

Wongawilli Colliery
North West Mains Modification:
Historical Heritage Assessment and
Statement of Heritage Impact

FINAL REPORT

Prepared for Wollongong Coal Ltd

13 July 2021

Biosis offices

NEW SOUTH WALES

Albury

Phone: (02) 6069 9200
Email: albury@biosis.com.au

Newcastle

Phone: (02) 4911 4040
Email: newcastle@biosis.com.au

Sydney

Phone: (02) 9101 8700
Email: sydney@biosis.com.au

Western Sydney

Phone: (02) 9101 8700
Email: sydney@biosis.com.au

Wollongong

Phone: (02) 4201 1090
Email: wollongong@biosis.com.au

VICTORIA

Ballarat

Phone: (03) 5304 4250
Email: ballarat@biosis.com.au

Melbourne

Phone: (03) 8686 4800
Email: melbourne@biosis.com.au

Wangaratta

Phone: (03) 5718 6900
Email: wangaratta@biosis.com.au

Document information

Report to:	Wollongong Coal
Prepared by:	Samantha Keats Gary Vines
Biosis project no.:	33219
File name:	33219.NW.Mains.SoHI.FIN02.20210713
Citation:	Biosis 2020. Wongawilli Colliery North West Mains Modification: Historical Heritage Assessment and Statement of Heritage Impact. Report for Wollongong Coal. Keats, S. and G. Vines. Biosis Pty Ltd. Wollongong, NSW. Project no. 33219.

Document control

Version	Internal reviewer	Date issued
Draft version 01	Amanda Markham	22/09/2020
Final version 01	Samantha Keats	26/10/2020
Final version 02	Samantha Keats	13/07/2021

Acknowledgements

Biosis acknowledges the contribution of the following people and organisations in undertaking this study:

- Wollongong Coal: Eladio Perez, Peter Roser.
- EMM: Nicole Armit, Thomas Frankham.

Biosis staff involved in this project were:

- Anne Murray (mapping).

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Glossary

c.	Circa
CBD	Central Business District
CHL	Commonwealth Heritage List
CMP	Conservation Management Plan
DA	Development Application
DEE	Department of the Environment and Energy
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
Heritage NSW	Heritage NSW, Department of Premier and Cabinet (DPC)
LEP	Local Environmental Plan
LGA	Local Government Area
NHL	National Heritage List
NSW	New South Wales
NWMD	North West Mains Development
SHI	State Heritage Inventory
SHR	State Heritage Register
SoHI	Statement of Heritage Impact
study area	The area of impact for the proposed works
WCL	Wollongong Coal Ltd
WCC	Wongawilli Colliery
WDCP	Wollongong Development Control Plan 2009
WLEP 2010	Wingecarribee LEP 2010
WLEP 2009	Wollongong LEP 2009

Summary

Biosis Pty Ltd was commissioned by Wollongong Coal Ltd (WCL) to undertake a heritage assessment and statement of heritage impact (SoHI) for the proposed North West Mains Development (NWMD) works at the Wongawilli Colliery (WWC) in the Southern Coalfields, NSW (the study area). The study area is located approximately 9.5 kilometres west of Dapto and approximately 18 kilometres south-west of the Wollongong Central Business District (CBD), on the eastern edge of the Illawarra Escarpment.

The study area, defined by the area of impact of the proposed works, consists of the Wongawilli Pit Top and the Additional Driveage. This assessment approach has been undertaken to allow for assessment of both the study area as well as any additional areas in the broader study area which are likely to be affected by the proposal, either directly or indirectly. The study area is within or in the vicinity of three listed heritage items of both local and State significance. Significant heritage values identified within the study area include:

- Two heritage items, including Avon Dam and Wongawilli Colliery.
- One conservation areas, including Illawarra Escarpment Landscape Area.

The proposed development at the Wongawilli Pit Top will consist of an additional conveyor being installed to connect the conveyor portal of the existing infrastructure in order to re-utilise the existing infrastructure. The new conveyor will consist of two 5 x 7 metre driveheads and a 2 x 63 metre conveyor belt held up by pillars that will be located on a steep slope between the NWMD portal and the existing conveyor.

The Wongawilli Colliery, which began operations in 1906, was a major supplier of coke and coal in the NSW steel industry, firstly to C & G Hoskins steel works at Lithgow and from 1938 onwards to steel works at Port Kembla. The colliery saw the introduction of a transport system from the mine to the base of the escarpment, with the longest coal haulage incline in the world established in 1936 and man transport train established in 1940. It was also one of the first collieries where the Joy 4JCM (continuous miner) was used in Australia. This was the first installation in the world of a conveyor designed to lower coal 191 metre in elevation at a fast rate. Wongawilli Colliery is listed as a heritage item of local significance.

The project is likely to have partial direct impacts on Wongawilli Colliery. The existing conveyor is part of a large complex of structures identified as B9 in the CMP and having little significance but associative archaeological significance. The Conservation Management Plan (CMP) policy states that buildings and structures of associative significance need only be retained and conserved where required. No removal or demolition of the existing conveyor will occur; however, there will be some alternation to the fabric of B9 where the new conveyor connects to the existing conveyor. In addition, the proposed works are also in close proximity the Dumper House (B4), which has high significance and primary archaeological significance. Direct impacts may occur to this building due to the use and movement of machinery that could inadvertently damage the building.

The Additional Driveage part of the study area crosses the curtilage of the Avon Dam. As the driveage is being developed using the first workings mining method, no impacts are expected to the ground surface. Natural or seasonal variations in surface levels due to wetting and drying of soils are approximately 20 millimetres, and thus subsidence less than this can be considered no more than the variations occurring from natural processes, and should have negligible impacts on both natural and man-made surface infrastructure (CoA 2014, MSEC 2007, Hume Coal 2017). A geotechnical report provided by SCT Operations Pty Ltd (2020) confirmed this, with the geotechnical assessment concluding that there is no potential for any perceptible surface subsidence impacts as a result of the proposed Additional Driveage.

The Illawarra Escarpment Landscape Area is located adjacent to the Wongawilli Pit Top part of the study area. Temporary visual and noise impacts will occur during the proposed works but this will be resolved upon completion of the project and not result in any lasting impacts to the heritage item.

Therefore, if the appropriate mitigation measures are employed, it is considered that the works associated with the NWMD modification is acceptable from a heritage perspective, and that any loss of heritage significance through the proposed works will be appropriately managed if the recommendations are followed.

Recommendations

Recommendation 1 Archival recording

A digital photographic archival recording of the Wongawilli Pit Top part of the study area should be undertaken prior to any works occurring. This is in accordance with Policy 12 of the CMP. The archival recording should comply with the NSW Heritage Council guidelines *How to Prepare Archival Records of Heritage Items* and *Photographic Recording of Heritage Items Using Film or Digital Capture 2006*.

Recommendation 2 Protection of Dumper House (B4)

It is recommended that the fencing surrounding the Dumper House (B4) be clearly marked with high visibility bunting to protect it from any possible damage during the construction of the new conveyor. This is in accordance with Policy 5 of the CMP.

Recommendation 3 Unexpected finds procedure

Relics are historical archaeological resources of local or State significance and are protected in NSW under the *Heritage Act*. Relics cannot be disturbed except with a permit or exception/exemption notification. Should unanticipated relics be discovered during the course of the project, work in the vicinity must cease and an archaeologist contacted to make a preliminary assessment of the find. Heritage NSW will require notification if the find is assessed as a relic.

1 Introduction

1.1 Project background

Biosis Pty Ltd was commissioned by WCL to undertake a heritage assessment and SoHI for the proposed NWMD at the WWC in the Southern Coalfields, NSW (the study area).

WWC is an underground coal mine located approximately 15 kilometres south-west of Wollongong. A project approval was initially granted to Gujarat NRE Coking Coal Limited (the previous owners of WWC) on 2 November 2011, for mining operations within the WWC mining lease area until 31 December 2015. The project approval was granted a modification in 2015, which permitted mining operations to continue until 31 December 2020. The proposed modification is seeking to extend the life of the mine by 5 years to enable Wollongong Coal to continue development of the approved NWMD.

To date, approximately 500 metres of the NWMD has been developed prior to the Colliery going into care and maintenance in July 2019. Furthermore, the modification largely seeks approval to extend the length of NWMD by approximately 2.9 kilometres to access the existing Wongawilli Ventilation Shaft 1 and construction of a new section of coal conveyor system, approximately 60 metres in length, at the Wongawilli Upper top pit. The NWMD would continue to be extracted via first workings mining method using two continuous miners. WCL committed in 2019 to no longer undertake mining via longwall extraction methods. As such no longwall mining is proposed as part of this modification application.

1.2 Location of the study area

The study area is located approximately 9.5 kilometres west of Dapto and approximately 18 kilometres south-west of the Wollongong CBD (Figure 1), on the eastern edge of the Illawarra Escarpment. The study area is within the:

- Wollongong Local Government Area (LGA).
- Parish of Kembla.
- County of Camden.

The study area is surrounded in all directions by the Illawarra escarpment and Upper Nepean Catchment area and straddles Lake Avon. For this assessment, the study area is defined as the combined footprint of both the works at the Wongawilli Pit Top, and the Additional Driveage (Figure 2).

1.3 Proposed development

The footprint of the NWMD has been divided into two sections; the Wongawilli Pit Top, and the Additional Driveage (Figure 3).

Wongawilli Pit Top

The Wongawilli Pit Top is located at the top of a private road north west of Jersey Farm Road, Wongawilli. It is bounded on the west by the Illawarra Escarpment State Conservation Area. Access to the driveage will be via two existing portal entries on the uppermost bench of the pit top, with one being used for the transport of people and materials, and one being used to convey coal from the mine. In order to re-utilise the existing infrastructure at the Wongawilli Pit Top an additional conveyor will be installed to connect the conveyor portal

to the existing infrastructure. The new conveyor will consist of two 5 x 7 metre driveheads and a 2 x 63 metre conveyor belt held up by pillars. An additional one metre of vegetation will be cleared as a buffer around the structure, to allow access and maintenance.

Additional Driveage

The proposed additional driveage will consist of four underground roadways to be developed using first workings mining methods. This will involve the development of four 5.5 metre wide headings, drifts or roadways, and interconnecting cut-throughs with continuous miners. These will provide access to the coal resource, colliery ventilation and corridors for personnel and material movement within the seam and coal conveyor network. Works have commenced on the driveage, with approximately 500 metres developed within the Bulli Coal Seam. The modification largely seeks to extend the length of NWMD by approximately 2.9 kilometres to access the existing Wongawilli Ventilation Shaft 1 and construction of a new section of coal conveyor system, approximately 60 metres in length, at the Wongawilli Upper top pit.

As the driveage is being developed using the first workings mining method, no impacts are expected to the ground surface. The first workings method involves parallel tunnels known as 'headings' being driven into the coal seam from the mine entrance using remote controlled coal cutting. These form a series of self-supporting roadways, leaving behind a grid of pillars. The pillars are designed to provide stability to the void in the long term and support the roof strata above the seam. Where the pillars have been designed to be stable, the vertical subsidence is typically less than 20 millimetres.

Natural or seasonal variations in surface levels due to wetting and drying of soils are approximately 20 millimetres, and thus subsidence less than this can be considered no more than the variations occurring from natural processes, and should have negligible impacts on both natural and man-made surface infrastructure (CoA 2014, MSEC 2007, Hume Coal 2017). A geotechnical report provided by SCT Operations Pty Ltd (2020), confirmed this, with the geotechnical assessment concluding that there is no potential for any perceptible surface subsidence impacts as a result of the proposed additional Driveage.

1.4 Scope of assessment

This report was prepared in accordance with current heritage guidelines including *Assessing Heritage Significance*, *Assessing Significance for Historical Archaeological Sites and 'Relics'* and the *Burra Charter*^{1,2}. This report provides a heritage assessment to identify if any heritage items or relics exist within or in the vicinity of the study area. The heritage significance of these heritage items has been investigated and assessed in order to determine the most appropriate management strategy.

The following is a summary of the major objectives of the assessment:

- Identify and assess the heritage values associated with the study area. The assessment aims to achieve this objective through providing a brief summary of the principle historical influences that have contributed to creating the present – day built environment of the study area using resources already available and some limited new research.
- Assess the impact of the proposed works on the cultural heritage significance of the study area.
- Identifying sites and features within the study area which are already recognised for their heritage value through statutory and non – statutory heritage listings.

¹ (Heritage Office 2001)

² (Australia ICOMOS 2013)

- Recommend measures to avoid or mitigate any negative impacts on the heritage significance of the study area.

1.5 Limitations

This report is based on historical research and field inspections. It is possible that further historical research or the emergence of new historical sources may support different interpretations of the evidence in this report.

The historical research undertaken for this report is based on primary documents including Crown and deposited plans, Certificates of Title and historical parish maps. This information was supplemented by existing assessments and reports. Together this information was utilised to present a history of the study area. The archaeological survey was constrained by the presence of built fabric and modified ground surface areas in some locations, limiting the observations of ground surface and identification of potential archaeological resources. Although this report was undertaken to best archaeological practice and its conclusions are based on professional opinion, it does not warrant that there is no possibility that additional archaeological material will be located in subsequent works on the site. This is because limitations in historical documentation and archaeological methods make it difficult to accurately predict what is under the ground.

The significance assessment made in this report is a combination of both facts and interpretation of those facts in accordance with a standard set of assessment criteria. It is possible that another professional may interpret the historical facts and physical evidence in a different way.

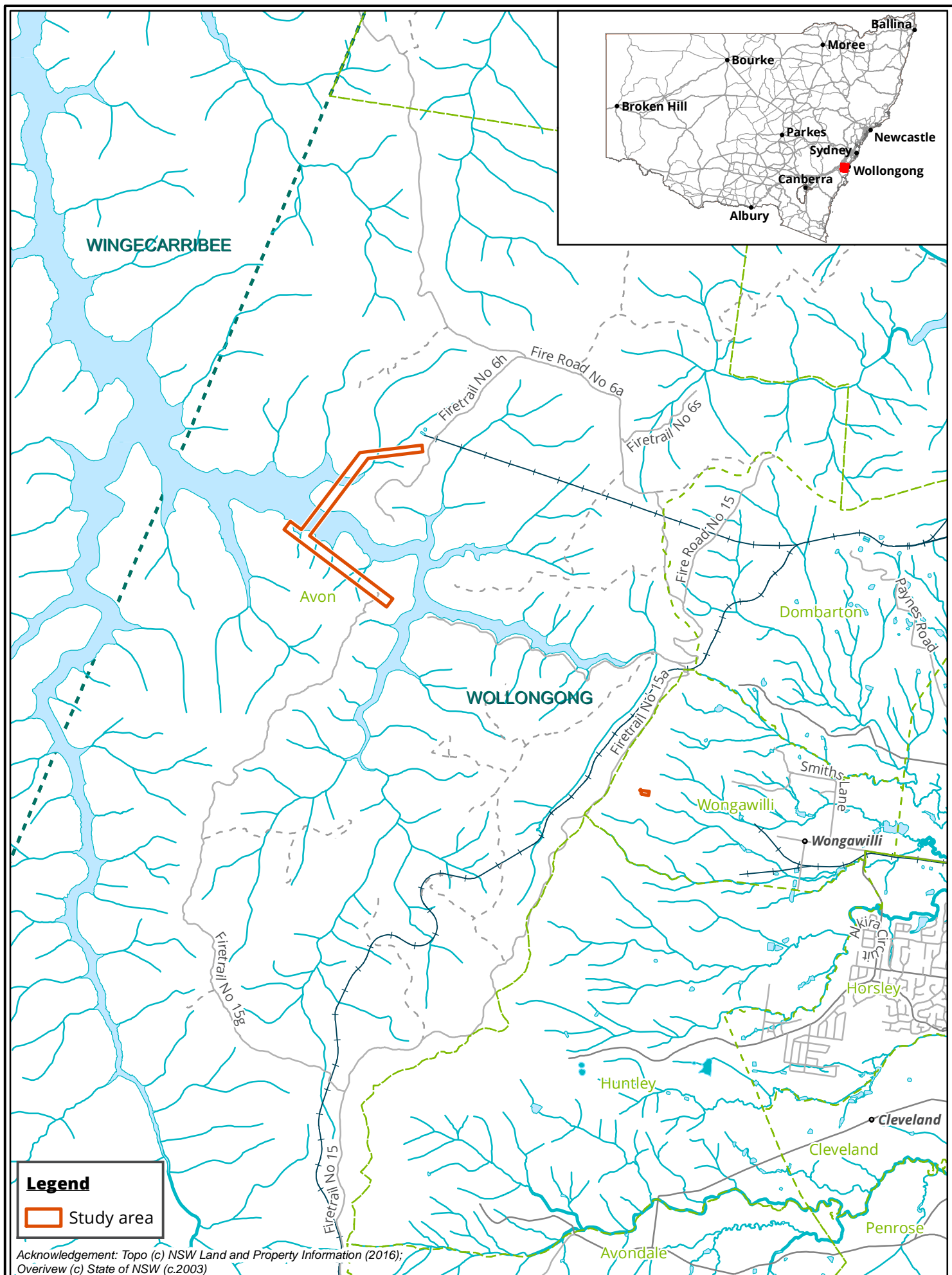
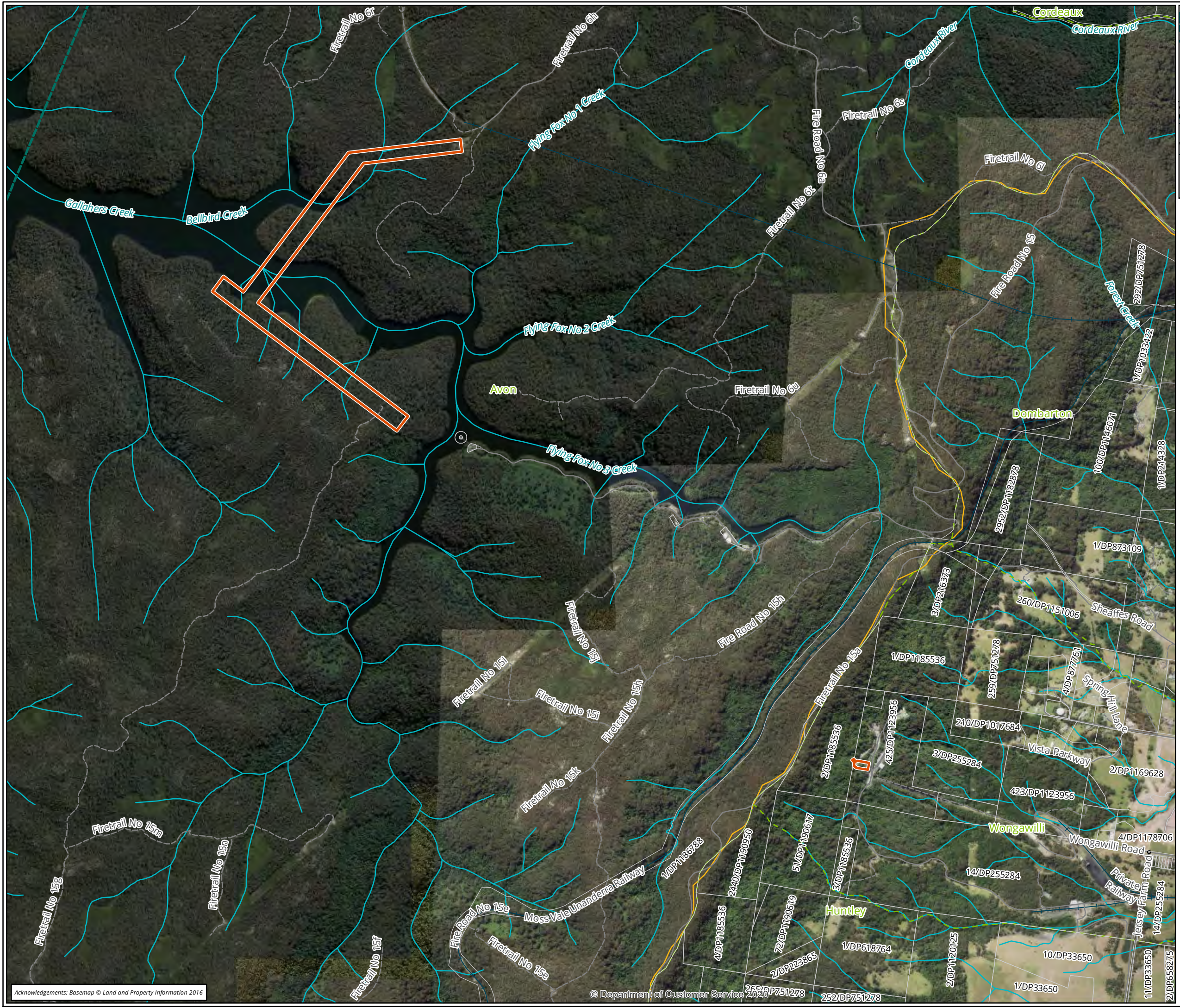


Figure 1 Location of the study area



- Legend**
- Study area
 - Lot


Figure 2 Study area detail

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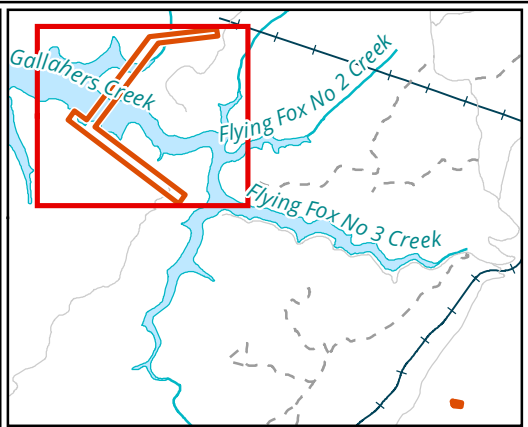
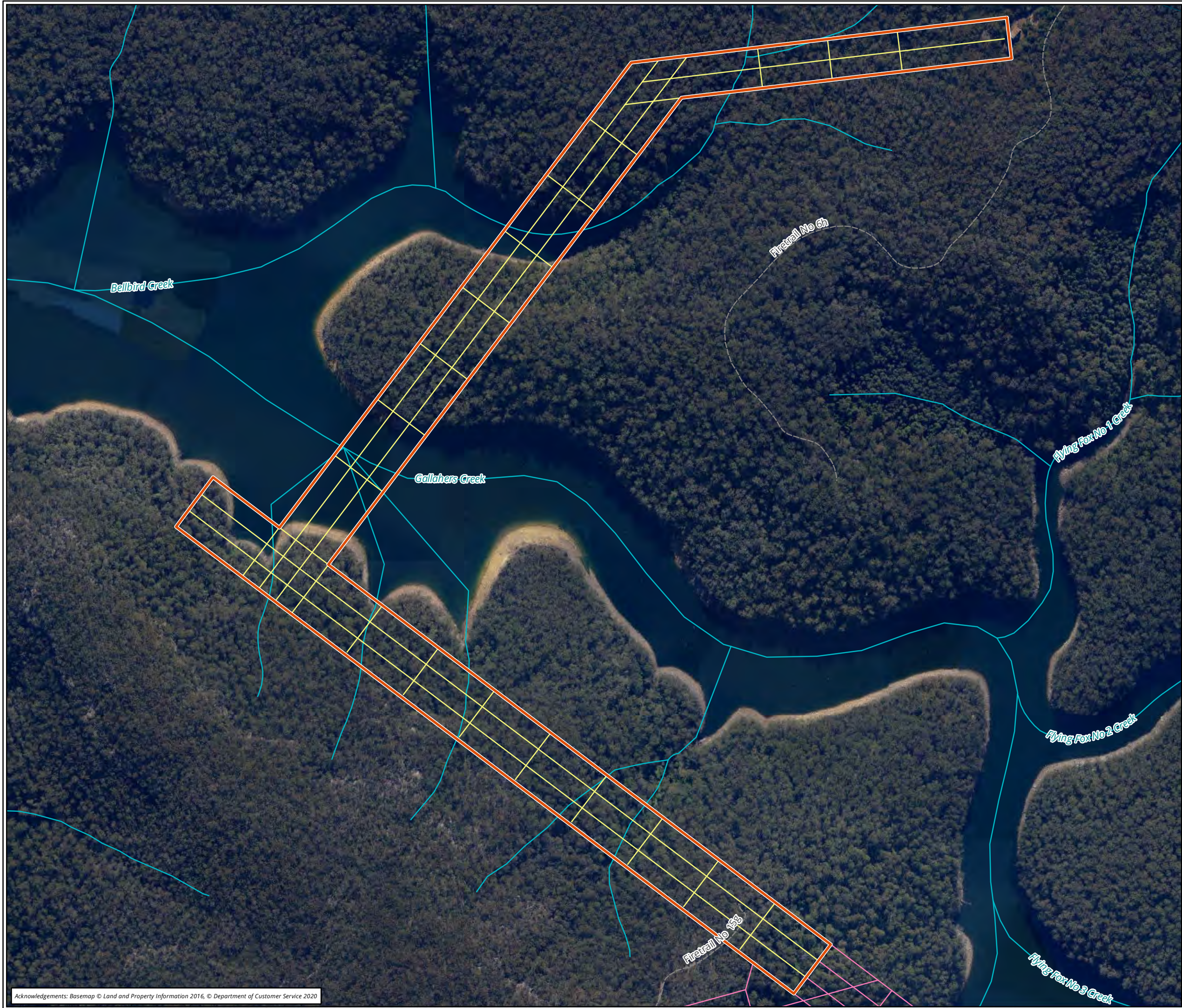
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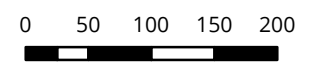


Legend

-  Study area
- Development**
-  Approved
-  Proposed

Figure 3 Proposed works

Additional driveage



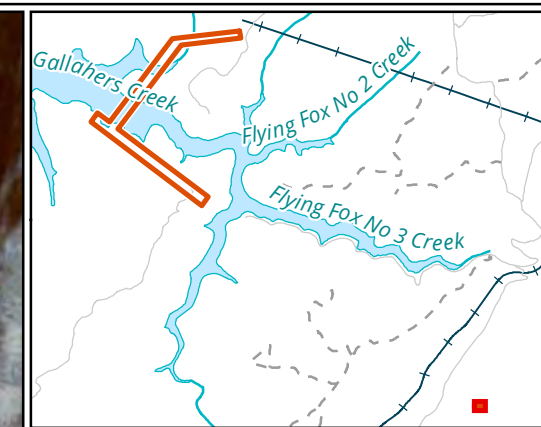
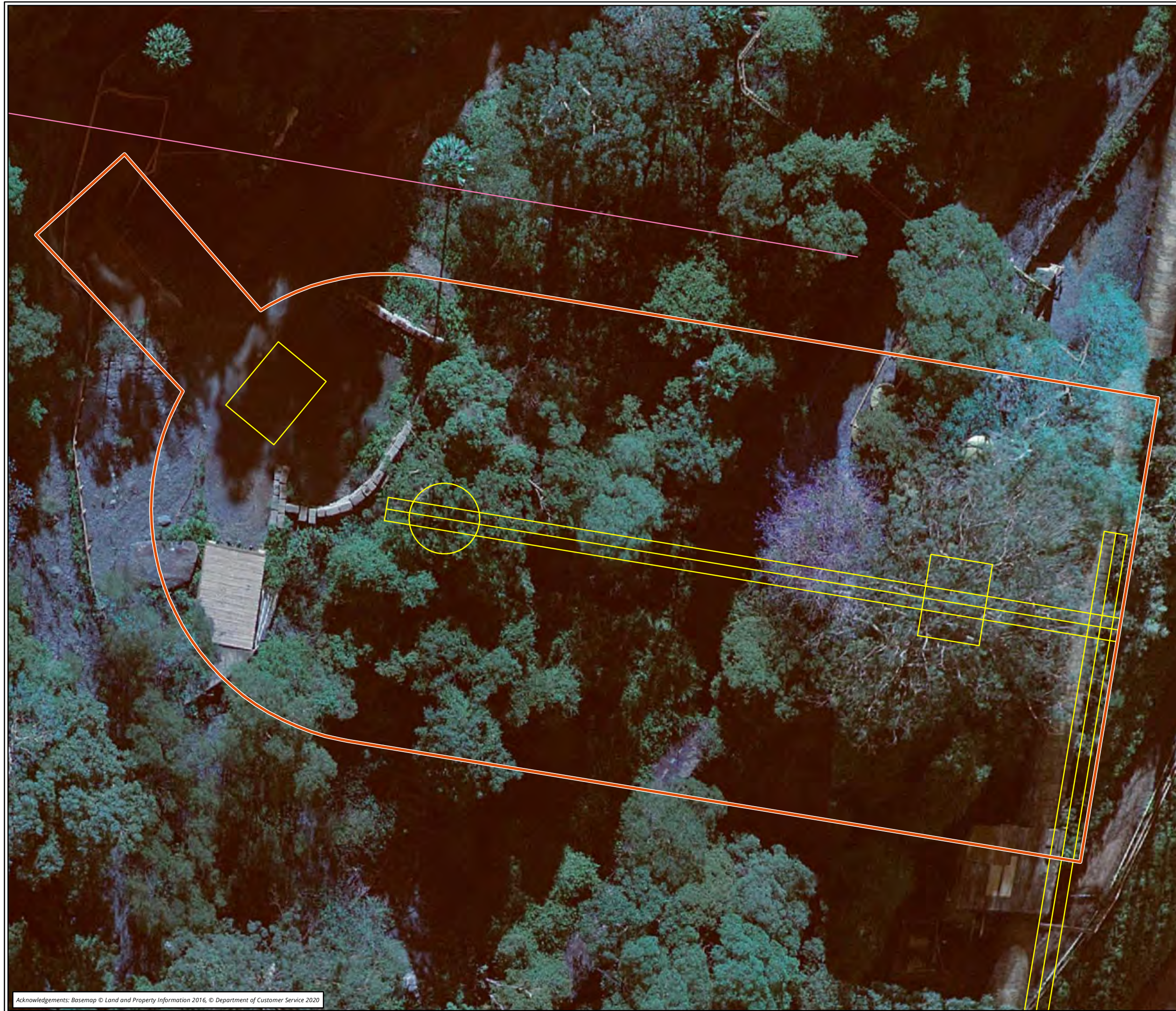
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Legend

 Study area

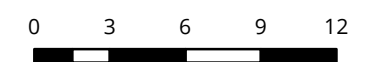
Development

 Approved

 Proposed

Figure 3 Proposed works

Wongawilli Pit Top



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2 Statutory framework

In NSW cultural heritage is managed in a three-tiered system: national, state and local. Certain sites and items may require management under all three systems or only under one or two. The following discussion aims to outline the various levels of protection and approvals required to make changes to cultural heritage in the state.

2.1 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Act 1999* (EPBC Act) is the national Act protecting the natural and cultural environment. The EPBC Act is administered by the Department of the Environment and Energy (DEE). The EPBC Act establishes two heritage lists for the management of the natural and cultural environment:

- The National Heritage List (NHL) contains items listed on the NHL have been assessed to be of outstanding significance and define 'critical moments in our development as a nation'.³
- The Commonwealth Heritage List (CHL) contains items listed on the CHL are natural and cultural heritage places that are on Commonwealth land, in Commonwealth waters or are owned or managed by the Commonwealth. A place or item on the CHL has been assessed as possessing 'significant' heritage value.⁴

A search of the NHL and CHL did not yield any results associated with the study area.

2.2 NSW Heritage Act 1977

Heritage in NSW is principally protected by the *Heritage Act 1977* (as amended) which was passed for the purpose of conserving items of environmental heritage of NSW. Environmental heritage is broadly defined under Section 4 of the *Heritage Act 1977* as consisting of the following items: 'those places, buildings, works, relics, moveable objects, and precincts, of State or Local heritage significance'. The Act is administered by the Heritage Council, under delegation by the Heritage Division, Heritage NSW. The *Heritage Act 1977* is designed to protect both known heritage items (such as standing structures) and items that may not be immediately obvious (such as potential archaeological remains or 'relics'). Different parts of the *Heritage Act 1977* deal with different situations and types of heritage and the Act provides a number of mechanisms by which items and places of heritage significance may be protected.

2.2.1 State Heritage Register

Protection of items of State significance is by nomination and listing on the State Heritage Register (SHR) created under Part 3A of the *Heritage Act 1977*. The Register came into effect on 2 April 1999. The Register was established under the *Heritage Amendment Act 1998*. It replaces the earlier system of Permanent Conservation Orders as a means for protecting items with State significance.

A permit under Section 60 of the *Heritage Act 1977* is required for works on a site listed on the SHR, except for that work which complies with the conditions for exemptions to the requirement for obtaining a permit. Details of which minor works are exempted from the requirements to submit a Section 60 Application can be

³ 'About National Heritage' <http://www.environment.gov.au/heritage/about/national/index.html>

⁴ 'Commonwealth Heritage List Criteria' <http://www.environment.gov.au/heritage/about/commonwealth/criteria.html>

found in the Guideline 'Standard Exemptions for Works requiring Heritage Council Approval'. These exemptions came into force on 5 September 2008 and replace all previous exemptions.

There is one item listed on the SHR within the study area. The following heritage items are listed:

- Avon Dam (Item No. SHR 01358), Avon Dam Road, Avon Dam. Transects the study area.

2.2.2 Archaeological relics

Section 139 of the *Heritage Act 1977* protects archaeological 'relics' from being 'exposed, moved, damaged or destroyed' by the disturbance or excavation of land. This protection extends to the situation where a person has 'reasonable cause to suspect' that archaeological remains may be affected by the disturbance or excavation of the land. This section applies to all land in NSW that is not included on the SHR.

Amendments to the *Heritage Act 1977* made in 2009 changed the definition of an archaeological 'relic' under the Act. A 'relic' is defined by the Heritage Act as:

'Any deposit, object or material evidence:

(a) Which relates to the settlement of the area that comprises New South Wales, not being Aboriginal settlement, and

(b) Which is of State or Local significance'.

It should be noted that not all remains that would be considered archaeological are relics under the NSW *Heritage Act 1977*. Advice given in the Archaeological Significance Assessment Guidelines is that a 'relic' would be viewed as a chattel and it is stated that,

'In practice, an important historical archaeological site will be likely to contain a range of different elements as vestiges and remnants of the past. Such sites will include 'relics' of significance in the form of deposits, artefacts, objects and usually also other material evidence from demolished buildings, works or former structures which provide evidence of prior occupations but may not be "relics".'⁵

If a relic, including shipwrecks in NSW waters (that is rivers, harbours, lakes and enclosed bays) is located, the discoverer is required to notify the NSW Heritage Council.

Section 139 of the *Heritage Act 1977* requires any person who knows or has reasonable cause to suspect that their proposed works will expose or disturb a 'relic' to first obtain an Excavation Permit from the Heritage Council of NSW (pursuant to Section 140 of the Act), unless there is an applicable exception (pursuant to Section 139(4)). Excavation permits are issued by the Heritage Council of NSW in accordance with sections 60 or 140 of the *Heritage Act 1977*. It is an offence to disturb or excavate land to discover, expose or move a relic without obtaining a permit. Excavation permits are usually issued subject to a range of conditions. These conditions will relate to matters such as reporting requirements and artefact cataloguing, storage and curation.

Exceptions under Section 139(4) to the standard Section 140 process exist for applications that meet the appropriate criterion. An application is still required to be made. The Section 139(4) permit is an exception from the requirement to obtain a Section 140 permit and reflects the nature of the impact and the significance of the relics or potential relics being impacted upon.

If an exception has been granted and, during the course of the development, substantial intact archaeological relics of state or local significance, not identified in the archaeological assessment or statement required by this exception, are unexpectedly discovered during excavation, work must cease in the affected area and the Heritage Office must be notified in writing in accordance with section 146 of the *Heritage Act 1977*. Depending

⁵ (NSW Heritage Branch, Department of Planning 2009, p.7)

on the nature of the discovery, additional assessment and, possibly, an excavation permit may be required prior to the recommencement of excavation in the affected area.

2.2.3 Section 170 Heritage and Conservation Registers

Section 170 of the *Heritage Act 1977* requires that culturally significant items or places managed or owned by Government agencies are listed on departmental Heritage and Conservation Register. Information on these registers has been prepared in accordance with Heritage Division guidelines.

Statutory obligations for archaeological sites that are listed on a Section 170 Register include notification to the Heritage Council in addition to relic's provision obligations. There is one item within or adjacent to the study area that is entered on a State government instrumentality Section 170 Register.

- WaterNSW – Avon Dam, Avon Dam Road, Bargo. Transects the study area.

2.3 Environmental Planning and Assessment Act 1979

2.3.1 Wollongong Local Environmental Plan 2009

The Wollongong LEP (WLEP) 2009 contains schedules of heritage items that are managed by the controls in the instrument. Heritage items in the vicinity of the study area are identified in Figure 5. The study area is within and in the vicinity of items of local significance on the WLEP 2009, Schedule 5:

- Wongawilli Colliery (Item No. 7100), Wongawilli Road, Part Lot 14, DP 255284; Lot 1, DP 321054 and Part Lot 244, Part Lot 255 and Part Lot 258, DP 751278. Located within the Wongawilli Pit Top portion of the study area. This item also has an archaeological component.

The study area is also situated within the vicinity of a conservation area of local significance:

- Illawarra Escarpment Landscape Area. Adjacent to the Wongawilli Pit Top portion of the study area.

2.3.2 Wingecarribee Local Environmental Plan 2010

The Wingecarribee LEP (WLEP) 2010 contains schedules of heritage items that are managed by the controls in the instrument. Heritage items in the vicinity of the study area are identified in Figure 5. The study area is within and in the vicinity of items of local significance on the WLEP 2010, Schedule 5:

- Avon Dam (Item No. I224), Avon Dam Road, Yerrinbool. Transects the study area.

2.3.3 Wollongong Development Control Plan 2009

The Wollongong Development Control Plan 2009 (WDCP) outlines built form controls to guide development. The WDCP supplements the provisions of the Wollongong LEP.

Chapter B6 (Development in the Illawarra Escarpment) states that if the subject site contains an item of environmental heritage or is within a heritage conservation area, a heritage impact assessment report will be required to accompany any Development Application for a subdivision or development upon the subject site. In addition, the preparation of the heritage impact assessment report must be carried out in accordance with the requirements of the Heritage Chapter in Part E of the WDCP.

Wongawilli Colliery (Item No. 7100) is listed as local heritage item that contains an archaeological component. The WDCP has a number of controls relating to archaeological sites such as:

- Any Development Application which proposes the disturbance or development of a heritage item listed in Schedule 5 of the WLEP 2009 as an 'archaeological site', or where the site is known, or is likely, to contain an archaeological site, is to undertake an Archaeological Assessment and to submit the assessment as part of the Heritage Impact Statement or Conservation Management Plan.

- Any development that involves the disturbance of archaeological sites shall not proceed without the appropriate approvals under the *NSW Heritage Act 1977*. The applicant should seek advice from the Heritage Branch in relation to these requirements.
- New development should be designed to avoid impacts on archaeological sites that are considered to be of heritage significance.
- Where new development will have direct or indirect impacts on an archaeological site, interpretive measures should be given careful consideration as part of the proposed development in order to mitigate the impacts of the proposal.
- Any disturbance of archaeological sites is to be conditional of Council's requirements and those of the NSW Heritage Council.

Illawarra Escarpment Landscape Area is listed as conservation item on the WLEP 2009. It is located adjacent to the Wongawilli Pit Top portion of the study area; therefore, the general principles of heritage conservation areas applies:

- Retain the existing street patterns that reflect the successive original subdivision patterns.
- Amalgamation of allotments should only be allowed where the new or replacement development is in the form and layout pattern of those existing dwellings on separate allotments.
- 'Contributory A' and 'Contributory B' buildings should not be demolished and their contributions to the areas are to be maintained or enhanced. It is an aim to improve the streetscape qualities of buildings through the removal or reversal of unsympathetic elements, where applicable.
- Neutral buildings may only be demolished if they are to be replaced by a building that will contribute to the character of the relevant Heritage Conservation Area. In this respect new contemporary dwellings are allowable in conservation areas, but must respect the significance and character of the area and ultimately contribute to the respective Heritage Conservation Area. New contemporary dwellings must strive to enhance the significance of the area by contributing to the quality of the built environment.
- Intrusive buildings may be demolished but must be replaced by a building that will contribute to the character of the respective area.
- Any proposed alteration and addition to an existing dwelling or a new infill dwelling will be assessed on its merits taking into account the relationship of the proposed development with the form, scale, building materials and streetscape character of existing dwellings in the conservation area.
- The removal of original detailing or the enclosure of verandahs on the front façade of a dwelling will generally not be permitted.
- Any first floor alteration or addition to a dwelling shall not impact upon the contribution of a building to the streetscape character of the area.

2.4 Wongawilli Colliery Conservation Management Plan

A CMP was prepared for the Wongawilli Colliery by Biosis (2011), which assessed the significance of historical elements of the Wongawilli Pit Top, bath house bench, coal handling area, incline and portals, mine managers house and associated landholdings in their historical context and with regard to more recent alterations and additions. The CMP considered the significance of surviving historical fabric at the mine and concluded that parts of the site have high cultural significance and any proposed works could be managed to ensure they will

have only minimal impact on the cultural significance of the place. Results of the assessment showed the following levels of significance along with their archaeological significance (in brackets):

Table 1 Summary of components and levels of significance

Grading	Elements
Exceptional	<p>The surviving original fabric of the following buildings and structures:</p> <p>B1 – Old Fan Room (Primary)</p> <p>B2 – Old Offices, lamp room, bath room, entry stairs (Primary)</p> <p>B11 – Man Transport (Primary)</p> <p>B15 – No 1 Man Transport Winding House (Primary)</p> <p>B16 – Old Powerhouse (Primary)</p> <p>B18 – “Wonga” managers house (Primary)</p>
High	<p>The surviving original fabric of the following buildings:</p> <p>B3 – Carpenters Shop (Primary)</p> <p>B4 – Dumper house (Primary)</p> <p>B5 – Storage Shed – Old Workshops (Primary)</p> <p>B6 – Loco Charging Station (Primary)</p> <p>F1 – Mine Dam (Primary)</p> <p>F2 – Coke Ovens archaeological area (Archaeological)</p> <p>F3 – Bankbook Hill (Archaeological)</p> <p>W11A – Old Main Rope Haulage Drift Portal (Primary)</p> <p>W12 – Old Main Fan Portal (Primary)</p> <p>W13 – Old No 1 South Track Portal (Primary)</p>
Moderate	<p>B7 – Fire Station (Contributory)</p> <p>B14 – Bath House (Contributory)</p> <p>W8 – Belt Conveyor Inspection Portal (Contributory)</p> <p>W9 – Belt Conveyor Portal (Contributory)</p> <p>W10 – Loco Track Portal (Contributory)</p> <p>W11 – Old Portal (Contributory)</p> <p>W11B – “Wombat Hole” (access to W11A) (Contributory)</p>
Little	<p>B8 – Office (Associative)</p> <p>B9 – Breaker Building and Transfer Bunker (Associative)</p> <p>B10 – Decline Conveyor coal bins and stack out conveyor (Associative)</p> <p>B11a – Man Transport Shed (Associative)</p> <p>B12 – Diesel Shed (Associative)</p> <p>B13 – New Workshops (Associative)</p> <p>B17 – Coal Bins and Loading-out Gantries (Associative)</p> <p>W4 – Rangers Portal (Associative)</p> <p>W5 – Daylight Entry Portal (Associative)</p> <p>W6A – Rubber-Tyred Vehicle Transport (RTV) Portal (Associative)</p> <p>W6 – Main Transport (Track) Portal (Associative)</p> <p>N6, N7 – Forest 11 Portal (Associative)</p>
Intrusive	<p>Those items, which in their present form adversely affect the significance of the place:</p> <p>B19 – New bathhouse (constructed 2010)</p> <p>B20 – Fan Shed near reworked transport portal (constructed 2010)</p> <p>W7 – New Transport Portal, former Old Prospect Tunnel (no surface evidence - reconstructed 2010)</p>

Grading	Elements
	W16 – New Conveyor Portal (constructed 2010)

In summary, it was recommended that the elements of the site of primary and contributory significance be retained and maintained in a re-usable condition. This will ensure that the significance of the place is not compromised, whilst continuing the mine's operational requirements.

Buildings and structures of **primary significance** should be retained, and their visual and structural integrity preserved. Active conservation works should be carried out to ensure their preservation. Such works need only involve ensuring the buildings remain structurally sound and have adequate external integrity to prevent ingress of rain. Continued use of elements of primary significance is encouraged as this will ensure their survival as part of a whole.

Buildings and structures of **contributory significance** should be conserved to the extent that no demolition work, removal of building fabric or other major disturbance should be carried out. Active conservation of these buildings and structures need only be carried out in the event of future upgrading or reuse being necessary.

Buildings and structures of **associative significance** need only be retained and conserved where required. However, if demolition or removal is required, then consideration should be given to the impact of this action on the potential future use and conservation of the primary and contributory buildings.

A category of **archaeological significance** has also been determined based on the potential for significant archaeological remains to be present in specified areas.

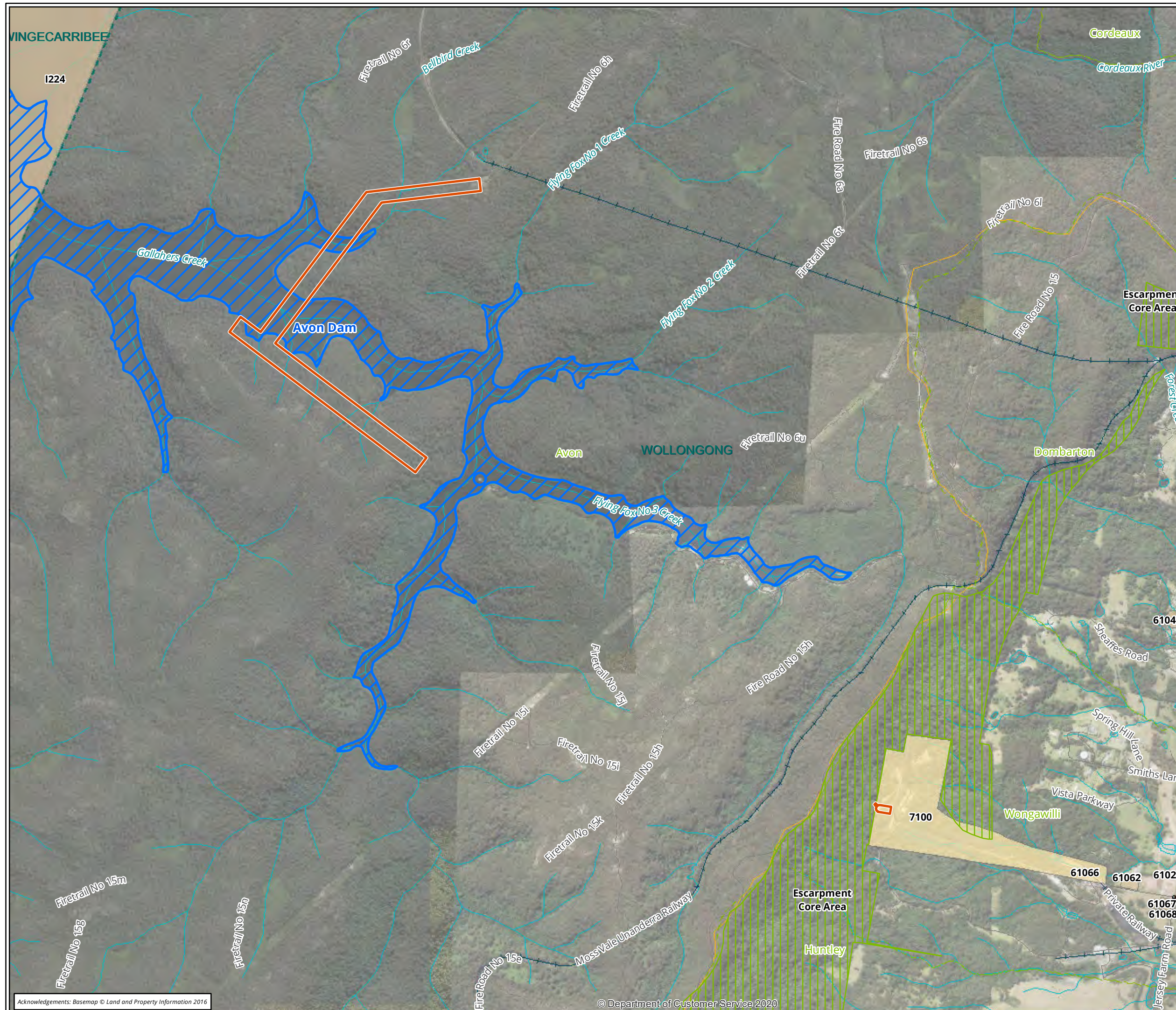
All existing portals in the vicinity of the Wongawilli Colliery, should also be treated so that there is minimal disturbance to the surface structures and immediate surrounding area as far as is practical considering health and safety regulations. Buildings not identified as of primary, contributory or associative significance are of no significance and can be retained, altered or demolished as required.

2.5 Summary of heritage listings

A summary of heritage listings within and in the vicinity of the study area is presented in Table 1 and Figure 4.

Table 2 Summary of heritage listings within and adjacent to the study area

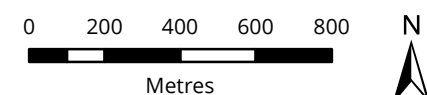
Site number	Site name	Address / Property description	Listings		Significance
			Individual item	As a Conservation Area	
01358	Avon Dam	Avon Dam Road, Avon Dam	State Heritage Register	–	State
–	Avon Dam	Avon Dam Road, Bargo	WaterNSW	–	State
1224	Avon Dam	Avon Dam Road, Yerrinbool	Wingecarribee LEP 2010	–	State
7100	Wongawilli Colliery	Wongawilli Road, Part Lot 14, DP 255284; Lot 1, DP 321054 and Part Lot 244, Part Lot 255 and Part Lot 258, DP 751278	Wollongong LEP 2009	–	Local
–	Illawarra Escarpment Landscape Area	Adjacent to the Wongawilli Pit Top portion of the study area	–	Wollongong LEP 2009	Local



Legend

- Study area
- State heritage item
- Local heritage item**
 - Conservation Area - Landscape
 - Item - Archaeological
 - Item - General
 - Item - Landscape

Figure 8 Heritage items in the vicinity of the study area



Scale: 1:20,000 @ A3
Coordinate System: GDA 1994 MGA Zone 56



Matter: 33219,
Date: 26 June 2020,
Checked by: SJK, Drawn by: AEDM, Last edited by: amurray
Location: P:\33200s\33219\Mapping\33219_F8_HerItems.mxd

3 Historical context

Historical research has been undertaken to identify the land use history of the study area, to isolate key phases in its history and to identify the location of any built heritage or archaeological resources which may be associated with the study area. The historical research places the history of the study area into the broader context of the Illawarra.

3.1 Topography and resources

The study area is located within the southern Woronora Plateau, an area typically characterised as 'level to rolling pattern of plains, rises and low hills standing above a cliff, scarp or escarpment that extends around a large part of its perimeter' (Speight 2009, p.69). It comprises deeply incised creek valleys resulting in steep, high sandstone cliffs and high ridgelines. Typical landform elements associated with plateau landform patterns described by Speight (2009) present within the study area include: cliff, hillcrest, hillslope and drainage depressions. Cliffs are very wide, steep to precipitous slopes that are eroded usually by gravity, water-aided mass movement or sheet wash. Rock flats are flat or bare consolidated rock eroded by sheet wash. Hillcrests and hillslopes are very gently to gently inclined slopes eroded mainly by sheet wash, creep or water-aided mass movement. Drainage depressions are level to gently inclined depressions rising to moderately inclined side slopes.

3.2 Aboriginal past

The Illawarra region is the traditional land of the Wodi Wodi, a group of people who spoke a variant of the Dharawal language (Wesson 2009). The area occupied by this group extended from Botany Bay down the coast to around Nowra. To the north of the Wodi Wodi, the Darug are identified, to the west are the Gundangurra, and in the south the Thoorga (Dhauga) are identified (Tindale 1974). The areas inhabited by each of the groups are considered to be indicative only and would have changed through time and may have been dependent on certain circumstances (i.e. availability and distribution of resources). Interactions between different types of social groupings would have varied with seasons and resource availability. Traditional stories tell of the arrival of the Wodi Wodi to Lake Illawarra, bringing with them the Dharawal or cabbage tree palm from which their language is named (Wesson 2009, p.5). Analysis of middens in the region has provided dates of occupation dating back 6000 to 7000 years on the coast and at Lake Illawarra, and it is accepted that Aboriginal occupation of the south coast dates to around 20,000 years ago (AMBS 2006).

The Illawarra escarpment, named Merrigong, has great symbolic and historical importance for local Aboriginal people and has a number of named mountains. These include Wonga (Wongawilly), meaning native pigeon, Djera (Keira), meaning wild turkey, and Kembla derives from either Jum-bulla, meaning wild game abundant or plenty of game, or from Djembla, meaning wallaby (Wesson & New South Wales Government Office of Environment and Heritage 2005). Aboriginal creation stories express the deep cultural and physical connections between the people and their environment. High places are generally culturally important and were an important area for ceremonial practices and a rich source of food, medicine and other resources (NSW National Parks and Wildlife Service 2018).

3.3 Illawarra – historical development

While the Illawarra Region was noted by explorers from the 1770s, and first attracted settlers in the 1800s, cedar getters were the first to open up the district as early as 1805. When they had exhausted the easily

accessible timber by 1820, cattle grazing took over and the coastal plain was extensively settled and cleared for pastoral estates and farms.

3.3.1 Exploration and early settlement

The earliest settlements in the Colony were generally located in areas such as rivers and coastal areas which could be easily accessed by boat. Transport by water was vital for the development of the colony as passengers and goods could be moved with little requirement for capital works. The south coast of NSW was settled following this pattern with coastal or riverine locations chosen for the earliest settlements.

The Illawarra district was first noted by James Cook in 1770 when he located the headland of Port Kembla, naming it 'Red Point'. He also identified a large hill which looked like the crown of a hat. This was Mount Kembla, which was known as Hat Hill in the early days of the settlement. The next recorded Europeans to visit the Illawarra district were Bass and Flinders in 1796, who sailed along the south coast from Sydney in their small boat, the Tom Thumb. Following their landing near Tom Thumb Lagoon, they entered Lake Illawarra and made the first recorded contact with the Aboriginal people in the Illawarra (McDonald McPhee Pty Ltd 1991).

In 1797, the *Sydney Cove* was wrecked in Bass Strait and survivors made their way along the 600 kilometres of coastline to find help, losing several members of their party to 'hostile natives' as they went. Camping overnight at Coalcliff, the survivors used coal found in a seam to keep warm. The survivors were eventually rescued and taken to Sydney, where their report of the coal led Bass to be sent back to the area to investigate the report. Bass located a coal seam 6 feet thick; however this resource was not utilised for a further 80 years. During this visit Bass also located and named the Shoals-haven and the Shoalhaven River (Osbourne 2000).

The first settlement in the Illawarra region was established by Charles Throsby Smith (C.T. Smith), who cut a cattle track from Glenfield to just behind South Beach, Wollongong, where he constructed a stockman's hut and cattle yard in 1815 (Osbourne 2000). Joe Wild was Throsby's stockman, and was also made constable of the district of Five Islands in 1815 (McDonald 1966). The following year, Surveyor-General John Oxley was sent to the Illawarra region to make a general survey of the area and to connect it to the known parts of the colony, as well as identify specific lands for prospective grantees (Osbourne 2000).

Although C.T. Smith was the first to pasture cattle in the Illawarra, closely followed by John Oxley, neither received land grants in the Illawarra region. The first five grants in the area were made in 1821 to absentee landlords, who ran cattle on their lands with a few stockmen present. C.T. Smith was promised Bustle Farm in 1821; however the deed of grant for his 300 acres, which would eventually become the site for the Town of Wollongong, was not issued until 20 December 1835. The Illawarra region was attractive not only for its rich pasture, but also for its Red Cedar, which was exploited by the early timber cutters. Between the cattlemen and the cedar cutters, passage into the Illawarra region was found. Grants continued to be made in the Illawarra region, comprising essentially free grants with easy terms, until August 1831, when land could only be purchased at auction. Following the gazetting of the Crown Lands Act 1861 any un-alienated land was taken up as Conditional Purchase holdings (Lindsay 1994).

3.3.2 Early development of mining

The first discovery of coal in what was to become known as the Illawarra Coalfield was in 1797. As early as 1849, oil-bearing shale from the slopes of Mount Kembla were tested by the Reverend W.B. Clarke:

"under the escarpment at the head of the Cordeaux River, and a little to the west of it and below Mount Kembla in the beds intersected by America Creek, a series of shales exist with coal, a portion of which are found to produce oil" (Sellers 1976).

Subsequently, the first kerosene shale mine in Australia was situated on a small plateau beside American Creek. This is the present day site of the Nebo Colliery, but at the time the land was owned by Mr. John Graham.

Coal was first mined at Mt Kembla in 1865 to fire the retorts for the Pioneer Kerosene Works. After John Graham sold his share of the Kerosene Works in 1874, the Mount Kembla Coal and Kerosene Company was formed and continued to operate until 1880, when the Mount Kembla Coal and Oil Co. commenced operations. By World War I, there were ten or more collieries being worked on the Illawarra escarpment, mostly to supply the Sydney market, although some coal was utilised in the production of coke. In 1916, G and C Hoskins Ltd. purchased the Wongawilli Colliery in order to produce coking coal to augment coke supplies at its Lithgow Iron & Steel Works.

3.3.3 Wongawilli

Wongawilli is a company town established to serve the Wongawilli colliery, which is one of a series of escarpment coal mines in the Illawarra Region, developed from the mid to late 19th century. Early land grants in the Wongawilli locality belonged to John Vaughan Thompson, James, Peter, Martin & Patrick Larkin, John & James Miller, William Rose, John Hoare, Timothy Jardine and John Biggar. This included the area that was to become the Wongawilli Village and Colliery.

John Biggar held a land grant on the escarpment (Portion 294) and was digging coal on his block in the 1880s (Plate 2). This was close to the site of the later Wongawilli Mine, and probably involving the same coal seam. Adjacent blocks were granted to James Miller (Portion 255, immediately east of Biggar's block and containing the surface workings of the Wongawilli Mine), and Timothy Jardine (Portion 263, south of Wongawilli Mine and containing the Southern Entries).

References to prospecting in this vicinity can be found in Harper's (1915) report on the Southern Coal-field. Quoting earlier Department of Mines Annual Reports, he confirms that prospecting tunnels were described on the property of the late John Biggar as early as 1888, 'located 120 chains south west of the Ocean View Colliery (South Kembla Colliery) on Portion 294, Parish of Kembla' (NSW Department of Mines 1890, pp.255–259). Several tunnels are indicated, with one on the top seam (Bulli Seam) and another on the 4-foot seam.

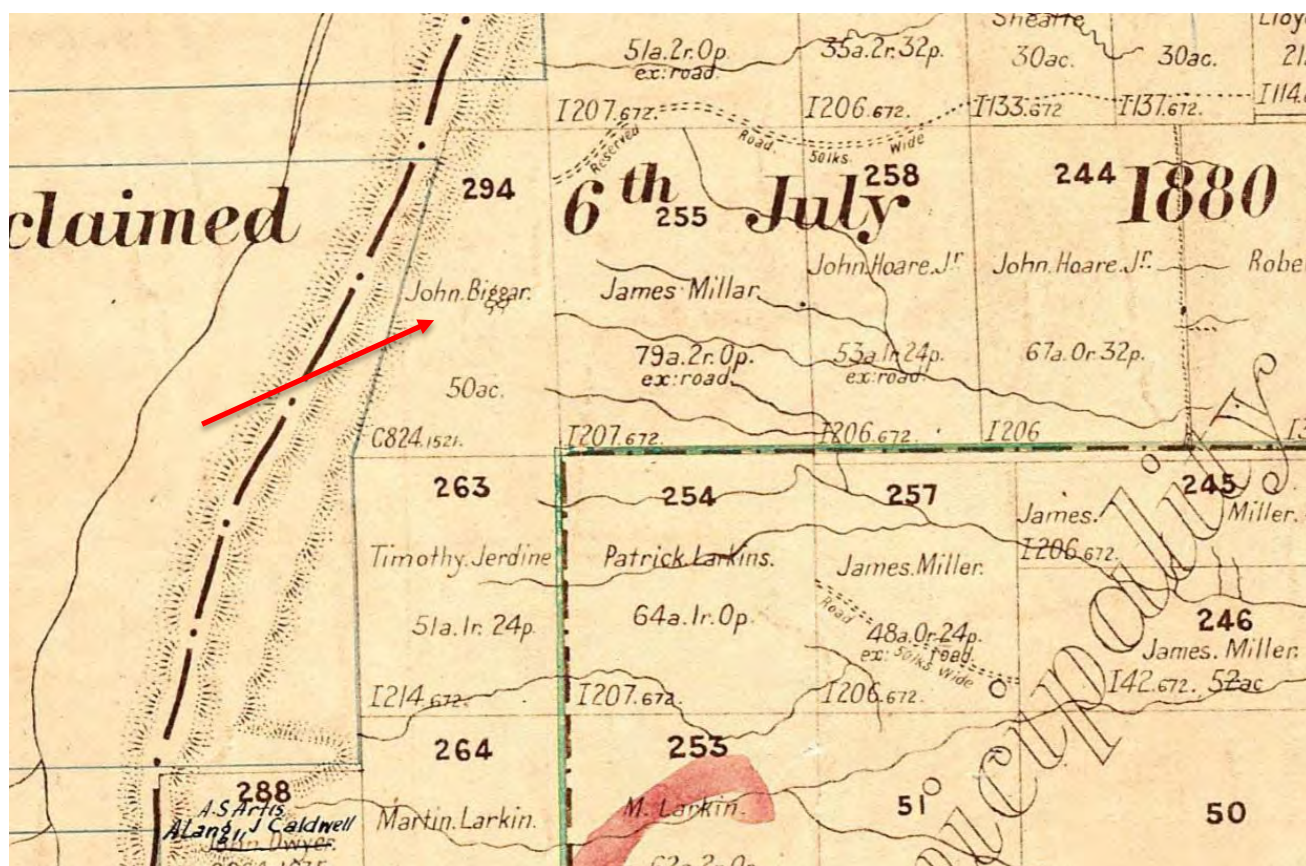


Plate 1 1880 parish map showing the early land grants near the study area, marked with a red arrow (Source: NSW Land Registry Services)

In 1906, Andrew Lang (possibly Alexander) a prominent local business person, was prospecting in the area of Wongawilli, where a tunnel had been driven into a coal seam exposed on the hillside (Walker 2003, p.26). Upon his discovery he applied for the grant of Crown Portion MP6 previously held by Biggar. L.F. Harper, the Government Geological Surveyor, inspected the site in 1907 and reported in 1915 that the seam being prospected by Lang had not previously been worked by any of the South Coast collieries (Harper 1915, p.94).

The mineral lease (Coal and Shale) No 321 was taken out for Portion MP6 by Alexander Lang on 11 December 1916. Walter Lang, a Wollongong butcher, whose commercial ambitions exceeded his capital, had operated the small mine with a tiny workforce for several years (Photo 1). It is unclear what his relationship was with the Andrew (or Alexander) Lang who had prospected here a decade earlier, but it might be assumed they were brothers or father and son (Hagen & Wells 1997). In any case, Lang's prospecting paid off, not through coal mining, but by selling to Hoskins.



Photo 1 First coal from the Wongawilli Mine, date unknown (Source: Wollongong City Council)

3.3.4 Wongawilli Colliery

Wongawilli was essentially a mining village, which grew around the Wongawilli Colliery developed by G and C Hoskins Limited in 1916 (Cousins 1948). Charles and George Hoskins were pioneers in the iron and steel industry in NSW. They invested in Lithgow Iron and Steel in 1908 and expanded the operation in the 1920's to three open hearth furnaces with a total capacity of 230 tons (Hoskins 1995, p.53).

In order to secure an improved supply of coking coal for Lithgow, G and C Hoskins directed their search to the south coast of NSW, which was by then securely leased from Helensburgh to Mount Kembla. The search was concentrated south of Mount Kembla because the coal in this region had strong coking characteristics. In 1916, G and C Hoskins Limited purchased the Wongawilli Colliery in order to produce coking coal to augment coke supplies at its Lithgow Iron & Steel Works. The younger Cecil Hoskins described the deal:

"After testing the coal for coking quality, my father and I met Mr Lang at Wongawilli in 1916 and, after clambering over the hills in the area until we were exhausted, we purchased from him the lease of Wongawilli Colliery from which very little coal had ever been extracted."

The coal at the number 3 seam that was worked at the Wongawilli mine was dirty, so to clean it, a washing plant was built at the colliery (Photo 2). This was one of the first washeries on the coast and reduced the ash in the coal from 25% to 14%. The product of the washery was capable of making very high grade coke and having established this, Hoskins took up extra acreage at the back of the leases secured by Mr Lang.



Photo 2 View of the coal washeries, date unknown (Source: Wollongong City Council)

1916 and 1917 were busy years for the mine, with the *Illawarra Mercury* reporting progress on opening the mines, building coke ovens, construction of buildings, and excavation of dams. A contract was let for the excavation of a four mile long tunnel in March 1917, and by August the incline and 20 coke ovens were ready for use. A coal crusher was installed by April 1918. The powerhouse, used for driving the conveyors, pumps and electric locomotives and lighting the works and some of the mine, was constructed in 1916 to 1917 and extended during the following decade (Photo 3).

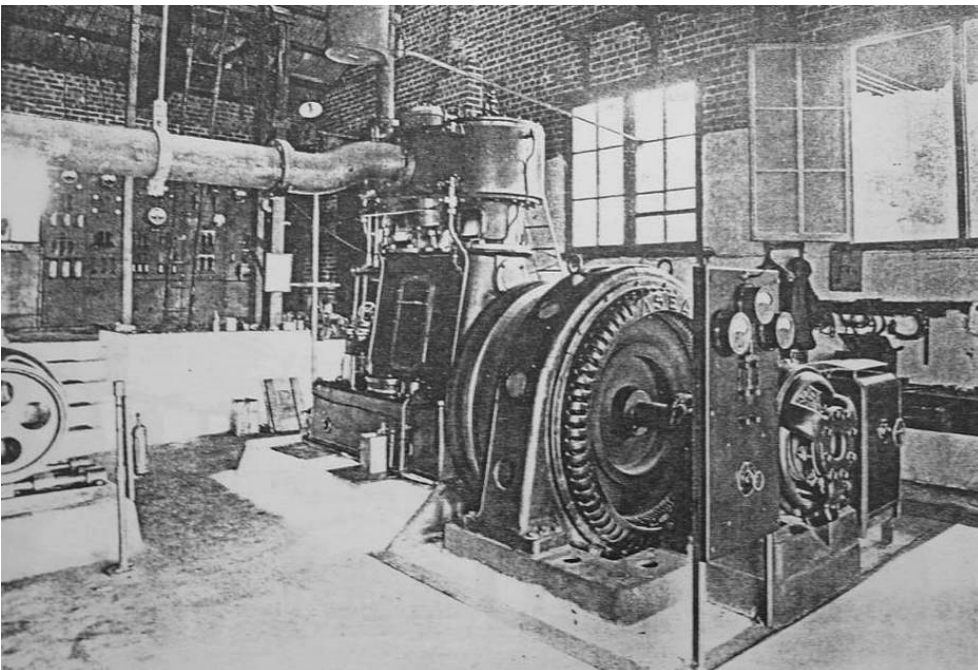


Photo 3 Interior of the powerhouse, date unknown (Source: Wollongong City Council)

The Wongawilli colliery was connected to the main southern railway on 25 November 1916 and in 1917 coal was being transported from the mine to Hoskins Iron and Steel Co Lithgow works, via a rather circuitous route, up the South Coast line to Sydney, then back down the Main Southern Line to Lithgow (Jacobs 1977). Initially a row of 40 ovens was installed and the resulting coke was transported to Lithgow by rail. In 1925, a further 40 ovens were added. To meet the increased demand for coke with the erection of the Port Kembla blast furnace the Wongawilli battery was increased from 80 to 120 ovens in 1927. These ovens were Belgian non-by-product ovens (Hoskins 1995).

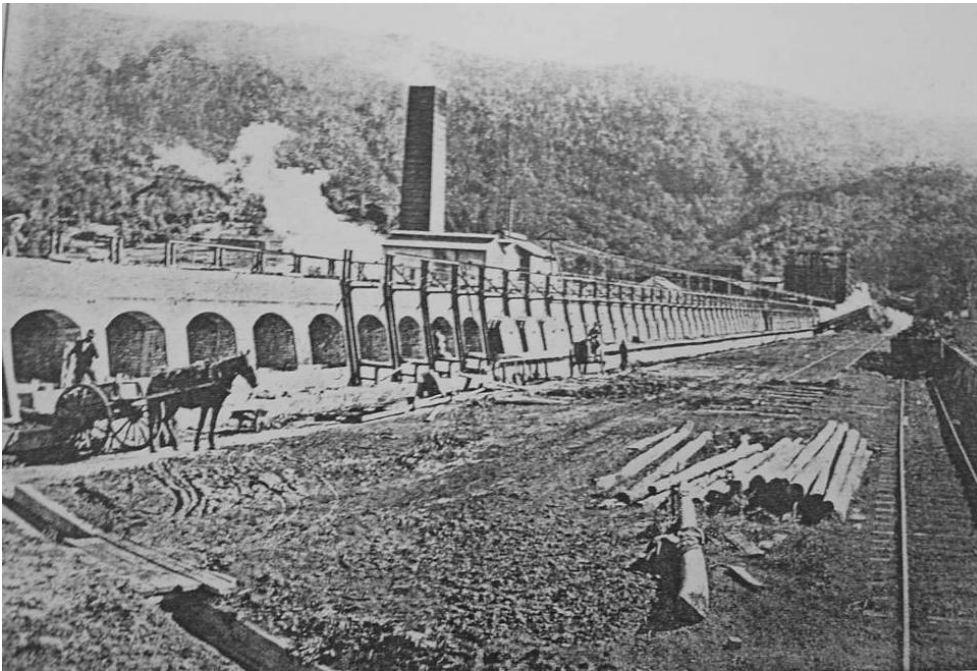


Photo 4 Coke ovens with chimney and powerhouse in the background, date unknown (Source: Wollongong City Council)

In 1919 the company donated land at Wongawilli to the Parish of St Luke's, Dapto and an Episcopalian Church Hall was built prior to 1925. In 1927 the Wongawilli Public School was opened in the Church Hall and the Wongawilli Parents and Citizens Association formed. Hoskins' foresight in developing this mine was vindicated when Wongawilli became an essential factor in the development of the Port Kembla Iron and Steel Works (Hoskins 1995).

In 1929, two new tunnels were opened, one on the Number 6 seam and one in a seam already worked but further south, possibly the Woonona Seam. Three haulage motors were in use and eight pumps, all driven by electricity, presumably generated at the mine's own power station, which was located at the north end of the coke ovens.

Hoskins had difficulty in developing his Lithgow steel works because of the rising cost of freight, and the need to transport both raw materials and finished products. After securing extensive high-grade iron ore reserves in Western Australia, it was clear that a coastal site would provide considerable advantage. In 1924, Hoskins bought 400 acres at Port Kembla, near the recently completed new government-built port, and borrowed £300,000 to erect a blast furnace, jetty and ancillary works. The company then pressed the NSW government to build a rail line from Moss Vale near Marulan on the Great Southern Line (where Hoskins had recently acquired extensive limestone deposits) to Port Kembla (Hoskins 1995).

Hoskins Iron and Steel Company, however, was not able to mobilise enough capital on its own to finance the venture and so negotiations were begun with two British Steel companies, Dorman Long and Baldwins Limited, with the latter transferring its little-used rolling mill from Sydney. The shipping company Howard Smith also joined in the group to form Australian Iron & Steel Limited (AIS) in May 1928. AIS therefore became the owner of the Lithgow Ironworks, the Port Kembla Works, the Wongawilli mine and coke ovens, and various other facilities (Hoskins 1995).

Unfortunately for this new venture, the steel works had hardly begun production when the Great Depression struck the Australian economy causing the Port Kembla Steel works, coal mines and other industries to reduce production by up to 90% and by 1933, employment in the mines declined to half the 1929 level (Hagan & Wells 1997, pp.60–61). Inability to compete with BHP's Newcastle works, and an untenable contract with BHP for supply of ore, led AIS in October 1935, to approach BHP with an offer to merge.

Wongawilli Colliery was operated by BHP Illawarra Coal from 1935 until June 2005 and they formed the Elouera Colliery from the merger of the previous Wongawilli Colliery and Nebo Colliery in 1993. Gujarat NRE Coking Coal Limited acquired the mining leases in December 2007 and the operation was renamed Wongawilli Colliery. Gujarat NRE was renamed WCL on 25 March 2014, following Jindal Steel and Power Limited of India acquiring a majority shareholding in WCL.

3.3.5 Avon Dam

The study area is also located within parts of the curtilage of Avon Dam. During the early years of the 20th century, work on the Nepean Water Scheme that included Cataract, Cordeaux, Nepean and Avon dams began in order to supply water to meet the needs of the increasing population in Sydney and its suburbs (Heritage NSW 2019). In 1921, the Public Works Department, under contract to the Government, commenced work on the Avon Dam. It was designed and constructed under the supervision of the Public Works engineer, E.M. DeBurgh.



Photo 5 Avon Dam (Source: Water NSW)

The sandstone for the Cyclopean Masonry Blocks, renowned at the time for strength and durability, was quarried from sandstone blocks on site and a neighbouring creek. This involved quarrying sandstone blocks on site, which were fitted into an irregular pattern and packed with sandstone concrete. The blocks were lifted into place by electric powered cranes. All the materials for the construction of the dam were hauled by truck from Bargo over a specially made road built by World War I veterans living in a rehabilitation camp nearby. A township was constructed for the dam construction workers, which was placed on the hillside overlooking the spill. It still contains a rubbish tip, road system and incinerator (Heritage NSW 2019).

The dam storage area was cleared of all timber and brush and an extensive area of Coachwood timber *Ceratopetalum apetalum* was harvested from the storage basin, which was used in the construction of buildings in the Nepean township. Avon dam was completed in 1927 and handed over to the Water Board in 1928. Avon Dam was strengthened in 1971 by buttressing the downstream face with a rock fill embankment. A tunnel linking Avon and Nepean dams, to enable the transfer of water between dams in either direction, was completed in 1973 and, in the 1980s, the downstream face of the dam was strengthened.

The water level within the Avon River is approximately 50 metres higher than before the dam construction and the valley floor has been inundated. All of this inundated area would have been part of the Narrabeen Group geological formation.

3.3.6 Illawarra Escarpment Landscape Conservation Area

Illawarra Escarpment Landscape Conservation Area covers an area of approximately 3,900 hectares and is spread across Wollongong, Shellharbour and Kiama LGA's. The escarpment extends from Royal National Park south for approximately 50 kilometres to Budderoo National Park and Barren Grounds Nature Reserve (NSW National Parks and Wildlife Service 2018). It includes the edge of the Woronora Plateau and its upper foothill slopes and possesses attributes such as natural rock exposures, forests and pasture lands, and threatened and protected species (NSW Heritage 2020). The escarpment forms a magnificent backdrop to the heavily developed industrial and newly emerging residential areas below and the adjacent narrow coastal plain exaggerates the vertical scale of the escarpment.

Cliffs of the escarpment are generally sheer and spectacular and extend for an extraordinary length of relatively unbroken cliff lines. The varying colours of the sandstone exposures contrast with the mixed heath vegetation and low forest at the plateau edge and the mature eucalypt forest and pockets of lush remnant rainforest near the cliff base. The area has a number of historic features from pioneer cedar cutting activities and associated settlements, mining sites and early isolated homes.

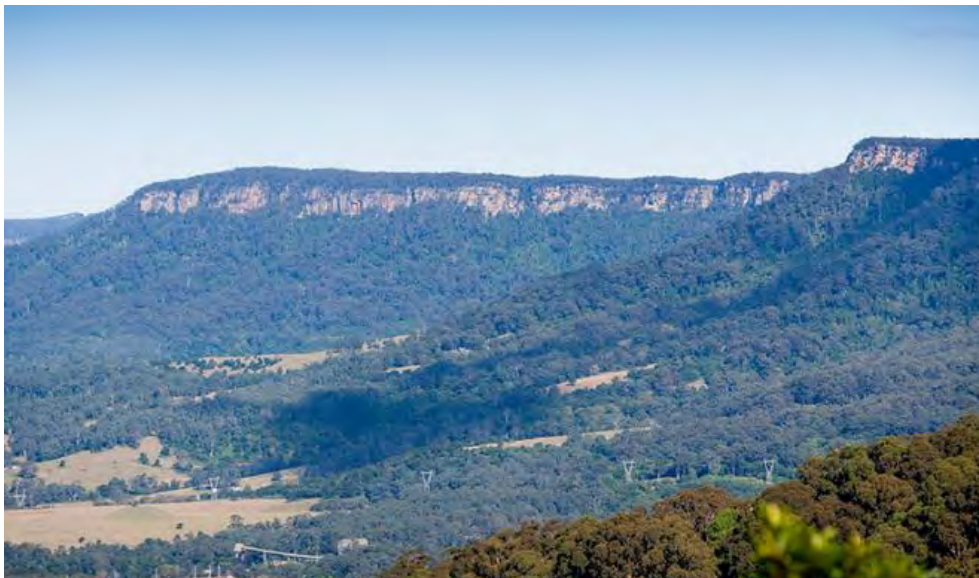


Photo 6 Illawarra escarpment (Source: National Parks and Wildlife Service)

3.4 Chronology of the study area

The chronology of the study area can be found in the Wongawilli Colliery CMP (Biosis Pty Ltd 2011) in Appendix 2.

3.5 Research themes

Contextual analysis is undertaken to place the history of a particular site within relevant historical contexts in order to gauge how typical or unique the history of a particular site actually is. This is usually ascertained by gaining an understanding of the history of a site in relation to the broad historical themes characterising Australia at the time. Such themes have been established by the Australian Heritage Commission (AHC) and the Heritage Office and are outlined in synoptic form in Historical Themes⁶.

There are 38 State historical themes, which have been developed for NSW, as well as nine National historical themes. These broader themes are usually referred to when developing sub-themes for a local area to ensure they complement the overall thematic framework for the broader region.

A review of the contextual history in conjunction with the Illawarra thematic history has identified one historical theme which relates to the occupational history of the study area. This is summarised in Table 3.

Table 3 Identified historical themes for the study area

Australian theme	NSW theme	Local theme
Tracing the natural evolution of Australia	Environment – naturally evolved	Features occurring naturally in the physical environment which have significance independent of human intervention
Developing local, regional and national economies	Mining	Activities associated with the identification, extraction, processing and distribution of mineral ores, precious stones and other such inorganic substances.

⁶ (NSW Heritage Council 2001)

4 Physical inspection

A physical inspection of the study area was undertaken on 16 September, attended by Samantha Keats, Consultant Archaeologist at Biosis. The principal aims of the survey were to identify heritage values associated with the study area; this included any heritage items (Heritage items can be buildings, structures, places, relics or other works of historical, aesthetic, social, technical/research or natural heritage significance. 'Places' include conservation areas, sites, precincts, gardens, landscapes and areas of archaeological potential).

4.1 Site setting and built fabric assessment

4.1.1 Wongawilli Pit Top

The site of the Wongawilli Colliery comprises two main works area joined by an incline haulage and conveyor. The lower area comprises the Bathhouse Bench, coal bins, loaders and former coke Ovens Site, while the upper area comprises what is known now as the Wongawilli Pit Top, located about half way up the Illawarra Escarpment, with a number of mine portals, offices, workshops and various other buildings.

The portals are located between the 250-270 metres contours, locating them between the Top Seam/Bulli Seam and Balgownie and Wongawilli Seams. They are on two main levels at the Pit Top, the original mine portals dating back to 1916, are on the upper-level immediately above the incline. Later portals are on the north bench about 10 metres lower down. A tramway bench (currently called the Fire Station Bench) was constructed south from the main mine bench after World War II, and possibly associated with the introduction of mechanised mining. The tramway bench was probably only used to store unused mine cars, and also provided space for a maintenance bridge on the tracks, a powder magazine and makeshift hose drying tower.

The historic core of the site includes the buildings and portals associated with the earlier (pre 1960s) mine operation, the range of buildings at the southern end from the dumper house down (carpenter shop, old offices, bathrooms, lamp room, old fan room), the old workshops and blacksmith (now loco charging station and storage) (Photo 7), garden beds, stone retaining walls, the man haulage, and the fire station (Photo 8). At the bottom level, the old power house is obviously important, and the 1959 coal bins and decline conveyor have considerable visual and landscape impact.

Other more modern buildings are located at the top of the incline, including the Main Office Block (Photo 9), Switch Room, Diesel Shed, Breaker Building and large steel/-framed workshop building. A number of smaller modern sheds are located on the North Bench (Photo 10). This includes the oil storage sheds, compressor shed and fuel bay. Further new structures were erected in 2010 as part of upgrading the mine by Gujarat NRE. This included a new bath house to the north of the former man transport shed, a fan shed near the reworked transport portal, a roof over the bunded areas (oil store), a new conveyor portal and access above old tumbler bench and a new car park south of the main bench. None of these new structures are considered to have any heritage values.

The locations of the mine areas detailed layout of the features can be found in the Wongawilli Colliery CMP (Biosis Pty Ltd 2011) in Appendix 2. During the current inspection, only the buildings and structures at the Wongawilli Pit Top were viewed and they appear to be in a similar condition to those reported in the CMP.



Photo 7 South facing photo of the loco charging station



Photo 8 West facing photo of the fire station



Photo 9 North facing photo of the main office block



Photo 10 North facing photo of storage sheds

4.1.2 Additional Driveage

The Additional Driveage part of the study area crosses two landforms, steep hills and steep low hills (Photo 11). The dense vegetation limited access to some cliff lines and many cliff lines, particularly the ones that expand along the edges of Avon River, are extremely high and in many places impassable. Much of the ground was covered with dead leaf and tree litter, obscuring the ground and making it almost impossible to identify any historical sites or objects. Wongawilli No. 1 vent shaft, located on the northern side of Avon River,

consists of the vent shaft and associated buildings (Photo 12), and an electrical substation. No historical sites or objects were identified within the Additional Driveage area.



Photo 11 West facing photo showing the steep terrain and low visibility



Photo 12 South facing photo of the Wongawilli Shaft 1

Archaeological assessment

The potential archaeological resource relates to the predicted level of preservation of archaeological resources within the study area. Archaeological potential is influenced by the geographical and topographical location, the level of development, subsequent impacts, levels of onsite fill and the factors influencing preservation such as soil type. An assessment of archaeological potential has been derived from the historical analysis undertaken during the preparation of this report.

4.1.3 Archaeological resource

This section discusses the archaeological resource within the study area. The purpose of the analysis is to outline what archaeological deposits or structures are likely to be present within the study area and how these relate to the history of land use associated with the study area.

The Wongawilli Colliery was established in 1906 and, given the length of time it was in operation and the nature of industrial sites, it is likely that the Wongawilli Pit Top area contains varying levels of archaeological material relating to activities associated with mining. Archaeological material likely to be encountered within the Wongawilli Pit Top area is likely to consist of coal and waste byproducts associated with mining, discarded machinery and materials and structural remains associated with former buildings and infrastructure.

There is also the potential for archaeological relics, in particular the pre-WWII period of use, and specific items such as the 1930s continuous rope haulage drive. Existing buildings and surfaces may also overlay demolition and fill deposits associated with the earlier configurations of the colliery. Evidence of earlier configurations of the colliery may exist in the form of building foundations, floor surfaces and abandoned infrastructure including the rail sidings services.

Within the Additional Driveage part of the study area, no historical sites or object were identified and combined with the lack of development within the WaterNSW catchment area, it is unlikely that archaeological deposits or structures will be present.

4.1.4 Integrity of sub-surface deposits

The integrity of sub-surface deposits is likely to be variable across the Wongawilli Pit Top area. Impacts on the archaeological resource are likely to relate to the clearing and excavation of foundations and fill deposits as part of the installation and upgrading of infrastructure.

4.1.5 Research potential

Archaeological research potential refers to the ability of archaeological evidence to provide information about a site that could not be derived from any other source and which contributes to the archaeological significance of that site. Archaeological research potential differs from archaeological potential in that the presence of an archaeological resource (i.e. archaeological potential) does not mean that it can provide any additional information that increases our understanding of a site or the past (i.e. archaeological research potential).

The research potential of a site is also affected by the integrity of the archaeological resource within a study area. If a site is disturbed, then vital contextual information that links material evidence to a stratigraphic sequence may be missing and it may be impossible to relate material evidence to activities on a site. This is generally held to reduce the ability of an archaeological site to answer research questions.

Assessment of the research potential of a site also relates to the level of existing documentation of a site and of the nature of the research done so far (the research framework), to produce a 'knowledge' pool to which research into archaeological remains can add.

Developing local, regional and national economies – mining

The Wollongong Colliery has been in operation since 1906 and was a major supplier of coke and coal in the NSW steel industry. The Wongawilli method of coal extraction was developed from 1958 onwards at this site and was adapted and used where practicable throughout the Illawarra and in other coal fields in Australia. The mine is significant for its history of shared facilities and use with the Wongawilli village and the special associations and meanings for residents and people who have worked in the mine. Whilst it has undeniable significance as an industrial facility, any archaeological remains associated with the development and operation of the colliery would be better answered through documentary sources.

4.1.6 Summary of archaeological potential

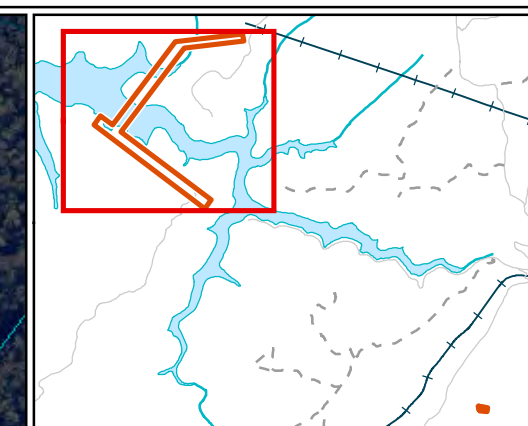
Through an analysis of the above factors a number of assumptions have been made relating to the archaeological potential of the study area, these are presented in Table 4 and Figure 5.

The assessment of archaeological potential has been divided into three categories:

- **High archaeological potential** – based upon the historical context and documentary evidence presented within this report there is a high degree of certainty that archaeologically significant remains relating to this period, theme or event will occur within the study area.
- **Moderate archaeological potential** – based upon the historical context and documentary evidence presented within this assessment it is probable that archaeological significant remains relating to this period, theme or event could be present within the study area.
- **Low archaeological potential** – based upon the historical context and documentary evidence presented within this assessment it is unlikely that archaeological significant remains relating to this period, theme or event will occur within the study area.

Table 4 Assessment of archaeological potential

Designation	Probable feature(s)	Possible construction date	Archaeological potential
Wongawilli Pit Top	Foundations, floors and deposits associated with the construction and operation of the colliery. Structures likely to be encountered include earlier configurations and the pre-WWII period of use and the 1930s continuous rope haulage drive. Demolition deposits and fills associated with the removal of buildings, by products and waste materials associated with the operation of the colliery.	1906 to present	Low
Additional Driveage	There is no historical evidence of occupation within this part of the study area. The Additional Driveage area has been part of WaterNSW catchment area since 1927 and has remained undeveloped. Any archaeological remains are likely to consist of ephemeral features and discarded items with no archaeological context.	N/A	Low



Legend

Study area

Archaeological potential

Low potential

Figure 5.1 Assessment of archaeological potential

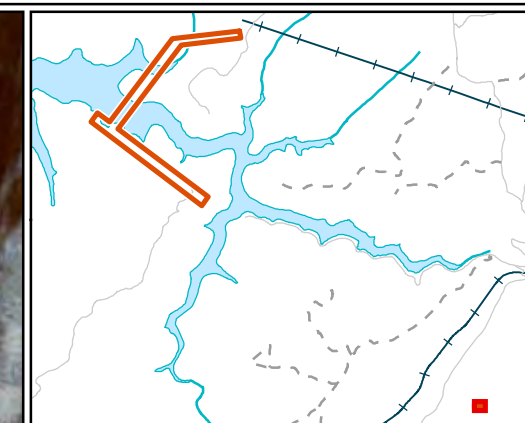
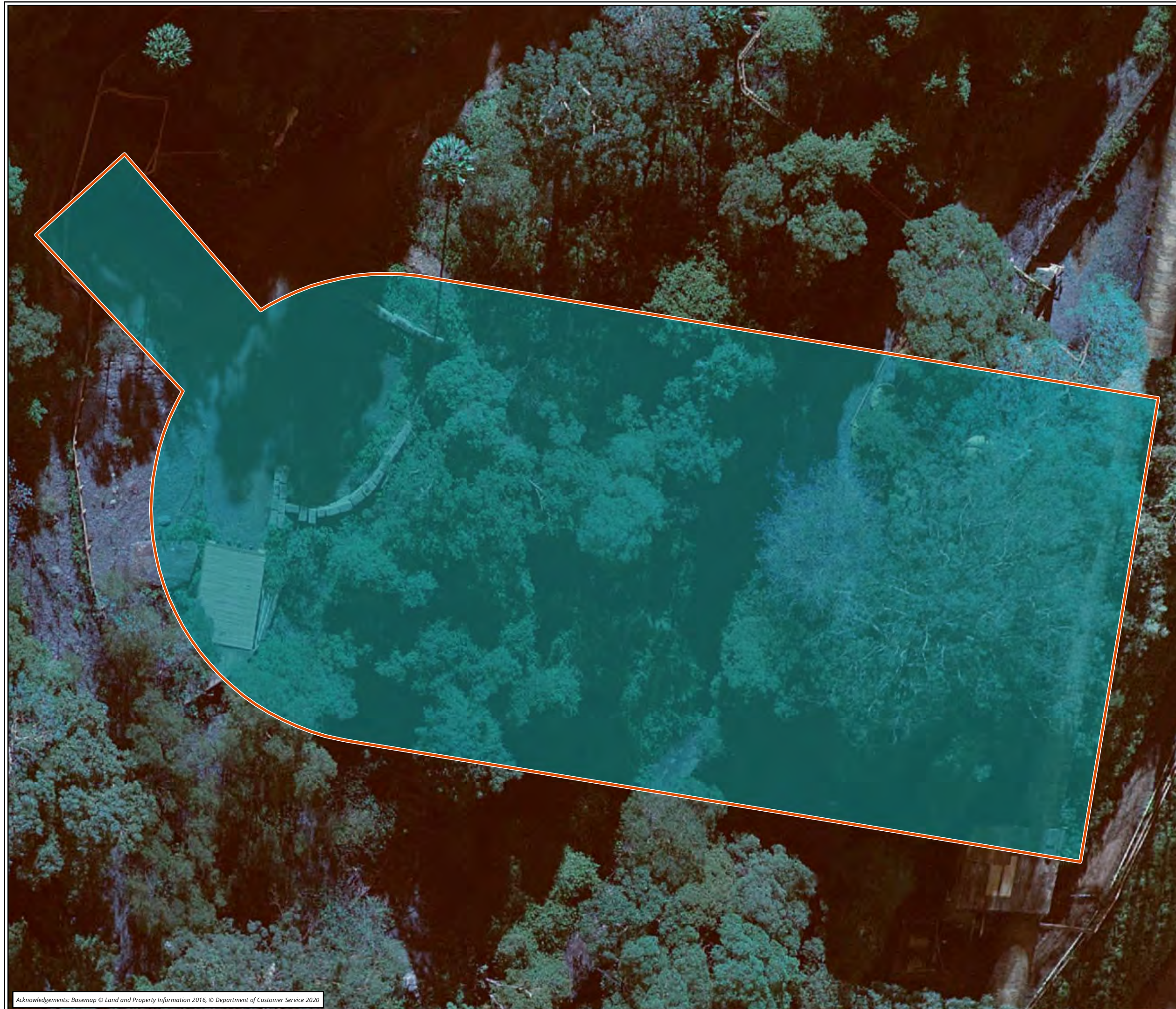
0 50 100 150 200
Metres

Scale: 1:6,000 @ A3


Coordinate System: GDA 1994 MGA Zone 56



Matter: 33219,
Date: 16 September 2020,
Checked by: SJK, Drawn by: AEDM, Last edited by: amurray
Location: P:\33200s\33219\Mapping\33219_F9_SurveyResult.mxd



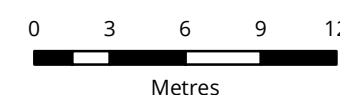
Legend

 Study area

Archaeological potential

 Low potential

Figure 5.2 Assessment of archaeological potential



Scale: 1:300 @ A3
Coordinate System: GDA 1994 MGA Zone 56



Matter: 33219,
Date: 16 September 2020,
Checked by: SJK, Drawn by: AEDM, Last edited by: amurray
Location: P:\33200s\33219\Mapping\33219_F9_SurveyResult.mxd

5 Significance assessment

An assessment of heritage significance encompasses a range of heritage criteria and values. The heritage values of a site or place are broadly defined as the 'aesthetic, historic, scientific or social values for past, present or future generations'⁷. This means a place can have different levels of heritage value and significance to different groups of people.

The archaeological significance of a site is commonly assessed in terms of historical and scientific values, particularly by what a site can tell us about past lifestyles and people. There is an accepted procedure for determining the level of significance of an archaeological site.

A detailed set of criteria for assessing the State's cultural heritage was published by the (then) NSW Heritage Office. These criteria are divided into two categories: nature of significance, and comparative significance.

Heritage assessment criteria in NSW fall broadly within the four significance values outlined in the Burra Charter. The Burra Charter has been adopted by state and Commonwealth heritage agencies as the recognised document for guiding best practice for heritage practitioners in Australia. The four significance values are:

- Historical significance (evolution and association).
- Aesthetic significance (scenic/architectural qualities and creative accomplishment).
- Scientific significance (archaeological, industrial, educational, research potential and scientific significance values).
- Social significance (contemporary community esteem).

The NSW Heritage Office issued a more detailed set of assessment criteria to provide consistency with heritage agencies in other States and to avoid ambiguity and misinterpretation. These criteria are based on the Burra Charter. The following SHR criteria were gazetted following amendments to the *Heritage Act 1977* (Heritage Act) that came into effect in April 1999:

- Criterion (a) - an item is important in the course, or pattern, of NSW's cultural or natural history (or the cultural or natural history of the local area).
- 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 (or the cultural or natural history of the local area).
- Criterion (c) - an item is important in demonstrating the aesthetic characteristics and/or a high degree of creative or technical achievement in NSW (or the local area).
- Criterion (d) - an item has strong or special association with a particular community or cultural group in NSW (or the local area) 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 (or the cultural or natural history of the local area).
- Criterion (f) - an item possesses uncommon, rare or endangered aspects of NSW's cultural or natural history (or the cultural or natural history of the local area).

⁷ (Heritage Office 2001)

- 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; or a class of the local area's cultural or natural places; or cultural or natural environments.

5.1 Levels of heritage significance

Items, places, buildings, works, relics, movable objects or precincts can be of either local or state heritage significance, or have both local and state heritage significance. Places can have different values to different people or groups.

Local heritage items

Local heritage items are those of significance to the local government area. In other words, they contribute to the individuality and streetscape, townscape, landscape or natural character of an area and are irreplaceable parts of its environmental heritage. They may have greater value to members of the local community, who regularly engage with these places and/or consider them to be an important part of their day-to-day life and their identity. Collectively, such items reflect the socio-economic and natural history of a local area. Items of local heritage significance form an integral part of the State's environmental heritage.

State heritage items

State heritage items, places, buildings, works, relics, movable objects or precincts of state heritage significance include those items of special interest in the state context. They form an irreplaceable part of the environmental heritage of NSW and must have some connection or association with the state in its widest sense.

The following evaluation attempts to identify the cultural significance of the study area. This significance is based on the assumption that the site contains intact or partially intact archaeological deposits.

5.2 Statements of significance

This assessment has not revealed any historical or archaeological information which alters the significance of the Wongawilli Colliery, Avon Dam or the Illawarra Escarpment Landscape Conservation Area. However, the statement of significance for these items are presented below in Table 5 as it appears on the State Heritage Inventory.

Table 5 Statements of signifiante for listed heritage items within the study area

Site number	Site name	Address / Property description	Listings	Significance	Statement of significance
7100	Wongawilli Colliery	Wongawilli Road, Part Lot 14, DP 255284; Lot 1, DP 321054 and Part Lot 244, Part Lot 255 and Part Lot 258, DP 751278	Wollongong LEP 2009	Local	The Wongawilli Colliery is significant for its association with Wongawilli “Bank Book” Hill and Wongawilli Road residential areas, as evidence of the evolving relationships between mines, mining companies and their workers, and of the joint ownership of the mine and the associated steel industry. The Wongawilli Colliery was a major supplier of coke and coal in the NSW steel industry - firstly to C & G Hoskins steel works at Lithgow and from 1938 onwards to steel works at Port Kembla. The Wongawilli method of coal extraction was developed from 1958 onwards at this site and was adapted and used where practicable throughout the Illawarra and in other coal fields in Australia. Apart from innovative mining techniques, the Colliery saw the introduction of a transport system from the mine to the base of the escarpment, with the longest coal haulage incline in the world established in 1936 and man transport train established in 1940. It was also one of the first collieries where the Joy 4JCM (continuous miner) was used in Australia. This was the first installation in the world of a conveyor designed to lower coal 191m in elevation at a rate of 600 tph ROM. The mine is significant for its history of shared facilities and use with the Wongawilli village and the special associations and meanings for residents and people who have worked in the mine.
1358	Avon Dam	Avon Dam Road, Avon Dam	State Heritage Register, WaterNSW, Wingecarribee LEP 2010	State	<p>The Avon Dam was the third and the largest of the four water supply dams built as part of the development of the Upper Nepean Water Supply Scheme, one of the most important engineering works and items of public infrastructure in Australia, and is still the second largest of all the NSW water supply dams in terms of storage capacity. It was designed by the NSW Public Works Department under the direction of one of Australia's leading water supply engineers, E.M. De Burgh. The completion of the Avon Dam was a significant step in the continuing process of providing a reliable water supply for Sydney and surrounding areas as part of the Upper Nepean Scheme. Even by the international standards of the time, Avon was a high dam with a large impoundment of water and was a significant work of engineering in its day. It continues to play an important role as the major source of supply for the Wollongong, Port Kembla and surrounding towns and areas. Additionally, the Avon Dam is a handsome, well-proportioned structure with strong Egyptian style architectural character which complements the monumental nature of the structure and its attractive natural surroundings.</p> <p>The roadway was constructed prior to the Dam between 1918 and 1921, and was used to transport all materials, stores and labour and significantly provided the sole route of transportation, other dam sites relying on a combination of road, tram or ropeway, and continues to be used as the main access to the present time. The Avon Dam includes a range of ancillary structures which form components of the overall site. One building is believed to be the original Residential Engineers residence and is a fine example of an Interwar Bungalow. The other residential buildings associated with the dam are relatively modern replacements for the original set of houses, but are representative of their type.</p> <p>The grounds associated with the Avon Dam are of considerable aesthetic and social value. They contain an important, substantially intact interwar landscape design - including ornamental ponds, grottoes and rustic picnic structures - particularly incorporating various Egyptian Revival references to compliment the thematic treatment of the architecture associated with the main dam structures. The immediate dam area is of distinction as a scenic landscape.</p>
–	Illawarra Escarpment Landscape Area	Adjacent to the Wongawilli Pit Top portion of the study area	Wollongong LEP 2009	Local	An inspirational cultural landscape of supreme importance. Values encompass scenic, ecological, historic and Indigenous cultural, social (including tourist and recreational), visual, and natural history. The combined effect of a narrow coastal plain, rugged uplift sheer walls, rich forest and pasture lands give a most dramatic landscape of considerable grandeur which exceeds any other coastal plain and mountain landscape on the NSW coast. There are many vantage points to experience the extensive views and vistas into and out from the Illawarra Escarpment. Many smaller areas within the escarpment are of specific scientific, historic and scenic importance. The escarpment is located adjacent to one of the most heavily industrialised and confined areas on Australia's eastern coast. It is the single most important landscape feature of the Illawarra and is integral part of the wider landscape including above the escarpment and the coastal plain.

6 Statement of heritage impact

This SoHI has been prepared to address impacts resulting from the proposed redevelopment of the study area. The SoHI identifies the level of impact arising from the proposed development and discusses mitigation measures which must be taken to avoid or reduce those impacts. This section of the report has been prepared in accordance with the Heritage Manual guideline *Statements of Heritage Impact*⁸.

6.1 Proposal details

The proposed development at the Wongawilli Pit Top will consist of the current coal conveyor being replaced (covered under current approvals) and an additional conveyor being installed to connect the conveyor portal of the existing infrastructure in order to re-utilise the existing infrastructure. The new conveyor will consist of two 5 x 7 metre driveheads and a 2 x 63 metre conveyor belt held up by pillars. An additional metre of vegetation will be cleared as a buffer around the structure, to allow access and maintenance.

The Additional Driveage works will consist of four underground roadways to be developed using first workings mining methods. As the driveage is being developed using the first workings mining method, no impacts are expected to the ground surface. The first workings method involves parallel tunnels known as 'headings' being driven into the coal seam from the mine entrance using remote controlled coal cutting. These form a series of self-supporting roadways, leaving behind a grid of pillars. The pillars are designed to provide stability to the void in the long term and support the roof strata above the seam. Where the pillars have been designed to be stable, the vertical subsidence is typically less than 20 millimetres.

6.2 Assessing impact to heritage item(s)

6.2.1 Discussion of heritage impact(s)

The discussion of impacts to heritage can be centred upon a series of questions which must be answered as part of a SoHI which frame the nature of impact to a heritage item. The Heritage Manual guideline *Statements of Heritage Impact* includes a series of questions in relation to indicate the criterion which must be answered⁹:

- *How is the impact of the addition on the heritage significance of the item to be minimised?*
- *Can the additional area be located within an existing structure? If no, why not?*
- *Will the additions visually dominate the heritage item?*
- *Is the addition sited on any known, or potentially significant archaeological deposits? If so, have alternative positions for the additions been considered?*
- *Are the additions sympathetic to the heritage item? In what way (e.g. form, proportions, design)?*

6.2.2 Quantifying heritage impact(s)

Based upon the discussion of impacts to heritage items, impact to these items can be quantified under three main categories: direct impacts, indirect impacts and no impact. These kinds of impacts are dependent on the proposed impacts, nature of the heritage item and its associated curtilage.

⁸ (Heritage Office & DUAP 1996)

⁹ (Heritage Office & DUAP 1996)

Direct impacts

Direct impacts are where the completion of the proposed development will result in a physical loss or alteration to a heritage item which will impact the heritage value or significance of the place. Direct impacts can be divided into whole or partial impacts. Whole impacts essentially will result in the removal of a heritage item as a result of the development where as partial impacts normally constitute impacts to a curtilage or partial removal of heritage values. For the purposes of this assessment direct impacts to heritage items have been placed into the following categories:

- Physical impact - whole: where the development will have a whole impact on a heritage item resulting in the complete physical loss of significance attributed to the item.
- Physical impact - partial: where the project will have a partial impact on an item which could result in the loss or reduction in heritage significance. The degree of impact through partial impacts is dependent on the nature and setting of a heritage item. This typically these impacts are minor impacts to a small proportion of a curtilage of an item or works occurring within the curtilage of a heritage item which may impact on its setting (i.e. gardens and plantings).

Indirect impacts

Indirect impacts to a heritage item relate to alterations to the environment or setting of a heritage item which will result in a loss of heritage value. This may include permanent or temporary visual, noise or vibration impacts caused during construction and after the completion of the development. Indirect impacts diminish the significance of an item through altering its relationship to its surroundings; this in turn impacts its ability to be appreciated for its historical, functional or aesthetic values.

Cumulative impacts

Cumulative impacts relate to minimal or gradual impacts from a single or multiple developments upon heritage values. A cumulative impact would constitute a minimal impact being caused by the proposed development which over time may result in the partial or total loss of heritage value to the study area or associated heritage item. Cumulative impacts may need to be managed carefully over the prolonged period of time.

No impact

This is where the project does not constitute a measurable direct or indirect impact to the heritage item.

6.3 Assessment of impacts

A discussion, assessment and mitigation of impacts to heritage items located within or adjacent to the study area is presented in Table 6.

Table 6 Assessment of impacts to heritage items either within or adjacent to the study area

Heritage item	Significance	Discussion	Assessment	Mitigation measures
Wongawilli Colliery	Local	The proposed works will involve the installation of an additional conveyor to connect the conveyor portal of the existing infrastructure. This will consist of two 5 x 7 metre driveheads and a 2 x 63 metre conveyor belt held up by pillars. The pillars will be located on a steep slope between the NWMD portal and the existing conveyor. The existing conveyor is part of a large complex of structures identified as B9 (Breaker Building and Transfer Bunker) in the CMP, which includes the belt conveyor that extends into the underground workings, the drive house, breaker building, transfer bunker, and associated structures. These were installed in 1959 along with the Decline Conveyor, but altered in subsequent decades. B9 has little significance but associative archaeological significance. The CMP policy states that buildings and structures of associative significance need only be retained and conserved where required. No removal or demolition of the existing conveyor will occur; however, there will be some alternation to the fabric of B9, where the new conveyor connects to the existing conveyor. Furthermore, the proposed works are also in close proximity the Dumper House (B4), which has high significance and primary archaeological significance. Direct impacts may occur to this building due to the use and movement of machinery that could inadvertently damage the building.	Direct - partial	Recommendation 1 Recommendation 2 Recommendation 3
Avon Dam	State	The Additional Driveage part of the study area crosses the curtilage of the Avon Dam. As the driveage is being developed using the first workings mining method, no impacts are expected to the ground surface. Natural or seasonal variations in surface levels due to wetting and drying of soils are approximately 20 millimetres, and thus subsidence less than this can be considered no more than the variations occurring from natural processes, and should have negligible impacts on both natural and man-made surface infrastructure (CoA 2014, MSEC 2007, Hume Coal 2017). A geotechnical report provided by SCT Operations Pty Ltd (2020) confirmed this, with the geotechnical assessment concluding that there is no potential for any perceptible surface subsidence impacts as a result of the proposed Additional Driveage.	No impact	Recommendation 3
Illawarra Escarpment Landscape Area	Local	The Wongawilli Pit Top part of the study area is adjacent to the curtilage of the Illawarra Escarpment Landscape Area; however, no works will occur within the curtilage. Temporary visual and noise impacts will occur during the proposed works but this will be resolved upon completion of the project and not result in any lasting impacts to the heritage item.	No impact	Recommendation 3

6.4 Statement of heritage impact

WWC is an underground coal mine located approximately 14 kilometres south-west of Wollongong. A project approval was initially granted in 2011 for mining operations within the WWC mining lease area until 31 December 2015. The project approval was granted a modification in 2015, which permitted mining operations to continue until 31 December 2020. WCL proposes a second modification to the existing project approval for extension of mining activities for a further 5 years. The NWMD footprint requires modification in order to connect the Wongawilli Pit Top to an existing shaft to the east of Lake Avon.

The proposed development at the Wongawilli Pit Top will consist of the current coal conveyor being replaced (covered under current approvals) and an additional conveyor being installed to connect the conveyor portal of the existing infrastructure in order to re-utilise the existing infrastructure. The new conveyor will consist of two 5 x 7 metre driveheads and a 2 x 63 metre conveyor belt held up by pillars that will be located on a steep slope between the NWMD Domain portal and the existing conveyor.

The Wongawilli Colliery, which began operations in 1906, was a major supplier of coke and coal in the NSW steel industry, firstly to C & G Hoskins steel works at Lithgow and from 1938 onwards to steel works at Port Kembla. The colliery saw the introduction of a transport system from the mine to the base of the escarpment, with the longest coal haulage incline in the world established in 1936 and man transport train established in 1940. It was also one of the first collieries where the Joy 4JCM (continuous miner) was used in Australia. This was the first installation in the world of a conveyor designed to lower coal 191m in elevation at a fast rate. Wongawilli Colliery is listed as a heritage item of local significance.

The project is likely to have partial direct impacts on Wongawilli Colliery. The existing conveyor is part of a large complex of structures identified as B9 in the CMP and having little significance but associative archaeological significance. The CMP policy states that buildings and structures of associative significance need only be retained and conserved where required. No removal or demolition of the existing conveyor will occur; however, there will be some alternation to the fabric of B9 where the new conveyor connects to the existing conveyor. In addition, the proposed works are also in close proximity the Dumper House (B4), which has high significance and primary archaeological significance. Direct impacts may occur to this building due to the use and movement of machinery that could inadvertently damage the building.

The Additional Driveage part of the study area crosses the curtilage of the Avon Dam. As the driveage is being developed using the first workings mining method, no impacts are expected to the ground surface. Natural or seasonal variations in surface levels due to wetting and drying of soils are approximately 20 millimetres, and thus subsidence less than this can be considered no more than the variations occurring from natural processes, and should have negligible impacts on both natural and man-made surface infrastructure (CoA 2014, MSEC 2007, Hume Coal 2017). A geotechnical report provided by SCT Operations Pty Ltd (2020) confirmed this, with the geotechnical assessment concluding that there is no potential for any perceptible surface subsidence impacts as a result of the proposed Additional Driveage.

Furthermore, the NWMD as currently approved is located under the SHR curtilage of the Avon Dam. As discussed in Section 3.2 of the modification report, the proposed extension of the NWMD under MOD2 is required to access the existing Wongawilli Shaft 1 (located on the northern side of Lake Avon) and provide ventilation for the full extent of the NWMD. It is not possible to access the existing Wongawilli Shaft 1 without the extension of the approved NWMD under the SHR curtilage. No impacts are expected to occur to the ground surface as result of MOD2 and, as such, no impacts to Avon Dam or items within the SHR curtilage are predicted to occur. Furthermore all surface activities proposed under MOD2 are located outside of the SHR curtilage of the Avon Dam.

The Illawarra Escarpment Landscape Area is located adjacent to the Wongawilli Pit Top part of the study area. Temporary visual and noise impacts will occur during the proposed works but this will be resolved upon completion of the project and not result in any lasting impacts to the heritage item.

Therefore, if the appropriate mitigation measures are employed, it is considered that the works associated with the NWMD modification is acceptable from a heritage perspective, and that any loss of heritage significance through the proposed works will be appropriately managed if the recommendations are followed.

7 Recommendations

These recommendations have been formulated to respond to client requirements and the significance of the site. They are guided by the ICOMOS *Burra Charter* with the aim of doing as much as necessary to care for the place and make it useable and as little as possible to retain its cultural significance.¹⁰

Recommendation 1 Archival recording

A digital photographic archival recording of the Wongawilli Pit Top part of the study area should be undertaken prior to any works occurring. This is in accordance with Policy 12 of the CMP. The archival recording should comply with the NSW Heritage Council guidelines *How to Prepare Archival Records of Heritage Items* and *Photographic Recording of Heritage Items Using Film or Digital Capture 2006*.

Recommendation 2 Protection of Dumper House (B4)

It is recommended that the fencing surrounding the Dumper House (B4) be clearly marked with high visibility bunting to protect it from any possible damage during the construction of the new conveyor. This is in accordance with Policy 5 of the CMP.

Recommendation 3 Unexpected finds procedure

Relics are historical archaeological resources of local or State significance and are protected in NSW under the *Heritage Act*. Relics cannot be disturbed except with a permit or exception/exemption notification. Should unanticipated relics be discovered during the course of the project, work in the vicinity must cease and an archaeologist contacted to make a preliminary assessment of the find. The Heritage Council will require notification if the find is assessed as a relic.

¹⁰ (Australia ICOMOS 2013)

References

- AMBS 2006, *Volume 1: Aboriginal Heritage Management Plan: West Dapto Release Area*, An unpublished report to Wollongong City Council.
- Australia ICOMOS 2013, *The Burra Charter: the Australia ICOMOS Charter for Places of Cultural Significance*, Australia ICOMOS, Burwood, VIC.
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Appendices

Appendix 1 Heritage inventory sheets

Item details

Name of item:

Avon Dam

Type of item:

Built

Group/Collection:

Utilities - Water

Category:

Water Supply Reservoir/ Dam

Location:

Lat: -34.3526341175 Long: 150.6415665100

Primary address:

Avon Dam Road, Avon Dam, NSW

Local govt. area:

Wingecarribee

Local Aboriginal Land Council:

Illawarra

Boundary:

As per the Heritage Curtilage image.

All addresses

Street Address	Suburb/town	LGA	Parish	County	Type
Avon Dam Road	Avon Dam	Wingecarribee			Primary Address

Owner/s

Organisation Name	Owner Category	Date Ownership Updated
Water NSW	State Government	

Statement of significance:

The Avon Dam was the third and the largest of the four water supply dams built as part of the development of the Upper Nepean Water Supply Scheme, one of the most important engineering works and items of public infrastructure in Australia, and is still the second largest of all the NSW water supply dams in terms of storage capacity. It was designed by the NSW Public Works Department under the direction of one of Australia's leading water supply engineers, E.M. De Burgh. The completion of the Avon Dam was a significant step in the continuing process of providing a reliable water supply for Sydney and surrounding areas as part of the Upper Nepean Scheme. Even by the international standards of the time, Avon was a high dam with a large impoundment of water and was a significant work of engineering in its day. It continues to play an important role as the major source of supply for the Wollongong, Port Kembla and surrounding towns and areas.

Additionally, the Avon Dam is a handsome, well proportioned structure with strong Egyptian style architectural character which complements the monumental nature of the structure and its attractive natural surroundings.

The roadway was constructed prior to the Dam between 1918 and 1921, and was used to transport all materials, stores and labour and significantly provided the sole route of transportation, other dam sites relying on a combination of road, tram or ropeway, and continues to be used as the main access to the present time.

The Avon Dam includes a range of ancillary structures which form components of the overall site. One building is believed to be the original Residential Engineers residence and is a fine example of an Interwar Bungalow. The other residential buildings associated with the dam are relatively modern replacements for the original set of houses, but are representative of their type.

The grounds associated with the Avon Dam are of considerable aesthetic and social value. They contain an important, substantially intact interwar landscape design - including ornamental ponds, grottoes and rustic picnic structures - particularly incorporating various Egyptian Revival references to compliment the thematic treatment of the architecture associated with the main dam structures. The immediate dam area is of distinction as a scenic landscape.

Date significance updated: 01 Jul 13

Note: The State Heritage Inventory provides information about heritage items listed by local and State government agencies. The State Heritage Inventory is continually being updated by local and State agencies as new information becomes available. Read the Department of Premier and Cabinet [copyright](#) and [disclaimer](#).

Description

Designer/Maker:

De Burgh E. M.

Builder/Maker:

Public Works Department

Construction years:

1921-1927

Physical description:

The Avon Dam was the third and largest of the four dams constructed to develop the Upper Nepean catchment area, in order to meet Sydney's ever increasing demand for water. It was built using cyclopean masonry. This consisted of sandstone blocks, quarried from the site, which were fitted into an irregular pattern and packed with sandstone concrete. However, in this case the rock was quarried to make a deep cut through a ridge to a neighbouring creek to provide the spillway for the dam. Like its predecessors, Avon also had the upstream face of the dam sheathed with a layer of basaltic concrete (2 feet thick) for watertightness and to resist wave and other erosion forces.

The dam wall is curved in plan and has a spillway channel constructed as an open cut through a ridge between the reservoir and a watercourse, which discharges into the Avon River half a mile (0.8km) below the dam. Each end of the dam wall is flanked by massive Egyptian style pylons complete with decorative lotus columns. It is fitted with outlet valves on two levels. The upper level water draw-off consists of two 3 feet (0.9m) diameter pipes each fitted with needle valves 30 inches (76.2cm) in diameter, situated 80 feet (24.4m) below full supply level. The lower draw-offs, which were used for passing the stream flow during

construction work, consist of two 4 feet (1.2m) diameter pipes fitted with 36 inch (0.9m) diameter needle valves at the level of the river bed.

Specifications for Avon Dam:

Date of construction: 1921-1927.

Capacity: 47,153 million gallons (214,500 megalitres) (now 214,360 megalitres)..

Greatest depth of water: 210 feet (64m).

Greatest height of wall above foundations: 237 feet (72m).

Area of lake at full supply level: 2,609 acres (1,057 hectares).

Cost: £1,047,000.

Concrete in wall: 219,515 cubic yards (167,929 cu metres).

Length at crest including pylons: 725 feet (221m).

Length at spillway weir: 437 feet (133m).

Width at base: 200 feet (61m).

Width at crest: 20 feet (6m).

Area of lake catchment: 55 sq miles (142km²).

The Dam today has a well-developed picnic area on its eastern side, approximately in the area formerly occupied by the construction village. This picnic area features landscaped gardens within picturesque retaining walls, large areas of lawn and modern amenities and shelter facilities. There is a large rivetted steel (possibly cast-iron) elevated water tank within the picnic area, carried on rivetted plate-web girders and cast steel (or iron) posts. There is only one early residential building remaining, believed to be the former Resident Engineers residence. It is a single-storey weatherboard building with terracotta tiled hipped roof which also has a breakfront gabled wing. It is simply detailed with carved timber brackets to a projecting rectangular window frame and roughcast render to the chimney. One other house dates from the 1960s and two from the 1970s/80s and are all single-storey brick cottages. The earlier cottage is of red brick and has terracotta tiles to a hipped and gabled roof. The two later cottages appear to have been built to the same design and feature concrete tiled, gable roofs and utilise large-dimension mottled bricks. The works office and the picnic area amenities buildings are single storey brick buildings, recent in origin, with either profiled steel skillion roofs or gable roofs clad in concrete tiles.

After the immediate dam environment of the Cataract Dam, that of the Avon Dam is perhaps the most scenically impressive landscape. Near the dam wall there are several distinct gardens that function as individual picnic areas. These include a series of grotto-like shelters along the sandstone cliff that defines the western edge of the area; a discrete palm-planted area with ornamental pools; and a larger park-like area extending to the south along the edge of the dam.

The cliffline landscape includes shelters with stone and cement-rendered seating, some cement faux rockwork walling, plantings of Wisteria, palms, Cordyline sp., Cyathea sp. and various ferns. The pool garden is dominated by four large circular ponds, with small intermediate ponds, made from rendered cement. The larger ponds even have their own planters attached to the sides. The ponds are surrounded by an array of palm and Cordyline plantings in order to engender the ambience of an Egyptian oasis.

Nearby, the main gardens are contained within the elongated park-like area to the south. The

entry features a pair of stone piers incorporating the words AVON DAM in quartz pebbles and a central path that leads to various picnic tables. There are plantings of Swamp Cypress (*Taxodium disticum*), Hoop Pine (*Araucaria cunninghamii*), Syzygium, Podocarpus, Acer, Camellia, Flowering Cherry and Liquidambar. Other features include rustic picnic structures, birdbath, [Chinese] lantern and propagating structure. On the ridge above these gardens are several interwar cottages with contemporary plantings of Monterey Pinus (*Pinus radiata*), Cypress, Crepe Myrtle, Viburnum and Photinia. To the northeast of the cottages are the remains of a propagating structure - further testifying to the importance attached to the establishment and maintenance of this landscape. Nearby is a very large Scribbly Gum which, as part of the indigenous vegetation, long predates any use of the site for Sydney's water supply. The loop road, giving access to the area along the ridge, is edged by a low stone retaining wall that also dates to the late 1920s-1930s period. Along the main entry road to the dam site near an old gate are clumps of *Agave americana* and Flax which may indicate the earlier presence of a cottage now demolished.

The Conservation Management Plan outlines the key elements and their individual significance assessments.

Physical condition and/or

Archaeological potential:

Good

Date condition updated: 15 Jan 09

Modifications and dates:

1971- work was undertaken on Avon Dam to alleviate uplift pressure on, and leakage through, the foundations of the dam wall, in accordance with modern design criteria. The downstream face of the wall was supported with an embankment of quarried sandstone blocks, and sandstone fill, the latter being compacted by grid and vibratory rollers. The spillway was also modified from the original 4 feet (1.2m) high mass concrete weir to a sawtooth shape. This provides for a greater discharge of water in accordance with modern flood estimates which are greater than those considered adequate when the dam was built.

1963 - its storage capacity was reserved to meet the increased water supply needs of the Wollongong area.

1973 - as part of a plan to interconnect the various water supply systems for Sydney, Wollongong and Sutherland, a tunnel was constructed between the Nepean Dam and the Avon Dam. This allows water to be transferred in either direction, as required.

1980's - downstream face of dam strengthened by sandstone boulders.

2005 - road upgrade undertaken for safety purposes.

2006 - works were undertaken as part of the Metropolitan Water Plan to maintain water levels in Avon Dam above the operating level of its gravity fed outlet.

Current use:

Water supply water storage

Former use:

Aboriginal land, water supply, water storage

History

Historical notes:

The first stage of the Upper Nepean scheme was commenced in 1880 after supply from the Botany Swamps proved to be inadequate to meet Sydney water supply needs. The Upper

Nepean project consisted initially of the construction of a weir across the Nepean River below its junctions with the Cordeaux and Avon Rivers to divert the combined flow into a tunnel 4 miles (7.1km) long, discharging into the Cataract River at Broughton's Pass, where a second weir diverted the flow of the four rivers (Cataract, Cordeaux, Avon and Nepean) into another tunnel, the first of a 35 mile (57.2km) long chain of open canals, pipe aqueducts and tunnels known collectively as the Upper Canal. This ended at Prospect Creek where an earthen dam, known as Prospect Reservoir, was built. From here, via a second open canal, the Lower Canal, the water was carried to 'Pipehead', at Guildford, thence through pipes for distribution to the City.

By 1902 the original Nepean scheme was found also to be inadequate, after a severe drought had again depleted the water supply. A Royal Commission was appointed in 1902 to report on the water supply situation and in that same year, it recommended the construction of the Cataract Dam, to impound the waters of the Cataract River at a site upstream of Broughton's Pass. Construction of the dam was completed about the end of 1907.

From 1907, rainfall on the catchment area was very low and it was not until January 1911 that Cataract Dam first filled to capacity. This, together with the greatly increased rate of consumption of water, stressed the need for additional water storage.

The Nepean River watershed, from a topographical standpoint, was found to be very favourable for the construction of large water storage works at moderate cost. Rivers such as the Cordeaux, Avon and Nepean, located in narrow gorges, provided very suitable dam sites, with solid rock foundations at a shallow depth. Sandstone could easily be quarried into rough rectangular blocks and used for the construction. These features led to the recommendation that more dams be built.

A site for a second storage dam, Cordeaux, to be built on the Cordeaux River, was selected by the Water Board in the latter part of the 1911 and a gauging weir was constructed. Preliminary plans and estimates were prepared and the foundations tested. Following this, further investigations were carried out by the Public Works Department.

Good rainfall occurred throughout the succeeding years (except for a dry period in 1915-1916) and, because of this and the intervention of World War I, construction on the Cordeaux Dam was not commenced until 1918. In November of that year a Special Board of Experts consisting of engineers from the Public Authorities was appointed by the Government to draw up recommendations for the amplification of the Sydney water supply. This body not only endorsed the construction of the Cordeaux Dam but recommended the construction of the Avon and Nepean Dams as well.

In 1921, three years after the Cordeaux Dam was commenced and five years before it was completed, the Public Works Department commenced work on a third and much higher dam at a site selected on the Avon River, a tributary of the upper Nepean. The Avon Dam was also designed and constructed by the Public Works engineers under the direction of the Chief Engineer for Water Supply and Sewerage, E.M. De Burgh.

As with the previous dams, Cataract and Cordeaux, Avon Dam was built using cyclopean masonry. This consisted of sandstone blocks, quarried from the site, which were fitted into an

irregular pattern and packed with sandstone concrete. However, in this case the rock was quarried to make a deep cut through a ridge to a neighbouring creek to provide the spillway for the dam. Like its predecessors, Avon also had the upstream face of the dam sheathed with a layer of basaltic concrete (2 feet thick) for watertightness and to resist wave and other erosion forces.

The concrete was all manufactured on the site in special metal-crushing, concrete mixing plants. These included Jacques roll-jaw crushers, pulverising mills and Mullimix drum-type batchmixers. From the mixers, the concrete was discharged into concrete skips especially designed to facilitate the distribution of the concrete on the dam wall. All the plant was electrically operated and the current obtained from the State Power Station at Port Kembla by transmission lines 19 miles (30.9km) in length.

A road 6 miles (9.6km) in length was constructed from Bargo Railway Station to transport all the materials. Other plant used on the site included two Lidgerwood cableways, three locomotive cranes and four stiff-leg type derrick cranes. All of these were designed and constructed in Australia.

The water storage area for the dam was cleared of all timber and brush except for stumps 3 feet (0.9m) high. Any hardwood timber of commercial value was cut into sleepers, fencing posts and rails and used in the construction of the works railway to the Nepean Dam then under construction. An extensive area of Coachwood timber (*Ceratopetalum apetalum*) was found in the storage basin. This was cut at a special sawmill erected at the Dam and a fleet of punts and launches transported the logs down the river to the mill. About 1 million super feet (3,540 cu m) of sawn and dressed timber was produced. It was used in the construction of buildings in the Nepean Dam township, for wall forms for both the Avon and Nepean Dams and the remainder was sold.

Accommodation for workmen was provided near the construction site in a single-storey barracks for single men. Land was placed at the disposal of the married men who were assisted in constructing temporary houses for themselves and their families.

Avon Dam was completed in 1927 and handed over to the Water Board on 20 January 1928. It was built at the cost of (Pounds)1,047,000.

The Dam served the Sydney area until the completion of Warragamba Dam in 1960, after which, in 1963, its storage was reserved to meet the increased water supply needs of the Wollongong area. An electrical pumping station located in Flying Fox Creek, at the end of the stored water remote from the wall, pumps water over the Divide to Wollongong and Port Kembla.

In 1973, as part of a plan to interconnect the various water supply systems for Sydney Wollongong and Sutherland, a tunnel was constructed between the Nepean Dam and the Avon Dam. This allows water to be transferred in either direction, as required.

In December 2016 the state government approved the controversial South 32 Dendrobium coal mine, in Metropolitan Special Area, created to protect waters of Avon, Cataract, Cordeaux and Nepean reservoirs (Hannam, 2016, 14).

Historic themes

Australian theme (abbrev)	New South Wales theme	Local theme
3. Economy-Developing local, regional and national economies	Technology-Activities and processes associated with the knowledge or use of mechanical arts and applied sciences	(none)-
4. Settlement-Building settlements, towns and cities	Utilities-Activities associated with the provision of services, especially on a communal basis	(none)-
4. Settlement-Building settlements, towns and cities	Utilities-Activities associated with the provision of services, especially on a communal basis	Providing drinking water-
4. Settlement-Building settlements, towns and cities	Utilities-Activities associated with the provision of services, especially on a communal basis	(none)-
5. Working-Working	Labour-Activities associated with work practises and organised and unorganised labour	(none)-
7. Governing-Governing	Government and Administration-Activities associated with the governance of local areas, regions, the State and the nation, and the administration of public programs - includes both principled and corrupt activities.	Developing roles for government - building and operating public infrastructure-
7. Governing-Governing	Government and Administration-Activities associated with the governance of local areas, regions, the State and the nation, and the administration of public programs - includes both principled and corrupt activities.	Developing roles for government - public water supply-
8. Culture-Developing cultural institutions and ways of life	Leisure-Activities associated with recreation and relaxation	(none)-

Assessment of significance

SHR Criteria a)

[Historical significance]

Avon Dam is constructed within the Upper Nepean Catchment Area which was developed with the completion of the Cataract and Nepean tunnels in 1888 as the fourth source of water supply for Sydney. The potential of the Upper Nepean Catchment Area to supply water was fully developed through the construction of four major dams between 1903 and 1936. Avon Dam is the third of these dams to have been completed. The Upper Nepean Catchment Area continues to supply the regions of Sydney and the Illawarra, with Avon Dam providing a supply to the Illawarra region through the Upper Avon water pumping station.

Avon Dam was the fifth of the major water supply/irrigation dams constructed in NSW during the first half of the twentieth century. The design and technologies used in the construction of the dam are representative of methods developed by the Public Works Department of NSW at the time.

In conjunction with the completion of Cordeaux Dam in 1926, the impounded water of the Avon Catchment Area provided one of the major sources of water for domestic and industrial consumption in metropolitan Sydney, the largest city in NSW. In providing water for metropolitan Sydney during this era the dam, in ensuring security of supply, contributed to the extensive residential, commercial and industrial development of Sydney during the 1920's and 1930s.

SHR Criteria b)

[Associative significance]

The design and construction of Avon Dam was undertaken by the Water Supply and Sewerage Branch of the NSW Public Works Department. The construction of the dam drew upon the knowledge and experience of a number of the engineers employed in the Branch at the time including Ernest M. De Burgh (engineer in chief), the successful completion of the dam and its continuation of use as a water supply dam are a lasting testament to the professional capabilities of the Federation/Inter War era generation of engineers of the Public Works Department.

The former official quarters at Avon Dam, has provided for a number of generations, a holiday type residence for the board members of the Water Board. The buildings and grounds have some associations with past identities of the board, which was until comparatively recently one of the major government departments in NSW in regard to its economic and political influence.

The tract of West Australian gum trees situated to the north west of the former official quarters was planted out by board members of the Water Board in 1928. The trees have particular memorial associations with past identities of the Board.

SHR Criteria c)

[Aesthetic significance]

The wall of Avon Dam is an engineering work imbued with a sense of high aesthetic value expressed through the long curved wall set within the steep valley of the Avon River.

The design and finishes of the crest house, entry pylons and lower valve house in the Inter War Egyptian style were undertaken by the Government Architects Branch of the Public Works Department at that time headed by George McCrae. The architectural detailing of the superstructures evokes a romanticised vision of the 'Ancient Near East' at a time when many Australians had first hand experience of the area through military service, and through knowledge of archaeological finds reported in the popular press.

The dam is set within the valley of the Avon River. Upstream of the dam wall this setting is characterised by the broad expanse of the pool of water bordered by the crests of the valley sides. Downstream of the dam wall the setting is characterised by the steeper inclines that graduate into the river gorge. The topography, at times of high water level, imparts a picturesque scene when viewed from selective vantage points above and on the dam wall.

The former resident officer's cottage erected at the time of construction is an excellent, albeit much modified, example of the high standard of accommodation provided for resident Public Works Department for its senior staff.

The landscaping of its lower picnic grounds exhibit a high level of design awareness through its planning, evolution and association with the Botanic Gardens on the original layout and selection of species.

SHR Criteria d)

[Social significance]

The dam and grounds are recognised by the National Trust of Australia (NSW) as being a place which is part of the cultural environment of Australia which has aesthetic, historical, architectural, archeological, scientific and social significance for future generations, as well as for the present community of NSW.

The dam and grounds are recognised by the Heritage Council of NSW as a place which is of significance to NSW in relation to its historical, scientific, cultural, social, archeological, natural and aesthetic values.

SHR Criteria e)

[Research potential]

The cyclopean masonry of the dam is an excellent and early example of gravity dam construction in the Inter War era incorporating inspection galleries, contraction, joints and foundation drainage system which collectively demonstrate the principal characteristics of the state development of this technology at the time.

The double level discharge, penstock gates and roller gates collectively demonstrate the principal characteristics of the state development of this technology at the time.

The terraces and platforms adjoining the dam abutments demarcate the location of plant and equipment used to in the construction of the dam, in particular the location of the cableway head towers, the quarry railway terrace, the motor vehicle garage, and the electricity substation.

The grounds of the dam retain numerous tree plantings undertaken from the time of the completion of the dam in 1928. Collectively the diversity of these trees present a good record of past horticultural practices.

The catchment area in being relatively untouched bushland in close proximity to a major urban area has a high potential for further research into natural ecosystems.

SHR Criteria f)

[Rarity]

The basin of the reservoir of Avon Dam is the area of the largest impoundment within the Upper Nepean Catchment Area.

Avon Dam is one of three dams in NSW which incorporate extensive Inter War Egyptian Architectural detailing. Avon Dam is however unique in always retaining remnant landscape features that continues to evoke the imagery of an Egyptian revival landscape.

Avon Dam is one of two dams in NSW which incorporate pedestrian and vehicular entry pavilions to the crest wall.

The crest and valve houses and inlet works retain original ironwork and machinery such as the roller gates and penstock gates and operating mechanism which represent a substantial repository of water supply delivery technology of the era.

The spillway channel was the largest in terms of the depth and width constructed up to that date within the Sydney metropolitan area.

The purpose built road of access to the dam wall from the railhead at Bargo is unique within the context of the four metropolitan Dams in being the principal means by which the general supplies, men and raw materials were transported during the construction process.

The dam wall retains evidence for a scour outlet operating system which was unique to Avon Dam.

The dam incorporates cyclopean masonry which is a construction technique unique to the Metropolitan Dams in Australia.

SHR Criteria g)

[Representativeness]

Avon Dam is representative of a type of dam (cyclopean masonry gravity dam) constructed in NSW by the Water Supply and sewerage Branch of the Public Works department during the first half of the twentieth century. Key representative attributes of the dam's design and construction include the use of cyclopean masonry bedded in sandstone concrete, use of blue metal concrete in facing the upstream face, use of sandstone concrete in the facing of the downstream face, use of a spillway set away from the gravity wall, lower valve/crest house attractively designed and finished to a high standard, the use of an array of upstream intakes to regulate the quality of water supply, the internal inspection galleries, the foundation drainage system, the contraction joints, and the internal drainage system.

The upgrading works to the spillway and dam wall with the compacted rock embankment and spill weir redesign, completed in 1971 to make the dam meet modern safety requirements, are representative of engineering practice of the day.

The upgrading of the valves within the dam wall and ancillary monitoring and operating equipment is representative of modern dam safe operating practice.

The construction technologies used at Avon Dam are representative of dams constructed in NSW through the first half of the twentieth century by the Public Works Department. Key representative attributes of the dam's construction techniques include the use of cableways, the building of temporary camps to house labourers and tradesmen, building of permanent cottages to house salaried staff, the construction of terrace platforms to house plant and machinery, mechanisation of concrete production, the construction of a purpose built road of access to transport men, supplies and materials from the nearest railhead to the construction sites, the building of permanent infrastructure such as water supply for plant and men and houses, the use of electricity to power plant and equipment.


The rehabilitation of tracts of scarred in the construction process employed at Avon Dam through beautification works is representative of practices undertaken at other dams throughout NSW. Key representative attributes of this practice include utilising the former camp as a picnic area, utilising the former terraced construction platforms as picnic areas and lookouts, and utilising the former construction roads for vehicular access to the dam site and dam wall.

The practice of ongoing maintenance of the wall after completion through resident staff and workshop facilities is representative of procedures undertaken at other dams and weirs constructed in NSW.

Integrity/Intactness:

The Avon Dam has a high level of integrity, though the downstream face of the dam is now covered by an embankment of sandstone.

Assessment criteria:

Items are assessed against the  [State Heritage Register \(SHR\) Criteria](#) to determine the level of significance. Refer to the Listings below for the level of statutory protection.

Recommended management:

Recommended Management: Manage the place and its components in accordance with the NSW Heritage Office Management Principles and Guidelines for NSW Agencies including the Minimum Standards of Maintenance and Repair. Recommended Management: Prepare a maintenance schedule for the item(s) in Maximo. Recommended Management: Implement the Conservation Management Plan (Graham Brookes & Assoc., 2003). Recommended Management: Undertake environmental impact assessment (EIA) when planning works on the site (refer to SCA's EIA Policy). Prepare a Statement of Heritage Impact and gain S60 or S140 Heritage Office approval prior to undertaking any non-exempt works on the site. Recommended Management: Implement bushfire management plans for the Metropolitan Special Area. Recommended Management: Carry out annual condition inspections and report condition in SCA annual report. Recommended Management: Consult experienced heritage practitioners and the SCA's Planning and Assessment Team during the preparation and execution of works to the place.

Procedures /Exemptions

Section of act	Description	Title	Comments	Action date
21(1)(b)	Conservation Plan submitted for endorsement	Metropolitan Dams, NSW: Conservation Management Plan (Graham Brooks and Associates, Feb 2002)	CMP endorsed by Heritage Council 27 June 2003 for a period of five years, expires 27 June 2008.	Jun 27 2003
57(2)	Exemption to allow work	Standard Exemptions	<p>SCHEDULE OF STANDARD EXEMPTIONS HERITAGE ACT 1977</p> <p>Notice of Order Under Section 57 (2) of the Heritage Act 1977</p> <p>I, the Minister for Planning, pursuant to subsection 57(2) of the Heritage Act 1977, on the recommendation of the Heritage Council of New South Wales, do by this Order:</p> <p>1. revoke the Schedule of Exemptions to subsection 57(1) of the Heritage Act made under subsection 57(2) and published in the Government Gazette on 22 February 2008; and</p> <p>2. grant standard exemptions from subsection 57(1) of the Heritage Act 1977, described in the Schedule attached.</p> <p>FRANK SARTOR Minister for Planning Sydney, 11 July 2008</p> <p>To view the schedule click on the Standard Exemptions for Works Requiring Heritage Council Approval link below.</p>	Sep 5 2008

 [Standard exemptions](#) for works requiring Heritage Council approval

Listings

Heritage Listing	Listing Title	Listing Number	Gazette Date	Gazette Number	Gazette Page
Heritage Act - State Heritage Register		01358	18 Nov 99		

Heritage Act - s.170 NSW State agency heritage register		125180			
National Trust of Australia register					

Study details

Title	Year	Number	Author	Inspected by	Guidelines used
Sydney Water Heritage Study	1996	125180	Graham Brooks and Associates Pty Ltd	GRAHAM BROOKS AND ASSOCIATES PTY LTD. 1 July 1996	Yes

References, internet links & images

Type	Author	Year	Title	Internet Links
Tourism		2007	Avon Dam	View detail
Written	Aird W. V.	1961	The Water Supply, Sewerage and Drainage of Sydney	
Tourism	Attraction Homepage	2007	Avon Dam	View detail
Written	b cubed sustainability	2006	Avon Dam Wall Remedial Works Heritage Impact Statement	
Written	b cubed sustainability	2006	Nepean Dam Deep Water Recovery: Avon Dam Weir and Stilling Pool - Heritage Overview	
Written	b cubed sustainability	2005	Avon Dam Deep Storage Access Heritage Impact Statement	
Written	Beasley M.	1988	The Sweat of their Brows - 100 Years of the Sydney Water Board 1888 - 1988	
Written	Graham Brooks and Associates	2004	Statement of Heritage Impact - Avon Dam Access Road Upgrade	
Written	Graham Brooks and Associates	2003	Avon Dam Conservation Management Plan	
Written	Hannam, Peter	2016	Controversial South 32 mine wins nod: Mining - concerns for groundwater	
Written	M. Simpson	1985	Avon Dam Wall including valve houses, spillway channel and saw tooth weir	
Written	Nick Jackson, Matthew Taylor, Jon Breen	2003	Metropolitan Dams Conservation Management Plan Vol.4, Avon Dam	

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Item details

Name of item:

Illawarra Escarpment Landscape Conservation Area

Other name/s:

Calderwood, Macquarie Pass, Tongarra

Type of item:

Conservation Area

Group/Collection:

Landscape - Natural

Category:

Landform site or area

Primary address:

, Robertson, NSW

Parish:

Kangaloon

County:

Camden

Local govt. area:

Wingecarribee

All addresses

Street Address	Suburb/town	LGA	Parish	County	Type
	Robertson	Wingecarribee	Kangaloon	Camden	Primary Address
	Yellow Rock	Shellharbour	Jamberoo	Camden	Primary Address
	Tongarra	Shellharbour	Jamberoo	Camden	Primary Address
	Albion Park	Shellharbour	Jamberoo	Camden	Primary Address
	Tullimbar	Shellharbour	Jamberoo	Camden	Primary Address
	Macquarie Pass	Shellharbour	Jamberoo	Camden	Primary Address
		Kiama			Alternate Address
		Wollongong City			Alternate Address

Statement of significance:

An inspirational cultural landscape of supreme importance. Values encompass scenic, ecological, historic and indigeneous cultural, social (including tourist and recretaional), visual, and natural history.

The combined effect of a narrow coastal plain, rugged uplift sheer walls, rich forest and pasture lands give a most dramatic landscape of considerable grandeur which exceeds any other coastal plain and mountain landscape on the NSW coast.

There are many vantage points to experience the extensive views and vistas into and out from the Illawarra Escarpment. Many smaller areas within the escarpment are of specific scientific, historic and scenic importance. The escarpment is located adjacent to one of the most heavily industrialised and confined areas on Australia's eastern coast (NT 1974). It is the

single most important landscape feature of the Illawarra and is integral part of the wider landscape including above the escarpment and the coastal plain (Cmsn Enquiry 1999)

Date significance updated: 17 Jan 19

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Description

Designer/Maker:

Pre history

Physical description:

Area approximately 3900 ha between 3 LGAs at the eastern extremity of the Illawarra Range. It includes the edge of the Woronoria Plateau and those upper foothill slopes which possesses attributes whose preservation needs to be assured i.e. the natural rock exposures, forests and pasture lands, threatened and protected species.

The adjacent narrow coastal plain exaggerates the vertical scale of the escarpment. In the horizontal plane the escarpment forms a magnificent backdrop to the heavily developed industrial and newly emerging residential areas. The escarpment extends for an extraordinary length of relatively unbroken cliff lines. Cliffs of the escarpment are generally sheer and spectacular. The varying colours of their sandstone exposures contrast with both the mixed heath vegetation and low forest at the plateau edge and the mature eucalypt forest and pockets of lush remnant rainforest near the cliff base and on deeper soils on the slopes.

Red cedars ('Toona Australis), once common are becoming rarer. Many other species rapidly disappearing species are still to be seen in this landscape (NT). The cliffs are generally sheer and spectacular, extending in relatively unbroken lines for a remarkable distance. The area has a number of historic features from pioneer cedar cutting activities and associated settlements, mining sites and early isolated homes (RNE approx. 175,000ha)

Current use:

mixed

Former use:

mixed

History

Historical notes:

Natural landscape with cultural overlays.

Historic themes

Australian theme (abbrev)	New South Wales theme	Local theme
2. Peopling-Peopling the continent	Aboriginal cultures and interactions with other cultures-Activities associated with maintaining, developing, experiencing and remembering Aboriginal cultural identities and practices, past and present.	(none)-

3. Economy-Developing local, regional and national economies	Environment - cultural landscape-Activities associated with the interactions between humans, human societies and the shaping of their physical surroundings	(none)-
3. Economy-Developing local, regional and national economies	Exploration-Activities associated with making places previously unknown to a cultural group known to them.	(none)-
3. Economy-Developing local, regional and national economies	Science-Activities associated with systematic observations, experiments and processes for the explanation of observable phenomena	(none)-

Listings

Heritage Listing	Listing Title	Listing Number	Gazette Date	Gazette Number	Gazette Page
Local Environmental Plan	Shellharbour Local Environmental Plan 2013	C058	05 Apr 13		

Study details

Title	Year	Number	Author	Inspected by	Guidelines used
Register of the National Estate	0		Australian Heritage Commission		No
Illawarra Regional Environment Plan	1986		NSW Department of Planning		No
Shellharbour Natural Heritage Study (draft)	2004		Mayne Wilson Pty Ltd		No
Shellharbour Natural Heritage Study (draft)	2004		Mayne Wilson Pty Ltd		No

References, internet links & images

Type	Author	Year	Title	Internet Links
Written				
Written	Australian Dept Environment	2006	Inspirational Landscapes of Australia Federal List study	
Written	Australian Heritage Commission	1991	Register of the National Estate	
Written	Comissioner William Simpson Chairman	1999	Long Term Planning & Management of the Illawarra Escarpement,	
Written	Illawarra Natural History Society	1971	Illawarra Regional Park	
Written	K Mills	1989	Survey of Rainforests of the Illawarra District	
Written	K Mills	1988	Conservation of Rare Rainforest Plant Species in Illawarra Region of NSW	
Written	National Trust of Aus (NSW)	1976	Illawarra Region Landscape Study	
Written	National Trust of Australian (NSW)	2000	Requirements for Conservation of Natural Areas, Scenic Preservation and Recreation	
Written	NSW Department of Planning		Illawarra Regional Strategy 2006-31	
Written	South Coast Conservation Society			
Written	Wollongong, Shellharbour & Kiama Councils	2010	Illawarra Biodiversity Strategy Action Plan	

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Item details

Name of item:
Wongawilli Colliery

Type of item:
Complex / Group

Category:
Mine site

Primary address:
Wongawilli Road, Wongawilli, NSW 2530

Local govt. area:
Wollongong City

All addresses

Street Address	Suburb/town	LGA	Parish	County	Type
Wongawilli Road	Wongawilli	Wollongong City			Primary Address

Statement of significance:

The Wongawilli Colliery is significant for its association with Wongawilli “Bank Book “ Hill and Wongawilli Road residential areas, as evidence of the evolving relationships between mines, mining companies and their workers, and of the joint ownership of the mine and the associated steel industry. The Wongawilli Colliery was a major supplier of coke and coal in the NSW steel industry - firstly to C & G Hoskins steel works at Lithgow and from 1938 onwards to steel works at Port Kembla.

The Wongawilli method of coal extraction was developed from 1958 onwards at this site and was adapted and used where practicable throughout the Illawarra and in other coal fields in Australia. Apart from innovative mining techniques, the Colliery saw the introduction of a transport system from the mine to the base of the escarpment, with the longest coal haulage incline in the world established in 1936 and man transport train established in 1940. It was also one of the first collieries where the Joy 4JCM (continuous miner) was used in Australia. This was the first installation in the world of a conveyor designed to lower coal 191m in elevation at a rate of 600 tph ROM.

The mine is significant for its history of shared facilities and use with the Wongawilli village and the special associations and meanings for residents and people who have worked in the mine.

Date significance updated: 20 Apr 17

Note: The State Heritage Inventory provides information about heritage items listed by local and State government agencies. The State Heritage Inventory is continually being updated by local and State agencies as new information becomes available. Read the Department of Premier and Cabinet [copyright](#) and [disclaimer](#).

Description

Construction years:
1916-

Physical description:
The only remaining structures, buildings and fan left intact, and that were in use in the Contract mining days and on into the mechanised mining era are:
Incline, including man riding equipment, conveyor and transport portals, fan and structure, including fan portal, old office buildings, tipper and car transporter.
The significant items at this mine are the Mine Fan at No1 Shaft - It is unique in that no other coal mine has a fan erected directly over the top of the shaft with the mine air exhausting vertically as distinct from being turned through 90 degrees at the shaft top as usual.

Mine Car Dumper Station
The buildings are to the south of the Dumper House and include the mine fan and fan drive house and probably date back to the 1930's or earlier.

The only remains of the coke ovens is the brick power house building that once housed the three steam engine driven generator units. The Power House was constructed in 1916/17 and was extended at a date unknown. In about 1950 part of the building was refurbished as the mine office and it remained in that role until the mine office was built at the pit top in the 1960's.

No 1 Man Transport that was installed in about 1940 and remained in service until the 1960's. The drive house and machinery have been left pretty much untouched apart from being overgrown with weeds etc. The building and drive are located just below the Bathhouse site. The present Man Transport drive system is located at the pit top and was installed originally as the incline coal haulage system in 1949. With the introduction of the decline conveyor in 1959/60 it was converted to man transport duties in the late 1960's and replaced the original 1940 model No 1 Man Transport.

The original endless rope coal haulage that was installed in about 1935 was claimed to be the longest endless rope haulage in existence anywhere in the world and the drive system may still be in place. This haulage is underground but quite close to the surface and was taken out of service in 1949.

Physical condition and/or

Archaeological potential:

The mine car dumper station area is in a poor condition and requires maintenance work to maintain its significance. All other listed items are in an operable and maintained condition (2006).

Modifications and dates:

1916: Wongawilli Colliery established by G & C Hoskins Iron & Steel on 18 December 1916.

1993: Wongawilli Colliery consolidated with Kemira and Nebo Collieries to become the Elouera Colliery.

2007: BHP Biliton sold Elouera Colliery to Gujarat NRE Coking Coal Ltd, who re-christened the mine as the NRE Wongawilli Colliery

(<http://www.wollongong.nsw.gov.au/library/onlineresources/suburbprofiles/Pages/Wongawilli.aspx>).

2014: the mine was renamed WCL Wongawilli Colliery in February 2014

2017: the mine is owned by Wollongong Coal Limited (formerly Gujarat NRE Coking Coal Ltd), who also operate the Russel Vale Colliery (<http://wollongongcoal.com.au/our-assets-2/>).

Current use:

Coal Mining Colliery

Former use:

Coal Mining Colliery

History

Historical notes:

(West Dapto Heritage Study, HLA 2006): Early land grants in the Wongawilli locality belonged to John Vaughan Thompson who acquired 106 acres in 1844. It wasn't until 1907 however, when a coal seam was being prospected in the Illawarra Escarpment at Wongawilli by Andrew Lang that mining pursuits began. In 1910 a small mine was operational and 40 tons a day was transferred by bullock dray to Dapto (Wollongong City Library). By 1916 mining and production of coke were well established activities, Dapto was a significant town with a number of shops and community facilities. The first residences, constructed from 1917, "had a temporary quality" (Cummins 2003). During the 1920s a mine office and a number of small cottages were constructed for key personnel and a house for the mine hostler. A survey for the subdivision of a village on the plain of the escarpment on the southern side of Wongawilli Road was undertaken in 1934 and the allotments formally created in 1936. The lots were based on a standard 19.1 metre frontage and depth of 70 metres and 13 200 feet, over twice the size of lots used in common subdivision. The subdivision layout consisted of a unique linear group of single storey structures in a single line along Wongawilli Road. A number of community facilities were established within the subdivision, including a public school built in 1927 and a church previously erected in 1917 near the coke ovens was moved to the village in 1933. Electricity was supplied to the houses from the mine in 1937 by steel poles along the rear of each lot. A post office and shop opened between 1941-1950 and in 1950-52 a Community Hall was constructed by volunteers on land supplied by the mine.

(Historical Coal Mining Sites of the Illawarra Study, 2005):

1913 - Alexander Lang took out the Mineral Lease (Coal & Shale) No 321 for MP6 on 11, officially registered in the Department of Mines on 22 December 1913. Alexander Lang was periodically taking up to 200 tonnes of coal per week from his mine by oxen and horses to Dapto for railing to various customers but he appears to have lacked the financial backing to develop the mine into a commercial operation. Wollongong Mining Wardens Court records show that he made several applications for Suspension of Labour Conditions, stating that he was looking for a buyer or backer to develop the mine.

1916- Wongawilli Colliery established by G & C Hoskins Iron & Steel on 18 December. They were having trouble with their blast furnaces at Lithgow as the coke was not strong enough to adequately support the burden in the furnace. In an attempt to overcome the troubles they trialed coke from various sources and found that coke from

minerals. In an attempt to overcome the troubles they traded coke from various sources and found that coke from Illawarra was the most suitable. They were purchasing coke from coke ovens at Bulli, Coledale, Corrimal, Mount Pleasant and other Illawarra coke makers. About 1915 some 75 to 80% of the coke used at Lithgow came from Illawarra. Charles Hoskins eventually settled for a rather small mine at Wongawilli, near Dapto, which was owned by Alexander Lang. This mine had been driven into the No 3 seam as the No 1 seam had petered out at about Mount Kembla. The No 3 seam had a much higher ash content than the No 1 seam had.

The first locomotive used during the construction of the line to Coledale and the building of the mine and coke ovens was a small standard gauge Andrew Barclay 0-4-0 saddle tank loco built for the British Tasmanian Charcoal Iron Co. This company built a blast furnace at Redbill Point on the Tamar River in northern Tasmania. The furnace went into service in May 1876 and was permanently shut down in 1877 as the iron produced was too brittle for general use due to the high chromium content in the local ores.

What equipment from the plant that was of use to dealers was sold, the remainder was scrapped; the little loco apparently went to a dealer who supposedly sold it to a logging company. In 1916 Hoskins purchased the little loco, had it reconditioned and painted and named it "Wonga".

Hoskins immediate aim was to open the mine in an efficient manner and build an incline down to the bottom of the escarpment where coke ovens were to be erected. A standard gauge railway was to be built from the mine to Brownsville junction.

A new portal was established for driving the main haulage tunnel.

The initial incline was self acting. Initially there was no transport provided for the men; they had to walk from the bottom to the top and carry their tools, returning by the same manner. The No 1 Man Transport was installed in about 1940 and remained in service until the 1960's. The drive house and machinery have been left pretty much untouched apart from being overgrown with weeds etc. The building and drive are located just below the Bathhouse site.

The present Man Transport drive system is located at the pit top and was installed originally as the incline coal haulage system in 1949. With the introduction of the decline conveyor in 1959/60 it was converted to man transport duties in the late 1960's and replaced the original 1940 model No 1 Man Transport.

The original endless rope coal haulage that was installed in about 1935 was claimed to be the longest endless rope haulage in existence anywhere in the world and the drive system may still be in place. This haulage is underground but quite close to surface and was taken out of service in 1949.

The coke ovens were of modern Belgian type with underground flues leading to waste heat boilers for heat recovery. Initially 20 ovens were installed, immediately followed by another 20. All the equipment used for charging the ovens, pushing them and loading the coke into rail tracks was electrically powered using trolley wires to supply power to the moving equipment. Steam from the waste heat boilers was used to generate the electric power demands of the coke ovens machinery and that of the mine.

Hand fired grates were provided on the boilers to enable coal to be fired to make up any steam shortfall. Two of the steam engine driven 50 cycle AC power generating machines had previously had a very interesting history. The No 1 set (the second set installed) was a 300 kW Ferranti-Dick Kerr set which was one of the first generating sets installed in the Municipal Council of Sydney's first powerhouse commissioned at Pyrmont in July, 1904. The set was removed from Pyrmont in 1916 and installed at Wongawilli in 1917. The No 2 set (the first set installed) was a new 300 kW Belliss & Morcom machine. The third set installed, No 3, was a 300 kW Browett and Lindley machine which was one of the two sets installed when the PWD Port Kembla power house was commissioned in 1914 to supply power to their new coal loader. Some time after the installation of a much larger new steam turbine based power station in 1920 the Browett & Lindley machines became redundant and were removed; one of them was sold to Hoskins Iron and Steel (HI&S) and installed at Wongawilli in 1926.

1918 - the Wongawilli mine and coke ovens were shut down and a new coal washery was built immediately adjacent to the coke ovens. The mine, washery and coke ovens were again in service by about mid 1920. This was the first coal washery installed in Illawarra. An additional 40 ovens were built soon afterwards and came on line in June 1923, bringing the total to 80.

1921- 7 March, AIS purchased some 380 acres of land at Port Kembla from the Wentworth Estate on which to build their proposed new steelworks.

Work commenced on building the new works in mid January 1926. The plan was to initially build a large new blast furnace, new steel making furnaces, new rolling mills, a new spun pipe plant and the necessary associated plant and workshops. Coke supplies were to be taken from the Wongawilli coke ovens augmented with coke from other Illawarra coke works as needed. To cater for the additional coke demand a further 40 coke ovens were built at Wongawilli in 1927. In early 1928 a new company was formed called Australian Iron & Steel (AIS) with HI&S the principal shareholder. The new blast furnace went into service in August 1928. No sooner had the new works settled down, the Great Depression began (in 1929). This had a drastic effect on the works and the new blast furnace lay idle for extended periods due to the lack of orders; this in turn reduced the output of coke from

blast furnace lay idle for extended periods due to the lack of orders, this in turn reduced the output of coke from Wongawilli. The financial position began to improve in 1934 and AIS began to plan for an expansion of its operations. An additional 28 coke ovens were erected at Wongawilli, bringing the total to 108.

1933 - AIS took over the leases of the South Kembla Colliery from Cam Bros and they were amalgamated into the operations of the adjoining Wongawilli colliery. All the existing South Kembla surface equipment was salvaged for reuse, sold or scrapped.

The Broken Hill Propriety Company (BHP) and AIS came to an agreement to amalgamate on 11 October 1935. BHP immediately injected considerable funds into the uprating of AIS operations at Port Kembla. Two major items were the building of a second larger blast furnace; the other was the building of a battery of by-products coke ovens on the Port Kembla steelworks site. The new blast furnace would significantly increase the demand for coke while the new by-products coke ovens battery would mean the closure of the Wongawilli coke ovens. The by-product coke ovens were much more fuel efficient than the old beehive ovens; they also enabled other valuable by-products to be recovered for sale.

The new by-products coke ovens came into operation in January 1938. The Wongawilli coke ovens were then progressively closed down. With the closure of the coke ovens power generation from waste heat at the Wongawilli power house came to an end. The coal washery continued to supply washed coal to the Port Kembla coke ovens.

In 1936 an endless rope haulage system was installed to lower full skips from inside the mine down to the tippler at the bottom of the escarpment; the empty skips would then be returned up the incline to inside the mine working level. This system was taken out of service about 1949, when the automatic friction hoist comprising two 15 tonne track mounted self-loading and dumping wagons were installed.

An endless rope man transport system was introduced in about 1940 to transport men to and from the workings.

To minimise operating costs at their Illawarra collieries AIS constructed a 33 kV transmission line from their Port Kembla steelworks for supplying power to Wongawilli, Keira and Bulli collieries at a much lower cost than they could generate it themselves. This supply was made available to Wongawilli on 18 July 1940.

1952 - A Joy model 4JCM continuous miner went into regular service in Wongawilli. This one of the first three continuous miners to arrive in Australia and the first to go into continuous service in AIS collieries.

In 1959 the trunk conveyor belt system was installed to deliver coal from well underground to the surface and lower it down the escarpment to the coal bins. The conveyor delivering coal from within the mine was some 9,000 feet long and at the time was the longest single flight conveyor in the world. The decline conveyor was the only single flight conveyor in existence lowering coal down some 650 feet. Coal was hauled from Wongawilli colliery along the private branch line to the Brownsville junction, along the State Rail tracks to Unanderra and then by a private line to the steelworks in company owned rail hoppers hauled by company locomotives.

1960 – Joy 15SC shuttle cars placed into service

1961 – Wongawalli commences mining in the Bulli No 1 Seam.

1972 - A vertical mine fan was installed over the No 1 ventilation shaft. This type of fan was a popular design at Mt Isa, but was the only such fan installed on a coal mine site.

1977 – Mining in the Bulli seal ceases.

1991 – Mining in the No 2 seam recommences for the Elouera roadways.

1993 – Elouera Colliery established from the consolidation of Wongawilli, Nebo and Kemira Collieries. As mentioned above there were numerous firsts at Wongawilli. Wongawilli also pioneered a system of pillar extraction, now referred to as the “Wongawilli System” which is now used in many Australian and overseas coal mines.

Historic themes

Australian theme (abbrev)	New South Wales theme	Local theme
3. Economy-Developing local, regional and national economies	Mining-Activities associated with the identification, extraction, processing and distribution of mineral ores, precious stones and other such inorganic substances.	Mining-

3. Economy-Developing local, regional and national economies	Technology-Activities and processes associated with the knowledge or use of mechanical arts and applied sciences	Solving technical and scientific problems-
--	--	--

Recommended management:

That a Heritage Action Statement be carried out before any of the listed items are removed and be considered for preservation as part of the cultural landscape. Many of the buildings on site have potential for adaptive reuse including the Inclined Man Transporter which is still operable.

Listings

Heritage Listing	Listing Title	Listing Number	Gazette Date	Gazette Number	Gazette Page
Local Environmental Plan	Wollongong Local Environmental Plan 2009	7100	26 Feb 10	2010-76	
Heritage study					

Study details

Title	Year	Number	Author	Inspected by	Guidelines used
Review of heritage items in Wollongong LGA	2013	7100	Zoran Popovic	Zoran Popovic	Yes
Wongawilli Heritage Study	2003		John Toon		Yes
West Dapto Heritage Study	2006	Sites 25, 26, 27	HLA-Envirosciences Pty Limited		No
Historic Coal Mining Sites of the Illawarra	2006	D McBeath & D Landau	O.H.M. Consultants		Yes

References, internet links & images

Type	Author	Year	Title	Internet Links
Written	D.K. Reynolds	2001	The Railways of West Dapto	
Written	Don Reynolds, Geoff Mould and Ron Cairns, AusIMMHC	2005	Wongawilli Colliery	

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Appendix 2 Wongawilli Colliery CMP
