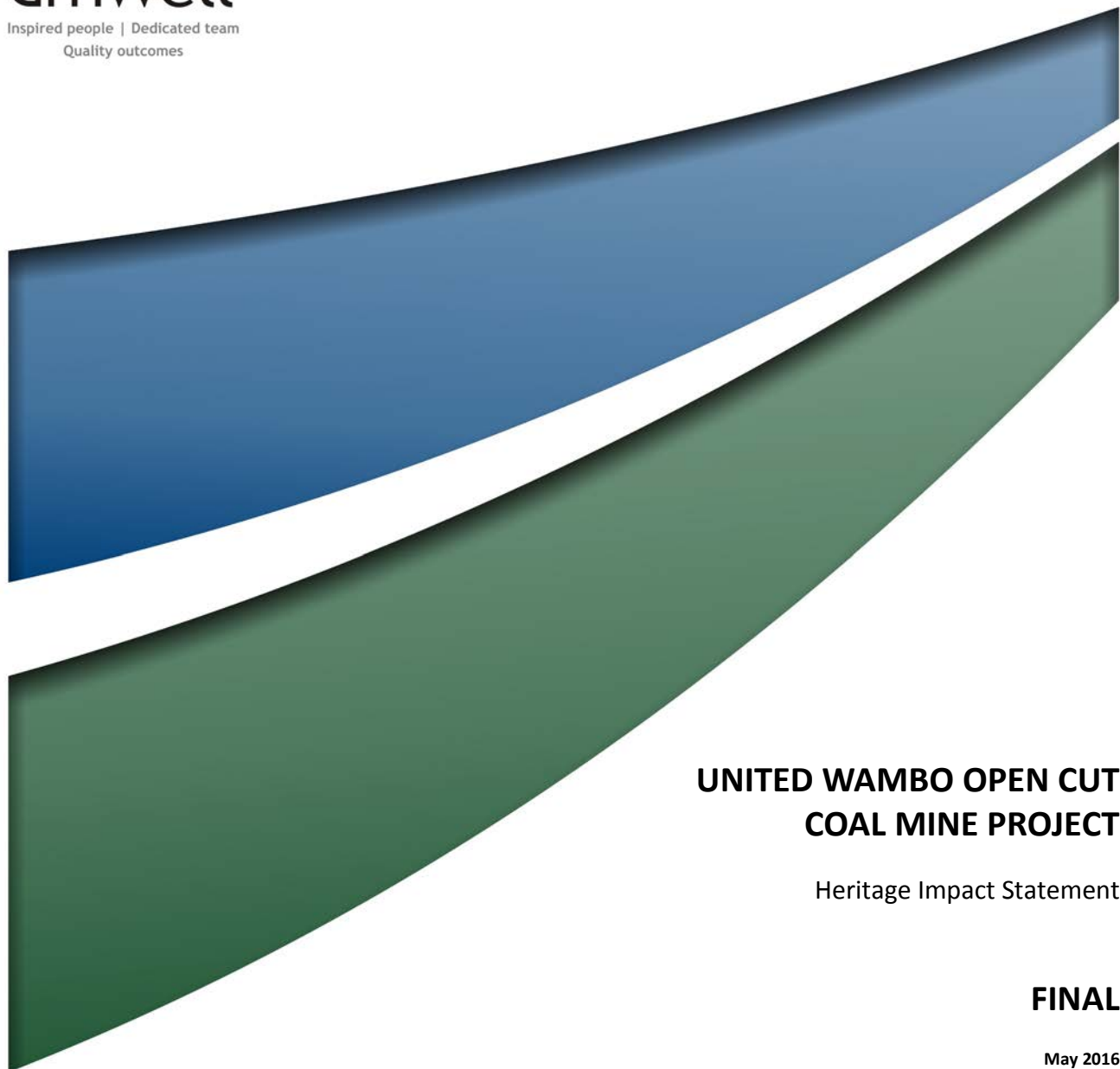




Appendix 16

Historic Heritage Assessment



**UNITED WAMBO OPEN CUT
COAL MINE PROJECT**

Heritage Impact Statement

FINAL

May 2016

UNITED WAMBO OPEN CUT COAL MINE PROJECT

Heritage Impact Statement

FINAL

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
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Report No. 3509/R05/FINAL
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ISO 9001

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1.0 Introduction

The United and Wambo mines are neighbouring mining operations located approximately 16 kilometres (km) west of Singleton in the Hunter Valley region of New South Wales (NSW) (refer to **Figure 1.1**). United Collieries Pty Limited (United) the operator of United mine and Wambo Coal Pty Limited (Wambo) the operator of Wambo mine, have formed a Joint Venture which includes the proposed development of the United Wambo Open Cut Coal Mine Project (the Project).

The Project proposes open cut coal mining for a period of 23 years, with mining in a new open cut mine at United (the United Open Cut) combined with ongoing mining at the existing, approved Wambo Open Cut under a modified mine plan. The Project will optimise future mining operations across these two adjoining open cut mining areas, maximising coal recovery and the efficient use of existing mining infrastructure, while providing the operational flexibility required to actively manage the mine to minimise environmental impacts.

The Project is State Significant Development as defined under State Environmental Planning Policy (State and Regional Development) 2011 and requires development consent under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The Project will also require a modification to the existing Wambo development consents under section 75W of the EP&A Act to harmonise these consents with the Project. An Environmental Impact Statement (EIS) has been prepared to accompany these applications.

This Historic Heritage Assessment has been prepared by Umwelt (Australia) Pty Limited (Umwelt) as part of the EIS for the Project. The assessment has been undertaken in accordance with the Secretary of the Department of Planning and Environment's Environmental Assessment Requirements (SEARs) for the Project.

1.1 Project Overview

Mining has been occurring at Wambo since the late 1960s and at United since 1989, with both mines previously undertaking both open cut and underground mining operations. Over this time the two mines have regularly cooperated, including sharing access to coal resources where appropriate, to provide for more efficient recovery of the State's coal resources. The two mines have also shared some mining infrastructure, including the joint use of the Wambo train loading facility, and share water to minimise external water demand.

Building on this long history of cooperative operations, in November 2014 United and Wambo announced a 50:50 Joint Venture between the two companies. The Joint Venture agreement outlines how the two companies will work together to further develop open cut coal resources held by the two mines.

Whilst open cut coal mining has previously been undertaken at United, over the last two decades the focus has been on underground mining. Underground longwall mining operations were approved to provide up to 2.95 million tonnes per annum (Mtpa) of saleable coal. Mining operations were suspended at United in March 2010 with the mine entering a period of care and maintenance. At that time, exploration and pre-feasibility works were commenced to determine the potential for future mining activities within United's mining lease. Ongoing exploration has identified substantial reserves of coal suitable for open cut mining.



FIGURE 1.1
Locality Plan

Ongoing open cut and underground mining is occurring at Wambo, with the mine having approval to extract up to 8 Mtpa of run of mine (ROM) coal by open cut methods. The combined Wambo underground and open cut operations have approval to extract up to 14.7 Mtpa ROM coal, and to transport up to 15 Mtpa of product coal via the train loading facility.

As discussed above, the Project includes open cut mining operations in two areas, the proposed United Open Cut and modified operations in the approved Wambo Open Cut for a period of approximately 23 years. The existing Wambo Open Cut has approval for continued open cut mining until March 2017 (with a modification lodged to extend this to 2020). Due to the progression of mining being slower than originally planned, there will be substantial coal resources remaining in this approved mining area at March 2017 and the Project proposes to continue mining in this approved area. The Project also seeks some minor extensions to the approved Wambo Open Cut surface mining area and will seek approval to mine deeper resources below the approved Wambo Open Cut area.

The Project will produce up to 10 Mtpa of ROM coal. The existing Wambo CHPP and train loading facility will be utilised for the Project. These facilities will also continue to receive coal from the ongoing Wambo underground mine (that is not the subject of this Project).

The Project also requires a number of changes to the layout of existing mining, public and private infrastructure within the Project Area.

The key aspects of the Project are shown on **Figure 1.2** and a summary of the key Project details is provided in **Table 1.1**.

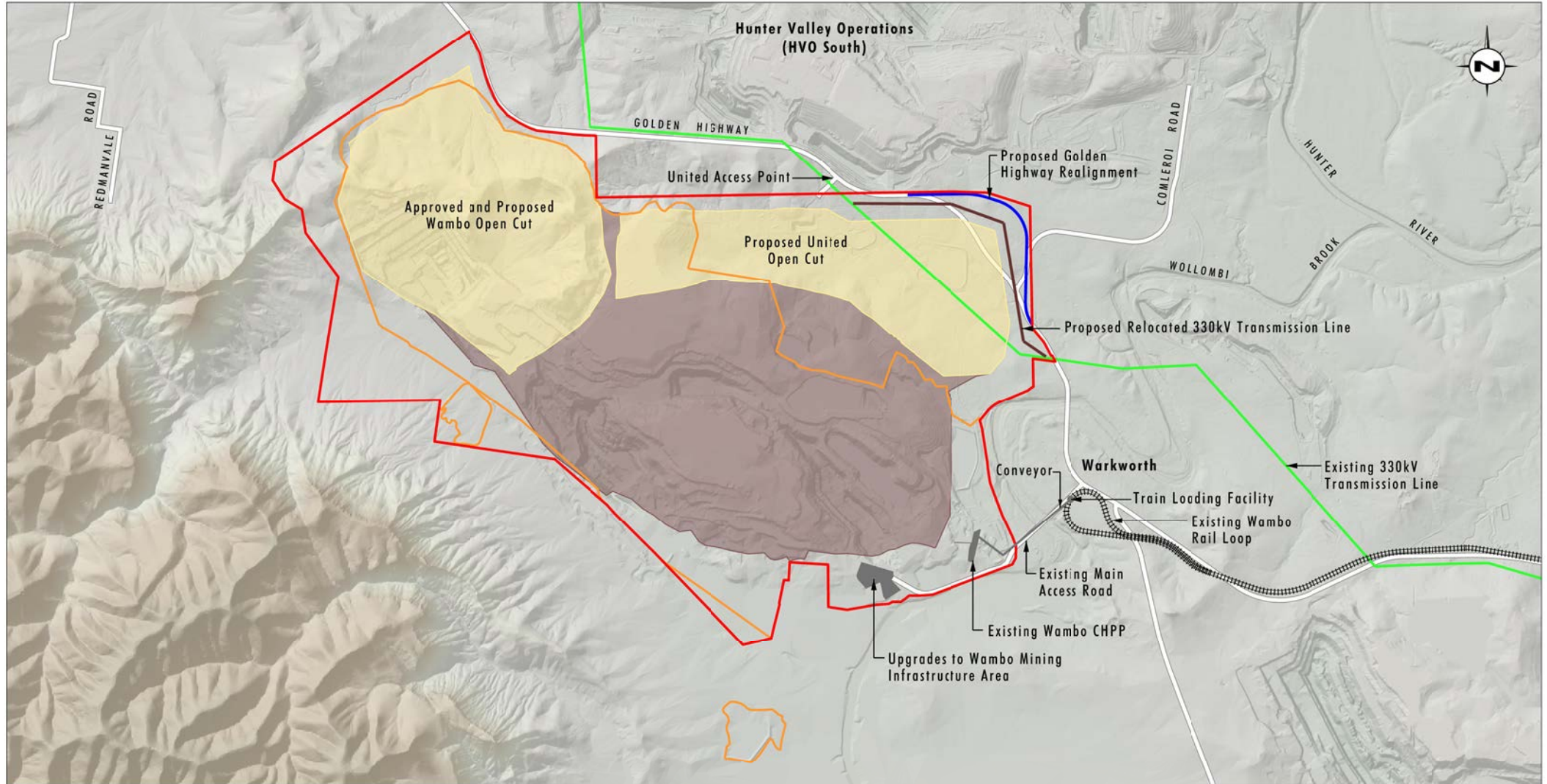


Image Source: United LiDAR (2015)
 Data Source: Glencore (2015)

Legend

- Project Area
- Proposed Conceptual Extraction Area
- Active Mining Area
- Approved Wambo Surface Development Area
- Proposed Golden Highway Realignment
- Existing 330kV Transmission Line
- Proposed Relocated 330kV Transmission Line

FIGURE 1.2
 Overview of the Project

Table 1.1 Summary of Key Project Details

Key Project Components/Aspects	Proposed Operations
Key feature of the Project	The operation of a multi-seam open cut mining operation integrating the existing and approved Wambo Open Cut under a modified mine plan and the proposed United Open Cut.
Total Economically Recoverable Reserve	<p>Approximately 176 Mt of ROM coal recovered from the two open cut mining operations, made up of:</p> <ul style="list-style-type: none"> • approximately 110 Mt of ROM coal from the United Open Cut • approximately 66 Mt of ROM coal in total from the Wambo Open Cut, including an additional 40 Mt accessed from the increased depth of mining.
Extraction Rates	Up to 10 Mtpa ROM coal.
Life-of- Mine	Approximately 23 years from the date of Project approval.
Operating Hours	24 hours per day, 7 days per week.
Number of Employees	Up to approximately 500 total operational positions (at peak production).
Mining Methods	Open cut mining using a truck and excavator/shovel fleet.
Extent of Mining Areas	<p>Refer to Figure 1.2 for the proposed extent of open cut mining.</p> <p>The Project proposes to modify the Wambo Open Cut boundary to maximise resource recovery. The modification to the approved Wambo Open Cut boundary will result in a minor surface adjustment of approximately 3.8 hectares of additional disturbance. The modification also includes accessing deeper seams within the existing Wambo Open Cut.</p>
Infrastructure	<p>Initial use and upgrades of existing United Mine Infrastructure Area prior to its decommissioning and demolition/removal due to the progression of the United Open Cut.</p> <p>Construction of temporary facilities during the construction phase of the Project.</p> <p>Ongoing use, expansion and upgrade of the Wambo Mining Infrastructure Area.</p> <p>Use of existing Wambo CHPP and train loading facility within their currently approved annual capacities of 14.7 Mtpa ROM coal and 15 Mtpa product coal respectively.</p>

Key Project Components/Aspects	Proposed Operations
<p>Tailings and Rejects Strategy</p>	<p>Decommissioning and capping of existing tailings storage facilities located in areas proposed for overburden emplacement and ongoing use of existing tailings storage facilities and storages established in other mine voids as required.</p> <p>Coarse rejects from coal preparation to be transported by truck to the open cut overburden areas for emplacement and subsequent covering by overburden material. Coarse rejects will continue to be co-disposed within the open cut overburden areas for the life of operations.</p>
<p>External Coal Transport</p>	<p>Product coal will continue to be transported off site via train from the existing Wambo train loading facility. Product coal transport rates proposed to increase from a maximum of six to eight trains per day. No change to total approved 15 Mtpa product coal tonnage transported by train.</p>
<p>Roads</p>	<p>Realignment of a 2 kilometre section of the Golden Highway to accommodate the proposed United Open Cut.</p> <p>The main entrance to the Project will be via the existing entrance to Wambo. The existing United access road will be used in the initial phase of the Project for construction and ancillary services with limited ongoing use as a property access point.</p>
<p>Power Infrastructure</p>	<p>An existing 330 kV transmission line which traverses the proposed United Open Cut mining area is proposed to be relocated as part of the Project (refer to Figure 1.2). Several other 66 kV and 11kV power lines will also require relocation to outside of proposed mining areas.</p> <p>Some existing telecommunications and associated infrastructure are located adjacent to the existing alignment of the Golden Highway and will also require relocation as part of the Project.</p>
<p>Water Management</p>	<p>Construction of mine water management controls including dams.</p> <p>Use of the previously mined United underground voids for water storage.</p>

United is owned 95 per cent by Abelse Pty Limited, a wholly owned subsidiary of Glencore Coal Pty Limited (Glencore) and 5 per cent by the Construction, Forestry, Mining and Energy Union (CFMEU) and is managed by Glencore. Wambo is a subsidiary of Peabody Energy Australia Pty Limited (Peabody).

2.0 Heritage Impact Statement

This Heritage Impact Statement was prepared by Umwelt (Australia) Pty Limited (Umwelt) for United. The report was prepared by Tim Adams, Principal Archaeologist – Historical Heritage, a qualified and experienced historical heritage consultant and Alison Lamond, Archaeologist. This report examines the historical (non-Aboriginal) heritage and archaeological issues associated with the Project with the aim of assessing and evaluating the potential heritage impacts associated with the Project. The report identifies the historical heritage sites contained within and in the vicinity of the Project Area and assesses the significance of any impacts on these sites potentially resulting from the Project.

The Preliminary Environmental Assessment (PEA) for the Project was reviewed by the Heritage Division, Office of Environment and Heritage (OEH) as part of the Department of Planning and Environment (DPE) request for input into the SEARs for the Project (letter to DPE from Heritage Division, OEH 15/06/2015). The Heritage Division comments are reflected in the SEARs (refer to **Section 2.1**).

As outlined in the SEARs for the Project, this assessment has been undertaken in accordance with guidelines set out in the NSW Heritage Manual 1996 (Heritage Office and Department of Urban Affairs & Planning (now DPE)), including *Archaeological Assessments, Assessing Heritage Significance, Statements of Heritage Impact* and *Heritage terms and Abbreviations* and with consideration of the principles contained in *The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance 1999* (Australia ICOMOS, 2000) and the *Historical Archaeology Code of Practice* (2006). In addition, although the land to which the Hunter Regional Environmental Plan (REP) 1989 (Heritage) applies comprises the City of Cessnock, the City of Lake Macquarie, Gloucester, Merriwa, Muswellbrook and Scone rather than any of the land forming the Project Area, the aims and objectives of the Hunter REP 1989 (Heritage) in terms of conserving the environmental heritage of the Hunter Region have been considered during the preparation of this report.

This report does not include an assessment or consideration of any Aboriginal archaeological values or Aboriginal cultural heritage values related to the Project. Aboriginal archaeological values and cultural heritage values are assessed in separate reports prepared by OzArk (Aboriginal Archaeological Values Assessment – United Wambo Project, OzArk 2016) and Australian Cultural Heritage Management (ACHM) (United Wambo Project Aboriginal Cultural Heritage Assessment Report and Consultation Records, ACHM 2016).

2.1 Statutory Overview

The *Heritage Act 1977* (NSW) (the Heritage Act) and the *Environmental Planning and Assessment Act 1979* (EP&A Act) are the primary statutory controls protecting historical/European heritage (non-Aboriginal) within NSW.

The Project will require development consent under Division 4.1 of Part 4 of the EP&A Act. Being development for the purpose of coal mining, the Project is declared to be a State Significant Development (SSD) under the provisions of the *State Environmental Planning Policy (State and Regional Development) 2011* and the Minister for Planning (currently delegated to the NSW Planning Assessment Commission) will be the consent authority for the Project and the relevant approval provisions of the Heritage Act and local planning instruments established under the EP&A Act do not apply. In addition, the EIS also supports applications to modify existing development consents for Wambo to harmonise these approvals with the Project.

However, this does not exempt the project from requiring a heritage assessment, which may identify heritage sites and provide recommendations for their management. Moreover, the heritage impact statement also provides a framework to examine the application of existing development consent requirements, as they relate to historical heritage, to the Project. The SEARs for the Project require:

An assessment of the likely impacts of the development on non-Aboriginal heritage, paying particular attention to its settlement by Europeans and pastoral history and having regard to the OEH's requirements (see Attachment 2).

Attachment 2 of the SEARs comprises Agency Correspondence in relation to the Project. As part of Attachment 2, the Heritage Division (OEH; as delegate of the Heritage Council) recommended the following be included in the SEARs:

1. The Applicant must undertake a highly detailed archaeological assessment which includes a consideration of Aboriginal and non-Aboriginal heritage. The archaeological assessment should consider the proposed below ground impacts on any potential archaeology, with consideration of any archaeological works that have already been undertaken on this site. The assessment should contain mitigation strategies to manage this potential archaeological resource.

2. A detailed Heritage Impact Statement (HIS) should be undertaken which documents and assesses the heritage significance of the site and its associated landscape, and any impacts the project may have upon this significance. This assessment should address the potential archaeological impacts of the project and any heritage impacts to the Wambo Homestead Complex. The HIS should include detailed mitigation measures to offset the impacts this project may have on the site's heritage values.

2.2 Consultation

General consultation has been undertaken by Glencore with government authorities, including the Heritage Division, OEH and community stakeholders in relation to the Project (refer to United Wambo Open Cut Coal Mine Project Environmental Impact Statement (2016)).

As part of the community stakeholder consultation, one local resident has expressed particular interest in the Dog-leg fence which is partially located within the Project Area. Further details on the Dog-leg fence are provided in **Sections 4.5.1** and **6.3.1**.

2.3 Heritage Listings

In order to identify if any historical heritage items are located within or in the immediate vicinity of the Project Area, desktop searches were conducted of the NSW State Heritage Register (SHR) and State Heritage Inventory, the Australian Heritage Database (including Commonwealth and National Heritage lists and the Register of the National Estate (RNE)), and local planning instruments (Singleton Local Environment Plan (LEP) 2013).

No listed sites/items were identified within the Project Area. However, several listed items were identified within the vicinity (within 3 kilometres) of the Project Area, including the SHR listed Wambo Homestead and Outbuildings.

Advice from Enviro Strata Consulting Pty Ltd (Enviro Strata, the blasting consultant for the Project) regarding distance from the approved and proposed open cut areas where the predicted range of ground vibration resulting from blasting associated with the Project would be less than 3 mm/s (i.e. well below the conservative level of 5mm/s below which there is predicted to be no vibration impacts) is less than 2 kilometres. As such the search area for listed items in the vicinity of the Project Area was limited to a conservative distance of 3 kilometres. Indirect impacts such as vibration potentially resulting from blasting are further discussed in **Section 6.1.2**.

All listed items identified within the vicinity of the Project Area are listed in **Table 2.1** and identified on **Figure 2.1**.

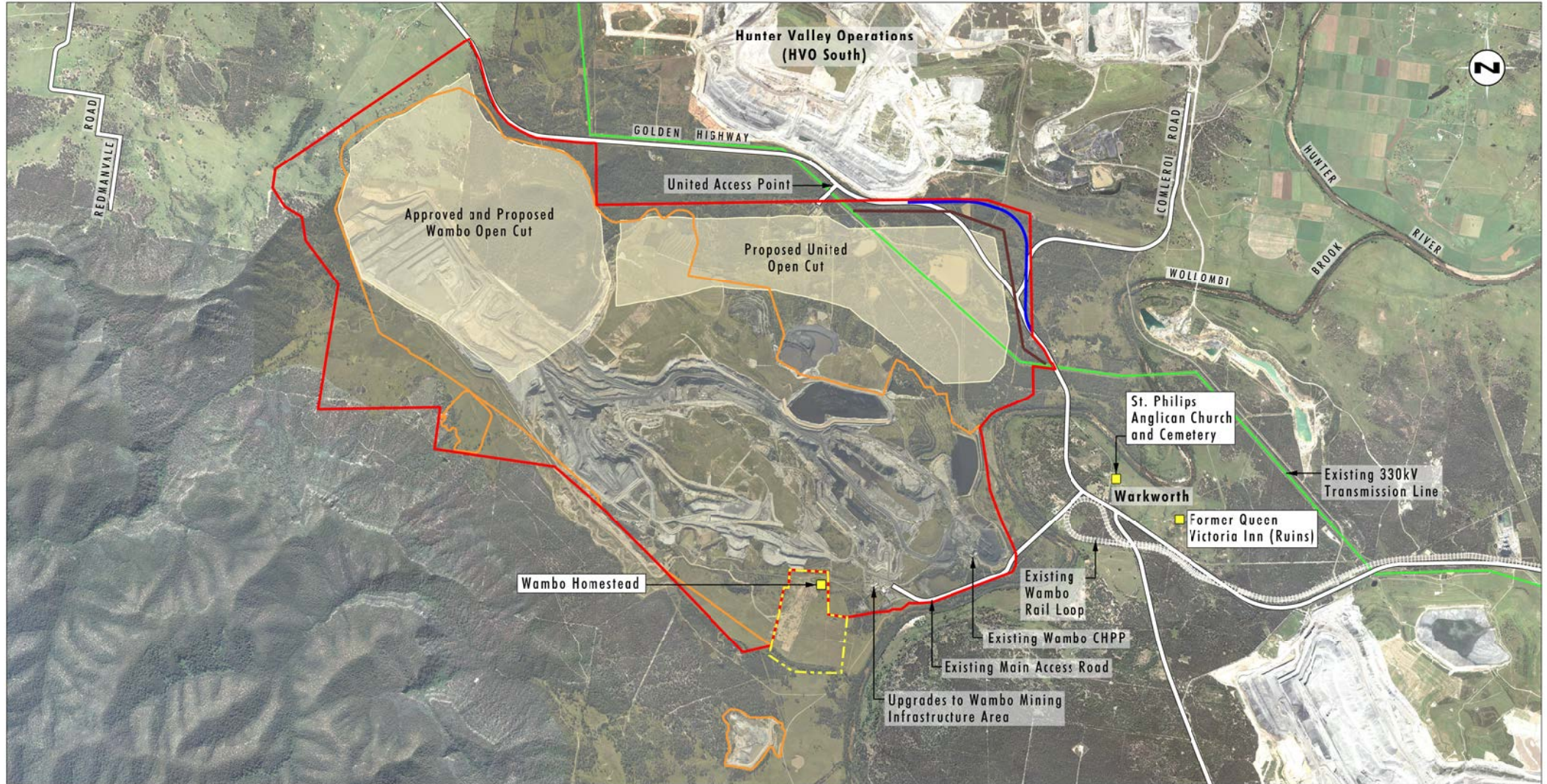
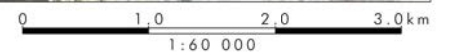


Image Source: AAM (2012), United (2015)
 Data Source: Glencore (2014)



Legend

- Project Area
- Proposed Conceptual Extraction Area
- Approved Wambo Surface Development Area
- Proposed Golden Highway Realignment
- Existing 330kV Transmission Line
- Proposed Relocated 330kV Transmission Line
- Listed Heritage Items
- Wambo Homestead Listed Boundary

FIGURE 2.1
Listed Heritage Items

Table 2.1 Listed heritage items located outside but within the vicinity of the Project Area

Item Name	Location	Co-ordinates (MGA)	Listing and Significance	Distance to Project Area and Disturbance Area
Wambo Homestead	Off The Golden Highway Lot 82 DP 548749	311615.17, 6393166.14	SHR Singleton Local Environment Plan (LEP) 2013 State significance. Register of the National Estate (RNE1).	Wambo Homestead listed boundary forms part of Project Area boundary. Approximately 2.5 kilometres from the open cut mining proposed as part of the Project at its closest point
St Philips Church, Warkworth	Off High Road, Warkworth Part Lot 21, DP 755267	314808.49, 6394312.45	Singleton LEP 2013 Local significance	Approximately 1.2 kilometres outside the Project Area boundary. Approximately 1.8 kilometres from the open cut mining proposed as part of the Project at its closest point
Former Queen Victoria Inn – Ruins Archaeological site	Jerrys Plains Road, Warkworth Lot 1, DP 770904	315490.07, 6393872.62	Singleton LEP 2013 Local significance	Approximately 1.8 kilometres outside the Project Area boundary. Approximately 2.5 kilometres from the open cut mining proposed as part of the Project at its closest point

Note no Aboriginal or natural heritage listings are considered in this report

1 The Register of the National Estate (RNE) is a non-statutory list of natural, Indigenous and historic heritage places throughout Australia. Many places in the RNE are now included in other statutory lists, such as the state heritage lists, or local government heritage registers. As a result, those places receive protection under the relevant federal, state, territory or local legislation.

3.0 Historical Background

As part of NSW heritage assessment procedures it is essential to have a full understanding of a site or item based on its historical and physical context. This section of the report provides a historical context for the Project Area and its broader locality to provide an understanding of the significance of any historical heritage or archaeological sites or items within the Project Area.

The Upper Hunter Valley of NSW has an extensive history of research, and in recent decades, has become one of the most intensively studied regions in NSW with numerous studies conducted in advance of proposed mining activity. This body of research has been focused predominantly on Aboriginal cultural heritage and archaeology. However, there are number of heritage reports relevant to the historical heritage of the Project Area. The historical context below and this assessment in general have been prepared using relevant information included in the following reports:

- Wambo Development Project Environmental Impact Statement (Resource Strategies, 2003).
- Hunter Valley Operations South Coal Project Environmental Assessment (ERM, 2008).
- Wambo Development Project Non-Aboriginal Heritage Impact Assessment (EJE Town Planning 2003).
- Heritage Impact Statement; Warkworth Aerodrome, Warkworth, New South Wales (Weir & Phillips 2007).
- Broke RAAF Landing Ground and McNamara's Dairy Cottage Archival Recording (Umwelt 2015).

In addition, if potential historical heritage items or sites were identified during research or site inspection additional research focusing on the specific site or allotment has been undertaken; including historical title searches and sourcing information from the National Archives of Australia. Where relevant, this information is discussed as part of the historical background below or as part of item/site specific discussions in **Section 4.0**.

3.1 European Contact

The Central Lowlands of the Hunter Valley is the traditional country of the Wonnarua people, one of the 600 different clan groups or 'nations' present in Australia at the time of European contact. Although early records on traditional tribal boundaries are limited, it is understood that the country of the Wonnarua was centered on the Upper Hunter Valley. Records also identify that the Wonnarua were closely affiliated with the Kamilaroi, whose country extended from the west as far south as Jerry's Plains according to some early authors (Threlkheld 1892, Matthew 1903). The Wonnarua also had close connections with other surrounding groups, such as the Awabakal centered on Lake Macquarie and the Worimi north of the Hunter River. There was apparently considerable contact between all of these groups, with social links connecting the coast and inland areas (Brayshaw 1986:51).

With the arrival of European settlers in the nineteenth century, traditional patterns of Aboriginal life were quickly and dramatically altered. European settlement of the Hunter Valley commenced in the early 1800s and increased from the 1820s onward when the region opened to free settlement. Disease spread through the Aboriginal population of the Hunter Valley, and displacement from traditional lands soon followed, with European settlers taking up land first along the major river systems then spreading inland. Conflict often resulted with warriors fighting to retain access to land and country, and Aboriginal use of resources – including hunting of settler stock – seen as theft, was quickly punished. Although not all interactions were hostile, some authors (refer to Milliss 1992) argue that there was a general hostility between the European settlers and Aboriginal people, evidenced by violent skirmishes from the earliest European settlement.

Documentary evidence suggests that by 1830 (only 19 years after the first European settlers arrived in the Hunter) ‘all armed resistance by local Aborigines’ had ceased (Davidson and Lovell-Jones 1993:17). By this time, the traditional use of the land by the Wonnarua and their social structure and interactions had been dramatically affected – all within one generation. On the other hand, there are also some accounts of cultural ceremonies being conducted decades later, such as a ceremony held at Bulga in 1852, noted by Blyton et al. (2004:9); and a ceremony held at the junction of the Page and Isis Rivers at Gundy reported in the 1870s (McDonald 1878:255-258).

Wollombi Brook is noted as having been a possible transport route, providing a continuous water supply between the base of the Dividing Range and the coastline. The systems morphology suggest it may have been a better resource than the Hunter River and large sites located in its proximity indicate resting areas and repeat visit locations (HLA 2007:18). The Hunter River was subject to drought, making permanent water sources a valued commodity in the area (ENSR 2008: 16).

European impacts were catastrophic on the Wonnarua people located in this area and their traditional culture (Insite Heritage 2008:18). European settlers were attracted to the grassed plains of the Hunter Valley and rapid settlement disrupted the Aboriginal economy in a very short time. Starvation, introduced diseases and massacres decimated the Aboriginal population at a devastating pace (ENSR 2008:16). Historical European records indicate a proliferation of emus and kangaroos in the Hunter Valley grassland areas, with the numbers dwindling as European occupation increased. Other animals observed in the post-European period include species such as the eastern grey kangaroo, the red-necked wallaby and the long-necked tortoise (Umwelt 2005:3.2-3.3). Historical sources note the Hunter Valley’s abundant resources, with possums and fish for food as well as trees to provide bark for implements (Breton 1833; Eyre 1859; Cunningham 1827; Dawson 1830; ENSR 2008:16). The contemporary area’s woodland community includes such species as forest red gum, yellow box and narrow leaved ironbark. Bullock and Grey Box open woodland have been noted, along with various grassland species such as three-awned spear-grass, couch, barbed wire grass and Queensland blue grass. These observations indicate what the environment may have been like for early European settlers. Tree clearance through the process of ringbarking was a common method of increasing grass growth in the region (Dean-Jones & Mitchell 1993:24; AMBS 2001:11). Overgrazing later became a problem, and sources from 1833 describe the region as wretched and destitute of grass as a result of such practices (Wood 1972:302; AMBS 2001:11). The contemporary floral landscape has since been heavily impacted by clearance for grazing and industrial purposes (Umwelt 2005:3.2).

The material culture of Aboriginal people also changed dramatically following contact, with the rapid influx of new technologies and materials. For example, Threlkeld (in Gunson 1974:54, 67) provides two examples of new technologies being utilised by Aboriginal people within the Lake Macquarie area, noting that bottle glass was replacing stone in Aboriginal weapons and that iron and glass were being used for fish hooks. A number of archaeological sites have also been recorded throughout the Hunter Valley evidencing Aboriginal use of introduced materials.

3.2 Exploration and Early Settlement

3.2.1 Newcastle and the Hunter River

In 1770 Captain James Cook sailed past Stockton Bight, noting only Nobby's Island (Whibayganba) and Port Stephens. The first knowledge of the Hunter region and its coal reserves came in 1791 through tales told by escaped convicts. In March 1791 William Bryant with his wife Mary, their two children and seven other convicts escaped from Port Jackson in the governor's cutter and sailed for east Timor. They arrived in Koepang 69 days later (Currey 1966). They observed coal during the early stages of their voyage after running their cutter into 'a small creek', thought to have been Glenrock Lagoon to the south of Newcastle (Turner 1997:4). Mary Byrant and four of the other convicts eventually reached England, but William and their children died. The Hunter River was also visited in 1796 by a party of fishermen, who brought samples of coal back to Sydney (Newcastle City Council, n.d). In 1797 Lieutenant John Shortland entered the Hunter River estuary and came ashore along Stockton Bight during a search for escaped convicts. He observed the coal resources responsible for much of the later European settlement in the wider Hunter region. Officially the river at this time was named after John Hunter, the colony's governor and Shortland's superior naval officer, but to many it was known simply as Coal River.

Miners and merchants seeking timber soon followed Shortland's observations. Besides coal, vast cedar forests covered a huge area up the Hunter River, providing a source of urgently needed building timber for the infant Sydney colony. Governor King decided to make a more systematic exploration of the area and its natural resources and sent an expedition in HMS Lady Nelson, commanded by Lieutenant James Grant, to survey these resources and explore the Hunter. On board were Lieutenant Col. Paterson, Ensign Barallier, J.W. Lewin, a mining expert, five sawyers, and a crew of nearly 60. The Lady Nelson, accompanied by the schooner Francis arrived off the mouth of the Hunter River on June 14 1801, and Col. Paterson named the island at the river mouth Coal Island (now Nobby's Island). Paterson prepared a detailed report on the resources of the area, commenting on the potential of coal, salt, lime, fish and pasture. He proposed a permanent settlement at the mouth of the Hunter River (Turner 1997:7).

Impressed by Paterson's report of the rich resources of the area and the already successful coal mining being undertaken, Governor King decided to establish a permanent settlement at Newcastle in 1801. The venture failed within six months and the convicts and their overseers were evacuated back to Sydney Cove. The estuary of the Hunter River was not attractive to agriculturalists and the extent of the swamps and sand dunes in the area ensured that Newcastle would have to depend on its coal and port for its future development.

It was not until 1804 that Newcastle was resettled as a penal colony. Although Governor King planned Newcastle to be more than a penal outpost, the majority of people arriving were sent to serve colonial sentences and formed a large part of the workforce available for the exploitation of the resources of the region; including coal, timber, salt and lime. The convicts were engaged in exploiting these natural resources to supply Sydney with much needed building and heating supplies – the cedar forests and shell middens (most the result of past Aboriginal activity) produced building timber and lime respectively, and coal heated the houses and forges. The lime was produced by gathering and burning the local shells (ENSR 2008:17). The area was closed to free settlement at the time, with profits from resources going to the Government.

The penal settlement was founded under the administration of Lieutenant Charles Menzies with 34 Irish prisoners, exiled by Governor King for their role in the Battle of Vinegar Hill of 1804. Menzies had commanded the detachment of marines who quelled the Vinegar Hill convict rebellion. The expedition to found the new colony left Sydney on 28 March 1804. Menzies was accompanied by Dr James Mileham (surgeon), Isaac Knight (superintendent of convicts), John Tucker (store-keeper), Ferdinand Bauer (artist), George Caley (botanist), 11 military guards and 34 convicts. Among the convicts were three miners, three sawyers/timber cutters, two carpenters, a gardener and a salt bailer (to make salt from salt water for both the new settlement and Sydney). They arrived on 30 March 1804. Menzies named the new settlement Kingstown, but Governor King's own choice, Newcastle, prevailed. Menzies' instructions were to use the convicts in 'getting as many coals as possible', cutting cedar, clearing ground for cultivation and 'to enforce a due observance of religion and good order'. During his term as commandant, Menzies had huts constructed for the military guard and the convicts, built a large stone wharf, established a coal beacon to assist navigation into the harbour, organised the cutting of cedar and the obtaining of salt from salt-pans at Collier's Point and reached satisfactory rates of production of coal (Flowers 1967).

Under Captain James Wallis, commandant from 1815 to 1818, the convicts' conditions improved, and a building boom began. Wallis laid out the streets of the town, built the first church on the site of the present Anglican Cathedral, erected the old gaol on the seashore, and began work on the breakwater which now joins Nobbys to the mainland. The quality of these buildings was poor and only (a much reinforced) breakwater survives. For these works, and for his humane rule in the convict colony, Wallis earned the personal commendation of Governor Macquarie.

At its peak in 1821 the convict population of Newcastle had risen to more than 1100. However, in Governor Macquarie's opinion the Newcastle prison settlement was too close to Sydney and the proper exploitation of the land was not practicable with prison labour. In 1823, military rule in Newcastle ended. The number of prisoners was reduced to 100 and the remaining 900 were sent to Port Macquarie (Newcastle City Council, n.d). Although the penal settlement was closed in 1823 in favour of Port Macquarie, convicts continued to toil in Newcastle on public works projects such as the breakwater and in private assignment into the 1840s. In the 1830s the majority of the population of the town were still convicts; a total of 60 percent in 1836 (Turner 1997:14).

The establishment of the new penal station at Port Macquarie allowed Newcastle and the Hunter Valley to be settled.

3.2.2 Hunter Valley

The Pattersons Plains area first opened to settlers from 1813 onwards, including the first free settler John Tucker who settled with his family in 1814. Tenants were allowed to settle in the Wallis Plains area (north of present day Morpeth) but upstream from these farms the land remained untouched by European infiltration. This all changed when the necessity of opening the valley to settlers was recognised by Governor Macquarie. His despatch of 8 March 1819 acknowledged the growing population and the 'extensive rich and fertile land being found at no great distance' along the principal sources of the Hunter River (Campbell 1926:73). Macquarie thought it:

...judicious to establish settlers on the plains along the River Hunter where they would have the combined advantages of a fertile soil of comparatively easy cultivation, and the benefit of water conveyance for their produce to Newcastle and thence by sea to the principal mart of Sydney...(Campbell 1926; 74)

A number of exploratory expeditions had sought to find new routes and open up new areas for colonial development in the Hunter region in the early 1800s. Colonel Paterson may have reached the Singleton area on an exploratory river trip he undertook in the early 1800s, although the furthest point he reached is uncertain due to a lack of recorded data. The earliest recorded journey that did reach the area occurred during October and November in 1817. This expedition was from the Hawkesbury area, journeying to what was most likely the headwaters of Doyles Creek, located to the west of Warkworth. The expedition included William Parr and Benjamin Singleton. Benjamin Singleton returned to the area on another expedition in 1818. Two trips were made into the area in October 1819 and March 1820 by John Howe (Chief Constable of Windsor from 1813 to 1825) looking for a line of road for an overland route between Sydney and Newcastle. John Howe, Benjamin Singleton and the others who took part in these two expeditions, reached the Hunter River in the vicinity of Whittingham after 10 days in March 1820. The overland route became what is known as the Bulga Track (refer to **Section 3.7.1**).

In 1821 John Marquett Blaxland found an alternative track from the Hawkesbury to the Wollombi district. Governor Brisbane promised him land in return for his discovery which he later selected as a 640 acre grant on the western side of Wollombi Brook (Dunne 2012:31). John Marquett Blaxland was the eldest son of John Blaxland Snr, who was one of the colony's most prominent landholders; including allocations of land in the Broke area.

In 1821, Henry Dangar was commissioned to undertake a survey of the Hunter Valley to assess its suitability for settlement and farming, with the survey of the lower Hunter Valley complete in 1822 and the Upper Hunter Valley complete in 1826 (Brayshaw 1986:9). Settlement followed closely behind Dangar's 1821 survey party, with settlers occupying land as far north as Singleton by October 1821. Early reports describing the suitability of the land for pastoral pursuits resulted in the establishment of large scale pastoral holdings. The discovery of the overland route to the Hunter Region from Windsor meant that stock could now be overlanded from the overcrowded Cumberland Plan (Heritage Office 1996a:46). European settlement expanded quickly in the mid nineteenth century, with a total of 372,141 acres being allotted to European settlers in the Hunter Valley between 1822 and 1826. This was increased to over 500,000 acres by 1867 (Brayshaw 1986:10).

3.3 Historical Land Use in the Hunter Valley

Of all the natural resources noted in European documentation, those which most impressed and attracted early settlers were the grasslands, due to their potential for grazing livestock. Wool production, dairy farming and wheat growing became the predominant industries with sheep becoming a major commodity as the wool export industry expanded. Wheat production went into decline in the mid 1800s owing to the disease 'rust' which struck severely in 1857 (Turner 1995). The late nineteenth century saw the decline of agriculture along river flats as they were converted to dairying on pastures improved by pump irrigation (Dean-Jones and Mitchell 1993:2). The pastoral and dairy industries continued to dominate into the twentieth century.

Many of the land holders in the region also owned tracts of land inland and the trend in the late 1800s was for these landholders to replace sheep with cattle from their inland runs. Many of the larger holdings were subdivided in the early 1900s, some of which were part of the Soldier Settlement Scheme. In the latter part of the twentieth century, many of the smaller holders were reconsolidated into large scale coal mining leases.

3.3.1 Pastoralism

In terms of developing the new colony Commissioner Bigge recommended pastoralism as the preferred land use for the new free settlers in the region. This was partly due to the attraction of exports for the important wool market and the suitability of wool (over more perishable products) for long-distance transportation. However, with the exception of the Australian Agricultural Company (the AA Co; refer to **Section 3.5**) who became the largest importers of sheep in the region, cattle-raising was more popular in the Hunter than sheep-raising (Clive Lucas 2013:49-50).

Commissioner Bigge was Commissioner of Enquiry in NSW from 1819 following Henry Bathurst's (Secretary of State for the colonies from 1812 to 1827) Royal Commission, issued on 5 January 1819, authorising an investigation of 'all the laws regulations and usages of the settlements'. Bigge prepared three reports: *The State of the Colony of New South Wales* (19 June 1822), *The Judicial Establishments of New South Wales and of Van Diemen's Land* (21 February 1823) and *The State of Agriculture and Trade in the Colony of New South Wales* (13 March 1823). These reports persuaded Bathurst that transportation should be continued and resulted in changes in the administration and in the land policy of the colony (Bennett 1966).

John Howe cited the Hunter region as containing the finest sheep land he had seen since departing England (Howe 1819; ENSR 2008:17). During the nineteenth century, pastoral grazing became the dominant land use of the Hunter Valley, with more than 25,000 cattle and 80,000 sheep introduced to the area by 1867. The pastoral industry was the earliest established industry within the region of the Project Area.

Benjamin Singleton placed a notice in the Sydney Gazette as early as December 1821 advertising agistment at St Patrick's Plains at 10 shillings a head per annum for not less than three years. In 1823, John Howe was granted permission to graze his stock at Patrick's Plains, agisting 1000 sheep and 1200 cattle. In the 1820s, Dr James Bowman ran 2000 merino sheep and 200 head of cattle on his Ravensworth Estate. In 1824 Ravensworth was the northernmost settlement of the Hunter Valley and by 1828, over 40 convicts and overseers worked on the Ravensworth property as shepherds, labourers, carpenters, sawyers, blacksmiths and stone masons (Hunter 1997:17). The Ravensworth Homestead is a comparable pre-1850s established homestead to the SHR listed Wambo Homestead.

The 1828 census indicates that, of the 191 large (over 1000 acre) estates occupying the Upper Hunter Valley, 'only one third were sheep grazing enterprises with cattle raising being much more common' (Turner 1995:18). Although the Hunter Valley was a centre of pastoral interests based on sheep and cattle during the nineteenth century, there was a shift from wool production in the nineteenth century as mixed farming, dairying and to a lesser degree grazing became more important in the twentieth century.

3.3.2 Agriculture

As well as grazing, the Hunter Valley was opened up for farming in the 1820s with land granted and areas swiftly developed in the fertile region. The Singleton locality contained several thousand acres clear of timber and covered with rich alluvial soil which produced various heavy crops. Agriculture soon became important to the growing economy of the region and during the period 1821 to 1860 wheat was the most common staple crop, with maize for fodder as the second preference. Crops were primarily grown for use by the individual landholder or to sell locally (Clive Lucas 2013:49-50).

A correspondent of the Australian in 1827 reported the Castle Forbes, Singleton properties yielded 36 bushels (1 bushel = 8 gallons/36.37 litres) to the acre of wheat. He goes on to say there were two stack yards within a mile of each other containing together 10,000 bushels of wheat. Tobacco was another crop grown in the area and a few properties also experimented with cotton which ultimately failed.

Historical records indicate the extent of cultivation in 1831 noting that the Patrick’s Plains district cultivated 1054 acres of wheat, 625 acres of maize, 54 of barley, 10 of oats, 15 of rye, 15 of potatoes, and 17 acres of tobacco at that time. In 1836, the number of acres in the counties of Brisbane, Northumberland, Hunter and Durham under wheat was 27,424 and maize 7899 with 45 tons of tobacco harvested (JRAHS 1953). **Table 3.1** shows the area under cultivation for wheat decline while the area under maize and tobacco increased between 1836 and 1844.

Table 3.1 Area under Cultivation - Counties of Brisbane, Northumberland, Hunter and Durham (JRAHS, 1953)

Crop	1836	1839	1844
Wheat	27,424 acres	15,114 acres	21,534 acres
Maize	7899 acres	10,112 acres	14,226 acres
Tobacco	45 tons	1505 hundredweight	4890 hundredweight

Returns for 1860 show that there were 206 landholders at Patricks Plains which included the counties of Durham, Hunter and Northumberland and they held 161,310 acres. Of this area 155,508 acres were not cultivated. The crop yields were: wheat 22,000 bushels, maize 25,926 bushels, barley 400 bushels, rye 45 bushels, millet 15 tons, potatoes 49 tons, sorghum 243 hundredweights and hay 235 tons (JRAHS, 1953).

Wheat crops grown in the Hunter Valley were prone to the disease ‘rust’, which struck severely in 1857 (Turner, 1995). Disease together with the relatively dry conditions in the Upper Hunter made wheat a precarious crop and as a result its production declined. The decline in wheat cultivation saw an increase in barley production mainly for stock feed but as the dairy industry began to grow lucerne crops became a more viable option.

3.3.3 Dairying

Dairying was one of the initial impetuses for the division of large estates in the Upper Hunter and by the 1890s dairying had become an important industry in the Upper Hunter. In the early twentieth century the Upper Hunter was mostly occupied by dairy farms of up to 500 acres in size (Heritage Office 1996:49). Dairy farming became an important land use after sheep/wool production began to wane in the late nineteenth century due to parasitic infections in sheep.

The importance of the dairying industry in the Upper Hunter coincided with the ‘development of the mechanical separation of milk and refrigeration causing a re-shaping of the pattern of farming’ in the area, due to the increased demand for dairy products in Australia and overseas (Turner 1995:19). Dairying increased after World War I as soldiers were given small holdings and government assistance to establish small agricultural businesses, such as dairy farms (Heritage Office and DUAP 1996a:49). The effect of soldier settlement increased after World War II in the Singleton area when the ‘country was cut up into wheat-sheep farms’ (Heritage Office and DUAP 1996a:49). In 1955 the NSW milk board established quotas for the supply of milk to overcome shortages.

In the second half of the twentieth century the dairying industry went into a gradual decline. Since 1901 the dairy industry in NSW had been controlled by various government bodies. In the mid to late 1960s policies aimed towards specialisation and amalgamation affected the smaller scale dairy farms. Then in the 1970s Britain joined the European Economic Community and Australia lost its main dairy export market. In the early 1970s the Milk Board was replaced with the Dairy Industry Authority resulting in the reallocation of milk quotas and the eventual deregulation of the industry. Farm improvements to meet new regulations and standards, including the installation of refrigerated holding tanks, resulted in many of the typical small dairy farms of the area becoming unviable. The number of dairy farms in NSW dropped from 9,061 in 1970 to 4,626 in 1976 (Dunne 2012:75-81).

3.3.4 Horse Breeding

Horse breeding also became a thriving industry in the region as early as 1822. While horses were used for transport they were also important in terms of the management of stock and recreation. Thoroughbred horses were imported by the larger (wealthier) landholders throughout the nineteenth century establishing a strong history of horse breeding in the area. The majority of breeders focused on thoroughbred racing horses rather than stock horses and some estates held race meetings on their own racetracks. The Scotts of Glendon were importing stud horses in 1822 and Alexander Bowman bred a number of race horses at Oaklands as did George Bowman at Archerfield. James Glennie at Dulwich Estate, George Townshend at Trevallyn and John Earle at Glenridding were also all known for their breeding of mares and stallions (Clive Lucas 2013:51).

3.3.5 Viticulture

By the 1830s there were a number of properties in the Hunter growing grapes and producing wine; effectively establishing the industry that continues to thrive today. There were several important figures in the region who contributed to the establishment of the industry. In 1828 James Busby was granted 2,000 acres at Carrowbrook to the northeast of the Project Area. Busby had studied viticulture in France before arriving in NSW and published *Treatise on the Culture of the Vine and the Art of Making Wine* in Sydney in 1825. Rev. Henry Carmichael at Porphyry Point is recognised as a pioneer in viticulture in the Hunter Region. The Reverend Richard Hill is reported to have planted over two and a half thousand vines on his Milbro Dale (now named Milbrodale) Estate by 1834. Captain G. J. Frankland at Mowbray was the first to introduce the grape into the Paterson district. Dr. H Lindeman at Cawarra is often considered to be the father of the wine industry in Australia. In 1847 the Hunter Valley Viticulture Society was formed and in 1853 the Hunter Valley Vineyard Association was established (Clive Lucas 2013:50-51).

However, large scale commercial wine growing in the wider area was not undertaken until the 1920s when the Fordwich Soldier Settlement viticultural farms were established. As the number of ex service men struggling with their viticultural farms increased more established families like the Tullochs gradually bought up their operations and soon dominated the area (Dunne 2012:82-85).

3.4 Soldier Settlement

Following World War I the Commonwealth and State Governments cooperated to initiate programs to enable returned soldiers to settle on their own farms or secure their own homes (under the War Service Homes Act of 1918 and soldier settlement schemes). While most land made available to returning soldiers was former Crown land, some freehold land was purchased by the Crown and then made available to returned soldiers. Blocks secured by returned servicemen from World War I that had been surrendered to the Crown under the Act were known as Settlement Purchase Areas (SPA).

3.5 Early Land Ownership Mapping in the Region of the Project Area

The earliest land taken up in the vicinity of the Project Area was around what became the Wambo Estate; on land close to the first road (refer to **Section 3.7**) to Windsor and the fertile river flats of Wollombi Brook and the Hunter River.

Mathew Hindson was the earliest settler in this area with 2000 acres granted on twentieth April 1824. David Maziere was granted 746 acres adjacent to Hindson's grant on fourteenth November 1825. Hindson was free settler who became a Sydney merchant and land owner in the Maitland and Wollombi districts. Maziere was another free settler who arrived in NSW in 1822. He became a shareholder in the Bank of NSW and a wine and spirit merchant operating in George Street, Sydney (Collins 1994:8). Apart from some clearing works, which was a standard condition of land grants during this period, neither Hindson or Maziere appear to have developed their grants (GML 2010:41). By 1834 both Hindson and Maziere had sold their land to James Hale to form what later became Wambo Estate. Hale originally named the property Lemington Grange after the name applied to the parish (Lemington) by Assistant Colonial Surveyor Henry Dangar (GML 2010:41, Collins 1994:8).

Henry Dangar's 1828 Map of the Hunter River and its Branches (refer to **Figure 3.1**) shows the land on the west side of Wollombi Brook owned by Hindson (shown in blue and numbered '2' across the southern portion of the Project Area) and Maziere (shown in pink and numbered '3' immediately to the south of the Project Area).

Henry Dangar had emigrated to NSW as a free settler and was appointed assistant in the Survey Department with the instructions to survey the country in the vicinity of Newcastle and the Hunter River. In addition to preparing the town plan of Newcastle, he extensively surveyed the Hunter River, its tributaries and the region of the estuary, measuring and marking out village reserves, church lands and allocations for settlers along the lower branches of the Hunter River. He marked out the road from Newcastle to Maitland, explored the present sites of Muswellbrook, Aberdeen and Scone, was the first European to observe the confluence of the Goulburn and Hunter Rivers and crossed the Liverpool Range to the plains beyond. His reports caused an immediate rush of applicants for land grants in these desirable new districts. Dangar was dismissed from government service in 1827 over impropriety in land dealings associated with his survey work. On returning to London his talents as cartographer and surveyor were recognised by the directors of the AA Co and by 1830 he was back in the Hunter Valley (Gray 1966).

The AA Co was established in 1824 by an Act of the British Parliament and brought stability and efficiency to Newcastle's coal industry. Although the Company was granted one million acres with the primary purpose of producing wool, the AA Co also entered the coal industry with the intention of exporting coal to India for use by the steamers of the East India Company. The AA Co held its monopoly over the coal mining industry in the Newcastle area until 1847 when the Company agreed to abandon its protected position in the coal industry in return for the right to sell its estates.

Robert Dixon's 1837 Map of the Colony of NSW illustrates the locations and size of some of the early allocations in the region of the Project Area (refer to **Figure 3.2**). By this time Hale had purchased Hindson and Mazieres' grant to form what became Wambo Estate - shown across the southern portion of the Project Area. The 1837 Map also shows the extent of allocation of land along the Hunter River and its tributaries; including Wollombi Brook.

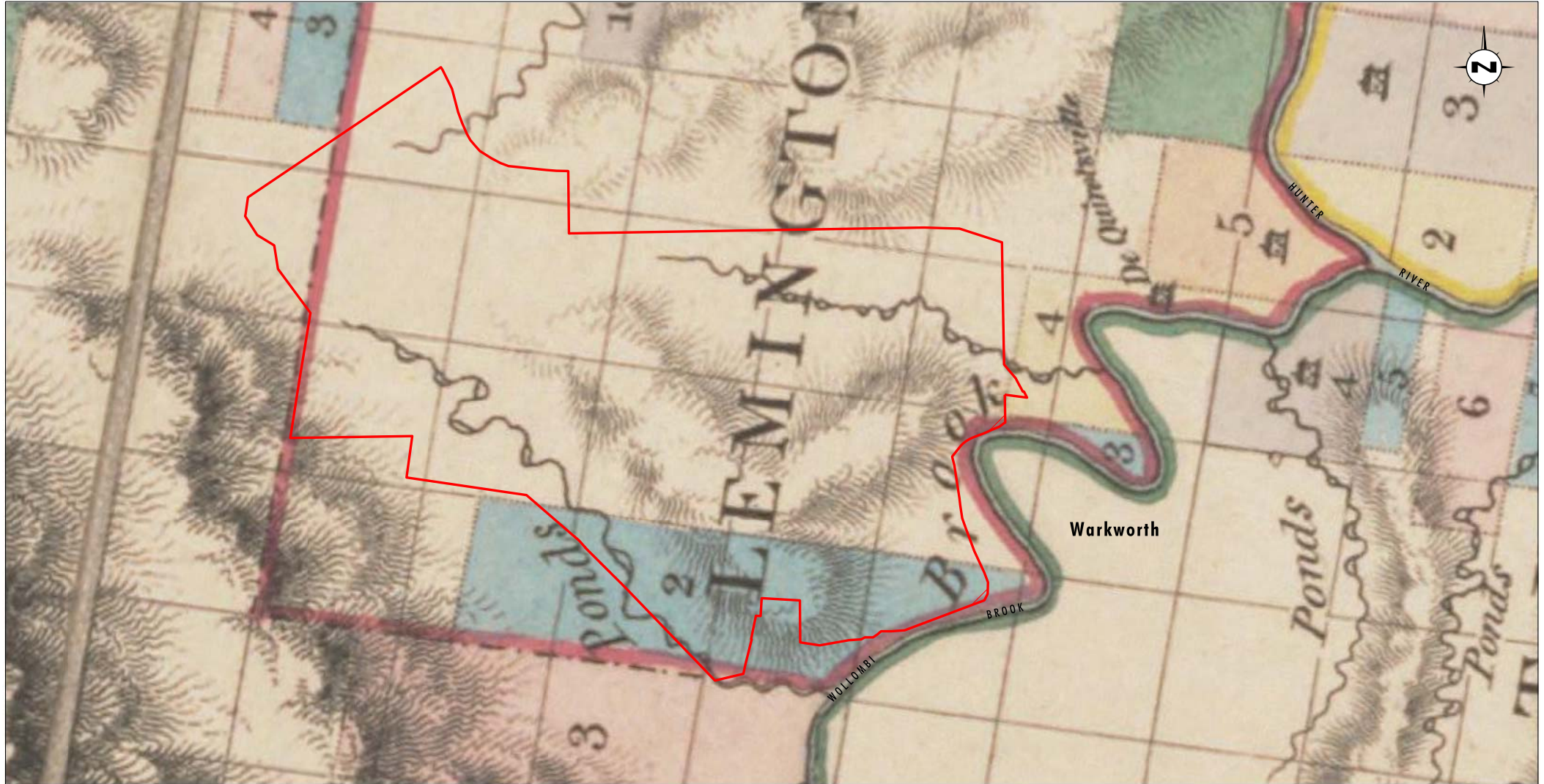


Image Source: National Library of Australia (2015)
 Data Source: Glencore (2014)

0 1.0 2.0 3.0 km
 1:60 000

Legend

Approximate Project Area Boundary

FIGURE 3.1

Detail of Henry Dangar's
 1828 Map of the Hunter River

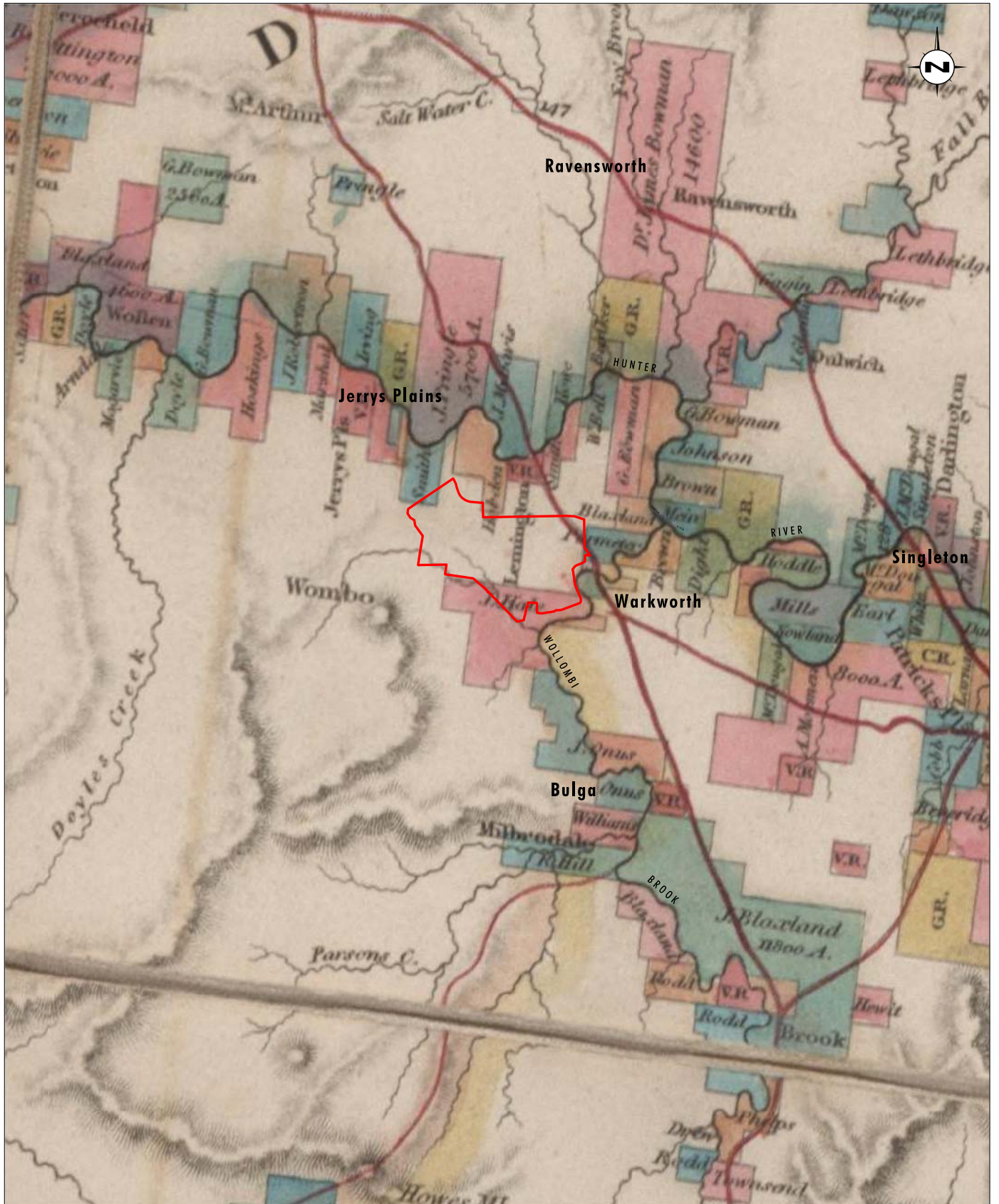


Image Source: National Library of Australia (2015)
 Data Source: Glencore (2014)

0 3 6 12 km
 1:250 000

Legend

Approximate Project Area Boundary

FIGURE 3.2

Detail of Robert Dixon's
 1837 Map of the Colony

Dixon's map (full title: *Exhibiting the Situation and Extent of the Appropriated Lands, including the Counties, Towns, Villages, Reserves, Compiled from Authentic Surveys*) is commonly known as 'the Squatter's Map' and comprises the earliest documented attempt to show who owned what land in NSW. Dixon (1800-1858) was an explorer and surveyor born in Durham in 1800 who came to NSW in 1821. From 1826 he was the assistant surveyor in the Surveyor-General's Department. The 1837 map was produced while Dixon was on leave in London and is reported to have been made using other surveys and documents. Surveyor General Major Thomas Mitchell, who had produced his own less informative map of NSW in 1834 is reported to have been offended by Dixon's 1837 map and refused to reappoint Dixon on his return to Sydney after nearly 15 years of service (Warden 2010:16-17).

William Baker's Australian county atlas (full title: *Baker's Australian county atlas: dedicated by the publisher to Sir T.L. Mitchell ... showing the various parishes, townships, grants, purchases and unlocated lands*) shows the Parishes of Wambo and Lemington in approximately 1843-1846 and the farm holdings at this time (refer to **Figure 3.3**). Hindson's and Maziere's land are still shown adjacent to a 960 acre grant belonging to Hale. Baker's Australian county atlas is a useful source of information regarding early land ownership up to approximately 1846 in NSW, Victoria (Port Phillip) and Queensland (Moreton Bay).

Figure 3.4 shows Parish Maps of Lemington, Wambo, Warkworth and Whybrow as relevant to the Project Area and also illustrates the locations and names of settlers subsequent to the early large landowners. The extensive area of red across the eastern portion of the Project Area relates to land that was reserved for a Travelling Stock Reserve in 1873 (further discussed in **Section 3.7.4**). The Parish Maps show other major landowners across the Project Area include Hobden family, the Allen family, Francis Parmeter Squire, Isaac Frith, C.H. and Lucy Dight, the Tudor family and Charles Durham.

3.5.1 Aerial Photographs

A review of aerial photographs obtained from the Department of Lands dating from 1963 was undertaken as part of this assessment. These show the Project Area generally comprised of cleared grazing land with scattered trees; illustrating the extent of tree clearing that has previously been undertaken in the area (refer to **Figure 3.5**). The 1963 aerial illustrated in **Figure 3.5** shows a number of buildings within the Project Area including:

- a group of buildings at the intersection of the Golden Highway and Comleroi Road (these are now known as the Shearing Shed and Creamery and are further discussed in **Section 4.5.5**)
- a group of buildings (since removed) within the existing Wambo Operations area
- Whynot Homestead in the southwest corner of the Project Area (further discussed in **Section 4.5.7**).

No other homestead or farms are apparent within the Project Area in the 1963 aerial photograph. Several buildings are evident in the immediate vicinity of the Project Area including:

- Wambo Homestead located immediately south of the Project Area (refer to **Section 4.4.1**)
- a group of buildings (since removed except for a dilapidated shed) outside, to the west of, the Project Area. Note these are over 3 kilometres from proposed extension to the northwest corner of the approved Wambo Open Cut area or proposed United Open Cut area and will not be impacted by the Project. As such they are not discussed further in this report.
- Montrose Property to the northwest of the Project Area (refer to **Section 4.6.1**)
- a group of buildings (since removed) to the north of the Golden Highway

- a group of buildings comprising a former service station (since removed) on the north side of Wolombi Brook, immediately north of Warkworth
- a number of buildings in the Warkworth area including the Former Warkworth Public School, St. Philips Anglican Church and Cemetery, the Piggery and Butchers Hut and Springwood (refer to **Sections 4.4 and 4.6**)
- the former Warkworth RAAF landing ground immediately northwest of the Project Area is also evident on the 1963 aerial (refer to **Section 4.5.6**).

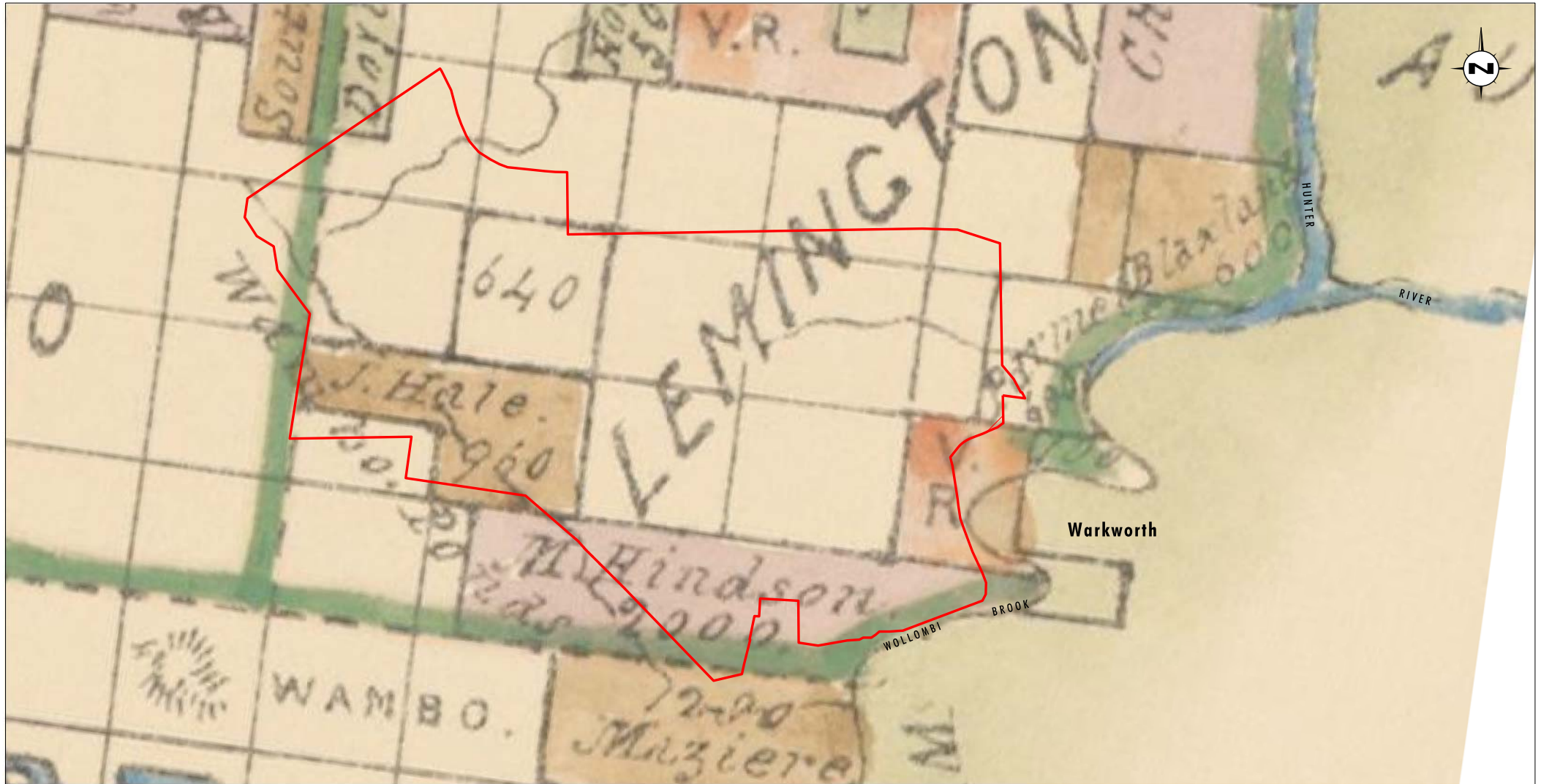
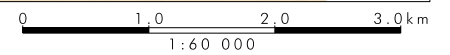


Image Source: National Library of Australia (2015)
 Data Source: Glencore (2014)



Legend

 Approximate Project Area Boundary

FIGURE 3.3

Detail of William Baker's
 Australian County Atlas

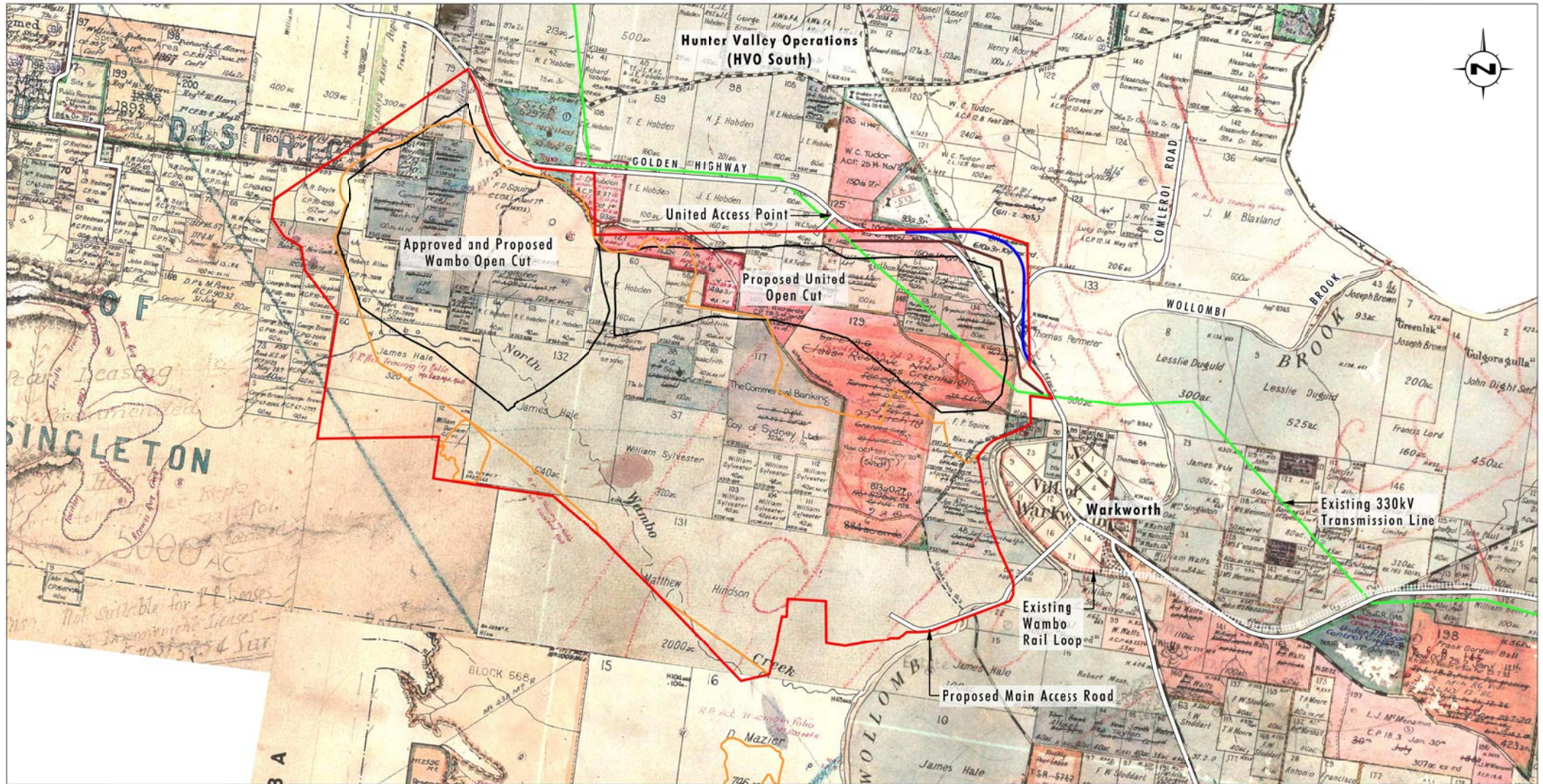


Image Source: United (2015)
Data Source: Glencore (2014)

Legend

- Project Area
- Proposed Conceptual Extraction Area
- Approved Wambo Surface Development Area
- Proposed Golden Highway Realignment
- Existing 330kV Transmission Line
- Proposed Relocated 330kV Transmission Line

File Name (A4): R05/3509_109.dgn
20160512 10.29

FIGURE 3.4

Parish Maps of Lemington, Wambo, Warkworth and Whybrow



Image Source: Land and Property Management Authority
 Base Data Source: Glencore (2015)

0 1.0 2.0 2.5 km
 1:50 000

Legend

- Project Area
- Approximate Heritage Items/Sites
- Approximate Homestead / Farmstead - no longer present

FIGURE 3.5

Aerial Photograph 1963

3.6 James Hale and the Wambo Estate

James Hale was one of a small group of convicts who rose to prominence in Australia. Transported at age 20 for stealing goods from a parson he arrived in NSW aboard the *Mariner* in 1816 and was forwarded to Windsor for assignment. He completed a seven year sentence before undertaking work as an overseer for William Cox and later as a Government contractor supplying fresh and salt beef, mutton, flour, maize, firewood and cartage for survey parties leaving Windsor in the 1820s and 1830s (Collins, 1994: 11-12, GML 2010:42). Hale married Mary Durham in 1828 and the same year built the White Hart Inn on George Street at Windsor (Collins, 1994: 12). His success in the colony was rapid and by 1830 he was the owner of 14 horses, 600 cattle, 1500 sheep and 2500 acres (1016.25 ha) of land with crops grown upon 150 acres (61 ha). Hale remained in Windsor until 1833 as publican of the White Hart Inn. In 1834 he applied for seven separate leases in the Parishes of Lemington and Warkworth, on either side of Wollombi Brook. In 1835 he purchased 1218 acres of land on Wollombi Brook adjacent to Hindson and Maziere's land. Hale rapidly consolidated and expanded his Hunter Valley interests, adding a further 5760 acres through leasehold in the same year and another 4480 acres in 1837, on and around Project Area (GML 2010: 42, Envirosciences, 1993: 58).

Although Hale's purchase of both the Hindson and Maziere properties reflects the opportunities in NSW for emancipists, it was unusual as land ownership at this time in the Hunter Valley was dominated by free immigrants. Only two of the 91 estates of over 1000 acres located in the Hunter Valley were owned by ex convicts in 1828 (GML 2010: 42).

Hale continued to increase his holdings into the 1840s with purchases around Inverell and further west around Coonabarabran. By 1841 his holdings totalled approximately 100,000 acres and included land in Windsor, Wambo, Bannockburn Station (Inverell), Tarawinda, Uliman, Bomera and Bundella outside Coonabarabran (GML 2010:42).

Hale was a member of the Coolie Association from 1842, which was an association for obtaining permission to import Asian labourers to replace convicts, following the cessation of the transportation of convicts to NSW in 1841. Although he had a convict background, as a large landholder in the Hunter Valley Hale would have been dependant on convict labourers. To compensate he employed newly arrived immigrants to work on his properties. In 1844 he employed John Marshall (farmhand) and his wife Elizabeth (housemaid) and George Moyes (blacksmith) and his wife Alice, all of whom were newly arrived migrants, at Wambo. Hale provided board and lodging and paid them £20 per year (GML 2010:42).

By 1844 Hale was one of the top one hundred landholders in the colony, using his Wambo Estate for both grazing and wheat cultivation. He also ran cattle on the property and is likely to have used Wambo as a halfway point for moving his sheep between Windsor and his large land holdings further north and west.

In 1843 Hale was campaign chairman for Robert Fitzgerald of Windsor, who advocated a 'just and liberal system of public education' but refused to recognise 'invidious distinctions' in the selection of immigrants. Fitzgerald was defeated by one vote and his supporters rioted at Windsor (Maclaurin 1972). By the late 1840s Hale was living at Clifton, a large horse stud near Windsor. He retained Wambo as a pastoral property until his death but maintained his family home in Windsor. James Hale died at Windsor on 21 June 1857 aged 60 (Collins, 1994: 17).

In 1857 the Wambo Estate (and all of Hale's properties in the counties of Hunter and Northumberland) was inherited by his stepson, William Durham Junior (the eldest son of his wife Mary from her first marriage). William Durham had likely been managing the property on behalf of Hale prior to his death. It was around this time that the name Wambo Estate became the preferred name used when referring to the property (Collins, 1994: 9). The name change is attributed to the tenure of William and Sophia Durham. The wider region continued to develop during the Durham's tenure and 1869 saw increased settlement in the area as the Great Northern Railway reached Muswellbrook (Envirosiences, 1991: 58).

The Durham family continued to operate the Wambo Estate until the end of the century. William Durham Junior lived there until 1891; when he died aged 68 and was buried in Bulga Cemetery (Collins, 1994: 25). In 1892 the Wambo Estate and homestead were inherited by William James Hill Durham and Charles H. MacQuade Durham, who were William Durham Junior's sons. They sold the Wambo Estate to Ben Richards, who was Charles H. MacQuade Durham's father in law, in 1894 (Collins, 1994: vii). In 1905 the Wambo Estate was purchased by R. C Allen and Frank McDonald (Collins, 1994: vii) who used it as a horse stud farm (Collins, 1994: 10) and initiated a building program of timber horse boxes, yards and fences (GML 2010:44). In 1908 the Wambo Estate was subdivided into six lots with Frank McDonald purchasing the Homestead and approximately 500 acres for his son William (Collins, 1994: 10).

The demand for electrical power in the post war period grew, opening opportunities to further exploit the coal seams of the Hunter Valley area. The majority of the Wambo Estate was sold to Wambo Mining Corporation in 1968 with the McDonald family retaining the homestead and 81.5 acres (33 ha) of the property (Collins, 1994: vii). Coal had originally been found on the Wambo Estate in 1863 when a well was being drilled. The Wambo homestead and the remaining 33 hectares of property were purchased by Mr John Birks from the McDonald family in 1983. In 1987 the homestead block was sold on to the Wambo Mining Corporation (Collins, 1994: vii. GML 2010:44). The company have been underground mining the area since 1969, and used the house for training and storage until approximately 2000, when it became vacant (GML 2010:44).

3.6.1 Wambo Homestead

There is no evidence to suggest that apart from undertaking clearing works Hindson or Maziere developed their grants in any way. The construction of the Wambo Homestead is thought to have commenced in approximately 1833 with Hale building a single storey stone building with a cellar. This building was later extended with the addition of a second storey made of brick. Between 1835 and 1845 Hale added more buildings, including the 'New House' built of brick on stone foundations in approximately 1844, a carriage house with stables and a large timber barn. With the construction of the new house the original 1833 building was used as a kitchen wing and soon had a servants quarters and stud masters cottage added (GML 2010:42-43).

In 1981 the Wambo Complex was classified by the National Trust and in 1982 a Permanent Conservation Order was placed on the site, which was converted directly to the State Heritage Register in 1999 as Wambo Homestead (GML 2010:44).

3.7 Roads, Railways and Communication

3.7.1 Bulga Road

In the Upper Hunter area, roads were the most important means of transport until 1869 when the Great Northern Railway reached Muswellbrook (Turner 1995:32). The first overland route to the Hunter River was discovered, after several unsuccessful attempts, by John Howe, Benjamin Singleton and others, who travelled from Windsor to near Singleton in late 1819. The route they discovered was officially opened in 1823 and when first opened, travellers required a permit which showed who was included in a travelling group, what animals and goods they were taking and how long they expected to be on the road. The first person to receive a permit to travel along the Bulga Road was Lieutenant Charles Close who had property in the Hunter Valley. Close took his family, servants and animals along the road over a two-week period from 8 May 1823 (Convict Trail Project n.d).

Close had arrived in Sydney in 1817 as a lieutenant in the 48th Regiment and was soon transferred to Newcastle. He resigned from the army in 1822 and settled on a 2560 acre grant (Illulung) adjacent to the government reserve for the Township of Morpeth on the Hunter River. In 1848 Closebourne, Close's home at Morpeth, became the Church of England's headquarters of the diocese of Newcastle; forever linking him to the foundation of the Church of England in the Hunter Valley (Gray n.d).

John Howe was a farmer and Chief Constable for the District of Windsor who mounted an expedition from Windsor to the north to discover if there was indeed rich country in the valley along the Hunter River. His two successful journeys in 1819 and 1820 produced what was known as the Bulga Track/Road or The Parson's Road (now Putty Road). The discovery of this route meant that stock could now be taken overland from the Cumberland Plains north to the Upper Hunter Region.

On 24 October 1819, John Howe left Windsor for his first expedition. The team included Howe and:

- George Loder Jr. (Howe's son-in-law) and John Milward (free men).
- John Eggleton, Charles Berry and Nicholas Connelly (convicts).
- Myles and another man who left the party on the second day (Aboriginal guides).

On 5 November they reached Doyle's Creek and travelled downstream collecting coal samples. Howe described Patricks Plains as the

...finest sheep country I have ever seen since I left England... the grass on the low ground equals a meadow in England and will grow as good a swathe... (Convict Trail Project n.d).

In March 1820, John Howe set out on his second expedition, aiming to reach the Hunter River and travel along it. In the expedition with Howe were:

- George Loder Jr, Benjamin Singleton and Daniel Phillips (free men).
- Jeremiah Butler (ticket of leave – a convict granted freedom to work and live within a given area before their sentence expired or they were pardoned).
- Charles Berry, Samuel Marshall, Frederick Rhodes, James House, Robert Bridle and Nicholas Connelly (convicts).
- Andrew Loder, Thomas Dargan Jr and Phillip Thorley (volunteers).

- Myles and Mullaboy (Aboriginal guides).

The expedition reached the Hunter River on 15 March 1820 and travelled downstream for five days, arriving at Wallis Plains. On their return journey, they blazed a route that became the first road north from Sydney. It was opened officially as a road in 1823. George Loader Jr, Benjamin Singleton and Daniel Phillips received land grants in the Hunter Valley as a reward for their efforts in setting a route for travel from Windsor to the Hunter Valley (Convict Trail Project n.d).

However, the route was recognised as being a treacherous journey and fell into disrepair and out of use with the construction of the Great North Road.

3.7.2 The Great North Road

The Great North Road was constructed between 1826 and 1836 using convict labour. The rapid growth of settlement in the Hunter Valley, especially the lower Hunter, soon made the Bulga Track/Road inadequate. Peter Cunningham, who was granted 1200 acres in the Upper Hunter Valley in 1825 and published the popular *Two Years in New South Wales: a Series of Letters, Comprising Sketches of the Actual State of Society in that Colony...* in 1827 described the Bulga Track/Road as:

...a rugged bridle path over the mountain ridge called the Bulgar, quite unfit to take even an empty cart by (Wood 1972:16).

In 1825 surveyor Heneage Finch was despatched to find a better route north. In April 1826 the early settlers in the area petitioned Governor Brisbane to construct the line of road marked by Finch. As a result the first gang of convicts were posted north of Castle Hill and work began on September 1826 (Lavelle 1999). Lieutenant Jonathon Warner supervised the work north and south of Wisemens Ferry. Warner's successor Lieutenant Percy Simpson is said to have transformed the road 'from a simple cart track to a fine and permanent avenue'. It was during Shortland's period of construction that the road was named the Great North Road (Lavelle 1999).

3.7.3 New England Highway

The origins of the New England Highway lie not in the work of early surveyors like Dangar but in that of explorer and botanist Allan Cunningham, who traversed the region in the period 1827 to 1829. Between January and August 1827, Cunningham travelled from the Hunter Valley northwards, crossing the Peel and Dumaresq Rivers, discovering the Darling Downs, before returning to the Hunter Valley and Bathurst. While exploring the Darling Downs, he discovered Spicer's Gap, through which there was access from Moreton Bay to the fine grazing offered by the Downs. Cunningham later found a second gap, Cunningham's Gap, in 1828-1829 (Perry 1966).

The roads leading north through the Hunter Valley were developed in the first part of the nineteenth century. By 1850 the main road to the north had extended from Muswellbrook to Murrurundi and onto Tamworth and Armidale. The road north of Murrurundi follows the track over the Liverpool Ranges discovered by William Nowland in 1827. The road forms the basis of the New England Highway of today.

3.7.4 Travelling Stock Routes

Travelling stock routes and reserves (TSRs) in NSW (also known as the Long Paddock in Australian literature) originated from the need to move stock to pastures and markets. To assist with the stock movements the government established a network of watering points and wide corridors for stock routes. Stock routes evolved from the 1830s onwards, the early routes generally following rivers or roads. By the 1860s legislation was introduced to protect the rights of adjacent run-holders and drovers. The Occupation

Act 1861 and the Pastures and Stock Protection Act 1880 attempted to regulate the use and administration of stock routes. By this time railway lines were also used as stock routes in some areas. During the 1880s and 1890s improvements were made to administration of the routes, culminating in the Pastures Protection Act 1902 which established Pastures Protection Districts and Boards (AHMS 2008:39-40).

Existing stock routes are not used as often for droving as they were in the past as truck transport provides an alternative. However the use and growth of the routes peaked during the two world wars, and continued in the post-war period particularly during the droughts of the late 1950s. Since then there has been a decline in use of the routes except during drought periods when they are used mainly for grazing stock rather than transporting them. The Rural Lands Protection Acts of 1989 and 1998 transferred administration of the routes to Rural Lands Protection Boards. The Boards now manage almost 600,000 hectares of travelling stock routes on crown land throughout NSW (AHMS 2008:39-40). There has been a significant increase in the numbers of stock using traveling stock reserves and public roads since the onset of the drought in the early twenty-first century (Hale 2008). Following the renewed use of the routes, concerns have grown about soil erosion and weed control, and protection of wildlife and remnant native vegetation (AHMS 2008:40).

A large area of the Project Area was formerly used as a TSR (indicated by the extensive area of pink across the Project Area on Parish Maps - refer to **Figure 3.4**). However by the early twentieth century the land had been sold and by 1932 was predominantly in the hands of the Commonwealth Bank of Australia.

3.7.5 Main Northern Railway Line/Great Northern Railway

The Great Northern Railway or as it is now referred to, the Main Northern Railway, was built in part following the Great North Road in the 1860s to the 1870s. The Main Northern Railway's first section was built from Newcastle to Victoria Street, Maitland in 1857. It then extended to Singleton (1863), Muswellbrook (1869), Murrurundi in (1872), Werris Creek and west Tamworth (1878), Armidale (1883) and Wallangarra, Queensland in 1888.

The hoped for rail extension of the Great Northern Railway that would have connected Singleton to Wollombi via Broke did not eventuate.

3.8 World War II

World War II saw war reach the Australian shore, with the conflict involving the civilian community, indirectly as workers or as victims of the enemy actions. Initially after declaring war in 1939 Australian involvement at home was limited to the RAAF participation in the Empire Air Training Scheme (EATS), which was designed to produce 50,000 trained pilots and aircrew (from across the Commonwealth) as long as there was a need, with 11,000 of these to come from Australia (Brew 2001:22). This left a considerable impact on the landscape with training schools established around NSW.

The 1941 Japanese attacks on Pearl Harbour and subsequent strikes against Malaya led to a rapid Japanese advance towards Australia. To protect Australia at home, defence works were pressed ahead including coastal defences, anti-aircraft batteries, anti-tank defences, ditches, anti-aircraft shelters and slit trenches. Airfields were built and target ranges constructed in remote areas, with 29 aerodromes recorded as existing or under construction in August 1942 in NSW (Brew 2001: 29). Over time some airfields evolved into strategic defence aerodromes. Army camps to house troops and larger areas for manoeuvres were also set up, whilst the Navy also took over suitable locations and built its own facilities (Heritage Branch n.d).

3.8.1 Aerodromes

The location of aerodromes depended on the proposed function or purpose of the aerodrome; whether it was for training, operational purposes or maintenance. For example the western region of NSW was ideal for the location of aerodromes, especially for training, as the land was flat, there were no nearby mountains and they were protected from attack. Weather conditions, especially near the coast were more favourable than in other areas and the ground proved suitable for heavy traffic (Brew 2001:41-42). An aerodrome (a 'parent' site) was supported by a number of associated satellite airstrips.

The Thematic Study: World War II Aerodromes and Associated Structures in New South Wales (Brew 2001) identifies there were 22 parent aerodromes actually constructed by 1942, with an additional 103 satellite airstrips or independent aerodromes. However, Brew notes the difficulty in accurately calculating the number. The majority of known NSW aerodromes are in the Sydney region, with a total of 23. The Murrumbidgee region has 21 with the Darling Plains and Murray regions having 17 and 16 respectively. The Lower Hunter region has 8 known aerodromes and the Upper Hunter 7 (Brew 2001:29).

The strength of the Japanese forces and the closeness of the war to the Australian coastline concerned defence authorities. The Curtin government considered a number of contingency plans in preparation for possible invasion. A significant plan for the formation of aerodromes in NSW was the demarcation known as the Brisbane Line. The build up of defence concentrated on the area of NSW was proposed to include aerodromes from which to stage bombing attacks and reconnaissance flights to ascertain the Japanese positions (Brew 2001:20).

Acquisition of land and construction on aerodromes began in August 1942, with 29 aerodromes either existing or under construction (Brew 2001:9). As the construction of aerodromes and landing grounds began, the Works Director, Air Services kept records of their progress, marking them as 'Most Secret'. The locations were divided into five areas: Western, Northwest, North-east, Eastern and Southern. The aerodromes of NSW were located within the 'Eastern Area' (Brew 2001:28).

The ongoing construction and occupation of the RAAF at aerodromes and landing grounds precipitated an 'Order of Aerodromes' a document similar to the 'Order of Battle' required by the RAAF Command Allied Air Forces, which contained up to date information concerning the disposition of Squadrons and the associated operational administration. The purpose of introducing the order was so operational commanders could have immediate access to vital details concerning aerodromes. This enabled commanders to obtain a complete picture of the status of aerodromes and operational provisioning. When this information was read in conjunction with the 'Order of Battle', it provided all the necessities for planning by any operational commander (Brew 2001:29).

3.8.2 RAAF Aerodrome Bulga

The RAAF Aerodrome Bulga (RAAF Base Bulga) and its associated satellite airstrips at Broke, Warkworth and Strowan (**Figure 3.6**) were planned and constructed as a result of the 1942 to 1943 defence works. A parent base at Pokolbin, with satellite bases at Rothbury and Ringwood was also planned, however it appears that construction of Pokolbin, Rothbury and Ringwood bases never commenced (Umwelt 2012:23).

The RAAF Base Bulga was classed as a General Reconnaissance airfield, which as of 1942/43 had its airfield infrastructure complete, while the ancillary buildings were yet to be constructed. Bulga was the only operational General Reconnaissance airfield proposed or constructed during World War II (Brew 2001 Appendix G).

In early 1942 the construction of the RAAF Base Bulga was deemed an ‘urgent war measure’ and its construction a matter of ‘great urgency’ with the spreading of the base over four fields (Bulga, Broke, Warkworth and Strowan) part of the ‘dispersal policy’. The need for, general location and designs of the satellite bases were determined by concerns of minimising the possible detection by enemy aircraft and any damage to aircraft and personnel if any of the bases were detected, as well as lessening any collateral damage to civilians (Weir and Phillips 2007a).

Figure 3.7 is a proposed plan of the RAAF Base Bulga compiled by the Camouflage Section of the Department of Home Security in 1942. The original plans for the parent base and satellite landing grounds called for 36 hideouts at the end of camouflaged, irregular taxiways. To camouflage the airstrips, straight lines were avoided during clearing and a natural ‘edge of clearing’ was created to conform to the surrounding country. The runway surfaces were disguised by spreading and staining gravel over the runway to blend into the surrounding contours and any bare ground left after construction was sown with grass and fertilised to speed up the grass growth.

3.8.3 Warkworth RAAF Landing Ground – Satellite Airstrip

The Warkworth landing ground (located immediately adjacent, and partially inside, the northeast corner of Project Area) was one of the three satellite airstrips associated with the parent RAAF Base Bulga, the others being at Broke and Strowan (Jerry’s Plains). Satellite airstrips were constructed to alleviate congestion at parent aerodromes (Brew 2001: 40). Of the 103 identified satellite landing grounds, 36 satellite landing ground locations are listed with the status of being under construction or existing and 10 proposed as at 1942/1943 (Brew 2001 Appendix G). Land was acquired for the four RAAF landing grounds at Bulga, Warkworth, Strowan and Broke in 1942.

In May 1942 documents indicate that the satellite fields were only to have one runway, with minimal associated buildings and a total of 36 hideouts were required. By August 1942 gravelling was about to commence at the main runway at Bulga, while forming works at Broke and Warkworth were also ‘well advanced’. Works at Strowan were ‘proceeding slowly’. By October 1942 Bulga and Broke were to each have 18 hideouts, while Warkworth and Strowan were to have 18 spread across them, however by March 1943 only 12 dispersal points were required. Progress by January 1943 at the RAAF bases at Broke and Strowan was given as ‘works nearing completion’, while at Warkworth the runway was useable, but dispersal services (hideouts) were not complete (Weir and Phillips 2007a).

Technical manuals were written with guidelines on works, buildings, quarters, etc. printed regularly. It was expected that once a month regular maintenance checks were done, which were to consider: surfaces of landing areas, hard surfaced runways, taxiways and hanger aprons, drains, boundary markers and wind indicators and fences. The runway, taxiway and apron areas were to detect surface defects, roughness, unevenness, holes, depressions, bare ground, erosion, boggy patches, softness of the surface, long grass and any debris (Brew 2001:29-30).

The plans of the RAAF landing ground at Warkworth dated 31 October 1942 show the camouflaged landing strip with taxiways running from the northern side of the runway having eight aircraft hideouts in five groupings among the trees (refer to **Figure 3.8**). At the end of 1943 it was assessed that over £2500 has been spent on the construction of messing and sanitary facilities for 50 personnel ‘a general purpose hut, kitchen, latrine (all ranks) and ablutions (all ranks)’ (Weir and Phillips 2007b). Over £50000 had been spent on the airstrip including fencing and drainage.

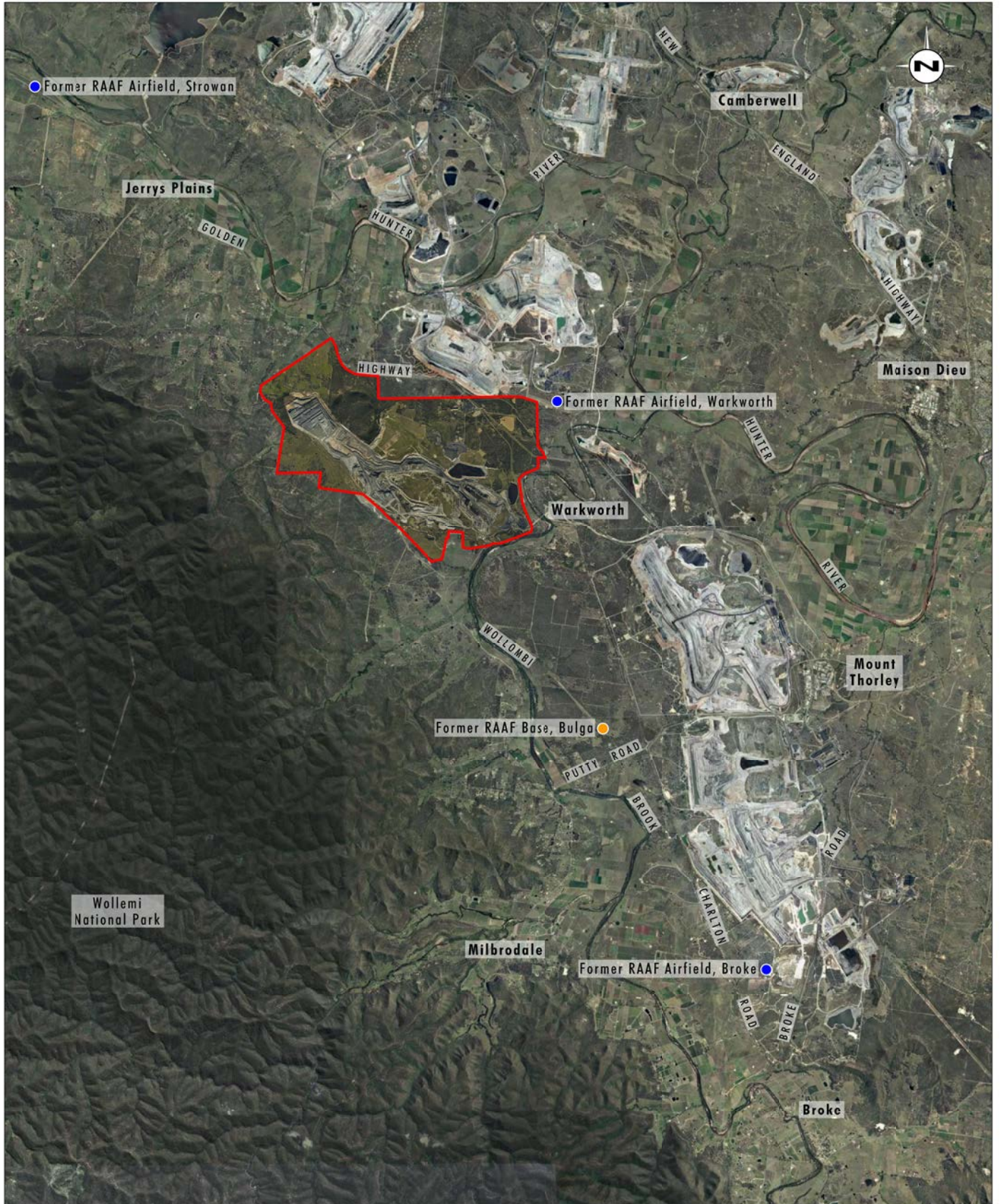


Image Source: Google Earth (2010), United (2015)
 Data Source: Glencore (2014)

0 2.0 4.0 8 km
 1:160 000

Legend

- Project Area
- RAAF Base Bulga Location
- Satellite Airstrip Location

FIGURE 3.6

Locations of RAAF Base Bulga and Satellite Airstrips at Broke, Strowan and Warkworth

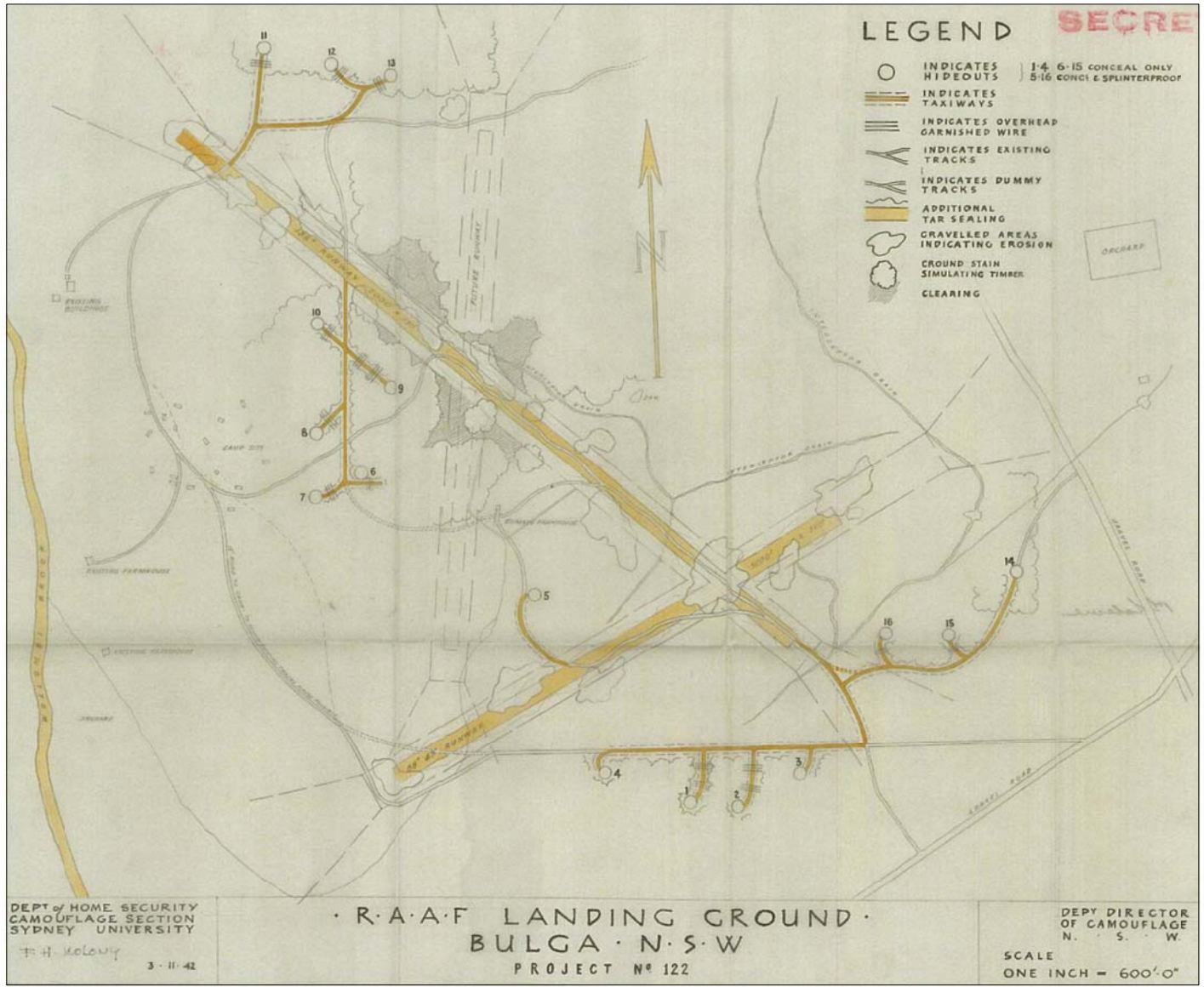


FIGURE 3.7
1942 Plan of Former
RAAF Base Bulga

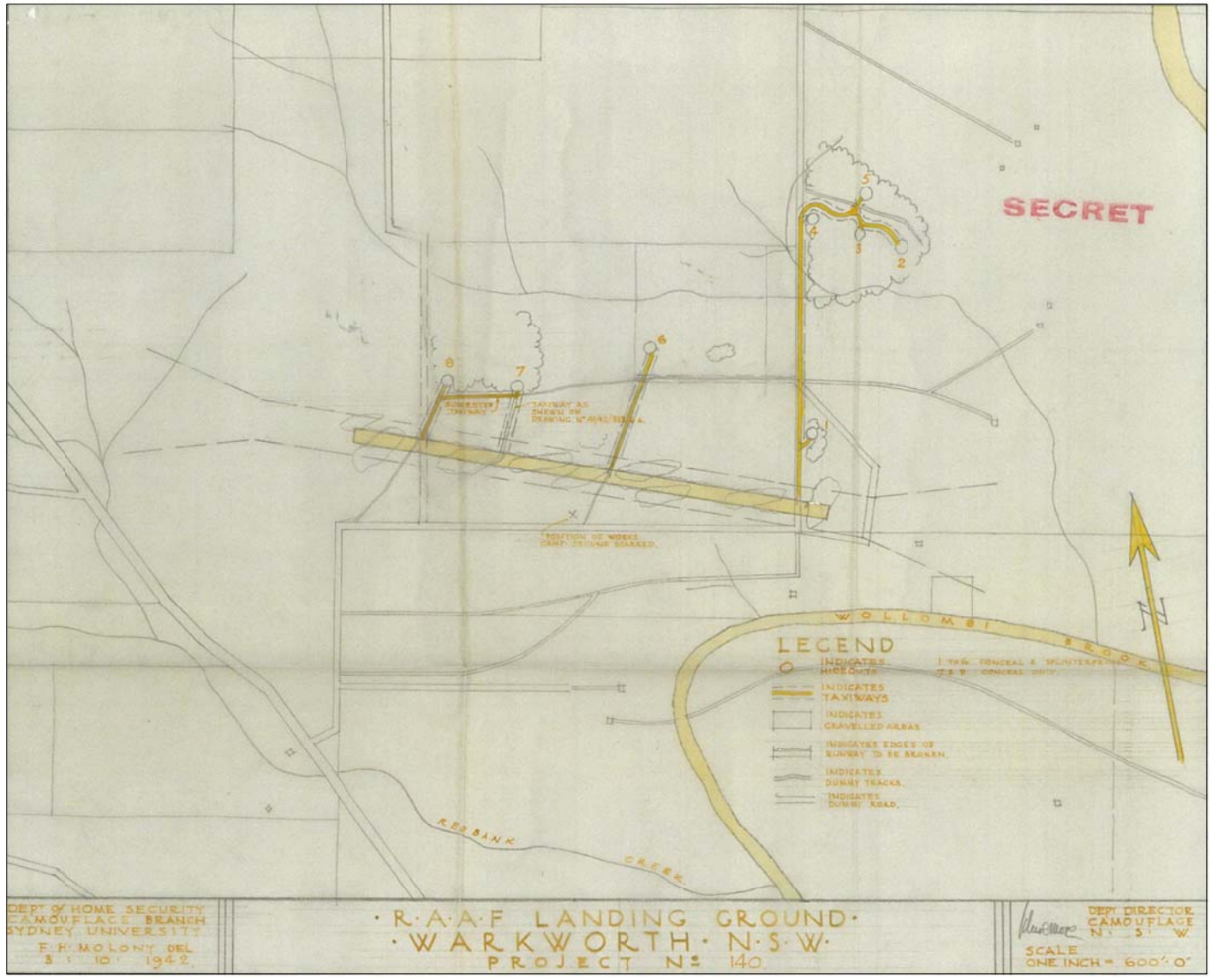


FIGURE 3.8

1942 Plan of Former RAAF Landing Ground Warkworth

A camp was also constructed to the north of the airstrip as shown on **Figure 3.9** as the blue shaded area in trees at the end of a track and detailed on **Figure 3.10**. The camp initially consisted of an existing farm building and shed. The sheds were converted into latrines and an ablution block. Fences, gardens and a track were constructed as camouflage and old farm machinery placed around the fenced yard. It was deemed essential to use existing fencing materials and old farm machinery where possible; to make the site blend into the surroundings. Some dilapidated fences were retained and reinforced with wire and a cream box placed at the gate, as existed at the gate of neighbouring farms.

It appears that the RAAF Base Bulga and its satellite sites at Broke, Warkworth and Strowan were never used for war related activities. By mid 1943 the need for and use of the bases at Bulga, Broke, Walworth and Strowan was not longer envisaged, so when the works had been completed to a minimum serviceable standard the consideration turned to future management of the sites (Weir and Phillips 2007a).

At the end of the war, it was decided that the Bulga airfield was to be retained by the RAAF, but not maintained, and the Broke, Strowan and Warkworth airfields could be subject to disposal to their original owners or by sale (Brew 2001:33). In 1944 the Newcastle Aero Club had requested permission to land on the RAAF air strips in the vicinity of Newcastle for practice in forced landings, with consent granted in 1945. By the end of 1952 all government interest in the sites was ending, with the properties returned to the original landowners or their estates (Weir and Phillips 2007a). The satellite airstrip sites at Warkworth and Strowan are both still utilised as airstrips. The airstrip at Warkworth is functioning as the David Parker Airfield and is utilised by the Hunter Valley Gliding Club (HVGC). The only surviving part of the World War II Aerodrome today is the airstrip itself. No structures survive and the paths to and locations of hideaways are no longer evident (Weir and Phillips 2007b). The airstrip at Strowan currently functions as a private airstrip.

3.8.1 Thematic Listings Program – WWII Aerodromes

World War I and II sites were one of four themes included in the 2009-2010 Thematic Listings Program. The Thematic Listings Program is a Heritage Council strategic initiative to maintain a balanced and credible State Heritage Register that accurately records the most significant places and objects in, and which reflects the cultural richness and diversity of, the State of NSW. The World War I and II sites were included to:

...acknowledge the important contribution of servicemen and women during both World Wars and the 70th anniversary of the beginning of WWII (Heritage Branch n.d).

Evidence for World War I and II sites in the NSW landscape is widespread but not always well recognised today. The Thematic Listings Program aimed to ensure that sites of significance to both World Wars are located, identified and assessed for their heritage values (Heritage Branch n.d).

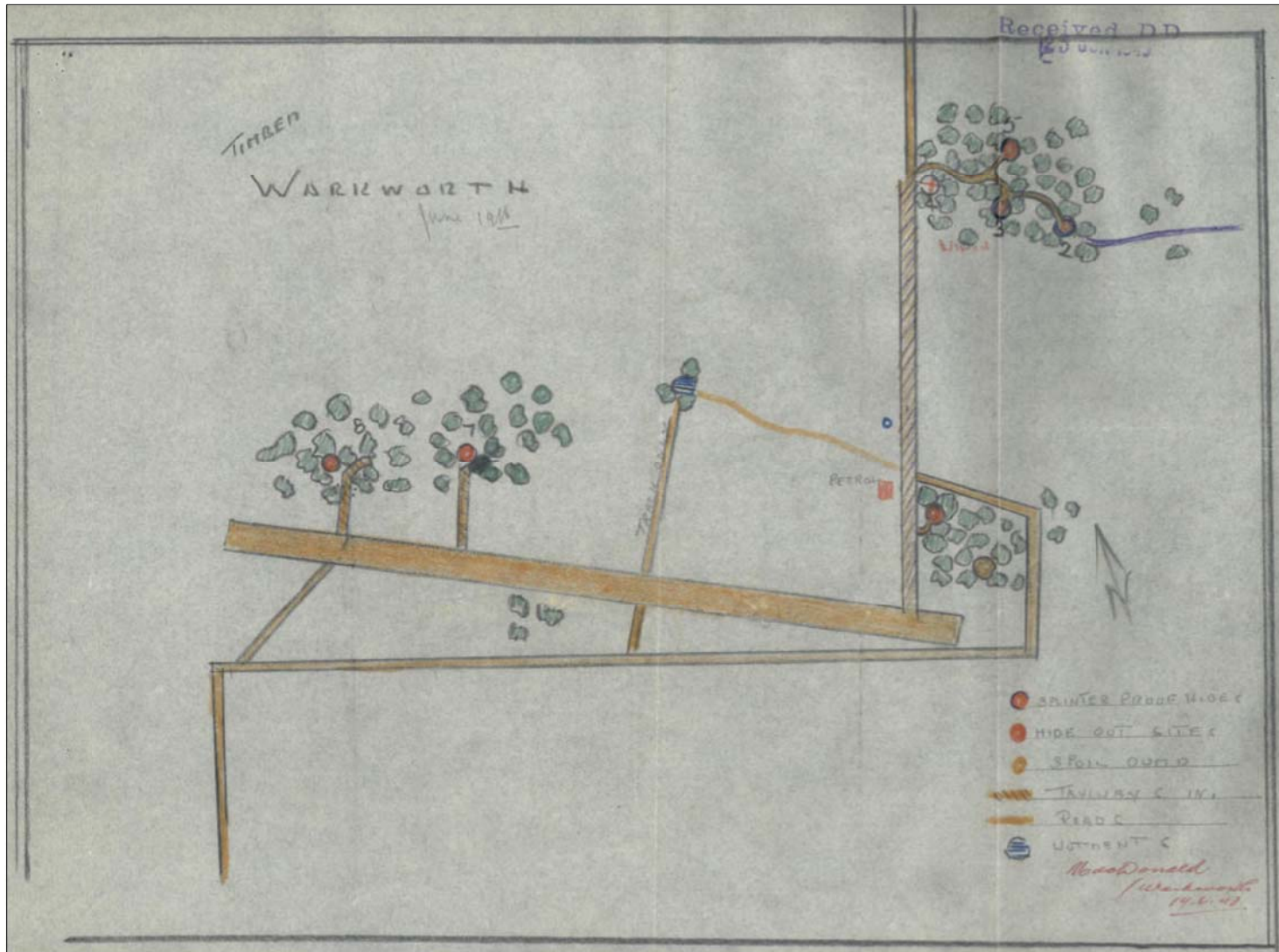


FIGURE 3.9

1943 Plan of Former RAAF
Landing Ground Warkworth

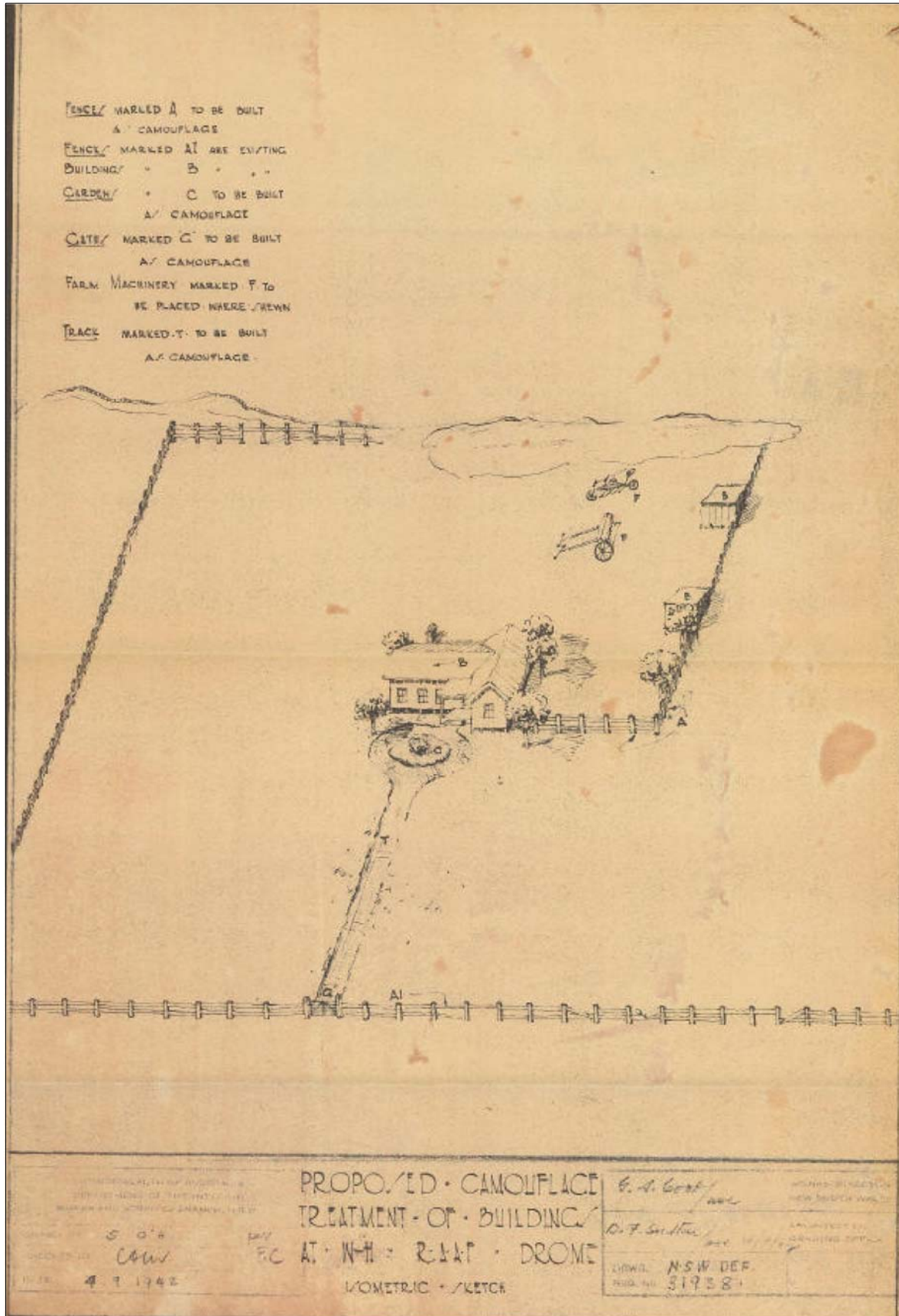


FIGURE 3.10

1942 Plan of Proposed Camouflage Treatment of Buildings at Former RAAF Landing Ground Warkworth

3.9 Mining

The development of coal resources comprises an important part of the region's history of coal mining within the Hunter Valley and began on a limited scale in the early 1900s, prior to a rapid expansion in the 1950s with the establishment of large open-cut mines (Dean-Jones and Mitchell 1993:2).

Coal was known to exist in Singleton and its surrounding areas since early exploration. It was originally found on the Wambo Estate in 1863. Coal was first mined in the Upper Hunter in the Rixs Creek area near Singleton in the 1860s (Rappoport 2006:24). On 23 September 1886, the 'Singleton News' in the Maitland Mercury reported that

Since Messrs Nowland opened up their mine, sinking for coal has been actively prosecuted on the Ravensworth estate and we learn that the perseverance of the promoters has been successful to such a degree that they intent to float the undertaking shortly into a company with equal capital of £50,000. A prospectus will be shortly issued.

According to the Heritage Office & DUAP (1996:4) 'coal was not commercially exploited until the 1890s in the Upper Hunter'. Coal mining and electricity generation have become major industries in the Singleton area since the 1950s with the first wave of collieries built to meet export demand at Liddell, Foybrook and Liddell State. Since the mid-twentieth century, coal mining operations 'expanded from Cessnock/Maitland area to the triangle bounded by Singleton, Muswellbrook and Denman, using highly mechanised, open cut surface mining techniques in which all overburden is stripped from the surface' (Rappoport 2006:24).

In 1964 the State Electricity Commission commenced construction of the Liddell power station, which was commissioned in 1973. The Bayswater Power station was commissioned in 1980. These projects changed the lifestyle of the residents of Muswellbrook, Singleton and surrounding local government areas by affecting employment, population, housing, commerce and the character of the locality. Through the 1970s more than 10 major open cut mines commenced operation in the area.

3.9.1 United Collieries Pty Limited

An Authorisation to Prospect was granted over the United area in 1980. Development Consent for mining within mining lease CL257 (now consolidated into CCL775) was granted in the early 1980s, with mining operations commencing in 1989.

From July 1989 until July 1992, United operated an open cut and auger mining operation extracting from the Whynot and Wambo seams. In 1991, a lease exchange was effected with the neighbouring Wambo owned mine, which enabled Wambo to secure greater open cut reserves and United to secure greater underground reserves.

Underground mining operations commenced at United in January 1992 within the Woodlands Hill seam using a continuous miner with shuttle cars. In May 1994, board and pillar development using the 'Cut and Flit' mining system was introduced. Coal pillar extraction operations commenced in October 1995 using a continuous miner, shuttle cars and mobile roof supports. In late 1996, the mine expanded to two development units and one pillar extraction unit. In 1997, a chain haulage system was introduced to increase production from 1.8 million tonnes per annum (Mtpa) to 2.95 Mtpa. In May 2002, longwall mining was implemented at United. The majority of United underground mining operations lie beneath Wambo's open cut operations.

United has a Coal Handling and Preparation Plant (CHPP) at the site that was used to wash run-of-mine (ROM) coal for delivery to the export market. From 1989 until 2006, product coal was transported from United by road along the Golden Highway to the Mount Thorley Coal Loader. With the construction of the Wambo rail spur and loop in 2006, product coal from United was transported to the Wambo train loading facility initially via the Golden Highway until an internal haul road was completed in December 2007. The product coal was stockpiled at the rail load-out facility at Wambo and loaded onto trains bound for the Port of Newcastle for export.

In March 2010, the United site entered into a period of Suspension of Operations and United subsequently commenced exploration and pre-feasibility works for future mining potential.

3.10 Historical Themes

A historical theme is a research tool, which can be used at the national, state or local level to aid in the identification, assessment, interpretation and management of heritage places (AHC 2001:1). Nine national historical themes have been identified by the Australian Heritage Commission (AHC now Australian Heritage Council). The Heritage Division, OEH has identified thirty-five historical themes for understanding the heritage of NSW. The development of the Project Area is broadly reflective of the history of the local region, and can be assessed in the context of the broader historic themes defined by the Heritage Division, OEH and AHC. In accordance with the Heritage Division and AHC framework of historic themes, the themes in **Table 3.2** are relevant to the Project Area and locality.

Table 3.2 Historical Themes Relevant to the Project Area and Locality

National	National Sub Themes	NSW Themes	Local Themes	Examples
Peopling Australia	Living as Australia's earliest inhabitants Adapting to diverse environments	Convict	Activities relating to incarceration, transport, reform, accommodation and working during the convict period in NSW.	Landscapes of control, convict built structure.

National	National Sub Themes	NSW Themes	Local Themes	Examples
<p>Developing local, regional and national economies</p>	<p>Developing Primary Production</p>	<p>Pastoralism</p>	<p>Activities associated with the breeding, raising, processing and distribution of livestock for human use.</p>	<p>Rural landscape, hay barn, dairy, vineyard, farmstead, fencing, shed, orchard.</p>
		<p>Agriculture</p>	<p>Activities relating to the cultivation and rearing of plant and animal species, usually for commercial purposes.</p>	<p>Pastoral landscape, homestead, fencing, well, water trough, shearing shed.</p>
		<p>Mining</p>	<p>Activities associated with identification, extraction, processing and distribution of mineral ores.</p>	<p>Mining field or landscape, mine, quarry, processing plant, miner's office, mine shaft.</p>
<p>Developing local, regional and national economies</p>	<p>Moving Goods and People</p>	<p>Transport</p>	<p>Activities associated with moving goods and people from one place to another, and systems for the provision of such services.</p>	<p>Highway, lane, stock route, bridge, footpath, aerodrome, horse yard.</p>

National	National Sub Themes	NSW Themes	Local Themes	Examples
<p>Building settlements, towns and cities</p>	<p>Making settlements to serve rural Australia Supplying Urban Services</p>	<p>Land Tenure Utilities Accommodation</p>	<p>Activities and processes for identifying forms of ownership and occupancy of land. Activities associated with the provision of services, especially on a communal basis. Activities associated with the provision of accommodation, and particular types of accommodation.</p>	<p>Fence, survey mark, subdivision pattern, stone wall. Bridge, culvert, weir, well, cess pit, reservoir, dam. Homestead, cottage, house site (archaeological site).</p>
<p>Governing</p>	<p>Defending Australia</p>	<p>Defence</p>	<p>Activities associated with defending places from hostile takeover and occupation.</p>	<p>RAAF base.</p>

4.0 Physical Context

This section discusses the potential heritage items present within, and in the vicinity, of the Project Area, identified through a search of relevant heritage registers, previous heritage studies in the area, historical research and archaeological survey. This information, in conjunction with the historical context (refer to **Section 3.0**), forms the basis of the significance assessment (refer to **Section 5.0**) and management strategy (refer to **Section 6.0**).

The Project Area is dominated by existing mining areas including the previous United underground mining infrastructure located within United's CCL775, the existing Wambo open cut mine along with areas of rehabilitated land and native vegetation (refer to **Figure 1.2**).

The area surrounding the Project supports a range of land uses including:

- open cut and underground coal mining operations - predominantly the existing mining activities of Wambo's open cut and underground operations, Coal and Allied's HVO including Carrington, North Pit, Cheshunt, Riverview and South Lemington Pits and their associated buffer lands. A number of mines are located further south including Mt Thorley Warkworth and Bulga Coal
- freehold grazing and cropping land
- the township of Warkworth to the southeast
- rural-residential and small rural holdings.

The land to the north east of the Project Area is occupied by Coal and Allied's Hunter Valley Operations (HVO South), and further to the north by agricultural land. The area south of the Project Area is occupied by Wambo owned grazing land. Land to the east of the Project Area is privately owned by the Hunter Valley Gliding Club, surrounded by Coal and Allied owned mining buffer land. To the immediate west of the Project Area is Wambo owned land which is utilised for grazing.

The village of Warkworth is located approximately 1 kilometre to the south east of the Project Area. The village of Jerrys Plains is located approximately 6 kilometres north west of the Project Area. The village of Bulga is located approximately 7 kilometres to the south of the Project Area. The rural area of Maison Dieu is located approximately 4 kilometres to the north east of the Project Area.

4.1 Physical Context of the Project Area

The landscape of the Project Area consists of undulating to hilly terrain to the north of the Doyles Range with lower topographic areas associated with the drainage lines. Four creek catchments drain the study area, Waterfall Creek (which flows into the Hunter River), Wollombi Brook, North Wambo Creek (that flows into Wollombi Brook) and Redbank Creek (that also flows into Wollombi Brook).

Waterfall Creek catchment is located in the western section of the Project Area and flows in a northerly direction draining a northern spur of Appletree Ridge. North Wambo Creek catchment is located in the south of the Project Area and flows in a south easterly direction draining the other side of the same ridge and the Wambo Ridge. Redbank Creek flows from a small group of hills located centrally in the Project Area and comprises first and second order streams until its confluence with Wollombi Brook. The proposed United Open Cut is located within the Redbank Creek catchment.

The Project Area is located within a landscape which has been heavily cleared and disturbed over a long period of time predominantly as a result of pastoral and agricultural activities dating from the 1800s. Further disturbance has occurred through the mining activities associated with the past open cuts at Wambo and United and the underground mining activities that have occurred throughout the Project Area. Prior to the establishment of mining operations, the Project Area had a long history of agricultural land uses, such as grazing and cultivation. Grazing and dairy operations are still wide spread throughout the surrounding area, occurring at a number of properties along the Golden Highway and the outskirts of Jerrys Plains. Irrigated agriculture is currently being undertaken along the alluvial floodplains of the Hunter River to the north of the Golden Highway. A small number of olive groves and vineyards are also located south of Jerrys Plains.

A review of aerial photographs obtained from the Department of Lands dating from 1963 was undertaken as part of this assessment and confirms that prior to 1963 substantial clearing had been undertaken in the Project Area; likely as a result of pastoral and agricultural expansion (refer to **Figure 3.5**).

4.2 Targeted Site Inspections

A targeted approach to site survey was undertaken in order to ground truth:

- the results of the research undertaken and presented in **Section 3.0**
- the review of previously prepared reports which identified several potential sites/items in the wider area (refer to **Section 4.3**)
- the review of existing topographic maps and aerial photography
- previously identified areas or sites of potential
- any sites/items identified during the 2015 Aboriginal survey undertaken by OzArk and the Project Registered Aboriginal Parties (RAPs).

Several targeted site inspections have been undertaken during the assessment of the Project Area. These have included:

- Initial inspection of the Dog-leg fence undertaken on 7 March 2013.
- Detailed inspection of the Dog-leg fence with Dr. John Pickard on 15 August 2015.
- A targeted inspection of potential sites within and in vicinity of Project Area was undertaken on 12 November 2015.

An Aboriginal archaeological survey was undertaken from March to June 2015 and subsequent Aboriginal archaeological test excavations were conducted from July to September 2015 by Ozark and the Project RAPs. No additional potential historical heritage sites or items were identified during the 2015 Aboriginal survey or test excavations.

Any sites identified during targeted site inspection are discussed, as relevant, in **Sections 4.5** and **4.6**.

4.3 Previous Environmental Assessment

As discussed in **Section 3.0**, Environmental Assessments, including field survey and historical research, for mining and other projects in the area of the Project have been undertaken in recent years including:

- Wambo Development Project EIS (Resource Strategies, 2003)
- Hunter Valley Operations South Coal Project EA (ERM, 2008)
- Wambo Development Project Non-Aboriginal Heritage Impact Assessment (EJE Town Planning 2003)
- Heritage Impact Statement; Warkworth Aerodrome, Warkworth, New South Wales (Weir & Phillips 2007).

These studies identified a number of non-statutory listed items of potential heritage significance within and in the vicinity of the Project Area. Items/sites outside, but in the vicinity of the Project Area assessed as not being of heritage significance as part of the previous heritage assessment are not considered as part of this report. The items that are located within the approved Wambo Surface Development area which have been previously assessed and managed as part of the Wambo Development Project are also not considered in this assessment unless there are additional impacts potentially resulting from the Project. These are discussed, as relevant, in **Sections 4.5** and **4.6**.

4.4 Listed Heritage items within the Vicinity of the Project Area

As discussed in **Section 2.3** no sites/items with a statutory heritage listing were identified within the Project Area. However, several listed items were identified within the vicinity (within 3 kilometres) of the Project Area, including the SHR listed Wambo Homestead. Distances measured to Project Area or disturbance area are from the closest point to the relevant boundaries (in terms of impact, measured from the closest proposed extraction area as this is where blasting will occur which has the potential to result in indirect impacts from vibration) from the item.

All listed items identified within the vicinity of the Project Area are listed in **Table 4.1**, identified on **Figure 2.1** and discussed below.

Table 4.1 Listed Heritage items Located Outside but within the Vicinity of the Project Area

Item Name	Location	Co-ordinates (MGA)	Listing and Significance	Distance to Project Area and Disturbance Area
Wambo Homestead	Off The Golden Highway Lot 82 DP 548749	311615.17, 6393166.14	SHR Singleton Local Environment Plan (LEP) 2013 State significance. Register of the National Estate (RNE2).	Wambo Homestead listed boundary forms part of Project Area boundary. Approximately 2.5 kilometres from the proposed United Open Cut area.
St Philips Church, Warkworth	Off High Road, Warkworth Part Lot 21, DP 755267	314808.49, 6394312.45	Singleton LEP 2013 Local significance	Approximately 1.2 kilometres outside the Project Area boundary. Approximately 1.8 kilometres from the proposed United Open Cut area.
Former Queen Victoria Inn – Ruins Archaeological site	Jerrys Plains Road, Warkworth Lot 1, DP 770904	315490.07, 6393872.62	Singleton LEP 2013 Local significance	Approximately 1.8 kilometres outside the Project Area boundary. Approximately 2.5 kilometres from the proposed United Open Cut area.

4.4.1 Wambo Homestead

Located to the south of the United mine site are the Wambo Homestead and associated outbuildings (refer to **Figure 2.1**). Substantially intact, the homestead comprises eight main buildings with other structures on the property including a large hay barn, silos and fences (refer to **Plates 4.1 to 4.3**).

² The Register of the National Estate (RNE) is a non-statutory list of natural, Indigenous and historic heritage places throughout Australia. Many places in the RNE are now included in other statutory lists, such as the state heritage lists, or local government heritage registers. As a result, those places receive protection under the relevant federal, state, territory or local legislation.

James Hale purchased 2000 acres of land from Matthew Hindson and built the later Wambo Homestead structures and outbuildings around 1844; the earliest buildings having been constructed in the 1830s. Later Wambo became the home of William and Sophia Durham, residents of social significance to the Hunter Valley during that period. At the turn of the 20th century it was the location of the Allen and McDonald Horse Stud infrastructure. The property is currently owned by the Wambo Mining Corporation Pty Ltd.

The largely unaltered nature of the structures and the intact outbuildings make the homestead rare in NSW, allowing easy understanding of the development of such a homestead complex. The expansion of the colony of NSW, agricultural diversification, the development of pastoral activities and the pattern of selection are all significant aspects of association with this property. Association with pioneering residents William and Sophia Durham align the homestead with social significance to the Hunter Valley, just as the Horse Stud period of the Allen and McDonald partnership links the complex to sporting aspirations at the turn of the twentieth century. Pastoral and horse breeding activities, economic development and the architectural development of homestead buildings in Australia are all important aspects of the Wambo Homestead, making it State significant in these contexts. The complex is currently listed in the SHR as State significant, its assessment finding historical, associative, aesthetic and social significance as well as rarity and research potential. The Singleton LEP 2013 also lists the homestead complex as an item of State significance.

The homestead components consist of the following main structures:

- Kitchen Wing - a two storey sandstone and brick structure with a basement (refer to **Plate 4.1**). The roof is composed of timber shingles covered by galvanised iron. The verandas are under separate roofs. A modern laundry wing and veranda rooms have been added onto the west elevation. This structure is dated to initial construction circa 1830 (EJE 2003).
- The New House - a single storey, stuccoed brick building constructed on a platform of exposed sandstone (refer to **Plate 4.2**). Timber shingles on the roof are covered by corrugated iron. A colonnade of hardwood columns support separate veranda roofs. The house consists of a central entry hall and four rooms with additional veranda rooms skirting these. The kitchen wing is linked to this structure via a breezeway between the two buildings. The new house was constructed in the 1840s (EJE 2003).
- Servant's Wing - a two storey building consisting of a ground floor with two rooms including a large kitchen with an open fireplace. The structure of the building has been noted as suggesting it was initially built as a kitchen with the servants' quarters situated above. An externally accessed storeroom is also part of the structure. The brickwork is a combination of Flemish bond and English bond. Windows have stone lintels and sills and the original gabled roofs timber shingles remain intact beneath corrugated iron. The veranda roofs are supported by timber columns and a large veranda beam. This structure is dated to initial construction in the 1840s (EJE 2003).
- Studmaster's Cottage - constructed in the 1840s and comprising a single brick, three room structure (refer to **Plate 4.3**). It is Old Colonial Georgian style with symmetrical façade, exposed brick, medium pitched shingled roof with veranda, timber roof shingles, slender veranda posts, sash windows, simple chimney and louvered shutters (EJE 2003).
- Carriage House with Stables and Granary - a two storey timber building consisting of four bays and a veranda. The roof is simply pitched and the building itself crude in construction. The building consists of a structural framework of large ironbark columns and floor beams. This structure is dated to an initial construction date of approximately 1844 (EJE 2003).

- Slab Butcher's Hut – constructed of vertical logs that have been dressed to take horizontal hardwood slabs internally and externally. Rammed earth has been packed in the space between horizontal slabs. The floor is unreinforced concrete with the interior lined with zinc mesh. Adzed slabs with a covering of earth compose the ceiling. In the northwest corner of the room is a butcher's cutting table that shows significant evidence of use. This structure's initial construction is dated to around 1900 (EJE 2003).
- Slab Horse Boxes - originally a timber pole frame construction with vertical timber slab cladding and a timber shingled roof. A corrugated iron roof has been installed later due to the original's deterioration. The structure also has a half round eaves gutter directing collected water to a galvanised storage tank. Timber stable doors, timber grille windows and a concrete floor are included in the structure. Internally it has slab partition walls and a purpose built timber manger. Nails used in the construction date to the beginning of the twentieth century (EJE 2003).
- Mounting Yard and Horse Boxes -these structures are associated with the mounting yards and consist of rectangular buildings made of light timber framing clad by weatherboard. Internal partitions are lined with thicker boards for greater strength. The roofs are simple gables with corrugated iron coverings and gutters used to collect water. Log bearers covered by thick timber slabs comprise the floor of the larger building. The smaller building has an unreinforced concrete floor. These structures have been dated to initial construction approximately 1906 (EJE 2003).

Wambo Homestead is located south of the currently operational Wambo Open Cut Pit and approximately 2.5 kilometres from the proposed United Open Cut extraction area at its closest point. As noted above the Wambo Homestead is located adjacent to but outside of the Project Area. There will be no direct impact on the Homestead (or associated structures) as a result of the Project with the only potential being indirect impacts associated with the mining activities located at least 2.5 km from the Homestead. It is also noted that the approved and operating Wambo Open Cut is located adjacent to the Wambo Homestead, substantially closer than the extraction activities proposed as part of the Project and that Wambo has been actively managing indirect impacts on the Homestead during mining activities. Potential impacts to the listed homestead complex as a result of the Project are considered in **Section 6.2**.

B. Collins (EJE Heritage) prepared a Conservation Management Plan (CMP) for Wambo Homestead in 1994 (B. Collins 1994). Godden Mackay Logan Pty Ltd prepared a review of the CMP in 2012 (GML 2012).

There have been numerous photographic recordings of Wambo Homestead and Outbuildings undertaken in the last 15 years including:

- *Photographic Record* prepared by EJE Heritage 2015.
- *Wambo Homestead near Warkworth: archival photographic record* prepared by EJE Heritage 2011.
- *Wambo Homestead Complex: photographic archival record* prepared for Peabody Energy Australia by Godden Mackay Logan 2013.
- *Wambo Homestead Complex: photographic archival record* prepared for Peabody Energy Australia by Godden Mackay Logan 2014.

In addition the 2012 CMP also provides a building-by-building examination of existing conditions of Wambo Homestead and Outbuildings.

In addition, a program of conservation and stabilisation works were undertaken at Wambo Homestead between 2010 and 2012 (EJE Heritage 2015:12).

As part of the preparation of this report EJE Heritage prepared a Statement of Heritage Impact (SoHI) to address any potential impacts that may occur to Wambo Homestead as part of the Project. The SoHI is attached to this report as **Appendix A**.



Plate 4.1

View to northwest of
Wambo Homestead
Kitchen Wing

© Umwelt, 2015



Plate 4.2

View to northwest of
Wambo Homestead

© Umwelt, 2015



Plate 4.3

View to west of Wambo Homestead Stud Master's Cottage

© Umwelt, 2015

4.4.2 St Philip's Anglican Church

St Philips Church at Warkworth is a brick structure built in 1856 and forms part of the village of Warkworth (refer to **Figure 2.1** and **Plate 4.4**). The church was classified in 1976 and is now listed in the Singleton LEP 2013 as an item of local significance. It is also listed on the NSW State Heritage Inventory. In 2003 EJE Town Planning noted that the buildings and associated cemetery were in good condition and would not be impacted by the Wambo Development Project (EJE 2003:C-16).

St Philips Church is well maintained and utilised by the Anglican Parish of Singleton. A Eucharist Service and a Morning Prayer service are held twice a month at the church.

St Philips Church is noted to be of importance to the Family History Society Singleton Inc; who are reported to have a specific interest in the church (Lillian Cullen, Singleton Heritage Advisor pers.comm. 4 December 2015).



Plate 4.4

View to south of St Philip's Anglican Church

© Umwelt, 2015

4.4.3 Former Queen Victoria Inn – Ruins Archaeological site

The former Queen Victoria Inn (ruins) is listed in the Singleton LEP 2013 as an archaeological site of local significance (refer to **Figure 2.1** and **Plate 4.5**). It is also listed on the NSW State Heritage Inventory.

The site comprises an archaeological site with evidence surviving above ground of several corrugated iron tanks, a concrete slab, below ground brick built cistern, timber posts and corrugated iron sheets.



Plate 4.5

Brick cistern at former Queen Victoria Inn site

© Umwelt, 2015

4.5 Potential Historical Heritage Items within the Project Area

Table 4.2 identifies the potential historical heritage sites/items with no statutory listing present within the Project Area. The location of the sites/items is shown on **Figure 4.1**. If a site/item has been previously assessed its identified significance has been noted. The location of the site /item in relation to the Project Area and/or additional disturbance area are also noted in **Table 4.2**. Where relevant, distances from an item to the closest portion of the additional disturbance area boundary are noted if they are not within the additional disturbance area.

Table 4.2 Potential Heritage items within Project Area

Item Name	Location	Co-ordinates (MGA)	Previously Assessed Significance	Distance to Project Area and Additional Disturbance Area
Dog-Leg Fence west of Jerrys Plains Road, Warkworth	West of Jerrys Plains Road, Warkworth. Partially within Project Area		-	Approximately 450 metres of the Dog-leg fence is located within additional disturbance area (refer to Figure 4.1). Approximately 1.3 kilometres of the Dog-leg fence is located immediately outside Project Area (refer to Figure 4.1).
Small additional section of Dog-Leg Fence	-	310631,639670 4310581,63967 25310555,6396 732310522,639 6744310502,63 96751310474,6 396760310434, 6396776310397 ,639679231069 5,6396682	-	Within proposed United Open Cut (refer to Figure 4.1).
Former house site	Lot 55 DP 753792	310350 6396707	-	Within proposed United Open Cut area (refer to Figure 4.1).
Well and windmill site	Lot 5 D.P. 1085145	310531 6397258	-	Within additional disturbance area (refer to Figure 4.1).

Item Name	Location	Co-ordinates (MGA)	Previously Assessed Significance	Distance to Project Area and Additional Disturbance Area
Derelict windmill site	Lot 7 DP 753792	310864 6396837	-	Within proposed United Open Cut area (refer to Figure 4.1).
Shearing Shed and Creamery	Intersection of the Golden Highway and Comleroi Road, Warkworth	313670.79, 6396276.85	Potentially significant (ERM 2008)	Within proposed additional disturbance area (refer to Figure 4.1).
Warkworth Airfield	Comleroi Road	314234.30, 6397108.33	Potentially significant (ERM 2008)	Southwest corner of the current Warkworth Airfield area (not including the runway) is within the Project Area and additional disturbance area (refer to Figure 4.1).
“Whynot” Homestead	In southwest corner of the Project Area	306925.05, 6395379.24	Limited Local Significance (EJE 2003: CC-16)	<p>Within the Project Area but not within the additional disturbance area (refer to Figure 4.1).</p> <p>Approximately 800 metres from the approved Wambo Open Cut and approximately 3.5 kilometres from the proposed surface extension of the Wambo Open Cut.</p> <p>Over 2.5 kilometres from the proposed United Open Cut area.</p>



Image Source: AAM (2012), United (2015)
 Data Source: Glencore (2014)

0 1.0 2.0 3.0 3.5 km
 1:65 000

Legend

- Project Area
- Proposed Conceptual Extraction Area
- Conceptual Additional Disturbance Area
- Approved Wambo Surface Development Area
- Existing 330kV Transmission Line
- Proposed Relocated 330kV Transmission Line
- Proposed Golden Highway Realignment
- Dog-leg Fence
- Potential Historical Heritage Sites

FIGURE 4.1
Potential Historical Heritage Sites

4.5.1 Dog-Leg Fence

Two sections of Dog-leg fence are located within the Project Area (refer to **Figure 4.1**). Previous to this assessment the fence has been referred to as a Cockatoo Fence. Any references to a Cockatoo fence located within the Project Area in previous assessment should be considered to be referring to the Dog-leg fence discussed in this report.

A dog-leg fence is any form of fence with pairs of dog-legs forming crutches supporting a higher log or rail (Pickard 2015:4):

Dog-leg ...fences were widespread and common in the initial stages of developing farms. They are recorded from most colonies and were used into the early years of the twentieth century...dog-legs were accepted as components of fencing improvements under NSW lands legislation... (Pickard 2013:40).

The main section of fence comprises approximately 1.7 kilometres of dog-leg fence located both within and outside (on land owned by Coal and Allied) the Project Area (refer to **Figure 4.1** and **Plates 4.6** to **4.10**). The second, smaller section of fence, is located wholly within the proposed United Open Cut (refer to **Figure 4.1** and **Plate 4.11**).

The main 1.7 kilometre section of dog-leg fence was inspected on 15 August 2015 by John Pickard; a noted heritage expert of rural fences in Australia. During the inspection the full length of the fence was walked and initial photography and recording of the fence was undertaken. Some vegetation was removed off the fence at several places to improve visibility, but no component of the fence was disturbed. The results of the Dog-leg fence specific site inspection is reported in *Dog-leg fences within proposed United Collieries open cut* (Pickard 2015). John Pickard's 2015 report has been extensively utilised in this and subsequent discussions regarding the Dog-leg fence and is attached to this report as **Appendix B**. As a result of the detailed nature of the Pickard 2015 report this section only briefly summarises the information and the appended report should be referred to for further details.

The fence was erected before 1920, most likely in the 1870s along boundaries of Conditional Purchases. The fence comprises two horizontal logs, both ironbark, the lower supported on sandstone blocks. Pairs of dog-legs rest across the lower log, and support the higher log in their crutch. The dog-legs are split ironbark, and like the logs, were sourced from trees that would have been present in the immediate area of the fence. The sandstone blocks have shallow circular channels chiselled across their tops forming a more secure bed for the lower log. While the overall structure is typical of dog-leg fences, the use of sandstone blocks is considered unique. These blocks are all that remain at the eastern end of the fence alignment; the logs having been burnt in bushfires. There are no truly intact portions of the fence, and considerable lengths simply comprise logs lying on the ground or alignments of the sandstone blocks. Approximately 335 metres of the fence at the eastern end is located within the proposed United Open Cut area and will be removed as part of the Project. A further 340 metres is located outside the Open Cut area but within the Project Area and proposed Project disturbance boundary. As such approximately 675 metres of the Dog-leg fence is likely to be removed as part of the Project. Note that a further 1,230 metres is located outside the Project Area. Within the section located outside the Project Area there are many places where the original structure is intact, although partially collapsed.

A short length of post-and-rail fence in the north-south section of the fence was constructed across a gully where the dog-leg fence would have been unsuitable (Pickard 2015:3).

The shorter section of Dog-leg fence comprises only the sandstone block supports with no evidence of the logs surviving following bush fires.

While the condition of the fence was assessed as being poor, there are enough semi-intact sections to enable the nature of the original structure to be understood:

The fence is a unique form of dog-leg fence using stone blocks to support the bottom log. No other examples have been described or have been recorded. The lack of logs at the eastern end clearly shows the long-term effects of recurrent bush fires, and it is inevitable that the rest of the fence will burn sooner or later. The fence on the north-south boundary between Portions 107 and 128 is in very poor condition, with most sections collapsed and many logs splitting from age. Dense scrub here makes further fire damage inevitable. Protecting the fence against fire would be impossible. Hazard reduction is not a preferred option on land associated with open-cut coal mines, and mechanical fire breaks are simply not wide enough to be effective in this type of vegetation (Pickard 2015:27).



Plate 4.6

Eastern portion of 1.7 kilometre section of dog-leg fence showing remnant sandstone blocks; the logs having been burnt in bushfires. Section located within the Project Area.

© Umwelt, 2015



Plate 4.7

Relatively intact section of the dog-leg fence located within the Project Area.

© Umwelt, 2015



Plate 4.8

Example of rocks packed under the bottom log to reduce the gap and prevent stock escaping. Section located outside the Project Area within Coal and Allied land.

© Umwelt, 2015



Plate 4.9

Section of Dog-leg fence adjacent to wire netting fence line. Net fence line indicates Project Area boundary. Section located outside the Project Area within Coal and Allied land

© Umwelt, 2015



Plate 4.10

Relatively intact section of the dog-leg fence located outside the Project Area within Coal and Allied land

© Umwelt, 2015



Plate 4.11

Shorter section of dog leg fence comprising only the sandstone block supports; the logs having been burnt in bushfires. Section located within the Project Area.

© Umwelt, 2015

4.5.2 Former House Site

The former house site is located to the north of Redbank Creek within Lot 55 DP 753792 and comprises evidence of three former structures in the form of brick and sandstone rubble and concrete slabs (refer to **Figure 4.1** and **Plates 4.12** to **4.14**). The three former structures likely comprised:

- two small brick built structures (one with brick chimney on sandstone footing)
- one concrete slab with timber frame walls (now gone) and corrugated iron cladding roof.

There are several different sized bricks within the areas of brick rubble; each size seemingly relating to a different former structure. A number of the bricks appear to be made from local clay and were likely fired on site; however there was no evidence of any clay pits or brick clamps found. A timber block is located within the concrete slab area and may have been a support for an anvil or the base of a butcher's block. A number of horse shoes were evident in the immediate area of the timber block. There is also an approximately two metre diameter, 1.80 metre deep circular brick built roughly mortared cistern, scatters of thin sandstone pavers and some evidence of ceramic and glass artefactual material; including a clear glass coffee & chicory essence bottle. The manufacturer of the bottle was Thomas Symington of Edinburgh, one of the leading makers of coffee products during 1920s-1940s (nzmuseums n.d).

It is reported that there was also a large timber fenced enclosure/corral and 'butchery' located in the immediate area that were destroyed in a substantial bush fire twenty years ago (Ben Kemp Geologist United Collieries, pers comm. 2015).

The known previous owners of the site are listed in **Table 4.3**.

Table 4.3 Ownership of Lot 55 DP 753792

Date and Term of Purchase	Registered Owner and Occupation Where Available
1871 (1871 to 1920)	Isaac Frith
16.10.1920 (1920 to 1953)	William Leeuwin Hickson (Grazier)
10.04.1953 (1953 to 1959)	Amy Hester Hickson (Widow) Charles Leeuwin Hickson (Grazier)
22.06.1959 (1959 to 1968)	Charles Leeuwin Hickson (Grazier)
29.03.1968 (1968 to 1975)	Mary Darvall Hickson (Married Woman) Peter Noel Dunlop (Solicitor)
16.07.1975 (1975 to 1976)	Mary Darvall Hickson (Married Woman) Charles Leeuwin Hickson (Grazier) Julia Margaret Leeuwin Hardy (Married Woman)
09.08.1976 (1975 to 1982)	J & A Brown & Abermain Seaham Collieries Limited Now Coal & Allied Operations Pty Limited
26.10.1982 (1982 to 1986)	Robert Elwin Kelly William Thomas Smale (for the Construction, Forestry, Mining and Energy Union, Mining and Energy Division)
31.10.1986 (1996 to 2009)	John William Maitland Robert Leslie Graham George Reginald Coates (for the Construction, Forestry, Mining and Energy Union, Mining and Energy Division)
27.03.2009 (2009 to date)	Anthony John Maher Andrew William Vickers (for the Construction, Forestry, Mining and Energy Union, Mining and Energy Division)

Isaac Frith was issued a certificate of title for Lots 55, 100 and 101 (with a total area of 120 acres) on 31 May 1868 for 120 pounds. Isaac Frith is noted as being the resident on the 40 acre lot 55 on a Conditional Survey plan dated 11 February 1871. The same plan indicates an area of buildings and a notation of ‘hut’ on the north side of Redbank Creek in the northeast corner of the lot (refer to **Figure 4.2**).

Isaac Frith was born in Warkworth in 1849 to John Frith and Sarah Eather. He married Ellen Marion Rowe and died in 1930 in Singleton. Isaac Frith is buried in Whittingham cemetery (Ancestry.com).

Frith’s mother Sarah Eather is also refer to as Sarah Tudor; making Isaac Frith a relative of the Tudor family who were also one of the early landholder families in the area in the mid to late nineteenth century (refer to **Section 3.5**).

Isaac Frith sold his three lots of land to William Hickson. The Hickson family became one of the major landowners in the Warkworth area in the twentieth century.

The former house site would have been constructed by Isaac Frith between 1868 and 1871. Frith appears to have lived there and worked the property until he sold it to Hickson in 1920.



Plate 4.12

View to west showing chimney base at former house site

© Umwelt, [YYYY]



Plate 4.13

Detail of concentration of brick rubble at former house site

© Umwelt, 2015



Plate 4.14

Detail of cistern at former house site

© Umwelt, 2015

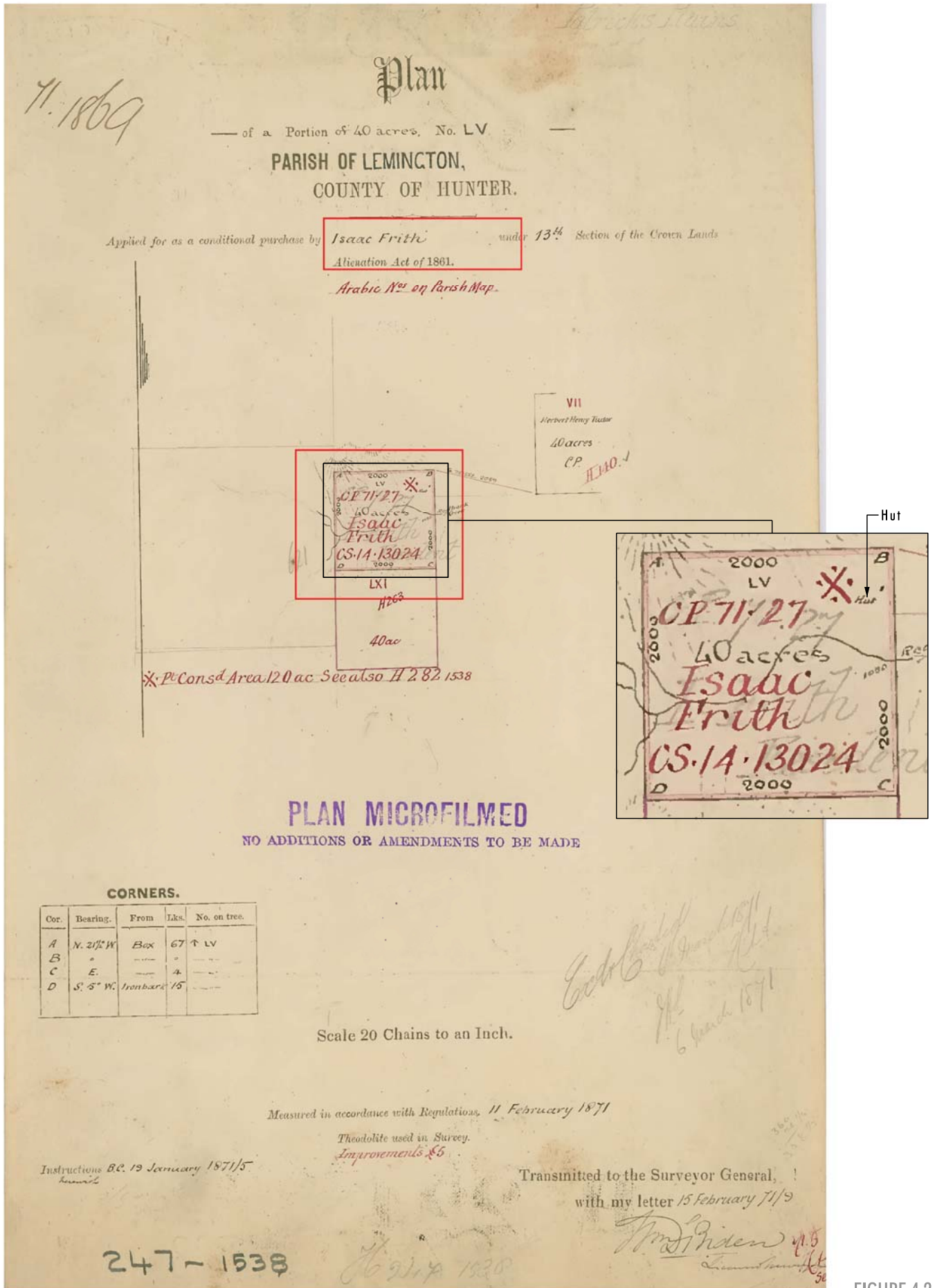


FIGURE 4.2

1871 Survey Plan of Lot 55 showing Isaac Frith's 'hut' Site

4.5.3 Well and Windmill Site

This site comprises an intact water pumping windmill installed above a timber lined well (refer to **Figure 4.1** and **Plates 4.15** to **4.16**). A borehole is also located adjacent to the well/windmill. A raised water pipe leads from the windmill to an adjacent dam. This site is located in Lot 5 D.P. 1085145. The portion the site is located in was originally part of the 160 acre Portion 57.

The timber lined well is approximately 12 metres deep and lined with timber for its full depth. The water pipe is raise above ground on roughly cut timber logs and would originally have been put through the dam wall; likely to reduce the need for pumping. The dam wall has broken as a result of the pipe being put through its wall. The windmill may originally have been placed over the bore before being moved over the adjacent earlier well and supported on concrete footings; which appear to have the date 30.9.41 scratched into them.

No other potential historical heritage items or sites were identified in the vicinity of the windmill.

The known previous owners of the site are listed in **Table 4.4**.

Table 4.4 Ownership of Lot 5 /DP 1085145 (originally part of Portion 57 Parish of Lemington)

Date and Term of Purchase	Registered Owner and Occupation Where Available
01.12.1874 (1874 to 1909)	John Ellis Hobden
03.05.1909 (1909 to 1923)	Richard Henry Hobden (Grazier)
22.11.1923 (1923 to 1953)	William Leeuwin Hickson (Grazier)
10.04.1953 (1953 to 1958)	Amy Hester Hickson (Widow) Charles Leeuwin Hickson (Grazier)
08.09.1958 (1958 to 1968)	Charles Leeuwin Hickson (Grazier)
29.03.1968 (1968 to 1975)	Mary Darvall Hickson (Married Woman) Peter Noel Dunlop (Solicitor)
02.04.1975 (1975 to 1976)	Mary Darvall Hickson (Married Woman) Julia Margaret Leeuwin Hardy (Married Woman)
18.06.1976 (1976 to computerisation – as regards Lot 1 D.P. 617852 now comprised within Lot 5 D.P. 1085145) (1976 to 1982 as regards Lot 2 D.P. 617852)	J & A Brown and Abermain Seaham Collieries Limited

Date and Term of Purchase	Registered Owner and Occupation Where Available
26.10.1982 (1982 to computerisation – as regards Lot 2 D.P. 617852)	Robert Elwin Kelly William Thomas Smale

The Hickson family owned Lot 5 from between 1923 and 1976. The construction and use of the windmill is thought to relate to their ownership.



Plate 4.15

View to southeast of windmill and timber lined well

© Umwelt, 2015



Plate 4.16

View of interior of timber lined well

© Umwelt, 2015

4.5.4 Derelict Windmill

This site is located on the 40 acre Lot 7 DP 753792 and comprises an isolated Comet water pumping windmill and bore (refer to **Figure 4.1** and **Plate 4.17**). The windmill tower has collapsed and the windmill itself is detached and located adjacent to the fallen tower. The steel lattice tower would have been approximately 7 metres high. The fallen windmill is immediately adjacent to a bore hole approximately 10 metres deep. No other potential historical heritage items or sites were identified in the vicinity of the collapsed windmill.

Aerial photography from the 1950s indicates clear crop lines across this area. The windmill would have pulled a considerable volume of water out to irrigate the crops.

The known previous owners of the site are listed in **Table 4.5**.

Table 4.5 Ownership of Lot 7 DP 753792 (Portion 7 Parish of Lemington)

Date and Term of Purchase	Registered Owner and Occupation Where Available
04.07.1867 (1867 to 1904)	Henry Tudor
29.07.1904 (1904 to 1917)	Henry Herbert Tudor (A Minor)
11.12.1917 (1917 to 1951)	Walter Charles Tudor (Grazier)

Date and Term of Purchase	Registered Owner and Occupation Where Available
14.08.1951 (1951 to 1965)	May Tudor (Widow)
18.05.1965 (1965 to 1965)	Elsie Edith Tudor (Widow)
24.06.1965 (1965 to 1968)	Charles Leeuwin Hickson (Grazier)
29.03.1968 (1968 to 1975)	Mary Darvall Hickson (Married Woman) Peter Noel Dunlop (Solicitor)
02.04.1975 (1975 to 1976)	Mary Darvall Hickson (Married Woman) Julia Margaret Leeuwin Hardy (Married Woman)
18.06.1976 (1976 to 1982)	J & A Brown and Abermain Seaham Collieries Limited
26.10.1982 (1982 to computerisation)	Robert Elwin Kelly William Thomas Smale

Lot 7 was owned by the Tudor family until purchased by the Hickson family in 1965. The construction and use of the windmill is likely to relate to the later part of the Tudor families' ownership or to Hickson's ownership.

4.5.4.1 Comet Windmills

Mr Sidney Williams founded the Sidney Williams & Company in 1879 in Rockhampton, Queensland. From 1910 to 1925 various Comet Windmill Patterns were introduced and for over 130 years the company specialised in the design and manufacture of windmill pumping plants for rural Australia. Manufacturing facilities were established in Dulwich Hill, Sydney in 1920. The engineering works at Dulwich Hill covered 2.5 acres of ground and comprised the largest and most-up-to-date Windmill Factory in Australia at the time (Comet Windmills n.d).



Plate 4.17

Derelict windmill site

© Umwelt, 2015

4.5.5 Shearing Shed and Creamery

This site is located at the intersection of the Golden Highway and Comleroi Road, Warkworth (refer to **Figure 4.1**). The site comprises two timber sheds; the 'shearing shed' and a former 'creamery building'. Previous assessment of this site has focused on the creamery which is reported to have been relocated to the site from the Cheshunt homestead and dairy site to the north of the Project Area on Coal and Allied owned land. The former creamery building was identified by ERM in 2008 as a potentially significant heritage item.

The site is located between Redbank Creek (to the south) and the Golden Highway (to the north). Its location immediately adjacent to the Golden Highway and the provision of picnic tables makes it a location known and utilised by passing vehicles as a rest stop.

The shearing shed and creamery buildings are located on the 80 acre (32.4 ha) Lot 134 DP 753792 (Portion 134 Parish of Lemington, formerly Portion 4). The known previous owners of the site are listed in **Table 4.6**.

Table 4.6 Ownership of Lot 134 DP 753792 (Portion 134 Parish of Lemington)

Date and Term of Purchase	Registered Owner and Occupation Where Available
1862	James Allen
11.12.1916 (1916 to 1919)	Perpetual Trustee Company (Limited)
02.10.1919 (1919 to 1919)	William Redman (Grazier)
14.10.1919 (1919 to 1969)	Robert Moss (Farmer)
10.10.1969 (1969 to 1981)	Amy Mildred Moss (Spinster)
02.02.1981 (1981 to 1996)	Robert Edwin Kelly William Thomas Smale
31.10.1996 (1996 to 2009)	John William Maitland Robert Leslie Graham George Reginald Coates
27.03.2009 (2009 to date)	Anthony John Maher Andrew William Vickers

Details from the early title to the land (Crown Tender Additional Conditional Purchase 1862/1137 Land District Singleton) issued to James Allen in 1862 indicate that approximately one third of the land was suitable for cultivation and there were good ironbark and other gum trees on adjacent Crown land. No improvements to the land had been undertaken at that time.

The site is likely to have comprised a federation period small farm site constructed and operated by Robert Moss who owned the land between 1919 and 1969 before passing into his wife's hands until 1981 when it was purchased by the Construction, Forestry, Mining and Energy Union, Mining and Energy Division.

4.5.5.1 Creamery

In 2005 Weir & Phillips assessed the Cheshunt homestead and dairy site located to the north of the Project Area on Coal and Allied owned land, including the then *insitu* creamery building, as being typical of farm homestead groups in NSW dating to approximately the 1880s. Any limited significance was assessed as being on a local level. The creamery building is likely to have originally contained a hand operated separator designed to provide cream to make butter and cream for domestic use and supply skim milk to feed calves (Weir & Phillips 2005:6). At the time of the 2005 assessment the creamery building was identified as a small slab shed with no evidence of the separator surviving.

Since the 2005 assessment the Creamery has been relocated to its present site on the Golden Highway (refer to **Figure 4.1** and **Plates 4.18** and **4.19**). The relocation of the creamery away from its context within the Cheshunt farm homestead group and the resulting alteration of its construction and fabric has removed any potential local heritage significance. Slab huts are easily transportable and relocated making it a fairly common practice. In the absence of any documentation with regards to the reasoning behind its relocation, it seems likely that it was thought it would suit the setting of the extant timber shearing shed adjacent to the Golden Highway and moved the structure accordingly.

The corrugated iron cladding used in the creamery's construction is trademarked 'Lysaght Australia Orb'. The original Lysaght brand of corrugated iron (under the trademark 'ORB') was exported in large quantities to Australia from 1897. John Lysaght had first established his company in Bristol and commenced manufacture (and export) of corrugated iron in 1857 (Warr 2000:3). John Lysaght (Australia) Ltd was established in 1921 to manufacture uncoated and coated steel sheet (National Library of Australia n.d). The Lysaght Australia Orb stamp on the corrugated iron cladding dates the creamery to post 1921; assuming the corrugated iron comprises the creamery's cladding moved from Cheshunt.

4.5.5.2 Shearing Shed

Aerial photography obtained from the Department of Lands dating from 1963 shows a much larger farm complex than survives today. **Figure 4.3** shows the 1963 aerial image compared with a modern aerial image. The 1963 image shows a number of cleared paddocks associated with what is likely the main house adjacent to the road, a number of outbuildings and the dam – which survives today. Only the shearing shed, dam and a water tank stand survive today (refer to **Plates 4.18** to **4.22**).

The shearing shed has been heavily modified since it was first constructed with numerous alterations and additions; including changes to its use. It may have originally comprised a smaller timber slab hut (or house) that was expanded into a shearing shed. It is possible that it comprised the original residence at the site before the main house (now demolished) was constructed. Apart from the vertical timber slab frontage, which has had a verandah added, the shearing shed comprises a timber framed corrugated iron clad shed. There is a derelict concrete sheep dip to its rear and a brick built in ground cistern immediately in front of the shed.

As discussed the main house has been demolished and there is no evidence of it remaining. The former house site is now a levelled area with picnic benches for passing motorists. Planting, likely dated to the use of the property, survive. United personnel have advised that they understand that there were previously yards associated with the shed that were extant in the 1980's, however, no evidence of the yards survive today.



Plate 4.18

View to west of creamery and timber tank stand. Note new concrete slab floor of creamery.

© Umwelt, 2015



Plate 4.19

View to southwest of shearing shed and creamery.

© Umwelt, 2015



Plate 4.20

View to west of shearing shed. Note in ground cistern in front of shed.

© Umwelt, 2015



Plate 4.21

View to northeast showing rear of shearing shed and creamery.

© Umwelt, 2015



Plate 4.22

View to southeast of shearing shed and creamery looking across former house location.

© Umwelt, 2015



Image Source: United (2015)

0 50 100 150m
1:3000

FIGURE 4.3
Shearing Shed and Creamery Site:
Comparison of 1963 and 2015 Aerial Photographs

4.5.6 Warkworth Airfield

Warkworth Airfield formerly comprised one of three satellite dispersal fields (landing strips), the others being at Broke and Strowan (Jerry's Plains), of the parent RAAF Base Bulga commissioned, designed and constructed between March 1942 and mid 1943. No detailed inspection was undertaken of the landing ground as it is a functioning airstrip, is outside the Project disturbance area and no impacts are envisaged.

The Warkworth landing strip comprised an airstrip with aircraft hideouts and an army camp located on the north side of the airstrip; all RAAF associated improvements and buildings are recorded as being located on the north side of the airstrip. The length of the east to west running airstrip would have originally been 2.4 kilometres long to accommodate the Liberator and Hudson bombers that are reported to have flown from it. Today the airstrip is approximately 1.7 kilometres long and functions as the David Parker Airfield (named in memory of David Parker, one of the early club presidents and chief flying instructor) and is utilised by the HVGC. The HVGC was originally formed as the Newcastle Gliding Club in 1964 and utilises buildings to the south of the airstrip constructed after the RAAF had disposed of the site (HVGC n.d).

A Heritage Impact Statement was prepared for the airfield in 2007 (Weir and Phillip 2007b) which determined that the airfields historical significance resulted from its association with its parent aerodrome, the former RAAF base at Bulga. The Airfield was identified by ERM in 2008 as a potentially significant heritage item.

Warkworth Airfield has historical significance derived from an understanding of its ability, as one of the three satellite airfields of RAAF Base Bulga, to demonstrate Australian defence works following the threat of Japanese invasion. This significance lies predominantly with the existing documented records as with the exception of the airstrip itself there are no known World War II period structures remaining. It is unlikely to yield substantial new or further archaeological or scientific information and as such it has little archaeological or research potential. Documentary evidence, including plans, would provide the best understanding of the site rather than any physical or archaeological evidence.

Although the southwest corner of the current Warkworth Airfield area is within the Project Area and conceptual additional disturbance area, the Project will not directly or indirectly impact the landing ground or any aspect of its heritage significance. As discussed, all RAAF associated improvements and buildings are recorded as having been located on the north side of the airstrip. None of the former RAAF buildings are known to still be present on the north side of the airstrip. All current buildings are likely associated with the HVGC use of the site.

As such Warkworth Airfield is not predicted to be impacted by the Project and is not considered further in this report.

4.5.7 "Whynot" Homestead

Whynot Homestead is located within the southwest corner of the Project Area approximately 800 metres from the approved Wambo Open Cut and approximately 3.5 kilometres from the proposed surface extension of the Wambo Open Cut. The Whynot Homestead is over 2.5 kilometres from the proposed United Open Cut.

The Whynot Homestead comprises a weatherboard cottage with a galvanized iron roof and brick chimney. The associated outbuildings are also of timber and galvanized iron construction. A number of the sheds are constructed using vertical wooden slab walls (EJE 2003:CC-7).

Although located upon land which formerly comprised part of the Wambo Estate (refer to **Appendix A**), Whynot is a federation period small farm site dating to after the subdivision and selling of this part of Wambo Estate (EJE 2003: CC-7).

In 1991 Envirosciences assessed Whynot Homestead as a site of potential heritage significance (Envirosciences, 1991: 59). The homestead was further assessed by EJE in 2003 who noted that the buildings were of an overall sound condition and considered the site to have:

...limited significance based upon the manner in which it reflects the break-up and redevelopment of the original Wambo Estate after 1900 (EJE 2003: CC-8).

The EJE report considered no specific mitigation measures were required for Whynot as part of the approved Wambo Development Project.

Although within the current Project Area, and approximately 800 metres from the approved Wambo Open Cut, the property is over 2.5 kilometres from the nearest new open cut mining proposed as part of the Project at its closest point and as such is not considered to have any potential additional direct or indirect impacts as part of the Project (refer to **Figure 4.1**). As discussed in **Section 2.3** advice from Enviro Strata regarding the distance from the approved and proposed open cut areas where the predicted range of ground vibration resulting from blasting associated with the Project would be less than 3 mm/s is less than 2 kilometres.

As such Whynot Homestead is not predicted to be impacted by the Project and is not considered further in this report.

4.6 Potential Historical Heritage Items within the Vicinity of the Project Area

Table 4.7 identifies the potential historical heritage sites/items with no statutory listing present within the vicinity of the Project Area. The location of the sites/items is shown on **Figure 4.1**. If a site/item has been previously assessed its identified significance has been noted.

As discussed in **Section 2.3**, advice from Enviro Strata regarding the distance from the approved and proposed open cut areas where the predicted range of ground vibration resulting from blasting associated with the Project would be less than 3 mm/s is less than 2 kilometres. As such the search area for potential heritage sites/items with no statutory listing located in the vicinity of the Project Area was limited to a distance of 2 kilometres. Distances measured to the Project Area or disturbance area are taken from the closest point on the relevant boundaries from the item. Indirect impacts such as vibration potentially resulting from blasting are further discussed in **Sections 6.2** and **6.4**.

Table 4.7 Potential Heritage items within vicinity of Project Area

Item Name	Location	Co-ordinates (MGA)	Previously Assessed Significance	Approximate Distance to Project Area and Disturbance Area
Montrose Property	Golden Highway	307106.11, 6399174.85	Slightly Significant (EJE 2003:CC-16)	450 metres outside the Project Area boundary. 750 metres from proposed extension to the northwest corner of the approved Wambo Open Cut. Over 3 kilometres from the proposed United Open Cut area.
The former Warkworth Public School	Warkworth	314356.24, 6394899.78	Potentially significant (ERM 2008)	Approximately 480 metres outside the Project Area boundary. Approximately 1 kilometre from the proposed United Open Cut.
Springwood (formerly Abandoned Homestead B)	Warkworth	314410.89, 6393600.87	Local significance (EJE 2003: CC-16)	Approximately 640 metres outside the Project Area boundary. Approximately 2 kilometres from the proposed United Open Cut.
Piggery and Butcher's Hut	Warkworth	314410.89, 6393922.23	Minor local significance (EJE 2003:C-16).	Approximately 730 metres outside the Project Area boundary. Approximately 1.7 kilometres from the proposed United Open Cut.

Item Name	Location	Co-ordinates (MGA)	Previously Assessed Significance	Approximate Distance to Project Area and Disturbance Area
Abandoned Homestead A	Perimeter Trail Road, South Wambo	309173.39, 6391577.56	Minor local significance (EJE 2003: CC-16)	Approximately 1.8 kilometres outside the Project Area boundary. Over 4.5 kilometres from the proposed United Open Cut.
Moses Crossing over Hunter River	Lemington Road	306202.69, 6400384.09	Potentially significant (ERM 2008)	Approximately 1.9 kilometres outside the Project Area boundary. Over 2.2 kilometres from proposed extension to the northwest corner of the approved Wambo Open Cut.

4.6.1 Montrose Property

The Montrose Property is located to the northwest of the Project Area; approximately 450 metres outside the Project Area boundary, approximately 750 metres from proposed extension to the northwest corner of the approved Wambo Open Cut and over 3 kilometres from the proposed United Open Cut (refer to **Figure 4.1**). The Montrose Property is owned by Wambo.

The Property includes a concrete masonry and fibrous cement sheet constructed house on reinforced concrete piers and slabs. It has a number of additions and modifications (refer to **Plate 4.23**). The house is immediately located within overgrown gardens with a tennis court and in-filled swimming pool. There are also a number of outbuildings, including a shearing shed approximately 400 metres to the northwest of the main house; adjacent to the Golden Highway. A number of other weatherboard buildings and timber/corrugated iron sheds are also within the wider property boundaries.

The shearing shed is located immediately adjacent to the Golden Highway at the entrance to the Montrose Property (refer to **Plates 4.24 to 4.26**). It comprises a timber framed corrugated iron clad structure with a number of smaller attached shed and pen areas. A derelict concrete constructed sheep dip is located immediately adjacent to the shearing shed. There is no evidence of yards remaining in the vicinity of the shed.

The corrugated iron cladding used has the brand 'RedcliffeTrademark' (refer to **Plate 4.27**). This brand of imported British corrugated iron was a cheaper version of the original Lysaght brand of corrugated iron (ORB) exported in large quantities to Australia from 1897. John Lysaght was established in Bristol and commenced manufacture of corrugated iron on 1857 (Warr 2000:3).

There would have been 3 shearing stands in the shed and the shaft driven mechanical shearing plant is still intact within the shed. A machine base in a small attached shed would have housed the engine. Frederick York Wolseley founded the Wolseley Sheep Shearing Machine Company Limited in Sydney in 1887. The company was one of the first to produce a mechanical sheep shearing machine (Wolseley n.d). By the early 1900s mechanical shearing had replaced hand shearing throughout NSW.

Although potentially located within the boundary of an early grant (to Smith) on Robert Dixons 1837 Map of the Colony (refer to **Figure 3.2**) Montrose Property is reported to have been constructed during the Federation period from approximately 1910 and is not thought to be related to the early land grant (EJE 2003:CC-15). The current house is not thought to date to the early period of the property and may comprise a more recent reconstructed of an earlier house no longer evident at the site. The current house is starting to show considerable fatigue in its building fabric.

In 1991 Envirosciences assessed the Montrose Property house as a site of potential heritage significance (Envirosciences, 1991: 59). The homestead and associated outbuildings were noted as being in good condition by EJE in 2003 and assessed:

...to be slightly significant in terms of its heritage and the ability to yield information that might contribute to the cultural history of the wool industry in the early part of the twentieth century (EJE 2003:CC-15).

The EJE report considered no specific mitigation measures were required for the Montrose Property as part of the approved Wambo Development Project.

The Montrose Property is located approximately 750 metres from the proposed extension to the northwest corner of the approved Wambo Open Cut and over 3 kilometres from the proposed United Open Cut. As a result of its proximity to the proposed extension to the northwest corner of the approved Wambo Open Cut, Montrose Homestead is considered in relation to potential indirect impacts resulting from vibration from blasting in **Section 6.4**.





Plate 4.24

View to North of Montrose Property Shearing Shed

© Umwelt, 2015



Plate 4.25

View to Northwest showing interior of Montrose Property Shearing Shed

© Umwelt, 2015



Plate 4.26

Interior Detail of Montrose Property Shearing Shed showing mechanical shearing plant

© Umwelt, 2015



Plate 4.27

Detail of Redcliff Trademark Stamp on corrugated iron of Montrose Property Shearing Shed

© Umwelt, 2015

4.6.2 Former Warkworth Public School

The former Warkworth Public School is located on Jerrys Plains Road, Warkworth (refer to **Figure 4.1** and **Plate 4.28**). The school opened in 1859, closed in 1997 and was called Cockfighters Creek when first opened in May 1859; however by June was known as Warkworth Public School (NSW Department of Education and Communities). It is Victorian Gothic in style and currently a mine owned occupied residence. This site was identified by ERM in 2008 as a potentially significant heritage item. It is not subject to any form of statutory heritage listing.

The Public School was the basic elementary School in the NSW education system. Originally known as National Schools (from 1848 to 1866) they became known as Public Schools from 1867. Originally the attendance of 30 children was required for the establishment of a Public School, but this was reduced to 25 in 1867 and 20 in 1880. In 1957, when Provisional Schools were converted to Public Schools, the minimum figure was reduced to nine. Until the 1880s there were no government Secondary Schools. But the 1880 Public Instruction Act recognised the presence at school of numbers of children who had completed the primary course, by providing for the establishment of Superior Public Schools with primary and post-primary courses, and for separate High Schools. After 1913 many Public Schools incorporated one or more distinct secondary departments or 'schools' (NSW Department of Education and Communities).

The former Warkworth Public School is located approximately 480 metres outside the Project Area boundary and approximately 930 metres from the proposed United Open Cut. As a result of its proximity to the proposed United Open Cut, the school is considered in relation to potential indirect impacts resulting from vibration from blasting in **Section 6.4**.



Plate 4.28

View to West of the Former Warkworth Public School

© Umwelt, 2015

4.6.3 Springwood Homestead

Springwood (previously reported by EJE Town Planning as Abandoned Homestead B) is located adjacent to Wollombi Brook, just outside (to the east of) the Project Area boundary and to the immediate south of the existing Wambo Development Project rail loop (refer to **Figure 4.1** and **Plates 4.29** to **4.31**). The Springwood Homestead is currently owned by Coal and Allied.

The site consists of a timber slab cottage with a wrap around verandah, a dressed sandstone chimney and later exterior weatherboard cladding. The building had a shingle broken-back roof with dormer windows. The interior of the building has many layers of wallpaper and hessian sack wall coverings. Internal wall coverings suggest the building was occupied until the 1950s (Maclean 2014).

Research undertaken by ERM indicates that William Watts acquired two lots of land totaling 100 acres in the mid 1850s to form the Springwood Estate. The homestead building was constructed from approximately the 1860s with the house being added to until approximately 1920. The Watts family were successful orchardists growing grapes, nectarines, plums and peaches. From the late 1800s into the early 1900s Watt's fruit was certified for export to any nation in the Commonwealth and was known to export to New Zealand (Maclean 2014). The Estate remained in the Watts family until 1961.

The site was assessed by EJE Town Planning as dating from between 1860 and 1880, of minor local significance as a result of its 'architectural style and age' and in a poor condition (EJE 2003:C-16). The EJE report considered no specific mitigation measures were required for Abandoned Homestead B as part of the approved Wambo Development Project.

The Springwood Homestead site is located approximately 640 metres outside the Project Area boundary and approximately 2 kilometres from the proposed United Open Cut. As a result of its proximity to the proposed United Open Cut, the site is considered in relation to potential indirect impacts resulting from vibration from blasting in **Section 6.4**.



Plate 4.29

View to Southwest showing front elevation of cottage

© Umwelt, 2015



Plate 4.30

Interior detail showing sandstone chimney in Springwood Homestead

© Umwelt, 2015



Plate 4.31

Interior detail of Springwood Homestead

© Umwelt, 2015

4.6.4 Piggery and Butcher's Hut

The Piggery and Butcher's Hut are located outside (to the east of) the Project boundary within the existing Wambo Development Project rail loop (refer to **Figure 4.1**).

The Piggery comprises a small timber and corrugated iron shed open on one side with three interior partitions. The shed is within a small wire fence with metal post enclosure. The Butcher's Hut is timber frame with timber cladding and a concrete slab floor. The site was identified by EJE Town Planning as being in a dilapidated condition in 2003.

Due to their close proximity to each other, this site may have been related to Springwood.

EJE Town Planning assessed the site as dating to approximately 1900, of 'minor local significance' in terms of demonstrating a 'facet of life of the inhabitants of Warkworth' in the early twentieth century (EJE 2003:C-16).

The EJE report considered no specific mitigation measures were required for the Piggery and Butcher's Hut as part of the approved Wambo Development Project other than ensuring no harm came to the structures during the construction of the rail loop. As discussed, the site is now extant within the Wambo Development Project rail loop in a similar condition to its condition in 2003.

The Piggery and Butcher's Hut site is located approximately 730 metres outside the Project Area boundary and approximately 1.7 kilometres from the proposed United Open Cut. As a result of its proximity to the proposed United Open Cut, the site is considered in relation to potential indirect impacts resulting from vibration from blasting in **Section 6.4**.

4.6.5 Abandoned Homestead A

Abandoned Homestead A is located adjacent to Stony Creek outside (to the west of) the Project boundary (refer to **Figure 4.1**). The site is spread over several acres and includes the remains of a cottage, four outbuildings, a pit mine and a number of moveable items (EJE 2003: CC-5). The site was identified by EJE Town Planning as being in ruins in 2003.

The site was assessed by EJE Town Planning as dating to the early 1900s as the land upon which the site is located was part of the subdivision of the Wambo Estate in 1900 and the remnant buildings all appear to date from the early 1900s. The site was assessed by EJE Town Planning as having minor local significance based on the potential to reveal archaeological information regarding federation period farm sites (EJE 2003: CC-6).

As the site is located approximately 1.8 kilometres outside, to the south of, the Project Area and over 4.5 kilometres from the proposed United Open Cut, the Project is not considered to have any potential direct or indirect impact to the site (refer to **Figure 4.1**).

As such this site is not considered further in this report.

4.6.6 Moses Crossing over the Hunter River

Moses Crossing bridge over the Hunter River is located on Lemington Road, close to the intersection with the Golden Highway (refer to **Figure 4.1**). This site was identified by Environmental Resources Management Australia (ERM) in 2008 as a potentially significant non-listed heritage item. At the time of the 2008 assessment the crossing comprised a timber bridge prone to flooding in times of high rainfall and flooding events. The timber bridge has since been completely removed and replaced with a low concrete bridge;

with no evidence remaining of the earlier bridge (refer to **Plate 4.32**). Therefore the site is no longer considered a heritage site.

In addition the site is located approximately 1.9 kilometres outside, to the northwest the Project Area boundary and over 2.1 kilometres from proposed extension to the northwest corner of the approved Wambo Open Cut.

The Project is not considered to have any potential direct or indirect impact to the site (refer to **Figure 4.1**). As such this site is not considered further in this report.



Plate 4.32

View to South of Moses Crossing

© Umwelt, 2015

4.7 Potential Other Sites/Items

4.7.1 Fence Lines and Rural Infrastructure

Rural fences have been built by landholders in NSW since first settlement in 1788. Fences were constructed to mark boundaries, exclude or enclose stock and to facilitate management. They can provide insights into the sequence of land settlement, the development of technology and legislation, environmental changes and the hopes and aspirations of settlers in the Hunter region (Pickard 2009:3). Nineteenth century land legislation in NSW required the fencing of conditional purchase and conditional leases. The post and rail fence is the most iconic of rural NSW fences, however it was expensive and required skill to construct. The use of wire in fencing came about as a way of saving costs (longer panels could be used resulting in fewer posts), as well as being a simpler and faster method of construction.

Based on knowledge of the past use of the land and the known Dog-leg fences located within the area, there may be as yet unidentified evidence of fencing and other rural infrastructure within the Project Area. However, any additional, as yet unidentified, fencing and other rural infrastructure that may be present within the Project Area is likely to be similar to those items identified within the Project Area and already described in this section and are therefore not considered to change the impact assessment findings and management strategy outlined in **Section 6.0**.

4.8 Summary of Historical, Archaeological and Physical Contexts

The potential heritage resource of the Project Area generally reflects the documented history of the surrounding region (discussed in **Section 3.0**) which indicates that the land has predominantly been utilised by graziers, agriculturalists and in recent times the mining industry. The resource is generally considered to be typical of the region.

The historical heritage evidence of the Project Area demonstrates the documented pattern of settlement and use from the early to mid nineteenth century, including its settlement by Europeans and subsequent use of the land for pastoral and agricultural activities. Sheep and cattle grazing were undertaken across the Project Area supplemented by agricultural activities with the cultivation of crops. Evidence of former house sites, sheds, yards and other rural structures demonstrate the typical pattern of land use and historical development of the area. Extant fence lines indicate the enclosing of the landscape to make paddocks and with the exception of the Dog-leg fence are typical of fences found throughout the Hunter Valley and rural NSW. Farm dams are of some importance as sources of fresh water for graziers and agriculturalists and their location relative to former house sites and fences can help understand how the landscape was used.

The Project Area and the area in the vicinity of the Project Area have been relatively intensively studied, surveyed and assessed as part of the historical heritage assessment and environmental assessment process associated with several approved coal mining projects currently operating in the immediate area; including the Wambo Development Project and Hunter Valley Operations South Coal Project. As a result, in addition to the listed heritage items, a number of potential heritage sites/items have previously been identified and studied in the area (refer to **Figure 4.1** and **Sections 4.5 to 4.6**).

On the basis of the historical context and the history of land ownership, any improvements to the Project Area would likely have been effected from the mid nineteenth century. These improvements were likely initially for sheep management with modifications to provide for cattle management. The general unsuitability of the Hunter for intensive sheep-raising, by comparison with large animals, was being recognised in the early twentieth century although sheep continued to be raised in the vicinity for perhaps another 50 years. The former House Site has the potential for sub-surface remains associated with a history of use and occupation from the late nineteenth century which may provide further information regarding the early use of the Project Area. Although outside the Project Area, the presence of the Springwood property provides evidence of the success of orchardists in an area dominated by pastoralism in the late nineteenth century.

While Dog-leg fences in general were once widespread and common, physical evidence of Dog-leg fences surviving today is rare. The presence of the fence within and adjacent to the Project Area provides an opportunity to study and better understand this form of early fence.

Any additional, as yet unidentified, heritage items that may be present within the Project Area are likely to be similar to those items identified within the Project Area and described in this section.

The significance of the potential heritage sites/items identified within the Project Area and described in this section, is assessed in **Section 5.0** of this report. The impact of the Project on these items and recommended management strategies to address any heritage impacts is discussed in **Section 6.0**.

5.0 Significance

5.1 Introduction

An assessment of significance is undertaken to explain why a particular place is important and to enable appropriate site management to be determined. In accordance with the SEARs for the Project, this section comprises a significance assessment of the historical heritage items within and in the vicinity of the Project Area.

The Australian ICOMOS Burra Charter 1999 (the Burra Charter) defines cultural significance as meaning ‘aesthetic, historic, scientific or social value for past, present or future generations’ (Article 1.2). The Burra Charter was written to explain the basic principles and procedures that should be followed in looking after important places. Cultural significance is defined as being present in the ‘fabric, setting, use, associations, meanings, records, related places and related objects’. The fabric of a place refers to its physical material and can include built elements, sub surface remains and natural material (Australia ICOMOS 2000).

5.2 Basis of Assessment

The NSW Heritage Manual (1996), published by the then NSW Heritage Office and Department of Urban Affairs and Planning, sets out a detailed process for conducting assessments of heritage significance. The manual provides a set of specific criteria for assessing the significance of an item, including guidelines for inclusion and exclusion.

The seven criteria defined by the Heritage Branch, OEH, and used by the NSW Heritage Council as an assessment format within NSW are outlined below:

Criterion (a) an item is important in the course, or pattern, of NSW’s cultural or natural history;

Criterion (b) an item has strong or special association with the life or works of a person, or group of persons, of importance in NSW’s cultural or natural history;

Criterion (c) an item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW;

Criterion (d) an item has strong or special association with a particular community or cultural group in NSW for social, cultural or spiritual reasons;

Criterion (e) an item has potential to yield information that will contribute to an understanding of NSW’s cultural or natural history;

Criterion (f) an item possesses uncommon, rare or endangered aspects of NSW’s cultural or natural history; and

Criterion (g) an item is important in demonstrating the principal characteristics of a class of NSW’s cultural or natural places or cultural or natural environments.

The following significance assessment is based upon the above seven criteria.

As a component of the holistic concept of significance, archaeological significance has been described as a measure by which a site may contribute knowledge, not available from other sources, to current research themes in historical archaeology and related disciplines (Bickford and Sullivan, 1984 19-26). Archaeology is concerned with material evidence and the archaeological record may provide information not available from other sources. An archaeological study focuses on the identification and interpretation of material evidence to explain how and where people lived, what they did and the events that influenced their lives.

Considerations material to the study of the archaeology include:

- whether a site, or the fabric contained within a site, contributes knowledge or has the potential to do so. If it does, the availability of comparative sites and the extent of the historical record should be considered in assessing the strategies that are appropriate for the management of the site
- the degree and level at which material evidence contributes knowledge in terms of ‘current research themes in historical archaeology and related disciplines’.

Following Bickford and Sullivan’s work on archaeological significance (1984, 19-26) the following questions can be used as a guide to assessing the significance of an archaeological site:

- Can the site contribute knowledge that no other resource can?
- Can the site contribute knowledge that no other site can?
- Is this knowledge relevant to general questions about human history or other substantive questions relating to Australian history, or does it contribute to other major research questions?

The Heritage Council of NSW recognises four levels of significance for heritage in NSW: Local, State, National and World. An item has local heritage significance when it is important to the local area. An item has state heritage significance when it is important in NSW. Most heritage in NSW is of local significance.

The significance of the Project Area as a whole is considered in the Statement of Cultural Significance in **Section 5.3**.

5.3 Significance of the Heritage Items/Sites within and in the immediate vicinity of the Project Area

5.3.1 Statement of Significance

The potential and known heritage sites/items located within the Project Area (refer to **Section 4.0**) are assessed in **Table 5.1** below. Note as the statutorily listed heritage items have existing significance assessment (as discussed in **Section 4.4** and including SHR listed Wambo Homestead and Outbuildings) they are not considered as part of this statement of significance unless there are associations with other potential sites.

Table 5.1 Statement of Significance

Heritage Division Standard Criteria	Statement of Significance
<p>Criterion (a) Historical</p>	<p>The Project Area has the potential to demonstrate the pattern of land use and development from its early exploration and settlement in the early to mid nineteenth century (including its settlement by Europeans and the subsequent clearing of the land for pastoral and agricultural activities through to its exploitation for coal resources). However, with the exception of the Dog-leg fence and former house site, the Project Area is unlikely to contain significant historical heritage or archaeological remains associated with this development history.</p> <p>Any archaeological evidence associated with the use and development of the Project Area (such as for early settlement, grazing, agriculture and land clearing) is likely to be patchy at best, and it would be impossible to specify what such remains may entail and where they would be located.</p> <p>Evidence of extant rural buildings/structures (both standing and derelict) (for example Whynot Homestead, the Shearing shed and Creamery site, the windmill sites and the Montrose Property), fencing, yards and other rural infrastructure demonstrate the pattern of land use and historical development of the area; including the sub-division and redevelopment of the early large land grants like Wambo. In general, however, they are unlikely to provide information not already known from the historical record.</p> <p>The shearing shed at the Montrose Property includes relatively intact shaft driven mechanical shearing equipment and other internal detailing.</p> <p>Shearing Shed and Creamery</p> <p>The Creamery building has been relocated to the site from the Cheshunt farm homestead group to the north, the shearing shed has been heavily modified and adapted for a number of different uses and the majority of other aspects of the property have been removed isolating the shed as an individual item and removing many of its historical associations with the site and property.</p> <p>Dog-leg fence</p> <p>The Dog-leg fence provides a tangible link to the early settlement of the area and fencing improvements; which at the time were covered under NSW lands legislation.</p> <p>Former House Site</p> <p>The potential archaeological resource at this site may provide a tangible link to an early phase of historical development, use and ownership of the Project Area.</p> <p>Springwood</p> <p>Springwood property provides evidence of the success of an emancipist family through orcharding rather than the pastoralism or later dairying which dominated the area in the nineteenth and early twentieth centuries (Maclean 2014).</p>

Heritage Division Standard Criteria	Statement of Significance
<p>Criterion (b) Associative</p>	<p>The Project Area has associations with several prominent personalities and families in the region; primarily James Hale and the successful orchardists the Watt family of Springwood (refer to Section 3.0).</p> <p>The potential archaeological resource of the former house site has a direct association with Frith family who were an important family in the area in the 1800s.</p> <p>However, while the Project Area has this associative significance due to its land tenure history, the potential heritage sites/items identified within the Project Area are unlikely to provide evidence of these associations.</p> <p>Note this report does not consider any Aboriginal historic associations with the Project Area, refer to the Aboriginal Cultural Heritage Assessment for the Project (OzArk 2016) for consideration of any such associations or connections.</p> <p>The Project Area is not known to have any other associations of particular significance.</p>
<p>Criterion (c) Aesthetic</p>	<p>With the exception of the Dog-leg fence, the potential heritage sites/items identified within the Project Area do not generally demonstrate distinctive aesthetic qualities or technical innovations, other than those typical of buildings and features found in rural areas characterised by rural landholdings, native bushland and primary industries including agriculture, forestry and extractive industries.</p> <p>The Project Area may demonstrate some aesthetic significance as a rural landscape through the creation of a pastoral landscape via the clearing of the native vegetation and construction of fences.</p> <p>The rural infrastructure present within the Project Area portrays construction techniques common in the Hunter Region from a limited range of materials, principally timber and it may have some aesthetic significance in the context of the surrounding landscape, however there are many other similar and better examples of rural infrastructure in the Hunter area.</p> <p>In general, any buildings, structures or ruins extant on the Project Area are representative of a range of farm and residential buildings and other rural infrastructure potentially dating from the late nineteenth century to early twentieth centuries. They may be considered to have some aesthetic qualities arising from their simple unadorned construction from a limited palette of materials, principally timber or as ruins within a rural landscape.</p> <p>Springwood Homestead, the Shearing Shed and Creamery site and the Montrose property shearing shed could be seen as having aesthetic values as dilapidated structures/ruins standing in a rural landscape that demonstrate local vernacular construction.</p> <p>In general the Project Area is unlikely to meet this criterion.</p> <p>Dog-leg Fence</p> <p>The unique physical presence of the Dog-leg fence and its ability to reveal the exact nature of the original structure of the fence, including the use of the sandstone block supports, provides an opportunity to study and better</p>

Heritage Division Standard Criteria	Statement of Significance
	<p>understand this form of early fence.</p> <p>Former House Site</p> <p>At this time, when the potential archaeological evidence at the site is obscured below the ground surface, it is not possible to determine with any certainty whether, and if so, how, the archaeological features at this site would meet this criterion.</p>
<p>Criterion (d) Social</p>	<p>The Project Area demonstrates the pattern of settlement and development in the area from the early to mid nineteenth century, and is typical of a large rural landscape within the wider regional area.</p> <p>A Social Impacts and Opportunities Assessment (Umwelt 2016), including consultation with local landholders and other stakeholders, has been prepared as part of the EIS for the Project. A small number of community members raised issues regarding Warkworth Village, the Dog-leg fence and a general loss of history. However, it is considered unlikely that the potential historical (non-Aboriginal) heritage resource of the Project Area, and particularly any archaeological remains that survive there, would have a strong association with any previous or contemporary particular community or group.</p> <p>Note this report does not consider any Aboriginal social, cultural or spiritual associations with the Project Area, refer to the Aboriginal Cultural Heritage Assessment for the Project (Ozark 2016, ACHM 2016) for consideration of any such associations with both traditional and modern Aboriginal ways of life.</p> <p>However, an archaeological site (for example the former house site) can take on additional social values as a result of community interest in archaeological excavations and any remains uncovered.</p> <p>Accordingly, in general the potential heritage sites/items identified within the Project Area do not meet this criterion.</p> <p>Shearing Shed and Creamery site</p> <p>This site may have some significance with the community and the community's sense of place as a frequently seen landmark and ruin standing in the rural landscape that has been present at the junction of Comleroi Road and The Golden Highway for possibly close to 100 years. However, as the section of the Golden Highway adjacent to the site is to be realigned to the north and the shearing shed removed it will no longer function as a local landmark.</p> <p>Former House Site</p> <p>The potential archaeological resource of the former house site may have some significance with ancestors of the Frith family who may still reside in the area.</p>

Heritage Division Standard Criteria	Statement of Significance
<p>Criterion (e) Scientific</p>	<p>With the exception of the former house site, there are unlikely to be any intact archaeological remains associated with the nineteenth and twentieth century development and occupation of the Project Area. A high degree of intactness in the archaeological resource is necessary before a substantive contribution can be made to the research potential and hence, the ability of the archaeological resource to answer research questions for the site. Generally any archaeological remains that may be present would be unlikely to have any research potential and would at best provide only a minor contribution to the significance of the area.</p> <p>Evidence of clearing would support the known history of clearing in the area and is unlikely to provide any additional information to that already known for the area.</p> <p>General evidence of rural buildings/structures (both standing and derelict), concrete slabs, yards and rural fences etc. demonstrate the pattern of land use and historical development of the area and could provide information about how the landscape was used and changed during its use as pastoral land. However, in general as individual items they have little research potential.</p> <p>In general, with the exception of the Dog-leg fence, the known and potential historical heritage items extant on site are typical of the area as a large rural landscape and are unlikely to provide further unknown information regarding the history and development of the area.</p> <p>The shearing shed at the Montrose Property includes relatively intact shaft driven mechanical shearing equipment and other internal detailing.</p> <p>Dog-leg Fence</p> <p>While in general fences are considered to have little research potential beyond the immediate physical presence of their type the Dog-leg fence provides an opportunity to study and better understand this form of early fence.</p> <p>Springwood</p> <p>Springwood Homestead was originally a slab cottage with a substantial dressed sandstone chimney built in the plan of a masonry constructed homestead and has the potential to reveal of the different phases of construction and history of its occupation.</p> <p>Former House Site</p> <p>As discussed, the research potential of a particular site and its ability to answer research questions is dependent on a high level of intactness in the archaeological resource. It is not possible to accurately determine the extent of and hence the level of intactness of the potential archaeological resource, due to the lack of sub-surface visibility. However, the archaeological resource that may survive includes building foundations, occupation deposits containing cultural material associated with former structures, deeper sub-surface features (cesspits/privies, rubbish pits and bottle dumps) and artefacts.</p> <p>The visible physical evidence remaining at this site suggests there is potential for an intact archaeological resource which could yield information about the</p>

Heritage Division Standard Criteria	Statement of Significance
	<p>historical development, occupation and use of the site from the mid nineteenth century.</p> <p>If intact, these remains may reveal archaeological information regarding Victorian period homestead/farm sites, provide a tangible link to this period of the area's history and have research potential. Archaeological investigation will confirm archaeological potential of the site (refer to Section 6.3.2).</p>
<p>Criterion (f) Rarity</p>	<p>With the exception of the Dog-leg fence, the potential heritage sites/items identified within the Project Area, including any extant structures, are typical of structures and other sites/items typically found within rural landscapes such as that of the Project Area and are unlikely to meet these criteria.</p> <p>The potential heritage resources associated with the Project Area are not associated with an unusual or remarkable aspect of the region's history. Although any heritage resource within the Project Area is part of an ever decreasing resource, in general the resource does not meet these criteria.</p> <p>Dog-leg fence</p> <p><i>The fence is a unique form of dog-leg fence using stone blocks to support the bottom log. No other examples have been described or have been recorded (Pickard 2015:27).</i></p> <p>As such it comprises a rare and endangered example of earlier technology.</p> <p>It provides evidence of a once common aspect of early settlement and the use and changing of the landscape by the development of farms and its use as pastoral land.</p> <p>Springwood</p> <p>Springwood Homestead was originally a slab cottage with a substantial dressed sandstone chimney built in the plan of a masonry constructed homestead and as such may be uncommon in the locality.</p>
<p>Criterion (g) Representativeness</p>	<p>The potential heritage sites/items identified within the Project Area are generally representative of the structures items/sites typically found in a rural landscape with a history of pastoral and agricultural activities and the exploitation of timber and mineral resources.</p> <p>Dog-leg Fence</p> <p>With the use of stone supporting blocks, the Dog-leg fence demonstrates an unusual variation to this type of fence.</p> <p>Springwood</p> <p>As a slab cottage with a substantial dressed sandstone chimney built in the plan of a masonry constructed Springwood Homestead represents a variation to its type.</p>

5.4.1 Archaeological Significance

Archaeological significance is directly linked to the archaeological (or scientific) research potential of an archaeological site or resource. An archaeological site broadly comprises below ground physical evidence of building foundations, occupation/archaeological deposits, features and artefacts (Heritage Office and DUAP, 1996b:2). In general no potential historical archaeological resource has been identified within the Project Area, with the exception of potential remains associated with the former house site. As a result, the three questions derived from Bickford and Sullivan's work on archaeological significance (discussed in **Section 5.2**) have only been further considered in relation to the former house site.

Can the site contribute knowledge that no other site can?

It is considered unlikely for any substantial intact archaeological remains to be present within the Project Area with the possible exception of the former house site.

The potential archaeological resource from the former house site may provide physical evidence that could be used to supplement and test what is known about the Upper Hunter region and its early settlement and working history from other sites.

If intact, the archaeological resource may provide an opportunity to investigate the settlement and use of the Project Area from the mid nineteenth century. If present, intact artefact bearing deposits (occupation / underfloor deposits, cesspits/privies, bottle dumps and other sub-surface features), could provide insight into aspects of a small farmstead enterprise in mid nineteenth to early twentieth centuries not available from other similar sites.

Can the site contribute knowledge that no other resource can?

The research already undertaken as part of this Project has included an evaluation of easily available documentary evidence which provides some information regarding the use and development of the area. However, an archaeological resource is likely to be able to add to and fill gaps in the available documentary resource of the area. For example, intact artefact bearing deposits may provide specific information about the ways of life of the people who worked and resided there.

Is this knowledge relevant to general questions about human history or other substantive questions relating to Australian history, or does it contribute to other major research questions?

There may be an opportunity to reveal aspects of the past through the material remains present on site. If present this archaeological resource may also be suitable for comparative analysis with other similar sites in NSW.

The proposed Project Area was part of the historical development of the Upper Hunter Valley. There may be an opportunity to reveal additional information about its past through the material remains that may have accumulated in the former house site area. The archaeological resource may also be suitable for comparative analysis with other sites in area, as well as in a wider context of settlement and exploitation of the area.

5.5 Condition and Integrity of Sites within the Project Area

This section addresses matters that combine with the assessment of significance to allow a formal Heritage Impact Statement to be appropriately validated. The condition and integrity of sites/items is considered as part of the assessment of heritage significance.

A heritage item is said to have integrity if its fabric is still largely intact. In general the potential historical heritage resource within the Project Area is in a poor physical condition represented by ruins of former rural structures and rural infrastructure with varying degrees of intact fabric.

There is very little original fabric associated with the former house site located within the proposed open cut area. The presence of any intact archaeological remains would need to be confirmed with sub-surface investigation (refer to **Section 6.3.2**).

Although the condition of the Dog-leg fence has in general been assessed as being poor, there are enough semi-intact sections to enable the nature of the original structure to be understood (Pickard 2015:27).

While the fabric of Springwood Homestead is generally intact there are a number of dilapidated and structural damaged parts to the house. Since the EJE Heritage assessment in 2003 the adjacent sheds have almost completely collapsed and partly been removed from the site.

5.6 Summary Statement of Significance

The Project Area is typical of a rural landscape within the Upper Hunter region of NSW. The history of the area from the early to mid nineteenth century, including its settlement by Europeans and subsequent use as cleared pastoral and agricultural land through to its exploitation for mineral resources is reflected in the low potential of the archaeological resource and in the evidence of former house and farm sites and other rural structures and infrastructure which collectively provide a cross section of the cultural record of settlement and pastoral pursuits in the area since settlement.

In general terms, with the exception of the Dog-leg fence and the former house site, the identified and potential historical heritage components within the Project Area have been assessed as having no significance with no research potential.

Dog-leg Fence

General evidence of rural fences...may provide information about how the landscape was used and changed during its use as pastoral land. However, in general as individual items they have little research potential beyond the immediate physical presence of their type (Pickard 2015).

Although the condition of the Dog-leg fence has been assessed as being poor, it is a unique example of the former private and government Dog-leg fences once common across NSW and could be seen as an important icon in Australian history (Pickard 2007). Its physical presence within the Project Area provides an opportunity to study and better understand this form of early fence.

As such the Dog-leg fence is considered to be of State significance as it is a unique example of a rare and endangered type of fence. Only one other example of a Dog-leg fence, at Mt Trooper south of Ingebyra NSW, is known to have been recorded (Pickard 2009:45). The Dog-leg fence at Mt Trooper does not have the unique stone supporting blocks of the fence discussed in this report.

Detailed heritage impact assessment and management strategies for the Dog-leg fence are discussed in **Section 6.3.2**.

Former House Site

Former house has been assessed as being of local significance based on the potential to reveal archaeological information regarding what may be a small farmstead enterprise from the mid nineteenth to early twentieth centuries. The visible physical evidence of a concentration of several different structures, potentially with differing functions, suggests there could be intact archaeological evidence of a working pastoral farmstead, with the ability to provide information about the historical development, occupation and use of the site.

Shearing shed

This site may have some local significance with the community and the community's sense of place as a frequently seen landmark and ruin standing in the rural landscape that has been present at the junction of Comleroi Road and The Golden Highway for possibly close to 100 years.

Listed Heritage Items

As discussed there are significant listed heritage items in the vicinity of the Project Area including Wambo Homestead and Outbuilding (State significant), St Philips Church, Warkworth (local significance) and the Former Queen Victoria Inn ruin site (archaeological site - local significance).

Springwood Homestead

Springwood Homestead is located in the vicinity of the Project Area. The Homestead is of local significance with the potential to reveal details of the different phases of its history and occupation by a successful orcharding enterprise in a period dominated in the region by pastoralism. It also has potential to be an uncommon slab cottage with a substantial dressed sandstone chimney built in the plan of a masonry constructed homestead.

Unidentified Potential Heritage Items

Any additional, as yet unidentified, potential heritage sites/items that may be present within the Project Area are likely to comprise of evidence of former rural structures and infrastructure. If present, these are likely to be typical of those found throughout the Hunter Valley and rural NSW and at most of local significance.

6.0 Heritage Impact Statement and Management Strategy

This section provides a heritage impact statement and management strategy for the heritage sites/items within and where relevant within the vicinity of the Project Area. The heritage impact statement identifies the potential impacts from the Project on all known and potential heritage sites/items identified within, and where relevant within the vicinity of, the Project Area. The impacts are assessed against the significance of the respective elements.

The Burra Charter's options for managing historical heritage include maintenance, preservation, restoration, reconstruction, adaptation and interpretation, or a combination of these (Australia ICOMOS. 2000).

As discussed in **Sections 4.5** and **4.6**, as a result of the nature of a number of the previously identified potential heritage items/sites and the distance they are located away from both the Project Area and any potential Project disturbance area, a number of sites have been assessed as not having any risk of impact either physically or to their heritage significance as a result of the Project. As such, these items/sites have not been included in the discussions of heritage impacts and management strategies discussed in this section. These sites include:

- Warkworth Airfield
- Whynot Homestead
- Abandoned Homestead A
- Moses Crossing Bridge over the Hunter River.

6.1 Potential Impacts of the Project

The potential impacts of the Project are considered in terms of direct impacts and indirect impacts.

6.1.1 Direct Impacts

Direct impacts are considered to be physical impacts to a site, including removal/destruction.

Potential direct impacts are discussed in **Section 6.3**.

6.1.2 Indirect Impacts

Indirect impacts are considered to include vibration from blasting; which has the theoretical potential to damage/destroy/disturb historical heritage items.

As outlined in **Section 2.0** and illustrated on **Figures 2.1** and **4.1**, the Project involves two open cut mining areas (the United Open Cut and the Wambo Open Cut, part of which is already approved); as a result, drilling and blasting will be required as part of mining operations. Blasting is also likely to be required as part of the road realignments being undertaken as part of the Project. Operations will undertake blasting in accordance with a detailed design process that will consider operational, geological and environmental constraints.

Indirect impacts such as vibration from blasting have the theoretical potential to damage/destroy/disturb historical heritage items. ACARP Report (No. C14057) *Effect of Blasting on Infrastructure* recommends 'safe' vibration limits for heritage structures such as those used by British Standard BS7385. Annex A of the British Standard BS7385:Part2:1993 for the Evaluation and Measurement for Vibration in Buildings states that:

...the age and existing condition of a building are factors to consider in assessing the tolerance to vibration. If a building is in a very unstable state, then it will tend to be more vulnerable to the possibility of damage arising from vibration or any other ground-borne disturbance British Standard BS7385:7.

The British Standard BS7385 further discusses that 'a building of historical value should not (unless it is structurally unsound) be assumed to be more sensitive' (British Standard BS7385:5). The German standard DIN 4150: Part 3 Effects of Vibration on Structures includes a building type 'Particularly Sensitive' which is assigned vibration limits of 3 mm/s (at less than 10Hz), 3 to 8 mm/s (at 10-50Hz) and 8 to 10 mm/s (at 50-100Hz). Swiss Standard SN640 312:1978 also includes a 'Particularly Sensitive' structural type which is assigned vibration limits of 3 mm/s (at 10 to 30Hz) and 3 to 5 mm/s (at 30 to 60 Hz).

Australian Standard AS 2187.2-2006 *Explosives—Storage and use Part 2: Use of explosives* no longer references 'sensitive or heritage structure'. The previous AS 2187.2-1993 indicated a conservative vibration level of 5 mm/s should be assigned to 'sensitive or heritage structures'. In the absence of a current Australian Standard which refers to structural vibration in buildings or heritage structures specifically, or any building specific assessment of the relevant sites/items considered in this report, it is suggested that a conservative peak particle velocity limit of between 3 to 5 mm/s be adopted for the heritage structures in the vicinity of the Project Area. However structures in the vicinity of the Project Area are considered on an individual basis in terms of their structural integrity; as an abandoned semi-derelict and dilapidated structure would likely be more sensitive to vibration induced damage than a well maintained and regularly utilised building.

Note the current approved vibration limit (Wambo conditions of consent DA 305-7-2003) for Wambo Homestead is:

Not to exceed structural damage assessment criteria prescribed by A 2187.2-1993 (or its latest version) Explosives – Storage Transport and Use for Sensitive and Heritage Structures.

As discussed above this is considered to be a 5 mm/s.

As part of the Blasting Impact Assessment prepared for the Project by Enviro Strata (Enviro Strata 2016) predicted vibration levels were identified for the listed and non-listed heritage items located outside, but in the vicinity of, the Project Area. Potential indirect impacts, including predicted vibration levels, are discussed where relevant in **Sections 6.2, 6.3 and 6.4.**

6.2 Listed Heritage items outside but within the Vicinity of the Project Area

Table 6.1 details the listed heritage items located outside, but in proximity to, the Project Area that should be considered in terms of potential vibration impacts (refer to **Figure 2.1**). Maximum predicted vibration levels are indicated as detailed in the blast assessment (Enviro Strata 2016). The predicted vibration levels are noted in relation to the closest proposed open cut area with the highest predicted range of vibration.

Table 6.1 Listed Heritage Items Located in the Vicinity of the Project Area and Predicted Ground Vibration due to Blasting

Item Name	Location	Coordinates (MGA)	Listing and Significance	Predicted Range of Ground Vibration (mm/s)
Wambo Homestead	Off The Golden Highway Lot 82 DP 548749	311615.17 6393166.14	SHR Singleton LEP 2013 RNE State significance	0.1 to 1.5
St Philips Church, Warkworth	Off High Road Part Lot 21, DP 755267	314808.49, 6394312.45	Singleton LEP 2013 Local significance	0.2 to 2.4
Former Queen Victoria Inn – Ruins Archaeological site	Jerrys Plains Road Lot 1, DP 770904	315490.07, 6393872.62	Singleton LEP 2013 Local significance	1 to 1.5

As indicated in **Table 6.1**, the predicted vibration levels are below the levels at which no impacts are predicted (i.e. are all less than 3-5 mm/s).

6.2.1 Wambo Homestead

Heritage Impact Statement

Wambo Homestead and associated outbuildings is located immediately south of the Project Area; the Wambo Homestead listed boundary forms part of south Project Area boundary. It is located approximately 2.5 kilometres from the proposed United Open Cut and will not be directly impacted by the Project.

With regard to the potential for indirect impacts, **Table 6.2** indicates the potential heritage impacts to the Wambo Homestead as assessed by EJE Heritage (refer to **Appendix A**).

Table 6.2 Statement of Heritage Impact for Wambo Homestead

Potential Impact	Heritage Impact Statement
Water, vibration & dust	Is very unlikely to have an additional impact over the existing mining operations due to the distance between the proposed new open cut mining areas during its life, and the homestead complex.
Existing buildings & Structures	Is very unlikely to have an additional impact over the existing mining operations due to the distance between the new open cut mine during its life, and the homestead complex.
Moveable Heritage	It is very unlikely to have any impact on moveable heritage.
Protecting the cartilage	It is very unlikely to have any impact within the boundaries of the listing.
Sight lines & View Corridors	It is very unlikely to have any impact on the existing sightlines and view corridors within the complex and the existing beyond.
Landscape elements	It is very unlikely to have any impact on landscape elements with respect to the homestead complex within or beyond the listed site.
Archaeological resources	It is very unlikely to have any impact on archaeological resources within the immediate curtilage of the homestead complex
Social Impact	It is very unlikely to have any further social impact given the extent of existing mining and that the new mining areas will be further from the homestead complex than the existing and approved mining at Wambo.
Protecting overall significance	It is very unlikely to have any impact on heritage significance
For Character, Sightlines & View Corridors	The proposal is very unlikely to have any impact on the character, sightlines and view corridors associated with the homestead complex.
For Landscape Elements	The proposal is very unlikely to have any impact on the landscape elements associated with the homestead complex or still contributing to the heritage significance of the homestead complex.

All information from EJE Heritage 2015:13-14

The maximum predicted level of ground vibration for Wambo Homestead and Outbuildings is 1.5 mm/s; below the conservative peak particle velocity criteria of between 5 mm/s at which no impacts to structures are predicted to occur. The predicted maximum ground vibration levels are also well below the current approved vibration limits of the Wambo development consent of 5 mm/s.

In consideration of the EJE Heritage 2015 Statement of Heritage Impact and the low level of predicted ground vibration it is assessed that the Wambo Homestead will not be affected by the Project.

Currently Approved Vibration Limits

As discussed in **Section 6.1.2** the current approved vibration limit (Wambo conditions of consent DA 305-7-2003) for Wambo Homestead is 5 mm/s.

Recommendation

No additional management measures are required in relation to Wambo Homestead as part of the Project, with the existing management regime in place under the Wambo mine development consent providing for the ongoing effective management of the site. This existing management regime includes:

- adherence to an approved conservation management plan
- blast monitoring undertaken for any blasts located within 2 km of the Wambo Homestead
- review of blast records by a suitably qualified and experienced structural engineer
- annual inspections of the Wambo Homestead by the approved structural engineer.

Wambo will continue to be responsible for the implementation of the Conservation Management Plan and overall management of the Wambo Homestead. Under the Joint Venture agreement between Wambo and United, United will be responsible for managing all aspects of the open cut mining operations. This will include implementing all relevant controls relating to Wambo Homestead that relate to open cut mining activities. United will also implement blast controls and monitoring consistent with the existing management regime in place, including achievement of the relevant blasting criteria.

6.2.2 St Philips Church, Warkworth

Heritage Impact Statement

St Philips Church is located 1.2 kilometres outside, to the east of, the Project Area; approximately 1.7 kilometres from the proposed United Open Cut.

The maximum predicted ground vibration level for St Philips Church is 2.4 mm/s; below the conservative vibration limit of 5 mm/s and the current HVO South approved limit of 5 mm/s.

As such, there are not expected to be any direct or indirect impacts to St Philips Church.

Current Approved Vibration Limits

The current approved vibration limit (HVO conditions of consent DA 06_0261) for St Philips Church is 5 mm/s.

Recommendation

No additional management measures are required in relation to St Philips Church as part of the Project. Blast monitoring will be undertaken utilising existing blast monitors located in Warkworth to confirm that blasting vibration levels meet relevant criteria, except where agreed otherwise with the owner and/or based on a structural assessment that identifies an alternate acceptable vibration level.

6.2.3 Former Queen Victoria Inn – Ruins Archaeological site

Heritage Impact Statement

The Former Queen Victoria Inn site is located 1.8 kilometres outside, to the east of, the Project Area; approximately 2.5 kilometres from the proposed United Open Cut.

The maximum predicted ground vibration level for the Former Queen Victoria Inn site is 1.5 mm/s; below the conservative vibration limit of 5 mm/s. In addition, it is noted that the Former Queen Victoria Inn is considered an archaeological site and unlikely to be affected by any indirect impact.

As such, there are not expected to be any direct or indirect impacts to the site.

Recommendation

No management measures are required in relation to Former Queen Victoria Inn site as part of the Project.

6.3 Identified Sites within the Project Area

This section addresses the potential impacts resulting from the Project to each of the site/items identified within the Project Area and proposes a management strategy to mitigate any impacts.

Figure 4.1 shows the proposed mine plan in relation to the locations of the identified heritage sites/items within the Project Area.

6.3.1 Dog-leg Fence

Heritage Impact Statement

Two sections of Dog-leg fence are located within the Project Area (refer to **Figure 4.1**).

The main section of fence is located at the northern edge of the Project Area. Approximately 335 metres of the fence is located within the proposed United Open Cut and will be removed as part of the Project. A further 340 metres is located outside the open cut area but within the proposed Project disturbance boundary and is also likely to be removed as part of the Project (refer to **Figure 4.1**). As such approximately 675 metres of the Dog-leg fence is likely to be removed as part of the Project. Note that a further 1,230 metres is located outside the Project Area. Within the section located outside the Project Area there are many places where the original structure is intact, although partially collapsed.

Pickard discusses how 'Place' is a key concept in heritage philosophy and, that in general terms, items should be retained in their original locations to maintain the historical association between place, purpose and function. However, Australian rural fences are notoriously difficult to manage as they are naturally threatened by combinations of decay, termite attack and fire and most heritage fences survive by benign neglect rather than by any formal management (Pickard 2007). Sections of the Dog-leg fence have already

been destroyed by bush fires; leaving only the sandstone support blocks to indicate the former fence alignment.

In relation to the Dog-leg fence located within and adjacent to the Project Area Pickard notes that

...the pine logs are very weathered with numerous cracks making them susceptible to both wild fires and hazard-reduction burns; even small sparks lodging in cracks cause smouldering and destruction of the logs. In recent years, the fence has been protected from hazard-reduction burning, but it is almost inevitable that a wild fire will consume the fence (Pickard 2015).

Due to the nature of the structure, the impact of blasting on the fence cannot be accurately predicted (Enviro Strata 2016). As a result, the 1,230 metre length of Dog-leg fence located outside the Project Area may be susceptible to damage from ground vibration; particularly the section closest to the open cut boundary. The Project does not propose to manage blasting to meet any particular ground vibration level at this location. It is acknowledged that impacts could occur.

The Dog-leg fence has been assessed as being of State significance (refer to **Section 5.0**).

Recommendations

Detailed Recording

As discussed in Pickard 2015, protecting the fence against fire would be impossible and hazard reduction is not a preferred option on land associated with open-cut coal mines. Mechanical fire breaks would not be wide enough to be effective in the type of vegetation surrounding the fence line. As such, detailed recording of the full length of both sections of the Dog-leg fence is the only practicable option.

A detailed survey and photographic/archival recording is planned to be undertaken in accordance with Heritage Division, OEH guidelines *Photographic Recording of Heritage Items Using Film or Digital Capture* (2006). Recording the full surviving alignment of the Dog-leg, including the section located outside the Project Area, will ensure all surviving physical aspects of the fence are identified and documented prior to any disturbance as a result of the Project or everyday natural threats such as bush fires, termite attack and decay. The proposed detailed archival recording will ensure that a full understanding and record of the Dog-leg fence will be available for future generations.

As part of the archival recording additional research will be undertaken to identify (if the information is available) an exact date of construction and who may have built the fence. Inspection reports associated with each Conditional Purchase may provide this information (Pickard 2015).

Interpretation Strategy

In addition to the detailed recording an interpretation strategy will be developed for the Dog-leg fence. Creating a permanent interpretation feature at the site is not possible because of the nature of the mine site. However, the stone blocks could be salvaged and combined with logs cut from within the Project Area, when it is cleared as part of site preparation works for the open cut, to reconstruct a section of Dog-leg fence (Pickard 2015).

The interpretive potential could be enhanced through the use of signage; providing opportunity to highlight the heritage significance in a way that the general community can identify with.

The location of the proposed reconstruction could, if practicable, be at the entrance to the mine site or within a community space / park in Jerry's Plain or Warkworth. Consultation should be undertaken with the community, local historical society and Singleton Council when preparing the interpretation strategy for the Dog-leg fence.

6.3.2 Former House Site

Heritage Impact Statement

The Former House Site is located within the proposed United Open Cut and will be removed as part of the project

The Former House Site has the potential for a locally significant archaeological resource.

Recommendation

Prior to the commencement of works that impact on this site, including ground preparation/clearing works, archaeological investigation of the former House Site will be undertaken to normal professional standards. The investigations should comprise (subject to consultation with the Heritage Division, OEH) a program of archaeologically monitored machine stripping of the grass cover focusing around the known former building locations.

Following the stripping of all grass cover across the area of archaeological interest, any archaeological remains (including concentrations/deposits of artefacts, structural remains or deeper cut features) exposed in this area during the monitored machine stripping would be recorded and hand excavated as part of the archaeological works. If no potential archaeological remains are identified following initial monitored machine stripping, further monitored machine stripping would be undertaken until either archaeological remains are exposed or sterile deposits with no evidence of historical archaeological remains or deposits have been encountered. Excavation would not be required once natural sub-soils are exposed, unless an archaeological feature is identified cut into the sub-soil.

The use of an archaeologically monitored excavator is considered an efficient and effective method of identifying the presence (or absence) of any archaeological evidence or remains.

Prior to archaeological works commencing an archaeological work method statement detailing the proposed works is proposed to be provided to the Heritage Division, OEH for comment.

6.3.3 Well and Windmill Site

Heritage Impact Statement

The well and windmill site is located within the proposed United disturbance area and will be removed as part of the project (refer to **Figure 4.1**).

This site has been assessed as having no significance and no research potential.

This site has been recorded as part of the preparation of this report. The photographic catalogue (photographic record sheets) and photographs (as thumbnail image sheets/proof sheets and burned to DVD) are included in this report (as **Appendix C**).

Recommendation

It is recommended that this site be retained in the landscape for as long as practicable. However, it can be removed as part of the Project.

No further management of well and windmill site is required for the Project.

6.3.4 Derelict Windmill Site

Heritage Impact Statement

The derelict windmill site is located within the proposed United Open Cut and will be removed as part of the Project (refer to **Figure 4.1**).

This site has been assessed as having no significance and no research potential.

This site has been recorded as part of the preparation of this report. The photographic catalogue (photographic record sheets) and photographs (as thumbnail image sheets/proof sheets and burned to DVD) are included in this report (as **Appendix C**).

Recommendation

No further management of the derelict windmill site is required for the Project.

6.3.5 Shearing Shed and Creamery

Heritage Impact Statement

The Shearing Shed and Creamery is located within the proposed United disturbance area; immediately adjacent to the proposed United Open Cut and will be removed as part of the Project.

The former creamery building was identified by ERM in 2008 as a potentially significant heritage item.

As discussed in **Section 5.0**, the Shearing Shed and Creamery may have some local significance with the community and the community's sense of place as a frequently seen landmark and ruin standing in the rural landscape that has been present at the junction of Comleroi Road and The Golden Highway for possibly close to 100 years.

This site has been recorded as part of the preparation of this report. The photographic catalogue (photographic record sheets) and photographs (as thumbnail image sheets/proof sheets and burned to CD) are included in this report (as **Appendix C**).

Recommendation

It is recommended that this site be retained in the landscape for as long as practicable prior to impact. However, it can be removed as part of the Project.

Given that this site is proposed to be impacted this report (and the photographic record included as **Appendix C**) is considered to be a sufficient record of the site.

Any potential additional associated features or archaeological 'relics' that are identified during any works in the area should be managed following the principles of Section 146 of the Heritage Act (refer to **Section 6.5**).

6.4 Identified Sites within the Vicinity of the Project Area

As part of the Blasting Impact Assessment prepared for the Project by Enviro Strata (Enviro Strata 2016) predicted vibration levels were identified for the non-listed potential heritage items located outside, but in the vicinity of, the Project Area.

Table 6.4 details the potential heritage items located outside, but in proximity to, the Project Area that should be considered in terms of potential vibration impacts (refer to **Figure 4.1**). Maximum predicted vibration levels are indicated as detailed in the blast assessment (Enviro Strata 2016). The predicted vibration levels are noted in relation to the closest open cut area with the highest predicted range of vibration.

Table 6.3 Identified Potential Heritage Items Located in the Vicinity of the Proposed Open Cut Areas or Project Area and Predicted Ground Vibration due to Blasting

Item Name	Location	Coordinates (MGA)	Listing and Significance	Predicted Range of Ground Vibration (mm/s)
Montrose Property	Golden Highway	307106.11, 6399174.85	No statutory listing. Local significance	1.7 to 14
The former Warkworth Public School	Warkworth	314356.24, 6394899.78	No statutory listing. Local significance	0.5 to 6.7
Springwood (formerly Abandoned Homestead B)	Warkworth	314410.89, 6393600.87	No statutory listing. Local Significance	0.2 to 2.2
Piggery and Butcher's Hut	Warkworth	314410.89, 6393922.23	No statutory listing. Local Significance	0.2 to 2.8

6.4.1 Montrose Property

Heritage Impact Statement

The Montrose Property is located to the northwest of the Project Area approximately 750 metres from proposed extension to the northwest corner of the approved Wambo Open Cut.

The maximum predicted level of ground vibration for the site is 14 mm/s. It is noted that this figure is a worst case scenario prediction for the largest predicted blast at the closest point to the Montrose Property. However, the Montrose Property, and in particular the Shearing Shed, may be susceptible to damage from ground vibration.

This site, and in particular the house and shearing shed, has been recorded as part of the preparation of this report. The photographic catalogue (photographic record sheets) and photographs (as thumbnail image sheets/proof sheets and burned to CD) are included in this report (as **Appendix C**).

Recommendation

As a result of the property's susceptibility to damage from ground vibration a photographic/archival recording of the shearing shed in accordance with Heritage Division, OEH guidelines *Photographic Recording of Heritage Items Using Film or Digital Capture* (2006) is recommended prior to any blasting being undertaken as part of the Project that may exceed 5mm/s.

This report (and the photographic record included as **Appendix C**) is considered to be a sufficient record of the main house on the Montrose Property.

As part of the archival recording, further research should be undertaken to better understand the history of occupation and use of the property.

6.4.2 The former Warkworth Public School

Heritage Impact Statement

The former Warkworth Public School is located 480 metres outside, to the east of, the Project Area boundary; approximately 930 metres from the proposed United Open Cut.

The maximum predicted ground vibration level for building is 6.7 mm/s. As such the former Warkworth Public School may be susceptible to damage from ground vibration.

However, although the maximum predicted ground vibration levels for the former Warkworth Public School are up to 6.7 mm/s, the potential vibration impact for the building can be effectively managed via the application of lower charge masses (Enviro Strata 2016:35). As an additional precautionary measure, subject to discussions with the land owner, United will undertake an inspection of the former Warkworth Public School prior to commencement of the Project. Regular inspections will also be undertaken to confirm that no damage has occurred due to the Project at the former Warkworth Public School.

Recommendation

Blast sizes will be managed to 5 mm/s for this building via the application of lower charge masses, except where agreed otherwise with the owner and/or based on a structural assessment that identifies an alternate acceptable vibration level. Ongoing blast vibration monitoring will be undertaken as part of the Project to monitor compliance with the relevant criteria.

No additional management measures are required in relation to the former Warkworth Public School as part of the Project.

6.4.3 Springwood

Heritage Impact Statement

The Springwood Homestead site is located approximately 640 metres outside, to the east of, the Project Area boundary; approximately 2 kilometres from the proposed United Open Cut.

The maximum predicted ground vibration level for Springwood is 2.2 mm/s; below the conservative vibration limit of 5 mm/s.

As such, there are not expected to be any direct or indirect impacts to Springwood.

This site has been recorded as part of the preparation of this report. The photographic catalogue (photographic record sheets) and photographs (as thumbnail image sheets/proof sheets and burned to CD) are included in this report (as **Appendix C**).

A Conservation Management Plan (CMP) is currently being prepared by ERM Heritage Consultants and Bligh Tanner on behalf of Coal & Allied for Springwood. The CMP was not available for review during the preparation of this report.

Recommendation

The CMP should be reviewed, once available, so that blasting associated with the Project can be undertaken in accordance with any relevant recommendations of the CMP.

No additional management measures are required in relation to Springwood as part of the Project.

6.4.4 Piggery and Butcher's Hut

Heritage Impact Statement

The Piggery and Butcher's Hut site is located approximately 730 metres outside, to the east of, the Project Area boundary; approximately 1.7 kilometres from the proposed United Open Cut.

The maximum predicted ground vibration level for the site is 2.8 mm/s; below the conservative vibration limit of 5 mm/s.

As such, there are not expected to be any direct or indirect impacts to the Piggery and Butcher's Hut site.

Recommendation

No management measures are required in relation to Piggery and Butcher's Hut site as part of the Project.

6.5 Unexpected Finds

6.5.1 Section 146 Heritage Act 1977 (NSW)

In the unlikely event that unexpected archaeological remains or potential heritage items not identified as part of this report are discovered during the Project, all works in the immediate area should cease, the remains and potential impacts should be assessed by a qualified archaeologist or heritage consultant and, if necessary, the Heritage Division, OEH notified in accordance with Section 146 of the *Heritage Act 1977* (NSW).

If an archaeological relic is located as part of the Project a S146 Discovery of a Relic notification form must be completed and submitted to the Heritage Division, OEH.

6.5.2 Human Skeletal Material

In the unlikely event that a potential burial site or potential human skeletal material is exposed within the Project Area, the following procedure should be followed in accordance with the *Policy Directive – Exhumation of Human Remains* (NSW Department of Health 2008), *Skeletal Remains – Guidelines for the Management of Human Skeletal Remains under the Heritage Act 1977* (NSW Heritage Office 1998) and the *Aboriginal Cultural Heritage Standards and Guidelines Kit* (NPWS 1997):

- as soon as remains are exposed, work is to halt immediately to allow assessment and management
- contact local police, OEH and the Heritage Division
- a physical or forensic anthropologist should inspect the remains *in situ*, and make a determination of ancestry (Aboriginal or non-Aboriginal) and antiquity (pre-contact, historic or forensic)
- if the remains are identified as forensic the area is deemed as crime scene
- if the remains are identified as Aboriginal, the site is to be secured and OEH and all registered Aboriginal parties are to be notified in writing
- if the remains are non-Aboriginal (historical) remains, the site is to be secured and the Heritage Branch is to be contacted.

The above process functions only to appropriately identify the remains and secure the site. From this time, the management of the remains is to be determined through liaison with the appropriate stakeholders (NSW Police Force, forensic anthropologist, OEH, Heritage Division, registered Aboriginal parties etc) and in accordance with the Public Health Act 1991.

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