Figure 20-4)	PIE_20_02
	PIE_20_03
	PIE_20_04
	PIE_20_05
Buffer zones around identified heritage paddock trees (Figure 20-4)	PIE_20_02
	PIE_20_03
	PIE_20_04
	PIE_20_05

20.6.2 MANAGEMENT STRATEGIES

BIHGP site induction training for all employees and contractors will be a mandatory requirement, potential heritage impacts and procedures to avoid negative impacts will be addressed in the induction process.

The permit to dig or undertake land disturbance must be signed off by the Environmental Superintendent.

A heritage item site discovery procedure has been developed, this procedure includes images of what employees and contractors need to look out for and how to respond. Having this information included in all standard work procedures means that employees and contractors have the required tools to ensure avoidance of any negative impacts. At the end of each task the supervisors note any issues or suggested improvements to the procedure and signs off on the success and or any improvements required. This ensures a complete record of works undertaken, any impacts that occurred, potential improvements and provides a formal path of communication.

Management strategies are outline below in Table 20-4.

TABLE 20-4 | IDENTIFIED MANAGEMENT STRATEGIES: HERITAGE

Management Strategies	Impact ID
Staff and contractor inductions include heritage concerns – ability to recognise cultural heritage.	PIE_20_01
	PIE_20_02
Implementation of site discovery procedure	PIE_20_03
Dig/land disturbance permits to be signed off by Environment Superintendent	PIE_20_04
	PIE_20_05

20.7 IMPACT ASSESSMENT

Terramin requested a search of the Central Archive which includes the Register of Aboriginal Heritage Sites and Objects in relation to the proposed ML area, which returned no entries for Aboriginal sites in the area.

Currently no native title exists over land, as the affected land are all freehold, which means that native title is extinguished, as outlined in the *Native Title Act 1993* (Cth). In regard to the area within which the Project and Woodside itself sits there are also no claims currently lodged, which means that in a more general sense there is no claimant group for Terramin to meet and discuss the broad implications of the proposed Project.

Based upon the findings of the Aboriginal and European Heritage report as well as the Cultural Heritage Report, Terramin do not expect to discover encounter unknown heritage items. Identified significant trees are protected by the site design, and have management and monitoring strategies which include buffer zones and yearly inspections ensuring their longevity throughout the life of mine. The expected impact upon heritage values is expected to be **negligible**.

Terramin acknowledge that despite database reviews revealing no registered sites of Indigenous heritage significance on the ML (DPC, Aboriginal Affairs and Reconciliation Division), reports regarding Indigenous heritage (history and archaeological), and extensive farming practices across the ML, it is still a possibility that artefacts could exist at the site and will implement induction procedures for all employees and contractors which include the recognition of cultural heritage, as well as the implementation of a site discovery procedure, which includes ceasing work until the relevant approvals are obtained. This commitment will be reflected within the proposed Outcome Measurement Criteria.

The risk assessment also considered the use of potentially using two blasts to prepare the boxcut, as opposed to an excavator and rock breaker preparing the site over months. The two construction surface blasts have been designed at one 5m bench using 12kg of explosives, and the second at a 10m bench using 40kg of explosives. As outlined in chapter 17 the impacts to the two historic chimneys are considered negligible.

The Lone Hand Chimney is located approximately 200m north of the proposed construction blasts. The Lone Hand Chimney is currently experiencing background levels of air overpressure (described in Chapter 17) which are well in excess of the 125 db(L) which is the level the two surface construction blasts would produce. For this reason, there is no credible S-P-R relationship between the chimney and air-overpressure. In regards to vibration, Terramin have investigated other heritage structures near mining projects in Australia. The most similar is the 1860s Cadia Engine House and Chimney, at Newcrest's Cadia Valley Mine in NSW (listing number 00779). Terramin would proposed to limit ground vibration to 15mm/s at the Chimney, as Newcrest have, which reflects the most conservative peak particle velocity for unreinforced or light framed structures, as outlined in British Standard BS7385-2. Authoritative investigations outlined in Australian Standard 2178.2 *Explosives – Storage and Use*, appendix J suggest that the guide values and assessment methods given in BS 7385-2 are applicable to Australian conditions (AS2187.2 - 2006, p. Appendix J). For this reason, Terramin consider impacts to the Lone Hand Chimney to be **negligible**. Impacts to the Ridge Chimney are not plausible based on these standards, as the Ridge Chimney is located where approximately 2mm/s is predicted through the construction blasts.

Ultimately, impacts could be reduced further by a series of smaller blasts, rather than the two blasts described above, however, the Blasting Impact Assessment (Appendix P1) indicates that the proposed criteria would be met at all receivers and blasting vibration at the Lone Hand Chimney would be below the proposed criteria to prevent structural damage.

Vibration impacts to listed flora and fauna are not considered credible as the limits are within human comfort levels outside of the Goldwyn construction or operational area. Similarly the overpressure is within AS and the baseline data collected. Chapter 17 shows there are regular naturally occurring instances of overpressure being higher than 115dB(L), caused by wind or possibly human induced activities such as aircraft flight or gas guns.

There are no credible pathways for impact from development or production blasting identified in the Blasting Impact Assessment (Appendix P1) to the Chimneys, as the vibration and air overpressure generated is considered to be too low (that is, less than 2mm/s vibration and 120dB(L) air overpressure through decline development and less than 0.5mm/s vibration and no air overpressure anticipated through production).

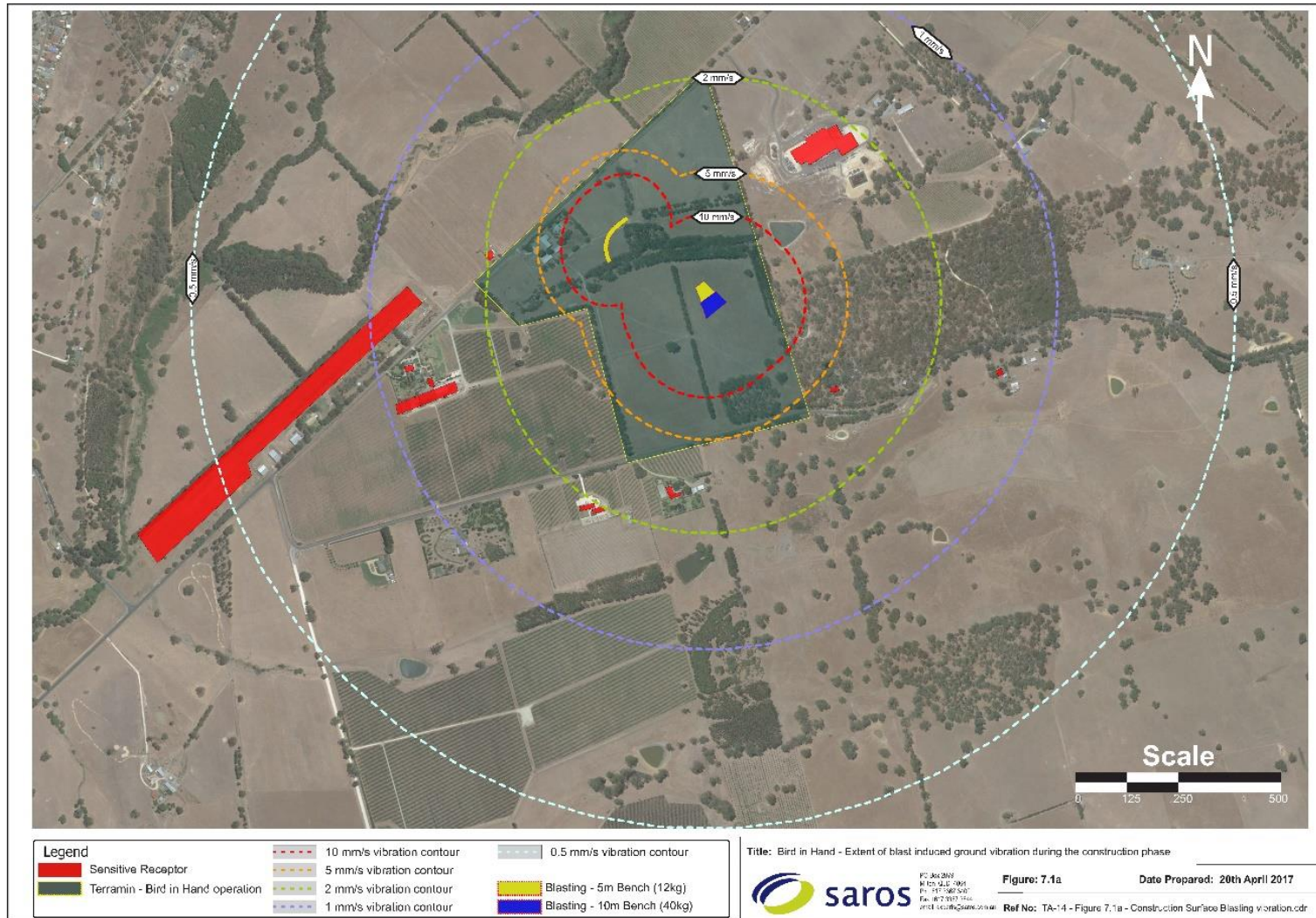


FIGURE 20-5 | GROUND VIBRATION - SURFACE CONSTRUCTION

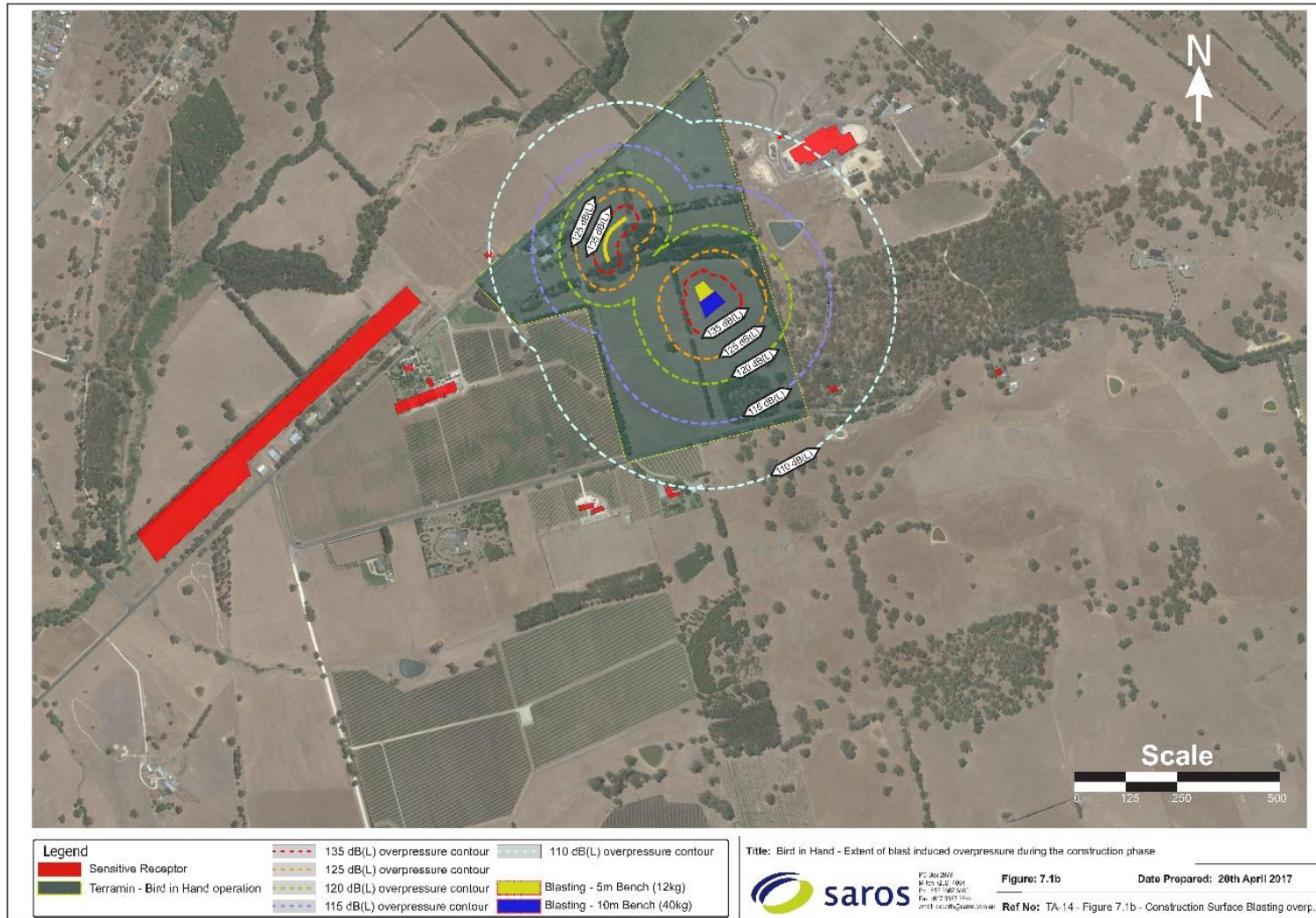


FIGURE 20-6 | AIR -OVERPRESSURE - SURFACE CONSTRUCTION

20.8 DRAFT OUTCOME(S) AND MEASUREMENT CRITERIA

In accordance with the methodology presented in Chapter 6, an outcome has been developed for heritage impact events with a confirmed link between a source, pathway and receptor (S-P-R linkage), see Table 20-5.

All outcomes are supported by draft measurement criteria which will be used to assess compliance against the draft outcomes during the relevant phases (construction, operation and closure), and where relevant draft leading indicator criteria. These measurement criteria and leading indicators are indicative only and will be developed further through the PEPR.

All Outcomes for the entire project are presented in Appendix D1.

TABLE 20-5 | DRAFT OUTCOMES AND MEASUREMENT CRITERIA

Draft Outcome	Draft Measurement Criteria	Draft Leading Indicator Criteria
No disturbance to Aboriginal heritage sites, objects or remains, unless prior approval is obtained from the relevant minister, pursuant to the Aboriginal Heritage Act 1988.	<p>Mine records demonstrate that appropriate authorisation has been obtained under the Aboriginal Heritage Act prior to the commencement of any activities that will disturb known Aboriginal objects and sites.</p> <p>If new Aboriginal objects or sites are discovered, work that may affect the objects or sites is ceased until appropriate authorisation under the Aboriginal Heritage Act is provided.</p> <p>Records are to be kept of land disturbance permits being approved by the Mine Manager prior to any works commencing.</p>	None proposed
No disturbance to non-Aboriginal heritage sites or objects, unless prior approval is obtained from the relevant minister, pursuant to the Heritage Places Act 1993.	<p>Mine records demonstrate that annual photo monitoring of known heritage sites was undertaken to demonstrate no damage by mining activities.</p> <p>Records are to be kept of land disturbance permits being approved by the Mine Manager prior to any works commencing.</p>	None proposed
No adverse impact to heritage buildings from air overpressure, flyrock and vibration caused by blasting.	All blasting demonstrates vibration levels caused by blasting are less than 15mm/s peak particle velocity at the Lone Hand Chimney.	None proposed

20.9 POTENTIAL BENEFITS

The location of the Lone Hand Chimney and historical processing area has the potential to become a visitor's viewing area, as it is located outside the proposed operational area. Mining tourism is a growing sector, and once operating, Terramin intend to utilise their unique historical features located within Goldwyn, as well as highlight their substantial revegetation and environmental activities regarding endangered bird populations.

20.10 FINDINGS AND CONCLUSIONS

The operational area of BIH contains no known sites of sacred sites or sites of Indigenous heritage value. There are operational systems put in place with all dig permits to protect any artefacts that may be



found during excavations, but artefacts are unlikely to occur. The Goldwyn property has one state heritage listed site, the Lone hand chimney and this will be protected by a development exclusion zone placed around it and be protected by a 15mm/s compliance criteria for ground vibration from blasting activities.